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and the

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ASSISTANCE ADMINISTRATION

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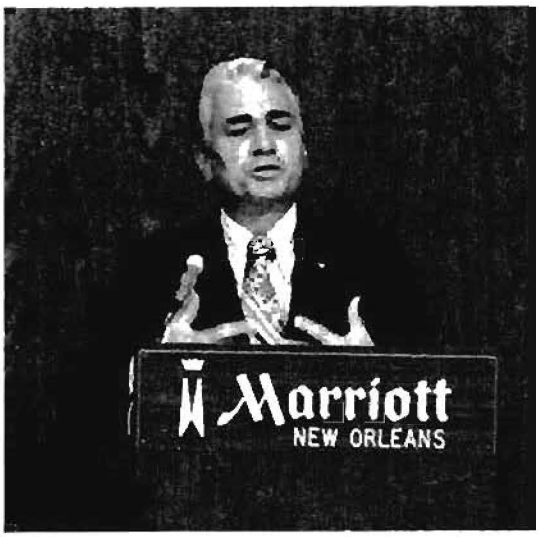
Research Foundation



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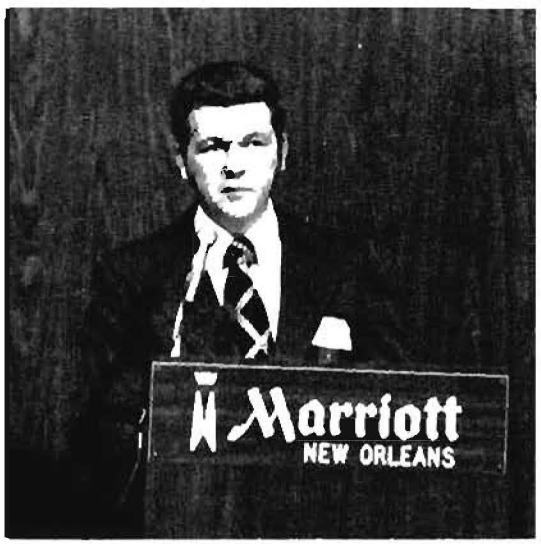

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ACKNOWLEDGMENT

The efforts of a great many people involved in presenting the SEARCH International Symposium on Criminal Justice Information and Statistics Systems are culminating in the publication of these proceedings. I would like to acknowledge the work of some of those who made the success of this venture a reality and thank them for their efforts and cooperation.

First, I would like to express my appreciation to all of the Symposium participants, the speakers, panel moderators, and session chairmen, for their contributions to SEARCH in achieving its information dissemination goals.

Secondly, I want to applaud the work done by the participants in Project SEARCH specifically regarding their continuous concern and subsequent efforts relative to informing those in criminal justice of the progress in information and statistics systems.

I would also like to thank those in LEAA, especially Mr. Richard Velde, Assistant Administrator, for the cooperation and continuous support given by LEAA to Project SEARCH in its Symposium related activities.

Additionally, I would like to offer my thanks to the New Orleans Police Department, specifically Mr. Claude Schlesinger, for all assistance rendered in making possible the presentation of the Symposium in New Orleans.

Finally, I want to express my gratitude to Mr. Dan Catherwood who provided a high level of staff assistance in preparation of this document.

There are, of course, many more whose contributions should be acknowledged.

Let me just say thank you to all involved.

Gary Cooper
Editor

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SESSION I

ADVANCEMENTS IN CRIMINAL JUSTICE INFORMATION AND STATISTICS SYSTEMS

O. J. HAWKINS, SESSION CHAIRMAN
ASSISTANT DIRECTOR
CALIFORNIA DEPARTMENT OF JUSTICE

SYMPOSIUM INTRODUCTORY REMARKS

O. J. Hawkins
Assistant Director
California Department of Justice

It's certainly a pleasure to address you today in introducing Project SEARCH and the International Symposium on Criminal Justice Information and Statistics Systems. It's particularly gratifying to me to see this many people in attendance and to realize that over the past three years our efforts in SEARCH with the assistance of the Law Enforcement Assistance Administration has created enough interest, and has produced enough results to have people from across the world attend this symposium. I speak also for the representatives of the other progressive information and statistics systems who will be participants and speakers and I am certain that they have some very worthwhile information to bring to your attention.

SEARCH is a project funded by the Law Enforcement Assistance Administration. Its participants include a representative from each state appointed by the governor of that state and from Washington, D.C., Puerto Rico and the Virgin Islands. Additionally we have four representatives on the Project Group appointed by the Law Enforcement Assistance Administration. The mission of Project SEARCH is to develop and test prototype systems which may have multistate utility for the application of advanced technology to the administration of criminal justice. SEARCH is a program that has worked on a number of projects each of which will be described by other speakers in the program today, tomorrow, or on the third day. Also to be discussed will be the SEARCH organization, the goals, the participants, the accomplishments, and our plans for the future.

An important part of our responsibility is to disseminate the results of our efforts. This symposium, like the first symposium held in Dallas, Texas in November 1970, is one of the means we use to disseminate information about the efforts and results of Project SEARCH. Again this year the Project Group decided that they would take maximum advantage of the opportunity by inviting representatives of agencies with advanced systems to share with you their knowledge and experiences.

As our announcement indicated the symposium program will include papers on advanced criminal justice information and statistics systems that can be considered as forerunners in the field of criminal justice. The symposium will include papers on system design, application and evaluation.

We have changed the format of this year's symposium by including a number of concurrent sessions. In Dallas, where we had over 600 people in attendance, we received many compliments after the symposium about the arrangement of the agenda and the fact that the whole program was held in plenary sessions. Everyone was able to sit in on all of the talks. However, we were compelled this year to include a number of concurrent sessions in Session II. This resulted from the overwhelming response to our call for papers, which included more than 100 abstracts — all of which were outstanding. It was impossible to narrow down the number of papers we selected to handle them in plenary sessions in just three days.

This year's program, as you know, is international in scope. We are most pleased that we have representatives from Scotland Yard, and the Royal Canadian Mounted Police, who will present papers about their progressive achievements. We welcome these individuals and hope this aids in the ever expanding exchange of criminal justice information.

We, as criminal justice practitioners, are proud of the advancements that have been made in criminal justice efforts. We, in Project SEARCH, are proud of our contributions to these efforts. We applaud the Law Enforcement Assistance Administration for their role in providing the mechanism which has made Project SEARCH a reality and for providing the opportunity to conduct this symposium.

Again, the symposium participants are most pleased that all of you were able to attend. We believe we have an excellent program and that it will be of great informational value to you.

We think that each of the programs and topics and sessions will be very valuable, we certainly invite your attendance and we thank you very much for coming.

KEYNOTE ADDRESS

Honorable Charles E. Wiggins
Congressman
United States House of Representatives
Washington, D.C.

I am delighted to have been offered this opportunity to address this group and, particularly, here in the City of New Orleans, one of America's great cities. I trust that each of you have had the opportunity to visit many of the cultural centers, some of which are within walking distance of this hotel. One of the hazards of a speaker in New Orleans is that the audience will exhale simultaneously after visiting those cultural centers, fogging my glasses and probably my mind as well.

A keynote speaker, as I understand it, Ladies and Gentlemen, is intended to set the tone and the mood of a meeting and I think it would be presumptuous of me to undertake that task. I think the keynote is your attendance here this morning. There has been truly a revolution in law enforcement within the last seven or eight years. The idea that there would be, perhaps, a thousand in attendance at a meeting intended to explore the very technical subject of information, its collection and dissemination, in the law enforcement field, would be unheard of not too many years ago. This revolution is a product, first, of a commitment on the part of the American people to do something about this continuing social problem of crime in America. That's the first commitment. And that has been reflected through legislation and through able administrators of that legislation such as Pete Velde. The Law Enforcement Assistance Administration can now be regarded as a permanent institution in the Federal Government making an annual financial commitment and giving direction to local law enforcement agencies. That, I think, is the keynote of law enforcement in America: A renewed commitment on the part of the American people to do more than just talk about what must be regarded as one of their principal social concerns. The commitment is to devote resources as well as rhetoric to the problem of crime in America.

Now, Ladies and Gentlemen, I am going to burden you with something that I seldom do, but I am going to do it, nevertheless, I'm going to read. Make notes if you wish but I will not ask questions at the end.

As a lawyer and now as a law maker in Congress, I am deeply interested in the role each of you is playing in this nationwide effort to strengthen the criminal justice system and to reduce crime and delinquency. I recognize, as all of us must, the awesomeness of the challenge of the tremendous human and financial resources that must be brought to bear on the problem of crime and delinquency if this effort is to succeed. Fortunately, a vast majority of the members of Congress and certainly this national administration have given a high priority to law enforcement and its assistance. Congressional appropriations and administrative action by the Nixon administration have placed on unprecedented Federal support behind criminal justice programs of every description. At the same time new levels of cooperation between Federal, State and local governments have advanced the potential for effective law enforcement to a remarkable degree.

Project SEARCH and the Law Enforcement Assistance Administration are both good examples of this new national commitment to improve criminal justice. LEAA reflects Congressional support by virtue of the broad statutory mandate, under which it operates, and, most emphatically, by the $850,000,000 appropriation approved by Congress this year. SEARCH on the other hand, is a product of State and Federal cooperation, the meshing of technical skills and of financial resources. The pioneering work done by those of you in the information and statistic system field may break down the remaining barriers in full cooperation between units of government at all levels. The importance of having complete and timely information about offenses and offenders has been recognized for many years. It is generally recognized that modern information technology now permits a massive assault on criminal justice problems at a level never before conceivable. An integrated national information system is needed to serve the combined needs of the nation, the state, regional, metropolitan, and county levels of government, and to supply those levels with efficient police, court, correction agency information. Each of these agencies has information needed by the other. An information system provides a means of collecting it, analyzing it, and disseminating it to those who need it. Each can be kept in close communication with the other and information transferred by voice, by teletype, or computer to computer.

Much of what has been accomplished thus far in the development of information and statistic systems has been done under the auspicies of the Law Enforcement Assistance Administration. The single largest activity of LEAA has been the funding of Project SEARCH in this area. LEAA's review of the criminal justice information capabilities of the states indicated that one of the central needs was for the development of a machine-readable format for criminal history records that could be used by all elements of the criminal justice systems including the courts and corrections, of course. Once this format was devised LEAA felt that it could support its efforts to facilitate the automated interstate computer exchange of these records.

Project SEARCH is a multi-state effort designed to develop a prototype computerized criminal justice information system. The project is financed by the Law Enforcement Assistance Administration and the participating states and is coordinated by the California Council on Criminal Justice through the California Crime Technological Research Foundation.

SEARCH is designed to give criminal justice agencies the needed information about offenders in a matter of seconds, but at another level Project SEARCH has implications far beyond providing information to criminal justice agencies or providing statistics to criminal justice managers. It has shown that it is possible to adapt complex modern technology to meet intricate criminal justice needs. It has demonstrated the ability of local, state and Federal agencies to cooperate in law enforcement and in criminal justice improvement.

The basic problems facing SEARCH in the demonstration period have probably now been solved. A common format for criminal histories has been developed in machine-readable form. As the test period has shown, a State making an inquiry in the central index, with perhaps no more information than a driver's license or the number, can find out if that person is in the index and then can switch to the State holding the complete criminal history. It takes merely a matter of seconds to receive the desired information. At the present time there is no rapid way to ask every State whether or not it has an individual in its criminal files. A nationwide SEARCH system would make such an inquiry possible, indeed it could make it a very routine matter.

Moreover, Project SEARCH has developed and demonstrated a new statistical series, Offender Based Transaction Statistics, that will enable criminal justice planners and managers to have a comprehensive and timely factual data base of the dynamics and characteristics of the criminal justice system.

However, now that computerization is beginning to modernize the criminal justice information mechanism, the very speed and sophistication of the technology has aroused questions in some quarters about the problem of security and privacy. This concern, I believe, is real and it can be justified. And, therefore, this administration, the Nixon Administration, has for some time been studying the problem and weighing the alternatives, as have those of us in Congress of the United States. Legislation has been introduced to meet the obvious needs to facilitate and regulate the exchange of criminal justice information and to insure the security and privacy of the data systems.

The House Judiciary Committee, on which I serve, has held preliminary hearings into this field. During the 1970 deliberations of the Omnibus Crime Control and Safe Streets Act, the Committee on the Judiciary in the Senate added a provision requiring the Law Enforcement Assistance Administration to submit to Congress legislative recommendations to promote the integrity and accuracy of all criminal justice data collection. The bill, Senate Bill 2546, is the administration's response to this problem. Its significant features include the following:

First, it provides for stringent controls over the security of the criminal justice data system including a requirement that they be used only for law enforcement purposes and that they be kept under the management and control of law enforcement agencies; and on that issue there is considerable disagreement. The Attorney General is authorized under this bill to grant waivers, however, in certain cases to permit state and local agencies that cannot now meet the control requirements to participate in the system nevertheless.

Secondly, the bill provides for limited access to the data systems in question. Only law enforcement and criminal justice agencies, police, courts, corrections, and the like, will have direct access to this data base. Dissemination beyond those agencies must be justified under the bill as necessary to the enforcement of a specific law and must be approved in advance by the Attorney General.

Third, the bill authorized individuals access to their own records to insure their accuracy and completeness.

Fourth, it requires specific operating procedures to guarantee that each individual record is purged

from the active files after the passage of a sufficient period of time to indicate that the individual is no longer active in the criminal justice system; that is, perhaps deceased or even rehabilitated.

Fifth, the bill provides for civil and criminal penalties for the willful dissemination or use of criminal justice information in violation of the bill's provision.

And, finally, of course, the bill authorizes the Attorney General to prescribe regulations to carry out its intents and purposes.

The outline, of the bill which I have just described, is a long way from passage, Ladies and Gentlemen. Many of its features are controversial; many of its features are too strong for some in the law enforcement community; and other are too strong for those who regard themselves as civil libertarians. Congress will grapple with these differing points of view later on.

An unresolved issue is the non-law enforcement use of criminal information. The Congress may decide to authorize certain additional uses, perhaps background checks for applicants to certain types of jobs where licensing is required. The administration has taken, however, a restrictive view and has eliminated all non-law enforcement access to this information. In addition, there are widely varying views concerning the collection and use of data for criminal intelligence purposes.

The middle view is, that intelligence is an indispensable law enforcement tool that should not be renounced simply because of uninformed criticism. In my view the administration's bill proposes no serious regulations upon the keeping of intelligence information that are inconsistent with good and enlightened police practice. The administration bill was referred to the Committee on the Judiciary in the Senate after its introduction last year. It was subsequently considered by the committee's Subcommittee on Constitutional Rights, but has not yet been reviewed by the Subcommittee on Criminal Laws and Procedures nor, of course, has it been passed by the Senate itself.

In its deliberation Congress must forth-rightly confront the issue of how law enforcement and criminal justice agencies, at all levels, can maintain and disseminate the necessary offender information and still protect the rights to privacy of these and all other individuals. I expect Congress to delay any further consideration of this legislation at least for this session, but have no doubt that it will be considered during the 93rd Congress.

As I look over the agenda of this Symposium, and I have studied it at some length, I have been truly impressed by the advanced technological nature of many of the items. They remind me of the stark fact that less than ten years ago America's criminal justice system was still in the era which could be described as the "whistle and night stick" era. Policemen, we hoped, arrested criminals then; judges tried defendants; prisons kept law breakers from menacing the public, or at least we hoped so; but a law enforcement planner was almost unheard of ten years ago. Rehabilitation was teaching a prisoner, too often, to make license plates, an illegal activity on the outside, and practically no one in authority anywhere had given much thought to comprehensive criminal justice planning that involved police, courts, and corrections.

We certainly all have come a long way in these last few years. Of course, we still have a long way to go before crime and the fear of crime have been reduced to what might be regarded as an acceptable level. Nevertheless, the programs begun in the past few years, to strengthen and improve law enforcement, to prevent delinquency, and to modernize the court system and to rebuild rehabilitation into the corrections system, all of these efforts are now beginning to show results. I personally believe that the positive results will begin to snowball to have an expanding impact on criminal justice within the months and years just ahead. The recent FBI statistics which have invoked some controversy, nevertheless, point clearly to a trend which is in the right direction and which we all regard as healthy. As the results begin to flow, you can take great satisfaction in the knowledge that much of the progress stems from the information and statistics systems which you have in a large part fashioned and developed.

For the past few minutes, Ladies and Gentlemen, I've been directing my remarks to the role of data collection and dissemination as a part of our overall criminal justice system. Certainly this is an important role and obviously it will become more so as the efforts of many of you in this room reach fruition. But I don't regard it as the critical unresolved question which plagues law enforcement. In our own way, Ladies and Gentlemen, we are all working toward the achievement of a free and an orderly society – a free and an orderly society. The question is how much of each, how much freedom and how much order, are we willing to tolerate. A free and an orderly society involves, to some extent, mutually contradictory concepts. The resolution of this difficult question is in my opinion the central issue which confounds all persons concerned about the quality of our social

institutions of which the criminal justice system is but one. For example, the gadgetry or the hardware of our system of justice is largely the product of devoting sufficient financial resources to known or developing technology. But how that hardware is to be used involves political, not technical, judgment. At this junction, the juncture where a political judgment must enter into the mix, the difficult and delicate balance between freedom and order must be made. At this moment, for instance, there can be no greater unresolved political and legal question than this: How much due process can a system of justice stand and still be worthy of its name? I wish I knew the answer to that. That's a mixed political, mixed legal, mixed social question. Or perhaps, more germane to this Seminar – How much privacy should an individual surrender in the name of efficient data collection and dissemination so as to achieve an orderly society? There are no absolute answers to these difficult questions but in each case the standard must be balance and reasonableness. Congress will doubtless decide where that balance should be struck, at least in the criminal history field, next year. But the problem, Ladies and Gentlemen, is not for Congress alone. In your work you should not focus your attention only upon that which is technically attainable and efficient. You should also give due regard for the impact of your labors on the maintenance of a free society. I know that considerable effort has gone into the question of providing for the security of these information and data collecting systems.

As you proceed with this important work, I am confident, personally, that you will also not only give regard for that which is technically attainable but that you will indeed give proper regard for the maintenance of a free society. Under the guiding hand of your distinguished chairman and of the Law Enforcement Assistance Administration I am completely confident that you will do so.

Ladies and Gentlemen, I am sure that all of my colleagues in the Congress, all of them, join me in extending best wishes to you, to each of you, for a productive Symposium and for great success in this important work. I am grateful to all of you for having invited me to be your guest speaker this morning.

I wish you well in your work.

DEVELOPMENTS IN CRIMINAL JUSTICE TECHNOLOGY

Paul K. Wormeli
Vice President
Public Systems Inc.
(SEARCH Project Coordinator)

Project SEARCH has become a consortium of states involved in a combination of activities directed toward the application of advanced technology in the criminal justice system. The evolution of this role and structure has been a product of the innovation and search for new directions which has characterized law enforcement and criminal justice over the past few years. The intent of this paper is to provide a review of the background and context of the work accomplished by Project SEARCH.

BACKGROUND

Project SEARCH began in 1969 as an effort to develop and test a national system for the exchange of criminal histories. Based on the strong encouragement of LEAA, and the excellent cooperation of the participating states, the prototype was implemented within 11 months. A second objective was to develop a new form of statistics for criminal justice in the nation. Both of those projects have been well documented and the details are available in the various Project SEARCH publications.

After establishing a record of success in these efforts, the SEARCH organization was about to go out of business. At this point it was suggested that the organizational machinery might have other roles to play which could assist LEAA and the states. Following a considerable period of deliberation, a new role for Project SEARCH was developed. The limited objectives of the past projects were replaced by a much broader scope and task assignment for Project SEARCH. Mr. Jerris Leonard, LEAA Administrator, in a letter to Project SEARCH Chairman O. J. Hawkins, proposed that Project SEARCH be expanded to a national organization containing representatives from all 50 states, and that the new role of SEARCH be to apply advanced technologies to criminal justice, and, in particular to develop and test prototype systems having multistate utility in criminal justice, and to provide LEAA with recommendations for implementing whatever resulted from the prototype tests.

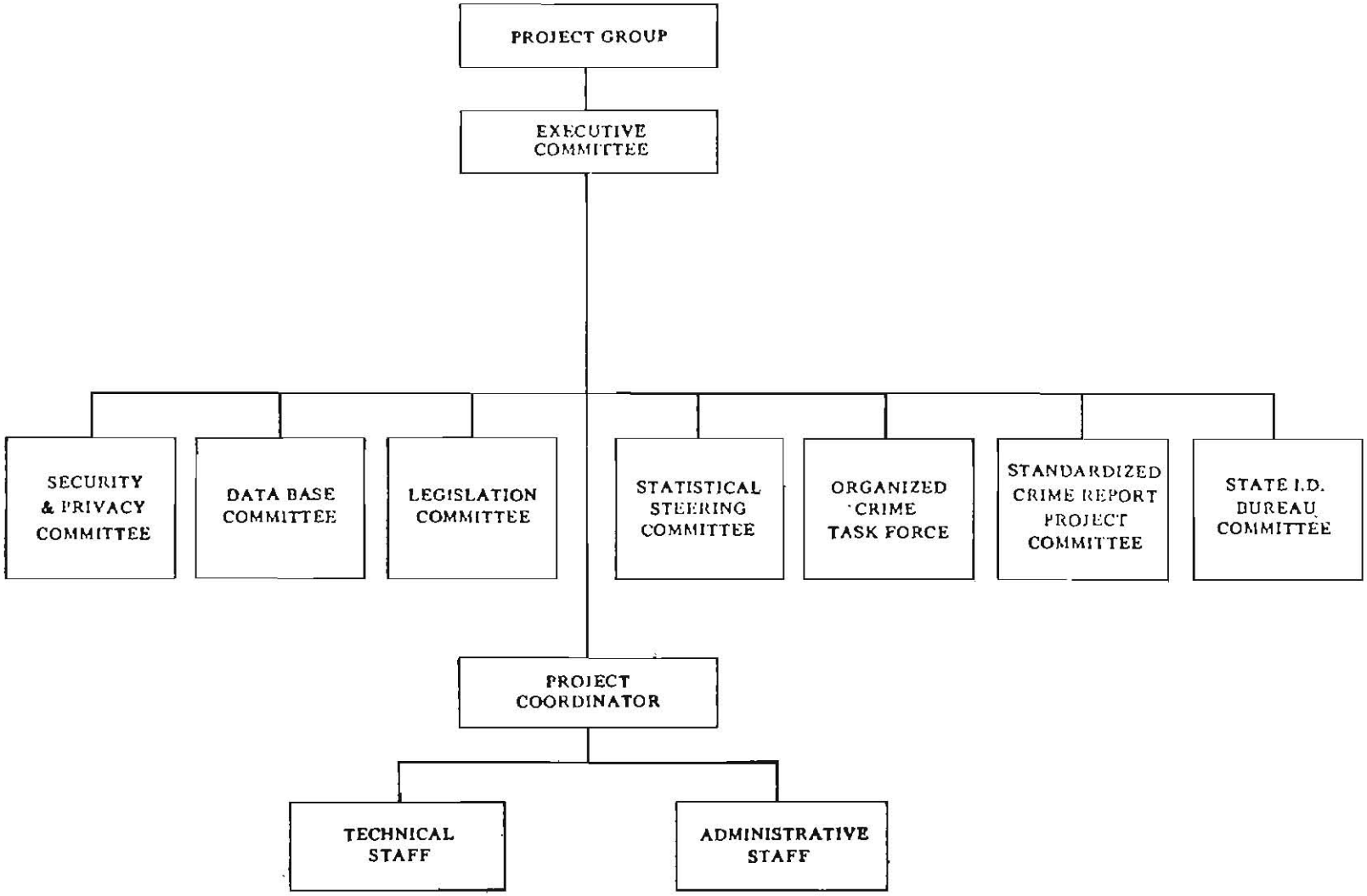
The word "technology" rather than "computer systems" was carefully chosen. The role was intentionally designed to cover all of the possible areas of advanced technology. The application of computer technology is still a major part of the program because the need for management data as well as operational information is a pressing one throughout the whole criminal justice system.

The SEARCH organization is a model of a new kind or organizational structure in government. It is a very unconventional organization. It has no permanent members. It is designed, with only project-related objectives, to persist only until projects are completed. It is primarily a set of "ad hoc" committees whose life spans vary and are continually changing. Even its staff is obtained under contract. The best description of the organizational structure is given in the concept of an "adhocracy" as defined by Alvin Toffler in *Future Shock*. That is, SEARCH has no permanence (as an agency), and it is composed of transient team members whose role is determined by their expertise rather than by any pre-determined organizational hierarchy.

Specifically, the structure consists of a governing board, an Executive Committee that is selected by the larger board, ad hoc committees, standing committees, project committees for each of the various project activities undertaken in SEARCH, a coordination staff (administrative and technical), and the project participants which have been state and local governments throughout the United States as appropriate for the various projects.

Figure 1 shows the present organizational form. The Project Group is the governing body of SEARCH. It consists of one representative from each state appointed by its governor to serve on this "board of directors". It elects an Executive Committee which handles the routine administrative decision making for the Project Group. The Executive Committee consists of fifteen members. There are three standing committees: the Security and Privacy Committee, the Data Base Committee, and the Legislation Committee, which deal in general terms with their respective areas of concern as they affect any project in SEARCH. The management for each project consists of a project committee which reports to the Executive Committee. Present project committees are: the Statistical

Figure 1. PROJECT SEARCH ORGANIZATION



Steering Committee, the Organized Crime Task Force, the Standardized Crime Reporting System Project Committee, and the State Identification Bureau Project Committee. The Project Coordinator reports to the Executive Committee. Mr. Orville J. Hawkins is Chairman of the Executive Committee as well as the Project Group. Technical and management staff are provided by Public Systems, incorporated, and the administrative and fiscal staff by the California Crime Technological Research Foundation.

PROJECT ACTIVITIES

Although numerous reports have been published regarding the past projects that SEARCH has undertaken, the overall intent and the interrelationship of the projects may not have been well documented. A brief review of the projects and results may help to clarify these matters.

As has been adequately mentioned, the prototype interstate exchange of criminal histories was the first effort undertaken in Project SEARCH. Following the demonstration of the prototype, the National Crime Information Center was tasked with the very difficult job of transforming the prototype into an operational system, and the result is the computerized history file (CCH) which is now a part of NCIC and is operational. There are four states presently on-line. Seven more states are close to being ready. Within a year or two, there should be 15 to 18 major states on-line in the system.

The Offender-Based Transaction Statistics (OBTS) Project, which began in 1969, is now just coming to a close with the implementation in five states of an OBTS system. The Offender-Based Transaction Statistics work of SEARCH, as well as the Computerized Criminal History program, have been combined as major elements in the new Comprehensive Data System program of LEAA.[3,4,5]

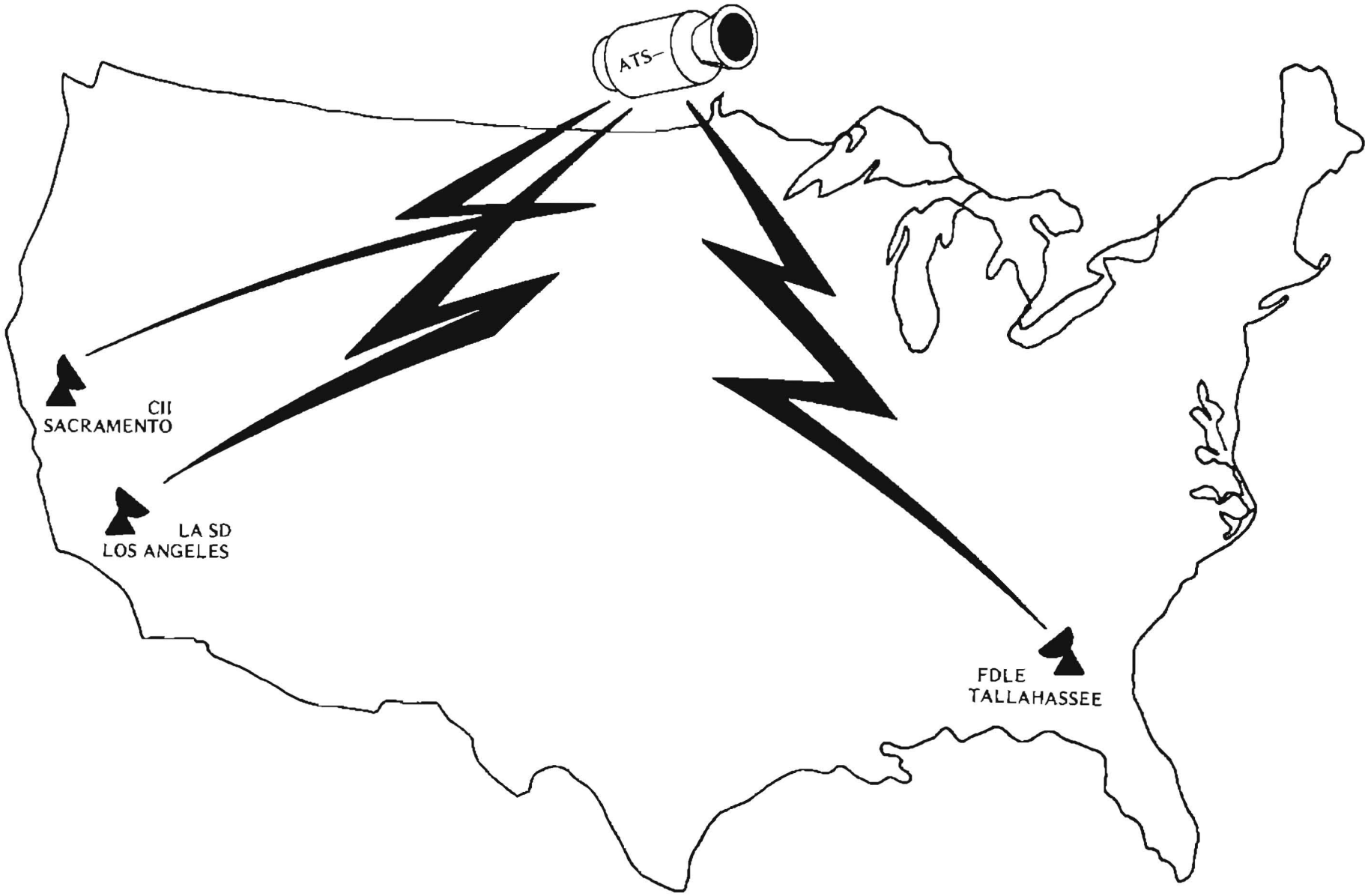
The Offender-Based Transaction Statistics effort is still a prototype in the sense that it needs to be implemented on a national basis. The Comprehensive Data System program provides the motivation in terms of funds to move forward with this program, but it is quite evident to the SEARCH participants that we have not solved all the statistics problems of criminal justice in our limited efforts. As was pointed out at an early project meeting two years ago, it has been 100 years since the police first began to collect crime statistics and we still don't seem to know how much crime there is.

To make the Computerized Criminal History system a more useful tool, SEARCH undertook two special experiments dealing with prototypes testing the feasibility of new concepts. The rationale for these projects is an important aspect of the work of Project SEARCH. It was generally agreed that the CCH file was half a system. The other half of the system, identifying the person that is in custody or that comes before a court prior to obtaining his criminal record, was not yet developed. The SEARCH participants questioned at the beginning of the project whether it made any sense to provide within seconds or minutes the computerized criminal history back to a user when it may take two weeks to know exactly who the suspect or defendant really is. Many of those in the project understood that computerized criminal history was a trivial thing to do (even with all its problems) compared to the problem of obtaining the identification to support the use of the record. There is no way at the present to provide identification at a speed comparable to the delivery of the record.

There are two problems in the identification half of the system. One is getting the fingerprint (the only basis for positive identification) to a bureau that happens to hold the files, and then processing the incoming print against the file quickly. To focus in on the possibilities for improvement of the identification half of the system, SEARCH explored the two parts of the problem – communications for fingerprint transmission and the automatic matching of fingerprints once they arrive at the identification bureau.

In the communications area we chose the most advanced technology available – satellite communications (Figure 2). With the help of NASA, ground stations were located in Los Angeles; Sacramento, California; and Tallahassee, Florida. Fingerprint facsimiles were routed via the satellite to Sacramento from the Los Angeles County Sheriff's office. At the state identification bureau in Sacramento, the fingerprints were matched or compared with those in the files. If a match was made, a response was made to Los Angeles quickly. If not, they were sent on to Florida which acted as a simulated national bureau. A lot of data was collected, including testing of a facsimile store and forward technique which would be necessary in an operational system. The general result was that, if a system is needed that would solve the communications problem of getting the fingerprint to where it has to be identified, the use of a satellite is indeed

PROJECT SEARCH SATELLITE EXPERIMENT CONFIGURATION



feasible. Project SEARCH recommended that LEAA pursue the further development of a satellite application in this field.[7]

The other side of the problem, identifying the print once it arrives, was approached by exploring the use of advanced optical correlation techniques. Three different vendors were asked to compare a test set against a total library set of fingerprints to find out whether or not holographic techniques could be used to automatically match fingerprints. There are other technological approaches, but this one was chosen because it had not been thoroughly tested and because it was potentially close to being ready for use at least by state identification bureaus. Generally it was found that it was technically feasible to use this equipment but the state of the development of these devices was such that it was not economically feasible, at least in the minds of the users who evaluated the results of the experiment, at the present time.[6]

Both of these projects were probes into the field of the identification half of the system, to see whether or not something could be done to improve that part of the system as an input to computerized criminal history retrieval.

As a replication of some of the concepts developed in the criminal history exchange prototype system, SEARCH also undertook the development of an Interstate Organized Crime Index. The concept of a central index which was developed in the Project SEARCH initial efforts seemed to be a reasonable approach to apply to organized crime subjects provided that the data was public record data only and that proper precautions were taken to control the system. There is now a prototype system operating with 16 terminals placed throughout the country. The evaluation begins soon. This prototype is designed to determine the value of this kind of a nationwide exchange of organized crime intelligence.

There are two new projects recently undertaken by Project SEARCH. The first is a very ambitious effort to develop a standardized crime reporting system for the nation – not to impose one, but to develop one that would be usable and useful throughout the nation and would serve every user of crime statistics – the individual collecting agency, planners in the criminal justice system, analysts who wish to explore different ways of allocating manpower, and other users. This project is only in its study phase, concentrating on a survey designed to determine current practices in the crime reporting field. It is envisioned that after some model or proposed standard is developed that a second phase will be undertaken which will be a large-scale test and evaluation of the usefulness of the system, probably going on in a number of cities and involving state and national uniform crime reporting agencies. The project is based, to some extent, on the demand by planners and legislators and governors for better and more detailed crime data.

The other new project is a continuation of work in the identification field. The project involves a thorough review of the entire identification process, including each step in the process. The grant from LEAA calls for a thorough requirements analysis and systems analysis of the identification processes in state identification bureaus. How does it perform? How should it perform? What are the demands for service that should be imposed on a state identification bureau? The project then will explore the kinds of technology that can be applied. The project is sometimes referred to as a "Model 51st State Identification Bureau", with modules that hopefully could be transferred or implemented selectively throughout the nation in accordance with need and financial ability of the various states.

FUTURE

Where do we go from here? There are several areas of concern to the Project Group and participants in SEARCH. One major area is the application of technology in the courts. SEARCH is exploring a number of possible projects to improve not only management information in the courts but to develop more sophisticated methodological techniques for jury utilization beyond just the mere computerization of jury selection. We are concerned about the application of technology in corrections and stimulating more work in the correctional field. We hope to work on at least one project covering the state institutional problem of management information and to develop some prototype systems in that area.

We are looking into a variety of other needs. It has been proposed that we study the use of mobile computer terminals, and, that we develop advanced computer systems for supporting forensic science. We are very seriously intending to do more work in the field of automated identification techniques and in the application of satellites for law enforcement and criminal justice. These are only concepts for projects at the moment. We hope to pursue some of these areas, LEAA willing. We see the need to move the application of technology beyond

where it has been – beyond just buying a computer, installing it, running it, and extracting data. We see other needs for technology. We see all these things and yet we have limited vision. The Project SEARCH Group and the Executive Committee have encouraged the widest possible interest on the part of practitioners to suggest the needs and areas in which advanced technology should be applied to criminal justice. We have, I think, a collective open mind, an interest in having the user community determine what its needs are in this field. Your comments and suggestions are invited.

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LAW ENFORCEMENT ASSISTANCE ADMINISTRATION PROGRAMS IN CRIMINAL JUSTICE INFORMATION AND STATISTICS SYSTEMS

Richard W. Velde
Associate Administrator
The Law Enforcement Assistance Administration

INTRODUCTION

Thank you for your invitation to participate in this impressive three-day program.

I would like to talk today about the systematic collection and application of accurate data and what this means for criminal justice.

In his famous biography of Samuel Johnson, James Boswell quotes Johnson as saying: "Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it."

This applies to criminal justice as well as to all other types of human activity.

We must either have the facts at hand, or we must know where to get them.

Most of the day-to-day work in law enforcement and criminal justice is based upon human judgments.

Policemen, judges, and corrections officials are constantly being called upon to make decisions about other persons.

But an official's judgment cannot be better than the available facts.

Obviously he cannot act on information he cannot obtain.

The application of up-to-date data to the problem at hand is the essence of the scientific method.

And we know that law and its practical operation in criminal justice must operate on objective principles.

This is the age of science in most human activity. But we know that some institutions lag far behind others in its use.

To cite but one example, space information technology far outstrips the use of information technology in criminal justice.

A student can obtain yards of data bank printouts on the chemical composition of Mars. But we are hard-pressed to give a law enforcement officer an out-of-state offender's past criminal history on a time basis.

Scientists can plan the exact path an astronaut will walk on the moon a year from now. But we cannot tell a municipal court judge what his docket will look like four weeks hence.

What we must do, therefore, is to provide police officers, judges, wardens, probation officers, and other criminal justice system personnel with the information tools that have long since been at work in other fields.

We are already hard at work at this task.

For the past four years, enormous strides have been taken, and a number of significant accomplishments have been attained.

Information systems are now in use in numerous aspects of criminal justice. They are producing results – results that give us hope for the future.

Thus, today we have good reason to believe that we are beginning to control crime. The figures just released by the Federal Bureau of Investigation for the first six months of this year reflect a very encouraging trend.

CRIMINAL JUSTICE AS A SYSTEM

You are all familiar with the concept of the various criminal justice agencies operating together in a system.

This thesis has been the subject of constant comment for some years. It is a key part of the Law Enforcement Assistance Administration's over-all effort to reduce crime and delinquency.

The idea is worth repeating again – because accurate data shared throughout the entire system is an essential aspect of reaching our goal of lasting crime reduction.

Police departments, courts, and correctional institutions are beginning to learn to function as a unified whole.

But these agencies will not be able to integrate themselves completely until they have been introduced into other scientific and governmental operations.

We are working toward the day when present potential has been translated into practical, everyday reality.

We are building toward the time when everything known about criminal justice is available to

every criminal justice agency that needs it anywhere within the entire country.

Sophisticated information-handling systems are not put together simply because of their fancy looks.

Information systems are an absolutely essential tool in crime reduction and effective justice.

Crime will not decrease in this country until being a criminal becomes more dangerous than being a victim. And I believe it will be generally conceded that it is not dangerous enough today. However, with the proper application of the available resources it can be made much more so.

THE OMNIBUS CRIME CONTROL ACT

Until the LEAA program was established there were no adequate means for providing the needed coordination and the funds to create integrated, nationwide information systems.

In 1968, LEAA was created in the Omnibus Crime Control Act and authorized to "collect, evaluate, publish, and disseminate statistics and other information on the condition and progress of law enforcement in the several States" and to "cooperate with and render technical assistance" to the states and other public or private agencies in criminal justice matters.

Information processing and data transfer are only parts of this enormous undertaking. LEAA also has prompted continuing changes throughout the entire system.

But, LEAA recognized the importance of information handling from its earliest days and made it an integral part of the Crime Control Act program.

Early in calendar year 1969, LEAA began to receive grant applications from states seeking funds to develop state criminal justice information systems.

The need was great, and so were the problems. To begin with, LEAA had exceedingly limited funding despite the substantial number of project applications that were received.

In 1969, the first fiscal year, for example, the discretionary funds at LEAA's disposal totaled only $4.5 million for the entire nation.

The early applications and proposals dealt with only one state or locality. That means that if a number of individual projects had been given funds, there would have been a number of disparate, incompatible state systems.

If LEAA had allowed that to happen, each state might then have gone off in its own direction, leaving a bewildering complex of independent and incompatible programs. Furthermore, there was the matter of the amount of money available to support such projects.

LEAA conducted an initial review of state capabilities and determined that a central need was for development of a uniform format for criminal history records, the one that could be used by all elements of the criminal justice system – police, courts, and corrections in many jurisdictions with diverse criminal code provisions.

Out of all this, Project SEARCH was born.

SEARCH

The original SEARCH concept was to give participating criminal justice agencies information about offenders in a matter of seconds.

It was created to develop common data elements for the automation of criminal histories, then to have an on-line demonstration of the interstate exchange of this vital information.

However, as our experience deepened, it was recognized that SEARCH had an even more significant role to play. This is its ability to make statewide and nationwide criminal justice coordination feasible through state and local efforts, rather than by imposing Federal control.

It was seen that LEAA could provide financial assistance and serve as a catalyst systematizing criminal justice procedures, while the basic police powers could be left where they belong – with the states and the localities.

So LEAA launched its program to facilitate the automated interstate computer exchange of criminal records by those states that were then project participants. There were first six states, then 10, later 15, and then 20 states in the SEARCH project.

The SEARCH project group, under the dedicated and effective leadership of its chairman, Orville Hawkins, and its project director, Paul Wormeli, met or exceeded every milestone and goal defined by LEAA for the original demonstration.

This success demonstrated forcefully that state government could assume responsibility for complex, technical programs and perform with efficiency and dispatch.

However, the original purpose behind SEARCH – the exchange of offender information – had been completed. The feasibility had been demonstrated, and the FBI has the responsibility for developing the operational system.

SEARCH itself then broadened its horizons. It has launched into a large variety of other criminal justice information efforts. Thus, we now have the means to develop and test prototype systems to

apply advanced information technology to criminal justice administration.

Project SEARCH will also help LEAA plan for the interstate and national implementation of the prototype systems and to create a recognized source of technological expertise.

It is one of the most significant developments in law enforcement and criminal justice in our generation. You will be hearing about these and other SEARCH projects in detail throughout this conference.

At the same time, SEARCH in cooperation with LEAA's Statistics Division, is developing a prototype offender-based transaction data system. This system, now in advanced development, tracks individual offenders in all their contacts with any criminal justice agency – providing a more complete and realistic picture of the entire criminal justice system's operation. The prototype is being tested now in five states.

This new statistical series will give state and local criminal justice planners and managers a comprehensive and timely data base. It will be possible to analyze the dynamics and characteristics of the criminal justice system in an objective and scientific manner.

Another significant SEARCH project is the satellite transmission of fingerprint data.

Last December, SEARCH conducted a 10-day test. An existing NASA satellite was used to send fingerprint card facsimiles from California to Florida.

It normally takes six days or more to send fingerprints from coast to coast by mail. Additional time is needed for processing. But satellite transmission takes just minutes. Equally important is the fact that the quality of the fingerprint images is excellent.

However, there is more to LEAA's information system programs than Project SEARCH – as important as that is.

LEAA's INFORMATION SYSTEMS

One of the most promising and hopeful examples is the LEAA program to help develop state criminal justice comprehensive data systems, a program largely based on the experience of Project SEARCH.

LEAA has adopted a plan to encourage each state to set up its own criminal justice data collection process and has set aside more than $20 million in discretionary funds to support the effort. Each such system would include:

- A criminal justice data center,
- An offender-based transaction statistics system linked to automated criminal histories,
- A management and administrative statistics system,
- A uniform crime reports system,
- A state technical assistance capability.

As a transaction statistics system is one of the most important, yet most difficult parts of a comprehensive criminal justice statistics system, work is to begin on this in each state as soon as possible. Furthermore, as criminal histories converted for statistical purposes will also be used for exchange with other states and groups, their development should receive a high priority.

In the not too distant future most states will have these systems. When that goal is reached we will truly have the knowledge at hand to make criminal justice an objective, scientifically operated activity.

It is also clear to professionals – though not always so to the general public – that information is useless unless it can be transmitted to each and every person who needs it.

Therefore, LEAA has long been especially interested in law enforcement and criminal justice communications systems.

The LEAA Statistics Division's largest activity is the National Crime Survey Panel. The panel is an omnibus sample survey to measure the incidence of crime on American society, or the so-called victimization of crime.

The panel will be able to provide estimates of the amount and the socio-economic and geographic distribution of crime.

In addition to providing national estimates of incidence, the panel will also focus on the costs of crime, which are many and varied.

The Statistics Division has also distributed almost $1 million during the past two fiscal years to support the centralized state reporting of Uniform Crime Report data.

One of the most promising programs of the Statistics Division is the establishment of a criminal justice statistical yearbook. A developmental grant has been awarded to a group at the State University of New York to examine existing federal, state, and related statistical series, fill the gaps and voids, and develop necessary formats for the program.

Another important LEAA undertaking is the effort to promote the exchange and transfer of software for computerized information systems. The computer needs of the various state and local governments are similar – though not identical.

It is not always easy to transfer system design information from system to system. But it is pos-

sible. And the time and money that can be saved through information exchange make it essential that the process be hastened, consistent, of course, with the needs of system security.

LEAA is writing into all system grants a requirement that will facilitate this information exchange. We are asking that the grantee make the utmost effort to use computer software already produced and available. And we are having some success. For example, the Kansas City, Missouri, Police Department ALERT system has been adopted in whole or in part by other systems planners in other metropolitan areas.

Another significant LEAA supported endeavor is PROMIS – the Prosecutors' Management Information System.

A key feature of PROMIS is the daily assignment of priorities to criminal court cases through a point or case weighing system. The gravity of the offense, the defendant's record, and the estimated strength of the evidence are combined to determine the case priority.

The system holds the hope that an offender with multiple convictions will no longer be able to use what were once weaknesses in the judicial system to escape justice.

THE FUTURE

I have given only an outline of some of the information programs LEAA supports. In the time remaining I would like to go beyond the past and the present.

Though the LEAA program is relatively new, it is to the future that we really are looking instead of the past.

In fiscal 1973, LEAA spending for data systems and statistical assistance will total some $21.2 million. This is more than double the $9.7 million spending in the past year. Total LEAA systems spending, including block and discretionary funds, will be over $50 million. That forward movement is only one sign of our commitment to this vital area. But it certainly can be interpreted as a demonstration of the Administration's categorical determination to proceed.

Information systems will be employed to standardize state identification bureau procedures – to help create model state standards that include uniform offense reporting.

In a not so distant time, we *will* know shortly after the fact what happens to an individual at each significant step on the way through the criminal justice system – from arrest to trial, to imprisonment, to release.

It is unquestionably true that planners and administrators must know these facts if they are going to effectively manage and evaluate existing programs and develop new and better ones.

How well a given system is working cannot be accurately gauged without knowing what actually happens to those subject to that system.

We are living in a time when basic and searching questions are being asked about the use of information and intelligence by criminal justice agencies, particularly that which deals with individual offenders.

The underlying assumption that "anything goes" in the collection, analysis and dissemination of this data is being challenged as never before. Congressional and other critics have been extremely vocal in focusing on existing systems and practices.

We must be articulate and persuasive in convincing Congress, legislators and others that information and intelligence systems are vital and essential to effective law enforcement. To accomplish this talk, all of us who are involved must unite and speak with a common purpose.

A look at a recently completed survey sponsored by LEAA reveals that 400 systems are already in being and at work. Forty-six percent are state-level and 54 percent are local-level operations. These systems are run from 254 central processing units of all sizes.

In 1968 there were just 10 states in this country with state-level criminal justice information systems. By 1970 this had increased to 30 states, and today there are 47 states that have operational criminal justice information systems on the state level serving at least one component of the system.

A sample analysis of criminal information systems currently in operation shows that: 41 percent serve law enforcement agencies; 17 percent serve courts; six percent serve corrections; eight percent serve other criminal justice agencies. Most significant is the fact that 28 percent of the systems serve a combination of these agencies.

About two-thirds of the central processing units involved are in a shared environment. Approximately one-fifth are dedicated to criminal justice purposes only. And the balance is unreported.

DEDICATED vs. SHARED SYSTEMS

The last set of statistics prompts me to say a few words about the controversy over shared versus dedicated systems that has gone on for too long within our professional circles.

This controversy is a luxury that the criminal justice system cannot afford.

Project SEARCH and its Privacy and Security Committee, ably chaired by Dr. Robert Gallatti, have pioneered in examination of the difficult and sensitive questions in this area. I expect that you can again rise to the challenge and lead the way to resolution of this controversy.

However we may feel, it is vital to remember that the Congress will most certainly make the final decisions – presumably next year. No matter what features new systems contain, new federal law will include severe penalties for the misuse or unauthorized disclosure of confidential data. This will improve high standards for system security and the protection of individual privacy.

I subscribe wholeheartedly to the prineiple of protecting the individual who is the subject of criminal justice record keeping. I would extend this protection to information that is also publicly available elsewhere – for instance, to courthouse records.

A citizen's name – or information about him – must not be bandied about, no matter what the circumstances.

But security and privacy of information systems mean much more than just who has control of the central computer. The central processing unit is just one link.

Another crucial issue is the control of the work of the person who did the original data compilation. The raw files have to be secure. And the integrity of the work of the compiler must be assured as well. The questions include:

- Who does the original work?
- What do the raw files contain in the first place?
- Where is that material stored?
- Who has access to it?
- How is the information transmitted to the computer?
- Who gets the computer printouts?

These issues can and will be resolved. So let us not permit the controversy to take time away from the systems development work presently at hand.

CONCLUSION

Criminal justice information and statistics systems are going to look much different a decade from now.

We know that there will be a national system which links all sizable law enforcement, court, and corrections agencies.

We know that the system will not stop at the national borders. In this day of rapid communications, a truly international system is essential. Interpol will have to be on line just like Kansas City. The possibility of a dedicated satellite system for national and international operations is being studied very seriously by LEAA.

We know that within regional systems every police officer will have to be accessable at all times. Every court and corrections official will have to be able to come on line as well.

The day is coming – and sooner than anyone thinks – when each criminal justice official will instantly have the information he needs to take the best course of action.

Until now, we have been trying to bring criminal justice information systems into the 20th Century.

From now on, we will start working on the 21st Century.

DEVELOPMENT OF COMMUNICATIONS AND INFORMATION SYSTEMS IN THE CRIMINAL JUSTICE COMMUNITY

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Broadly speaking, the job of the Systems Development Division is to assist you in law enforcement and it's a job we relish. Our primary mission is to develop and coordinate national policy for information systems and automatic data processing (ADP) in the criminal justice community. You probably know us best as the people who monitor and fund Project SEARCH. Of course we're proud to identify with it because of its many accomplishments and because we believe in Project SEARCH's fundamental concept of the states in consortium determining their own needs and contributing their efforts to the solution of common problems.

An additional mission which gives us much satisfaction is that of coordinating programs and administering funds to advance national policy and improve information systems and ADP usage. It is this mission which provides us with the opportunity to fund tests, projects and ideas which show promise of national impact.

Another of our major endeavors is backup support to LEAA's Regional Systems Specialists. They can and do stand on their own talents; however, there are times when the best of them find it reassuring to have their judgment in technical matters confirmed. We respond willingly because we are convinced of the value of teamwork.

Information systems and ADP are a complex environment under normal conditions and we do not assume that our mission is an easy one. In fact, we recognize our task as difficult in the criminal justice community because of (1) its vastness and encompassing nature; (2) extremes ranging from total absence through primitive to the most sophisticated information systems; (3) diversity in legislation, statutes and standards; and others with which many of you are only too familiar. And in addition to this are the many directions of pursuit resulting from the widespred and multiform effect of the numerous vendors and consultants providing services at state and local levels.

We have attempted to put together a program that would have the greatest impact on information systems and ADP usage in the criminal justice community. The theme of the program is common direction and common objectives, with emphasis on facilitating the transfer of useful and effective systems throughout the criminal justice environment. To pursue this program it was necessary to provide a formal and effective interface between the Systems Development Division and state and local governments. To meet this requirement, LEAA positioned a systems specialist at each of its ten Regional Offices. Their prime responsibility is to act as the contact point with the state and local governments for information systems and ADP. Many of these systems specialists are attending this Symposium. At the same time we instituted the Round Table Conference which brings together, at the conference table about every sixty days, the LEAA Regional Systems Specialists and the Systems Development Division personnel. This mechanism is viable and is providing a cross-fertilization and exchange of ideas. This communication and coordination have been effective in surfacing problems, and in developing solutions and policy direction in information systems and ADP in the criminal justice community. Based on performance to date, the Round Table Conference can be said to be a sound platform for pursuing our program and assuring its success.

Now, a brief coverage on a few of the more significant things that we have done since our birth in the spring of 1971. The combination of continuing attention to maximum efficiency and performance in systems with the greatest possible economy, the rapid development of systems and the vast amounts of federal, state and local funds being spent in this highly technical field, caused us to zero in on two projects – one, a policy document and two, a Directory of Information Systems. The policy document is aimed at overcoming inadequate documentation of information systems and the many computer languages in use, which are limited in application to only one make of computer. The Directory, an inventory of computerized

systems, is designed to preclude future duplication, parallel efforts, re-invention of the wheel and the lack of an over-view and awareness of what is going on in the criminal justice community. Our policy document is now in effect. Most significant in the policy is the requirement, on LEAA funded systems, for documentation such as systems description, operating instructions, user instructions, report forms and the like – and for the use of COBOL and FORTRAN in the writing of application programs. We understand that machine languages have an important place in systems design. We do not, however, wish to perpetuate the situation whereby the user is the prisoner of a particular manufacturer simply because of programs written in a proprietary language. This situation calls for informed judgment in the individual case and our systems specialist at each of the ten Regional Offices is capable of making that judgment.

As to the Directory, the National Association of State Information Systems (NASIS) in conjunction with the Systems Development Division is preparing an inventory of computerized systems serving criminal justice needs in the United States. Compilation of data has been completed by the Mitre Corporation and computerization of this data provided by the Data Processing Department of the State of Iowa; both of these organizations are working under contract to NASIS. We expect to have camera copy ready for submission to the Government Printing Office by 15 October. The Directory covers 50 states, 56 cities over 250,000 population, 10 selected cities, 20 selected counties, and 5 selected regions. We expect this Directory to be the best single compilation on computerized systems in the criminal justice community. Indexed by state, system name and subject function, it will provide a ready reference for the widest possible audience. The Directory will be used as a tool to foster an exchange of technology among criminal justice systems developers and to minimize the duplication of effort in development of criminal justice systems by providing ready access to information about systems in *operation* and under *development*. It will be invaluable in the effort to transfer systems and thus provide improvement in data processing at the least possible cost. Worthy of mention at this time is the uniqueness of our survey leading to the compilation of information. We started with questionnaires to 141 jurisdictions and actually got back every one of these and a bonus of 12 additional surveys. This shows the success of the questionnaires and is an example of federal and state governments working together in harmony.

As I indicated earlier, the Systems Development Division emphasizes the transferability of useful and effective systems throughout the criminal justice community. Practically all our effort relates to and can be identified to transferability of systems. How are we doing this? Before I answer, let me explain what we mean by transferability of information systems. To the Systems Development Division it means the degree or extent to which the system can be exported to another environment. Data processing professionals, more and more, are realizing that time and skilled manpower can be saved by adapting systems in being rather than proceeding independently to construct an original system substantially the same as many already completed. Time and manpower translate to money; therefore, the requirement to transfer systems is even more stringent in the criminal justice area because LEAA is funding so many of them. For these reasons, LEAA is using every means available to encourage the sharing of experience, concepts, systems analysis, design, application programs and software. Organizations such as Project SEARCH; G-MIS, the Government Management Information Sciences Users Group; NASIS, the National Association of State Information Systems; the International Association of Chiefs of Police and the various manufacturers' users groups are involved and LEAA encourages all of them.

As an example, the Systems Development Division recently funded the publication of the documentation for the D. C. Corrections Record Information System (CRISYS), the inmate accounting system of the D. C. Department of Corrections. It is available at minimal cost to any correctional institution requesting it. Likewise, the U.S. Attorney's Office in the D. C. Superior Court has made available PROMIS, its management information system. Mr. Leonard, the Administrator of LEAA, has written all district attorneys nationwide, recommending their consideration of this system, the only one known which determines the prosecutor's priorities based upon scientific analysis and the policies of the prosecutor. LEAA had initially funded PROMIS and the Systems Development Division has recently provided additional funding for a reprogrammed version of PROMIS which will lower production costs by reducing core storage requirements. Programmed in COBOL, it will incorporate many efficiencies and economies that will have the added effect of making it machine independent and more readily transferable.

Still another program is JURIS, the legal information retrieval system of the U.S. Department of Justice. The Attorney General has offered the software of this real time, on-line system to all of the states: five are now considering it actively.

The Metropolitan Police Department of Kansas City, Missouri, has achieved great renown for its ALERT System, one of the most practical and sophisticated computer installations in action today. Somewhere between fifteen and thirty cities currently use systems copied from K.C. ALERT System. In practical terms, this means that these cities spent less than would otherwise have been required and achieved an operational capability sooner than they would have without the leadership and generosity of Kansas City's Chief of Police Clarence Kelley. Chief Kelley summed up his attitude when he said, "If you're not going to help another policeman, you might as well quit!" Work is presently going forward under an LEAA Grant to achieve wider distribution of documentation for the many subsystems of ALERT.

Before closing, I will touch lightly on two other projects to which we are devoting time: communications and preparation of an LEAA ADP Policy Handbook. Communications and data processing are inextricably intermeshed. The state of police communications is a matter of real concern to us. With the increase in police assigned to patrol activities and the increase in the number of crimes, the effectiveness of the communications facilities now used by law enforcement agencies has deteriorated due to the sheer volume of information being exchanged over the relatively limited number of channels available. This severe congestion of radio channels has resulted in lost time by field personnel awaiting their turn to communicate with the dispatcher, reduction of the apprehension rate due to failure to get "the word" in time, and some sacrifice of personal safety when officers, frustrated by the communications delay, forego making routine wanted or warrant checks on vehicles and persons. This near disintegration of communications channels is a grave situation and we are now aggressively investigating new technology to make an early reduction in and eventual elimination of this problem. One of the techniques already showing promise is the use of digitized transmissions, in effect, a computer terminal in the cruiser or for that matter, on the scooter.

The ADP Policy Handbook is now under preparation and we expect to complete the first part in about two months. As presently planned, it will include LEAA Policy and associated areas relating to information systems and ADP. Included therein will be definitions, guidance on lease vs. purchase analyses, requirements for the acquisition of ADP, information and requirements for the State Master Plan for computerized systems and information on technology in general. The first edition of the Handbook will not be complete in itself but will be added to on a growing and continual basis. The idea is, however, that the Handbook can be looked to as the official LEAA publication on information systems and ADP in the criminal justice community.

I hope I have given you some idea of what we think and what we are doing. We are receptive to ideas not only from the SEARCH community, but from the entire criminal justice community. We believe that in the relatively short period of our existence we have carved out a dynamic program; we want to work with you in fulfillment of the most important mission we know – to make our streets safe. We are convinced that we can live up to our name and truly assist in law enforcement – and we are going to do it. Join us to make the LEAA program a success.

PROJECT SEARCH
SATELLITE COMMUNICATIONS EXPERIMENT

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INTRODUCTION

On December 1, 1972, Mr. O. J. Hawkins and Florida Department of Law Enforcement Commissioner William Reed spoke via the ATS-I satellite from the NASA transportable earth station in Tallahassee, Florida, to Los Angeles County Sheriff Peter J. Pitchess at the Hughes Aircraft plant in Los Angeles, California. This conversation was a prelude to the full-scale, two-week feasibility demonstration of the Project SEARCH Satellite Communications Experiment.

On Monday, December 6, formal testing began. The satellite schedule permitted experiments to be conducted four hours per day for a 10-day period between December 6 and December 17. A total of 200 fingerprint cards were transmitted from Los Angeles and Sacramento and received in Florida. As a climax, the satellite link between Los Angeles and Sacramento was used for live traffic on December 16. Four fingerprint cards were transmitted, of which three were postively identified in a matter of minutes at Sacramento. The fourth card was forwarded to the FBI.

On December 16 the satellite communications and facsimile portion of the experiment was terminated per the plan.

BACKGROUND

Project SEARCH has already demonstrated the utility of rapid access to criminal history files in all phases of the criminal justice process. For decisions relative to arrest, arraignment, trial, sentencing, correctional programming, and others, the availability of a complete prior record is a necessity. Early in the judicial process, it is *not* now possible to obtain a prior record with substantial proof that the subject of an inquiry has been positively identified. A court is not likely to accept a computerized criminal history record as a basis for action unless the record can be positively linked to the offender in custody. Courts in most states expect no more than a 4-to-8 hour delay between arrest and initial arraignment hearings. The full utilization of a computerized system demands that identification be performed within that time period. Both for the protection of society and for the protection of the individual rights of the accused, the immediate acquisition of a court-acceptable prior record statement is necessary. There soon will exist, under FBI management, the record retrieval part of the system. The high-speed, positive linking of an offender to a record remains to be established.

The present approach to identification relies on a manual (in most places) search of fingerprint files. Prints are transmitted through the mail to either a state identification bureau or to the FBI. Many cities and counties also maintain files.

Two major categories of delay are obvious in this system. The first is simply document transmission time. Using the mail, an inquiry from California to the FBI can take 2-3 days each way, resulting in a minimum of 4-6 days' delay in response *exclusive of processing time.* The second delay is in the file search and comparison process and depends on the inquiry. An "easy" inquiry can be handled comfortably within a few hours, while the difficult inquiry processing may take up to *3 or 4 days,* depending on priorities and work management techniques in the various identification bureaus.

Given these two problems, transmission delay and processing delay, the transmission problem is certainly the easiest to deal with. The processing delay will eventually be minimized with automatic processing, but such developments are not yet here.

The transmission of fingerprints is conceptually less difficult. Following the New York State Identification and Intelligence System example, it would be possible to establish a nationwide facsimile network for fingerprint submission. However, using a normal voice-grade telephone line, the transmission of an 8" x 8" fingerprint card requires over 14 minutes. Clearly, a nationwide network would clog up a lot of telephone line capability. Just to illustrate the point, the FBI receives about 30,000 print sets per day. If ordinary phone lines were used to send all of these prints in by facsimile, the FBI would need about 600 phone lines and receivers to accommodate today's work flow, allowing for a varying input rate load factor.

The logical alternative to using existing phone lines is to make available lines with a wider band-width such that transmission speed can be increased. As band-width is increased, the problem shifts from one of throughput to cost. Land-line charges for wide-band transmission go up rapidly as band-width is expanded.

It is at this tradeoff point that the concept of a satellite, providing a wide-band transmission link, becomes interesting to law enforcement. The use of a satellite becomes even more attractive when viewed from the perspective that other functions could be incorporated into a law enforcement spacecraft. Additional potential applications include:

Data communications – The computer-to-computer links now accomplished by land-lines could be accommodated jointly with a document transmission capability. A computer interface link was carried by satellite between the Honolulu police system and the now defunct California Highway Patrol AUTOSTATIS system.

Video communications – a nationwide closed circuit TV system for conferences, lectures and information exchanges between law enforcement officials could be very useful in investigative, training and intelligence operations.

Voice communications – there are local, regional, state and national situations, particularly in disaster and disorder control, where ground-based or land-line communications are entirely inadequate. A common-channel relay capability would provide fast creation of an emergency network for interagency communications.

It is difficult to develop a complete system concept for thorough cost/benefit analysis in view of the many degrees of freedom in design. A great deal of further study and exploration is required before an operational system can be fully defined.

Because of these unknowns, this satellite-based experiment is designed to assist in system definition and to provide a background for a more detailed analysis and review of requirements. It will also measure some of the system parameters which affect operational performance.

EXPERIMENT OBJECTIVES

The purpose of this experiment was to:

- Demonstrate the feasibility of using a satellite to transmit high resolution fingerprint data at high speeds.
- Obtain data on various facsimile system parameters affecting operational performance.
- Obtain data on technical and economic feasibility of the total operational system.

The theoretical applicability of satellite technology to high speed document transmission was not in question in this experiment. This technology successfully applied to aid the criminal justice system in terms of the practicality of operation of a national system was the Experiment Focus.

Although all of the uncertainties in system design were not resolved by this experiment, it was possible to obtain measurements of the pertinent system parameters in conjunction with testing the feasibility of the total system.

EXPERIMENT PARAMETERS MEASURED

In the course of the experiment the major technical parameters of the system that were varied included:

- Vertical and Horizontal Resolution;
- Gray scale of the facsimile process;
- Data compression techniques utilized;
- Scan speed of the facsimile equipment; and
- Signal-to-noise ratio of the communications link.

These parameters were varied in a programmed way in order to minimize the number of experimental trials. Wherever possible, duplicate data was collected during a preliminary phase of the experiment in which the actual satellite was not utilized in order to maximize the benefits to the experiment from the actual satellite time available and to provide a comparable baseline.

In addition to the quantitative information gathered during the experiment, subjective comments on the quality of the facsimile product, as well as of the equipment involved, were solicited from participants in the experiment by means of interviews.

Parameter deviation was measured in terms of communication error, the quality difference between the original fingerprint card and the facsimile copy and classification error, the difference in the modified Henry classification of the original fingerprint card and the facsimile copy.

EQUIPMENT USED

Satellite

The five-year old NASA Applications Technology Satellite (ATS-1), in synchronous orbit, 22,300 miles above the equator approximately over Australia, was used for this experiment. The 790-pound ATS-1 satellite was developed for NASA and was launched on December 6, 1966. The satellite is used by the National Space Agency in meteorological and space applications.

Los Angeles Earth Station

The Los Angeles Earth Station was a transportable, transmit-only facility owned by Hughes Aircraft Company (HAC) and was located at the HAC manufacturing plant in El Segundo, California.

Sacramento Earth Station

The Sacramento Earth Station was a receive and transmit, transportable station also owned by HAC. It was implaced at the California Department of Justice, Bureau of Identification Building, from which facsimile and teletype signals were received and transmitted.

Tallahassee Earth Station

The Tallahassee Earth Station was a receive and transmit, transportable station owned and supplied by NASA.

Facsimile Scanner and Receiver

The FAX scanner and receiver equipment, furnished by Litton Industries, provided the method of scanning the original fingerprint card and reproducing a facsimile copy. This equipment was modified such that two transmission and recording speeds (RPM) could be selected and resolution (LPI) could be varied between 150 LPI and 300 LPI.

Facsimile Signal Processing Equipment

The facsimile signal processing equipment supplied by DACOM, Inc. interfaced between the facsimile scanner/receiver and the respective satellite earth station. It permitted the testing of digitized facsimile, data compression and gray scale variation.

Store and Forward Equipment

Store and Forward Equipment consisted of a digital tape recorder provided by DACOM. It recorded the digitized facsimile received from Los Angeles at Sacramento and selectively retransmitted to Florida those fingerprint cards that hypothetically could not be identified by the California Bureau of Identification. To rescan a previously recorded facsimile image caused excessive degradation of the image quality. Therefore, it was necessary to record the facsimile signal on tape for subsequent recall and retransmission. This also simulated a facsimile data switching system. The facsimile data was switched from one communication link (Los Angeles to Sacramento); processed, and retransmitted on a different link (Sacramento to Florida).

EXPERIMENT CONFIGURATION

The original fingerprint card was scanned at the Los Angeles County Sheriff's Department in downtown Los Angeles. The scanner was capable of varying the resolution and transmission speed. The signal was then processed by the DACOM processing equipment which permitted us to digitize the signal, vary the grey scale and employ data compression techniques. The signal then went through a straight 9600 bit per second digital modem before being transmitted over a 25 mile long C-2 conditioned land line to the satellite earth station located at the Los Angeles International Airport. The signal was then transmitted to the satellite and received at the Sacramento earth station.

A 100' coaxial cable interfaced the Sacramento earth station with the facsimile equipment located within the California Bureau of Identification building in residential Sacramento. The received signal again went through a 9600 bit per second data modem.

The signal output from the modem went two different ways. The first was to the digital tape recorder where the signal was recorded and stored for total recall and later retransmission to Florida. The second path was to the single processing equipment and the facsimile recorder. The output was a photo facsimile copy of the original fingerprint card.

From Sacramento, fingerprint data was transmitted to Florida from one of two sources. The first was the Store and Forward Tape Recorder previously mentioned. The second method was from a facsimile scanner located at Sacramento. Data from the tape recorder was processed through a transmitting 9600 bit per second data modem before it went to the earth station outside the building for relay to the satellite. A similar route was also used by the facsimile scanner.

At Florida the signal was received by the NASA Earth Station complex. From the satellite terminal the signal went via coaxial cable to a nearby van containing the receiving facsimile signal processing equipment and the facsimile receiver. Florida acknowledged the receipt of the fingerprint data by using a teletype machine linked via satellite with Sacramento.

In addition to facsimile fingerprint data, criminal history information and fingerprint cards were also transmitted via the Ampex videofile system between Sacramento over satellite to Florida. The experiment configuration was designed to simulate a potential system concept for a national Satellite Communication fingerprint facsimile system. That is, Los Angeles represents a major city local agency; Sacramento represents a State or Regional Bureau while Florida simulated the role of a National Bureau.

FINDINGS OF THE EXPERIMENT

A great deal was learned in this experiment about the problems and potential of the satellite-based fingerprint transmission system. The specific findings after a detailed statistical analysis of data indicated that:

1. A satellite-based fingerprint transmission system using facsimile equipment to transmit and receive fingerprint images is clearly a technically feasible system, and such a system could also accommodate video transmissions, digital data, and voice transmissions.
2. A number of preliminary findings were obtained with respect to the operating parameters of a facsimile system:
   - The level of gray scale appears to have little or no effect on the classification of fingerprints. That is, black and white capability appears to produce reliable results equivalent to a full analog (photographic) image transmissions for print classification and identification purposes.
   - The resolution of the input facsimile equipment has a minor effect on system performance within the 150 lines per inch to 300 lines per inch resolution tested in this experiment. A resolution of 150 lines per inch appears to be adequate for classification and identification functions.
   - The minimum acceptable communication system signal-to-noise quality ratio was found to be 30 DB for useful transmission of digital facsimile, and 19 DB for analog images.
3. A store and foreward capability, using digital techniques, does not appreciably reduce the transmitted image quality and could be developed for use by identification bureaus. The store and forward capability is a fundamental requirement in operating a national facsimile-based fingerprint transmission system.
4. Digital facsimile equipment is both feasible and desirable in any eventual operating system due to the strong potential for transmit time reduction using data compression techniques and as a means of interfacing with digital store and forward systems that allow more flexibility in the speed of retransmission.

COMPARISON OF ALTERNATIVE SYSTEMS

The results of the experiment clearly demonstrated the technical feasibility of using a satellite in combination with either facsimile or video input/output equipment to transmit fingerprints. Having accomplished this demonstration, the Project SEARCH participants desired to compare the use of a satellite with other possible means of performing the function of rapid transmission of fingerprint data.

Before a comparison of alternatives could be considered, three assumptions had to be made. First, the requirements for the system had to be stated. Secondly, within the requirements stated, the reasonable alternatives had to be identified. The third and final ingredient was the development of criteria for the selection process.

Fingerprint Transmission Requirements

The FBI presently receives approximately 30,000 sets of fingerprints each day. Slightly less than half of these are criminal offender prints; the remainder being fingerprints of job applicants submitted to the FBI for checks against the file. Based on an analysis of trends in arrests, the criminal fingerprint input will reach 30,000 fingerprints per day in the next five to seven years, if it is assumed that job applicant fingerprints would not be sent through highspeed transmission system.

Digital Data Transmission Requirements

If a wideband system is to be established to transmit fingerprint images, it is reasonable to consider simultaneously carrying the digital data transmission needs because of the fact that the lesser bandwidth required for digital data exchange is a fairly low cost addition to any wideband transmission system. An examination of NCIC statistics, which considers a 10 year forecast and expansion expected due to the implementation of the criminal history information capability, indicates that a message load of 30,000 is not unreasonable.

Video Transmission Requirements

There is fairly obvious potential for the use of closed-circuit television transmitted via satellites for use in criminal justice. Because of the lack of a clear statement of requirements, arbitrary decisions were made regarding the need for a video capability:

(1) A national capability should be available for transmitting and receiving three black and white television broadcasts simultaneously, and (2) any stations which are to serve local agencies need only be capable of receiving simultaneously one of any of the three video channels. During the alternative evaluation process both video and non-video configurations were considered for each alternative.

Alternative System

A discussion of all of the possible alternative systems must include the existing "system". With respect to the transmission of fingerprints, the existing system is simply that provided by the United States Postal Service. The delays associated with using the mail have already been mentioned. The existing system for providing digital data transfer on a national basis is provided through NCIC. NCIC maintains computer-to-computer interfaces in many states and direct interfaces to local agencies in those states not able to handle a statewide telecommunications system.

There is no present capability for closed-circuit television on a national basis dedicated to law enforcement and criminal justice uses.

With the increasing need for timeliness in identification and the retrieval of criminal offender

records, the present systems no longer are satisfactory. The reasonable alternatives to the existing system must then deal with the problem of increasing the responsiveness of the identification and criminal history retrieval process to the needs of criminal justice agencies.

The viable alternatives can be reduced to three basic high speed approaches for moving the fingerprint information from local agencies to state and national agencies. They are:

- A satellite communications network
- A line-of-sight microwave network
- A network of leased wideband land lines.

EVALUATION OF ALTERNATIVES

It should be noted that the evaluation was carried out to the degree that primary and secondary information was presently available. The criteria used in the evaluation considered:

First, the systems communications capability. This included the evaluation of each alternative's capability to supply facsimile transmission, video transmission, voice communication, and data transmission.

Second, it considered the systems adaptability. This included the alternative capability to expand or reconfigure as the needs for the projected system change.

Third, it entailed the systems applicability. The ability of an alternative system to meet the needs of fingerprint data transmission was evaluated by this criterion.

Fourth, the systems reliability was discussed. As the title implied, this criterion dealt with a comparison of the potential reliabilities, in terms of failure rates, that can be expected from each alternative.

Fifth, implementation problems were considered.

Lastly, the cost consequence was evaluated. Cost was evaluated from three points of view: installation, operation, and maintenance. Each of the alternatives were treated in two configurations – with an without the inclusion of a video capability.

CONCLUSIONS AND RECOMMENDATIONS

The basic findings and conclusions reached by the participants in this project were:

- A national satellite-based communications sytem for the high-speed transmission of fingerprint images, other documents, and various other data is technically feasible and best satisfies the requirements of law enforcement agencies.

Of all the alternatives described, the satellite-based system provides the greatest capability and flexibility. It is at least as reliable as other approaches, and can easily adapt to changing system needs.

With respect to cost, a review of the estimates developed showed that if costs are considered over a 10-year expected operating life, the cost of acquisition and operation are nearly the same for the alternatives considered, when the communications system does not carry a video capability. When the assumed video capability is added, the satellite costs are substantially less than the other alternatives. These conclusions are consistent with other studies which indicate that satellite costs are closely competitive with ground-based systems.

Whether or not criminal justice agencies take any action, satellites may soon be used to supply some law enforcement data transmission needs. The FCC is now conducting hearings on eight separate proposals to establish domestic satellite communication systems. Several of these proposals involve common carriers that now provide data transmission services to law enforcement.

If either a specialized satellite system is implemented or equivalent services are obtained from common carriers, it seems reasonable to raise the question of whether the law enforcement community would influence the design of the system or if the design of these services will be performed by the aerospace and telephone companies. This issue is addressed by the second conclusion that:

- The requirements and operating environment of law enforcement are sufficiently different from other satellite system users so as to justify a design effort to define a satellite-based system meeting law enforcement needs at minimum total system cost.

In summary, based on (1) the findings of this experiment, (2) the initial exploration of alternatives, and (3) the advancing development in satellite technology, the Project SEARCH participants conclude that further action should be taken to pursue the application of satellite technology in criminal justice.

Therefore, the Project SEARCH Group recommends that the Law Enforcement Assistance Administration take the following action:

1. *Sponsor further experiments to verify and expand on current estimates of the utility of satellites.* Opportunities exist now to use much of the same equipment used in the Project SEARCH experiment for other tests, subject to the approval of NASA and others.

   The experimental effort should serve to go further toward an operational system, with lengthier periods of use. Other applications should also be explored.
2. *Undertake a thorough analysis of criminal justice interagency communications requirements.* The preliminary estimates given in this report need to be verified and expanded to establish present as well as 10-year needs.

3. *Coordinate the establishment of a planning consortium of federal and state agencies with assigned roles for the development of an operational national system.* Based on past experience in Project SEARCH, early identification of roles would do much to expedite the program.
4. *Develop a funding plan to start development in FY-1974.* If any of this capability is to be made available to law enforcement soon, budget entries should obviously be made.
5. *Present to the FCC a case for the consideration of law enforcement needs in their review of pending domestic satellite communications applications.* Present proposals vary considerably in the services to be offered. It may be possible to suggest a requirement to serve law enforcement as a condition of the license.

This concludes my presentation; if there are any questions, I would be happy to address them at this time.

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DEVELOPMENT AND TEST OF A PROTOTYPE INTERSTATE ORGANIZED CRIME INDEX

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INTRODUCTION

The Interstate Organized Crime Index (IOCI) project was a result of the evaluation showing that previous attempts to develop and operate a national system for the exchange of data on organized crime subjects were less than completely successful or satisfactory. Both the Law Enforcement Assistance Administration (LEAA) and the Law Enforcement Intelligence Unit (LEIU), were of the belief that there was a need to exchange such information. Each understood the need for security measures to protect the data from unauthorized disclosures and the need to protect sources of data. Agreement was reached that there should be a demonstration of a prototype system. This system would be limited to a central index acting as a pointer and referring inquiries from authorized law enforcement officials to local and state organized crime units who have information on the organized crime subject.

The project's objective was to define, develop, demonstrate and test, and evaluate the prototype computerized central index.

PROJECT OVERVIEW

The 14 month project is now completing its test and demonstration phase. The evaluation of IOCI will be completed by 1 January 1973. Each of the 16 remote on-line terminals, located in state or local organized crime units throughout the U.S., and an LEIU member have direct access via dedicated communication lines to the computerized central index. IOCI is operational 24 hours a day.

The central index, which is housed in the Michigan State Police computer, contains approximately 2,850 names of organized crime principals, 3,000 listed and searchable associates and over 10,000 law enforcement agency references which either have submitted information or are holding additional information. Each organized crime principal record has up to 34 different data elements containing public record type of information. The data base was prepared and is maintained on a batched mode by California's Department of Justice through the Organized Crime and Criminal Intelligence Branch and computer facility. The terminal configuration includes a CRT and printer. Three types of messages are allowed during this demonstration: security messages which check and verify terminal operators; inquiry messages which are made against the central index; and administrative messages which allow terminal agencies to send free test messages to any other terminal. Queries against the data base may be made by name, name and various personal identifiers, identification numbers, (such as LEIU number, FBI number, social security number), name of corporate holding, or contributing agency. A name inquiry will search *all* names in the file including principals, associates, aliases, and nicknames.

PROJECT ORGANIZATION

The IOCI project was divided into three phases: (1) development and design of the prototype system, (2) test and demonstration of the system and, (3) evaluation of its operational potential, and if necessary, redesign and report recommendations for an operational system.

The first phase of this project was to determine the scope and content of the data base. Careful decisions were made regarding the persons to be included, the specific data elements to be stored, and the rules of dissemination (access).

The second phase is to demonstrate and test the feasibility of continuing with this system on an operational basis. During the demonstration, one terminal agency is acting as a non-LEIU member. When this agency queries the file, it has access only to the organized crime subjects it contributed. If it makes an inquiry on any other subject in the file, the agency receives a no hit response and the contributing agency receives notification of the inquiry. The contributing agency then has the option to make a contact with the selected agency.

The third phase will determine the operational efficiency of the prototype. After determining the system's usefulness, a plan will be prepared to create an operational system. A report will be prepared describing the project results and recommending actions necessary to proceed with the development of an expanded IOCI system.

The project, funded by LEAA, is under the direction of an organized crime task force comprised of seven members from the LEIU Executive

Board, seven members from Project SEARCH states, and an LEAA member. The task force has established several subcommittees including the Technical Subcommittee responsible for defining the data base and system operations; the Security and Privacy Subcommittee and the Evaluations Subcommittee.

It is anticipated that if IOCI is continued and expanded to an operational system, this task force will form the nucleus of the Steering and Policy Committee administering IOCI. A tentative set of bylaws has been prepared for this possibility.

DATA BASE

The major part of the central index data base was obtained from the existing LEIU organized crime manual card file. Additional subjects were added by New Jersey State Police, Florida Department of Law Enforcement, and the Minnesota Department of Public Safety. The task force established the criteria for selecting organized crime subjects for inclusion in IOCI.

The data elements included in the record were also defined. The task force followed the LEAA grant special condition that only public record information type of data be included in the data base. The task force followed Project SEARCH's earlier definition of public record information to include all documents and records normally available to the public, including newspapers; and records completed during all phases of the criminal justice process. The agreed upon 34 data elements contain descriptive data of the subject including his name and personal identifiers (including various identifying numbers), limited background information, listing of associates, and listing of agencies having information on the subject.

The LEIU cards were converted and machine processed. The computer-generated records were forwarded to contributing agencies for review and update and determination if the subject should be deleted or entered into IOCI. The returned records were placed in the central index. A complete listing was generated and forwarded to all LEIU members for recording whether they had any additional information on any of the subjects in file. These agency responses were added to the data base. This information is providing invaluable assistance since it provides the inquiring agency investigative leads as to where more information is available.

SECURITY AND PRIVACY

The importance of the security and privacy aspects of organized crime information cannot be overstressed. The task force created a security and privacy subcommittee early in the project. The subcommittee was given the responsibility to develop security and privacy procedures for the demonstration and to address the security and privacy issues affecting organized crime and intelligence data.

The subcommittee has prepared an IOCI security and privacy code of ethics. The committee also has prepared suggested minimum security and privacy standards which appear in the *IOCI Security and Privacy Policy and Procedures Manual.* Copies have been forwarded to all LEIU members.

The present demonstration is operating under strict security and privacy procedures. As stated earlier, the data base contains only public record type information. Tight control is maintained on who has access to this information. Terminal agencies assume full responsibility for the release and usage of information obtained on their terminal. Each terminal is physically located in a secure location within its respective intelligence unit office. In addition we have developed an internal security system. A series of coded key questions have been programmed into the computer, making it impossible for an unauthorized user to gain access to the central index, even if he manages to bypass the locked doors installed at each terminal location. The code is made up of personal information about each authorized user, such as dates, names, schools he attended, or what kind of hair tonic he uses. The computer asks the questions in random sequence and the terminal operator must answer correctly in order to pass the security program.

SUMMARY

We realize the existing system has some severe limitations, nevertheless, we are already beginning to realize the benefits of this tool in organized crime investigations. We have found that many law enforcement agencies throughout the country are interested in the same organized crime subjects and associates. While the evaluation is not complete, I have already received many favorable comments about IOCI and its potential.

We have re-learned, as does anyone who has gone from a manual to an automated system, the acute importance of accurate, complete and up-to-date information, and the need to monitor and discipline the system. We are discussing ways to expand the IOCI system to provide better investigative leads to the local organized crime investigation.

GOALS AND STANDARDS FOR CRIMINAL JUSTICE

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The National Advisory Commission on Criminal Justice Standards and Goals was established just about a year ago by the Attorney General and the Administrator of the Law Enforcement Assistance Administration and its mission is to establish a blueprint for the reduction of crime and we expect to perfect that goal.

The President's Crime Commission of 1967, the Eisenhower Commission, and the Kerner Commission have all probed various aspects of the problems we are addressing. Each has directed sweeping recommendations toward stemming the increasing crime rate. And, to be sure, each has contributed something toward a fuller understanding of the crime problem. Their recommendations resulted in the implementation of a wide variety of new and innovative criminal justice programs and significant amounts of Federal funds were provided for implementing their recommendations.

So why was a new Commission needed? How does the National Advisory Commission on Criminal Justice Standards and Goals differ from other bodies who have grappled with these difficult challenges over the past decade? There are several answers.

Among the qualities our Commission is striving to embody in our reports are first, comprehensiveness . . . second, "specificity" . . . and third, "interface." The Commission, through its task forces, is developing detailed standards for the reduction of crime. Our standards will be put forth in terms that avoid ambiguity. They will spell out WHO should start the ball rolling—whether it is a policy agency chief executive, a State legislature, or a group of citizens in a community crime prevention organization. We will specify WHEN the standard should be implemented—sometimes it can and should be done immediately; in other cases, it may be impractical or even unwise to plunge into implementation now, and a reasonable, considered deadline is set.

In commentary on each standard, the Commission explains WHY this standard is needed. We do not have any mandate to force State and local governments to adopt these standards—and, of course, we have sought none. But we do hope that well-reasoned, thoroughly justified standards that will work *will* be adopted eagerly by agencies in the criminal justice system on the State and local levels—the levels where the problems of crime are most acute.

In many cases the standards go into highly specific details on HOW a standard can be implemented, step by step. The WHERE is important, too. For example, many aspects of criminal justice information systems—to be effective—must be established on a State level. The input that comes from various local jurisdictions is vital, of course, but one of the problems in this area has been the Balkanizing of systems, the carelessness about sharing critical information, the redundancy and inefficiency that results from lack of coordination at an appropriate level of government. We hope to set standards which will remedy this problem by answering the where question.

Another important difference between this Commission and others is the emphasis on practitioners in the membership. We have been asked to chart maps, and we feel the best people to ask are those who have travelled the roads frequently and well. Other commissions have been made up of distinguished men and women from a variety of disciplines—sociologists, educators, economists, political scientists. We have included these types on our Commission and task forces. However, our Commission is strong on police chiefs, corrections officials, judges and prosecutors. We have a wealth of working experience guiding our efforts—people who know what the problems are because they confront them daily; people who can recognize what works.

Chairman of the National Advisory Commission is Governor Russell W. Peterson of Delaware, who is also chairman of the National Governors' Conference's Standing Committee on Crime Reduction and Public Safety. Vice Chairman of our Commission is Peter J. Pitchess, Sheriff of Los Angeles County, a leading exponent of effective criminal justice information systems.

In addition to the 22 members of the Commission itself, we have been fortunate in having outstanding working experts on our Task Forces. Four operational task forces are producing standards for the Commission's approval on Police, Courts, Corrections, and Community Crime Pre-

vention. Eight advisory task forces are reviewing these standards and submitting recommendations and advice. Additionally, the advisory task force on Information Systems and Statistics, which is chaired by Col. John R. Plants of Michigan, vice chairman of Project SEARCH, is submitting a report setting out standards and goals for Criminal Justice Information Systems. The Commission staff is also preparing standards on Criminal Justice Systems Planning.

The subjects assigned to other advisory task forces may indicate the scope of the Commission's interest and these include:

1. Community Involvement
2. Juvenile Delinquency
3. Drug Abuse
4. Organized Crime
5. Civil Disorders
6. Research and Development
7. Education, Training and Manpower Development

Each element of the criminal justice system is vitally concerned with each of these subjects. Naturally, each is discussed, to a greater or lesser degree, in each of the reports from Police, Courts, and Corrections. So the reports that the Commission will issue, beginning next year, will have been gone over carefully not only by generalists in the broader aspects of criminal justice, but also by specialists who are experts on particulars of certain key problem areas.

The Commission is vitally concerned with the need for coordination among the elements of the criminal justice system, and also recognizes the necessity for establishing *interfaces* with other public agencies, which sometimes do not perceive the vital link between their efforts and the increasing incidence of crime. Particularly in the Community Crime Prevention task force report do we focus on what can be done by schools and colleges, mental health departments, zoning commissions, housing authorities and public welfare departments to reduce crime.

There has been a tendency in recent years to call for eradication of what are called "the root causes of crime," usually referring to inferior housing and schools, high unemployment, job discrimination, and chronic poverty. This is a laudable but difficult goal which we recognize must be addressed and solved. But we are also seeking solutions in crime prevention which are more immediately achievable and attempting in Community Crime Prevention to set them out in standards.

The Commission recognizes that there is a need to consolidate and focus our efforts on the critical problem of preventing and reducing crime. And this calls for greater efficiency and coordination in the operations of all public and private agencies to meet this problem. What is needed is a degree of uniformity—an overall strategy to reduce crime and improve the equitable administration of justice. This uniformity must not be stifling—creativity and innovation are certainly qualities that must come into play if progress is to be made in solving problems that have been with us for so long and do not seem to be materially abating. But instead of having thousands of individual police agencies and courts and correctional institutions each experimenting on a trial-and-error basis with remedies for the problems that plague them in common, the Commission would propose standards that set forth what works and comment on what has failed and why, so that the best efforts, the most successful innovative—or traditional—programs, can be adopted on a broad scale.

By establishing goals and standards, the Commission is setting a course of action for the country and the criminal justice system. The principle is simple. One needs to know where he wants to go before he begins the journey. Once a goal is agreed upon it is then possible to proceed with the problem of means. And the means will be clearly articulated in our standards setting *minimum* requirements for physical resources, human resources, and appropriate administrative structures.

At the end of a given period the achievements can be compared with the standards. In this manner an assessment of the various reasons for the discrepancies between what ought to be done and what has been done can be made. Achievements can be determined, and changes made to meet the standard. Part of the Commission's job is determining that the standards are realistic; that they can be met. This is why I mentioned in passing *minimum* requirements. For example, there is no point in describing what the necessary components of a police information system are in terms of on-line, real-time computer systems with accessing, aggregating and data retrieval characteristics in terms of Nanaseconds for a three-man police agency located in Mitchell, South Dakota.

Yet, it would not be placing an undue burden on the sheriff to ask him to contribute appropriate information to the regional or State information system that collects such data.

In line with the practical approach, the report on Information Systems and Statistics informs the smaller agencies how some of the necessary operations can be performed manually.

Establishing standards offers other advantages, some of which come under the general heading of public accountability. Specific quantifiable standards will enable practitioners and the public to know where the system is going, what it is trying to achieve, and whether in fact it has achieved the desired end. Precise standards can be used to focus essential public pressure on the reform of the entire criminal justice system and the prevention and reduction of crime.

Now, we expect to encounter a bit of controversy when our reports are issued. If the subjects we are tackling were free of controversy, standards might have been established and agreed upon long ago. Each standard will be debated by the entire Commission and the appropriate task force, and majority votes will prevail. In fairness, we include other points of view than those endorsed by the Commission in the commentary that accompanies the standards.

I have been looking with great interest at the agenda for this meeting and have observed that the same sorts of knotty problems we have worked at unravelling are faced in this program. Such issues as the pros and cons of a dedicated criminal justice information system versus a shared system have been debated by our task force, for example. Our report will also discuss the right of an individual to privacy balanced against the need for police departments to keep records on offenders as a working tool.

Additionally, our information systems report centers on the establishment of offender-based transaction systems. This seems the most appropriate tool not only for operational utilization, but also for long range planning. We are aware that such systems will not be established on anything approaching a uniform basis without discarding many traditions and without the passage of necessary legislation at the State level. It will also require a large scale program of public education, we feel.

The task force has given top priority to the offender-based transaction system for a number of reasons. It serves the function of systems that are essentially concerned with tactical and operational information and it also produces statistics that are fundamental to crime reduction planning. Just as standards in other areas represent a basis for the necessary evaluation of whether a program is working and whether goals have in fact been achieved, the offender-based transaction system can be used to evaluate criminal justice programs in a variety of areas and as a basis for continuing research.

OBTS is useful to courts and correctional institutions as well as to police agencies. It serves to point up which components of the criminal justice system are performing at peak efficiency and where the bottlenecks exist. Of course, there may be reasons for deficiencies and delays, but to correct them, it is first necessary to identify their location. OBTS is a system that recognizes the symbiosis between components and the needs they share in common. It has become increasingly apparent that the methods a police officer uses in making an arrest affects the court's disposition of the person arrested; that the success or failure of the corrections system to rehabilitate offenders under their responsibility will help determine the magnitude of the police task when recidivists again prey on society. And with computer capabilities, there is no longer any excuse for the left hand not knowing what the right hand is doing.

When uniform information systems have been established on a broad scale, there is every reason to believe that they will suggest innovative patterns and programs that have not previously been considered by the police, courts, or corrections. As a very basic finding, we can expect to have a clearer picture of who the clients of the criminal justice system are. The more sharply this picture is finetuned into definition, the more effectively programs of crime prevention can function.

Without turning to the "still-in-the-Dark-Ages" rhetoric that tempts many speakers when referring to various criminal justice practices, we can nevertheless call, like Goethe, for "More light!" Standardized information systems are one of the newer technological methods of shedding such light.

Although basic systems, manual systems for example, can and should be established immediately at all levels of the criminal justice system, there is no avoiding the stark cost factors that impede development of more sophisticated, computerized networks. This is unquestionably a worthy goal; experts seem certain it can be achieved. But the Commission is understandably concerned with reducing crime as fast as possible with strategies that can at least *begin* to be implemented today, and this brings me to one final aspect of our report that I would like to discuss.

Funding for the criminal justice system has increased significantly in the last ten years. In fiscal year 1969-70, the Census Bureau in a study sponsored by LEAA found that the total Local-State-Federal expenditures for law enforcement exceeded $8 billion up from $2 billion in 1960. These expenditures, however, represented only a small portion of the Gross National Product and

are not enough to meet all the demands of the criminal justice system. We see a need for the commitment of even greater level of funding.

Every day legislators, public administrators and criminal justice officials are forced to make hard choices about how they will allocate available resources. As you are all so well aware, they need guidance when faced, for example, with choosing the best hardware and programming to establish an effective information system. Standards and goals can contribute tools that will help them make those choices and set priorities. When a goal or objective is set, certain means or standards are better than others for reaching that goal. The Commission's standards provide an authority that can be cited as a reasonable explanation for why a certain funding or resource allocation decision was reached. And administrators or legislators can do so with the confidence that the best efforts of experts in the area concerned were directed toward the establishment of the standard that is being cited.

If from what I have said, the Commission's reports sound as though they will be monumental and encyclopedic—we hope they will. But above all, we expect that they will not be volumes sitting flaccid on some shelf gathering dust. We expect that within a year, copies will be dog-eared and well-worn from frequent reference. We expect some of our conclusions to be debated violently—and we hope that our carefully reasoned logic and the combined expertise of our membership will persuade the public and criminal justice agencies in the end to adopt the standards set forth.

OFFENDER

BASED

TRANSACTION

STATISTICS

THE DEVELOPMENT AND IMPLEMENTATION OF AN OFFENDER-BASED TRANSACTION STATISTICS SYSTEM UNDER PROJECT SEARCH

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Today, with this meeting, the SEARCH Statistical Steering Committee disbands. The criminal justice statistics projects undertaken by the Committee are documented and complete. The concept of offender-based transaction statistics (OBTS) has been proven and is now operational in five states. We do not, however, abandon the work of the past three years. On the contrary, today we deliver to you, the states that will be concerned with the design and implementation of their own OBTS systems, the knowledge and experiences gained by our participants. The Statistical Committee has published three SEARCH technical reports[1] which describe the development of the OBTS concept, the test of its feasibility and utility, and its implementation in five different state environments. In addition, every member of the Committee stands ready to assist others as they begin to develop these criminal justice statistics systems.

Our program, over the next ninety minutes, has been designed to highlight the key-issues that have surfaced during the execution of the statistics projects. To provide a diverse, yet comprehensive discussion of OBTS systems, many committee members have been asked to participate. The chairman of the Statistical Steering Committee will explore the OBTS model and its utility in support of criminal justice planning, operations, and program evaluation. Then, a panel composed of representatives from each implementing state will present various aspects of system implementation most critical to eventual success. Finally, the leader of the Evaluation Subcommittee will summarize the recommendations that we offer.

To put this discussion into perspective, I will spend the next few minutes reviewing the statistical projects of SEARCH and how they have unfolded.

At the outset, Project SEARCH placed its emphasis on the development of computerized criminal history systems at the state level to permit the interstate exchange of offender history information. As an add-on, the original grant request called for SEARCH to:

> Computerize annual statistical reports in existing statistical series to permit retrieval of data by LEAA and selected police, court, and correctional agencies for uses to be specified by the Project Coordinating Group.

The SEARCH Statistical Methods Task Force was constituted to perform this summary statistics task. They immediately found that "existing statistical series", for the most part, simply did not exist. Moreover, prior attempts to develop criminal justice statistics were constantly plagued by irregular and incomplete data collection in which the definition of terms was instable, and unique offender identification codes were lacking. These collections were single agency workload counts; an inadequate description of criminal justice system activity.

For years, national and state authorities, commissions and hearings, have recognized that improved criminal justice statistics are necessary. These groups have generally agreed on the summarized needs for improved information listed below.

- Determine impact of crime
- Measure effects of criminal justice system policies
- Forecast results of policy changes
- Allocate resources to effective programs
- Provide comparable performance standards
- Predict criminal justice agency workloads
  - crime incidence
  - internal system factors

To satisfy these requirements, a new approach to securing criminal justice data was needed. Such an approach should focus on the individual offender and event, and track all agency actions which involved him. As the experiences of the individual and the criminal justice system were monitored, time should also be recorded – time in criminal justice process and time in the criminal justice system. Thus, the concept of offender-based transaction statistics was formulated. An OBTS collection would provide new dimensions of data. The passage of time would be known; multiple actions toward the same offender could be studied; and for the first time, agency input could be related to the

output of agencies that preceded them in the sequence of criminal justice processing.

Based on this new approach, the Project Group was asked to request a grant revision to allow for the demonstration of the OBTS concept. As a result, the second objective of Project SEARCH became:

> Design and demonstrate a computerized statistics system based on an accounting of individual offenders' proceeding through the criminal justice system.

THE DEMONSTRATION OF A PROTOTYPE OBTS SYSTEM

The Statistical Advisory Committee was formed to apply the OBTS concept on a trial basis in the SEARCH states. In each of the ten SEARCH states, offenders were experimentally traced step-by-step through the entire criminal justice process. Because of time limits, the tracing was an exercise in constructing OBTS records of an arbitrary sample of 1968 arrestees, not a test of a standard reporting method. Events subsequent to arrest were added to a master record for each defendant. The facts that were found scattered throughout the files of local police, prosecutors, different levels of courts, and various state and local correctional agencies, were linked to show how each state's administration of criminal justice and adult criminal defendant processing could be analyzed.

The data collected by each state was reduced, processed and analyzed by computer to demonstrate the production of statistics describing all levels of the criminal justice process. Tables were generated separately for each state in the same analytical format.

This demonstration of possible methods and values of the OBTS approach illustrated basic problems in current record systems. No central agency possessed the necessary individual offender data. The frequent absence of any personal identity linkage between different agency case records required that the number of demonstration cases be finally reduced to 250 per state, in order to finish the task on schedule.

The demonstration proved the feasibility and utility of the OBTS concept. It is documented in SEARCH Technical Report No. 3, "Designing Statewide Criminal Justice Statistics Systems – The Demonstration of a Prototype."

THE IMPLEMENTATION OF THE OBTS CONCEPT

Encouraged by the outcome of the prototype demonstration, five states – California, Florida, Minnesota, Michigan, and New Jersey – were selected to implement OBTS systems at the state level. The Statistical Advisory Committee gave way to the Statistical Steering Committee which was given the responsibility to:

- Define the minimum requirements for an OBTS system
- Work in concert with five participant states in the development and implementation of such a system
- Conduct an evaluation within the five states and develop technical descriptions of each state's system so as to provide other states with concise guidelines for the development and implementation of OBTS systems.

The Statistical Steering Committee, after a year of experience and interchange, and in concert with LEAA, formulated a generalized model that is viable and workable. The model is composed of a minimum set of data elements that are efficient, yet maximize the amount of information that can be provided. As part of the OBTS model development, certain definitions were established. The unit of count was defined, and criteria for entry into the system was established. Data element structure was prescribed considering other existing and evolving criminal justice statistics systems. In particular, the codes for various data elements were made compatible with the NCIC coding structure.

The committee's function was to guide the implementation of the OBTS model in the individual states. Each state approached the implementation differently recognizing its own legal and administrative framework and criminal justice policies and practices.

Although diversity existed, similarity also existed. The implementation project was undertaken to implement a single concept – the OBTS model – in different operational environments with the purpose of uncovering fundamental principles which pertain to that concept. To this end, the following set of common milestones was established:

1. Constitute State Advisory Committee
2. Review/identify data elements
3. Develop state plan for implementation
   - forms
   - data collection procedures
   - training: field, office staff
   - manpower/organization
   - data processing/data flow
   - quality control, audit
4. Implement state plans
5. Complete computer software
6. Plan for dissemination of statistics
7. Compile data for national center
8. Complete documentation

To document the state experiences and to develop recommendations concerning implementation of OBTS systems, an Evaluation Subcommittee was established. The subcommittee, com-

posed of a member of the project staff and the representatives from Arkansas, Utah, and Wisconsin (observer states to the project), visited each of the participating states where they discussed and dissected the statistics system from the perspective of user participation, internal procedures, external procedures, and data processing.

Two technical reports have resulted from the OBTS implementation project. The first, SEARCH Technical Report No. 4, "Implementing Statewide Criminal Justice Statistics System – The Model and Implementation Environment," details the OBTS model, describes its application to criminal justice decision making, and documents the operational environment that existed in the five states at the time the OBTS system was implemented. The second volume, SEARCH Technical Report No. 5, "Implementing Statewide Criminal Justice Statistics Systems – An Examination of the Five State Implementation," documents the implementation process in the same five participating states and analyzes the process to develop recommendations about critical problem areas. In addition, the report examines the reporting of state OBTS data to a national center.

It is the OBTS implementation experience that is the subject of the following papers.

1 Project SEARCH Technical Report No. 3, "Designing Statewide Criminal Justice Statistics Systems – The Demonstration of a Prototype," November 1970.
Project SEARCH Technical Report No. 4, "Implementing Statewide Criminal Justice Statistics Systems – The Model and Implementation Environment," January 1972.
Project SEARCH Technical Report No. 5, "Implementing Statewide Criminal Justice Statistics Systems – An Evaluation of the Five State Implementation," (to be published).

48287

OFFENDER BASED TRANSACTIONAL STATISTICS: THE CONCEPT AND ITS UTILITY

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INTRODUCTION

Seventeen months ago Project Search created the Statistical Steering Committee whose purpose was to define the Offender Based Transactional Statistical concept (OBTS), and to supervise its implementation in five states. The purpose of our discussion this afternoon will be to share with you the experiences gained by the Committee in the expectation that this will facilitate the development of OBTS in your respective states. Specifically, my discussion will address four areas including: a definition of the OBTS concept, differences between OBTS and traditional approaches to criminal justice statistics, unique advantages of the OBTS concept and finally a resume of the types of problems you might anticipate in the implementation of an OBTS system.

THE OBTS CONCEPT

Probably the best way to understand the OBTS concept is to discuss briefly traditional approaches to the gathering of criminal justice statistics. Essentially most criminal justice statistical systems can be categorized into one of four functional areas. These would include law enforcement statistics, judicial and prosecutory statistics, non-institutional correctional statistics, and institutional correctional statistical systems.

Law enforcement statistical systems are best exemplified by the uniform crime reporting system developed by the FBI. Essentially this statistical system attempts to capture the incidence of crimes reported to police, the clearance of crime and arrests by age, race, sex, and type of offense. Uniform crime reporting is probably the most comprehensive criminal justice statistical system in terms of number of agencies represented, and contains data submitted by all states and large metropolitan areas.

Judicial and prosecutory statistical systems usually involve documentation of number of cases filed in court, dismissals, dispositions by type, and indices of number of cases pending at the end of the calendar year. These types of statistical systems are less comprehensive than the uniform crime reporting program since there is no integration of this information on an interstate basis.

The category of non-institutional correctional statistics would subsume data dealing with probation and parole. Generally these statistics deal with number of cases received by a given probation or parole authority, terminations, average number of active cases for a given calendar year, and some indices of success and failure. Although some attempt has been made to develop a uniform reporting format for parole statistics, no national system exists for the gathering, analysis, and dissemination of probation statistics.

The fourth functional area of traditional criminal justice statistics would include institutional correctional statistical systems, such as the *National Prisoner Statistics* and the *National Jail Census*, which would provide data describing jails and state correctional systems. Generally these statistical systems deal with number of prisoners received, released, escaped, average number of prisoners for a given calendar year, and some indices of recidivism, characterizing those individuals who return to the institution.

It should be noted that all these statistical systems share several things in common. Each of these statistical approaches is agency specific in that it deals with the activity of a given agency within the criminal justice system, as opposed to providing information on the activities of the justice system itself. Secondly, these systems focus primarily on the workload of the agency as opposed to the movement of the offender through the system.

The offender based approach to criminal justice statistics differs significantly from these traditional approaches. Under the offender based concept, an attempt is made to track the individual offender and his offense through the system regardless of the agencies involved in his processing. In addition, OBTS attempts to document all major decisions made about the offender from the point of arrest to his final exit from the system. Whereas traditional approaches tend to be an agency specific approach to statistics, the offender based concept tends to be a longitudinal offender oriented approach to statistics.

MICROFICHE

TABLE 1

COMPARISON OF OBTS AND TRADITIONAL APPROACHES TO CRIMINAL JUSTICE STATISTICS

	TRADITIONAL STATISTICAL APPROACHES	*OFFENDER BASED TRANSACTIONAL STATISTICS*
UNIT OF COUNT	Depends upon the agency involved; i.e., reported offenses, arrests, cases, probationers, prisoners, parolees, etc.	Offender and associated offense(s).
FOCUS OF THE SYSTEM	Agency specific; depends on the nature of the agency gathering the data. Usually involves workloads' description of the agency.	Criminal justice system processing; i.e., movement of the offender through the system.
TIME BASE OF THE SYSTEM	The calendar year, coinciding with planning and budgetary cycles.	Time interval between decisions involving the offender as he moves through the system.

COMPARISON BETWEEN OBTS AND TRADITIONAL APPROACHES

Table 1 presents a comparison of the offender based concept and traditional approaches to criminal justice statistics. The two approaches are compared with respect to three criteria, including: the unit of count, focus of the system, and time base of the system.

The first basis of comparison presented in Table 1 is the *unit of count*, which refers to the material object which is counted in the statistical system. It will be noted in traditional approaches that the unit of count varies depending upon the agency gathering the statistics. Law enforcement agencies are primarily concerned with reported offenses and arrests, not with the individual offender. Since one offender may be responsible for more than one offense or be involved in more than one arrest, these statistics provide no indication of the number of offenders involved at the law enforcement process, since the number of reported offenses and the number of arrests are always greater than the number of offenders involved.

By the same token, courts and prosecutors are concerned with cases as opposed to arrests, offenses, or offenders – a unit of count different from that used in law enforcement statistics. These statistics provide no index of the number of individual offenders involved in judicial process since one offender may be involved in more than one case.

The unit of count used in both institutional and non-institutional correctional statistics is the offender as opposed to offenses, arrests or cases. Although these statistics provide an index of the actual number of offenders involved in probation, incarceration and parole they do not provide information as to the number of offenses, arrests or cases accounted for by the offenders.

By way of contrast the offender based concept utilizes the offender and his associate offense as the unit of count. Regardless of whether the individual is involved at the law enforcement, judicial or correctional level of the criminal justice system, the unit of count is the same. To this extent the offender based concept attempts to integrate the criminal justice system from a statistical point of view.

The second basis of comparison presented in Table 1 involves the *focus of the system*. It will be noticed that traditional statistical systems primarily focus on a workload of particular criminal justice agencies. Law enforcement statistics deal primarily with reported offenses, offenses cleared, and arrests which represent the workload of the law enforcement community. Similarly the courts' statistical focus is on the number of cases that they handle and the backlog at the end of the year. The focus of correctional statistics is the number of individuals agencies handle, be they incarcerated or on probation or parole.

The offender based concept has as its focus the criminal justice system as opposed to any partic-

ular agency within the system. Here the concern is with the movement of the offender as opposed to the workload of the agencies involved. Although workloads can be calculated from an adequately implemented OBTS system the primary focus of the approach is the offender as he moves through the system.

The third basis of comparison between the OBTS approach and traditional approaches is the *time base* of the statistical system. It will be noted that in traditional statistical approaches the time base of statistical analysis is usually the calendar year. This time base is arbitrary and is used to coincide with planning and budgetary requirements. In the offender based concept the time base is the temporal interval between decision points in the criminal justice system. Since the offender based approach attempts to track the offender as he moves through the system, OBTS can readily provide information concerning the average time from arrest to trial, the average time on probation, and other temporal information impossible to derive from traditional approaches.

UTILITY OF OBTS

From what has been said it should be obvious that the OBTS concept has various advantages over traditional approaches to criminal justice statistics. Rather than discuss in detail the specific advantages of OBTS, I would like to discuss four generic areas of OBTS utility.

One of the primary advantages of the OBTS approach is that it can provide mortality information or indices of the degree of "fallout" from the criminal justice system. For example, a community may have reported 40,000 felony arrests during a given calendar year, and for the same year, the disposition of 15,000 felony cases. The pairing of these two statistics indicates a disparity of 25,000 arrests which are not reflected in the judicial statistics. A number of explanations could account for this difference including the hypothesis that a number of cases are dismissed by either the police or the prosecutor. Another explanation could be that some individuals arrested during one calendar year are not tried until the following calendar year. Another rationale is the fact that some individuals are arrested more than once, yet may only be tried for one offense.

The disadvantage of traditional statistics is that they do not provide mortality information, that is, the number of individuals who exit the criminal justice system at various points. The offender based concept can provide a breakdown of the percentage of individuals who exit the criminal justice system throughout all levels. Such information is vital for criminal justice planning since it allows us to anticipate increases in the number of offenders at various levels as a function of increases in the number of individuals arrested, dismissed, incarcerated, etc.

The second advantage of the OBTS concept is that it can provide information on the amount of time it takes to process an offender from one point in the system to another. Since the unit of count in traditional criminal justice statistics varies among different agencies, such statistical approaches cannot provide information on the time-flow of offenders through the system. The offender based concept can yield information on the average time from arrest to indictment, time in jail awaiting trial, average time involved in the appeal process, number of months on probation, and other important temporal information.

A third advantage of the OBTS concept involves the determination of the status of the criminal justice system at any point in time. Since the offender based concept attempts to track the individual offender through the criminal justice system, statistical information can be acquired as to the number of individuals involved at any decision point in the system at a given point in time. Traditional statistical systems cannot provide this capability since such approaches usually involve year-end counts and therefore only grossly estimate the status of the criminal justice system. Status information is extremely vital since it provides criminal justice planners with the capability of determining bottlenecks and workloads in the system and can be used to calculate such factors as the impact of additional manpower on the flow of offenders through the system.

The fourth area of advantage of the OBTS concept is that it can determine the impact of decisions made at one level of the criminal justice system on the activities associated with subsequent levels of the system. Although traditional statistical systems can reflect increases in number of arrests, they do not allow us to determine quickly the overall impact of these increases on court workloads. A properly implemented OBTS system can provide rather detailed information as to the interaction between various levels of the criminal justice system, including the effect of plea bargaining on the time to trial or the impact of the use of probation on projected prison population. In addition, the system can objectify the relationship between bail bond policies and pretrial jail populations as

well as the impact of additional judges and prosecutors on court dockets.

IMPLEMENTATION PROBLEMS

My discussion so far may appear to indicate that the OBTS concept is a panacea for criminal justice statistics and planning. Although this statistical approach has many advantages there are some unique problems involved in its implementation. Since the OBTS concept attempts to track the individual offender through the criminal justice system, it is a statistical attempt to integrate the law enforcement, judicial, and correctional segments of the criminal justice process. Since these agencies are functionally located in two constitutionally separate branches of the government, a variety of problems accrue when they are statistically integrated.

It must be realized that various agencies in the criminal justice system exist for different purposes and in some cases can have contrary objectives. Since the OBTS concept requires the submission of data from one branch of the government to another, which data could be used to evaluate the administrative efficiency of the agency contributors, it is only natural for these agencies to be reticent to submit such data for fear that the information might be used to hold them accountable.

Because of the interagency integration inherent in the OBTS concept, it is extremely important to involve representatives of all criminal justice agencies in the initial planning for the system. Their comments and suggestions must be incorporated in the initial development in order to achieve that level of cooperation required for successful implementation.

The second problem area is OBTS involves the complex nature of the system. Although the OBTS concept attempts to track the offender through all levels of the criminal justice system the primary area of complexity is human rather than technical. It must be appreciated that the individuals who contribute data to the OBTS system at the working level are record clerks, not systems engineers. Unless the system is designed in such a way as to consider the human factor problems involved at the level at which the data is gathered, the entire reliability and validity of offender based statistics become extremely questionable. It has been our experience in the past seventeen months that there is a tendency to underestimate the need for field training in the implementation of the OBTS concept. It is our recommendation that planners' invest a major portion of their resources into field training during the first few years of development so as to assure the reliability of the information submitted.

An important yet subtle problem with the OBTS concept involves the time to implement such a system. It is conceivable that an OBTS system could be designed, implemented, and become operational in approximately two years. However, at this point in time, the system is practically useless since insufficient actuarial data will exist to provide any meaningful statistics. This is predicated on the fact that it will take three or four years before a significant number of offenders can move from the point of arrest to termination of their sentence. Therefore, the two years required for implementation coupled with approximately four years for sufficient offenders to have moved through the system suggest that the OBTS concept will probably be of little statistical value for approximately six years.

If, in the promotion of the OBTS concept, planners under-estimate the amount of time required for the system to become truly operational they will be caught in the position of having to provide statistical data when no data exists. It is strongly recommended therefore, that planners seek long term support for the development of the OBTS system since it cannot be functionally operational for at least six years from its inception.

SUMMARY

The purpose of my discussion this afternoon has been to acquaint you with the offender based concept and to discuss its utility. OBTS represents a significant departure from traditional approaches in its unit of count, focus and time base. It represents a systems approach to criminal justice statistics with its primary emphasis on the offender's movement through the system, as opposed to an agency specific approach.

In spite of various difficulties involved in its implementation, the OBTS concept allows us for the first time monitor truly and statistically describe the administration of criminal justice. The system, although highly complex and time consuming to implement, can serve as the basis for the true integration of the criminal justice system, an absolute prerequisite to any intelligent approach to crime prevention.

PANEL – A PRAGMATIC LOOK AT IMPLEMENTATION

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ADEQUATE LONG RANGE PLANNING AND FUNDING

CAPT. GLENN DAFOE:
USER GROUP AND INVOLVING USERS

RONALD H. BEATTIE:
DATA UTILIZATION

THE PERSONNEL PROBLEM

Lt. Robert C. Dalton
Bureau Chief
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Although unique in many aspects, Criminal Justice can be compared with most any system or corporate endeavor when one is examining the personnel problem. The personnel problem transcends all levels of Criminal Justice and all components of the Offender Based Transactional Statistics System design. Planners and systems specialists must be ever cognizant of the personnel problem and its ramifications throughout the system.

With philosophical and technical considerations having been resolved implementation of the Offender Based Transactional Statistics System can begin. However, if the personnel problem has not received the proper emphasis during design, the system will be non-productive.

The personnel problem begins with top level management and flows down through the system to the lowest functional operative within each agency.

Considerable discussion could be devoted to the personnel problem at the state level which encompasses interagency coordination, budgetary commitments and legislative considerations. These can all be related to the personnel problem since the problem is created or resolved not only by the qualifications and numbers of personnel but by individual philosophies and desires.

The personnel problem is very broad in scope and would require more time than is allotted here to detail all aspects. I will attempt to address those areas of the problem that the planner should consider during the development phase of the program. Those of a more subtle nature, many of which will be unique to each state, can only be resolved through experience within your own environment.

This presentation then will restrict itself to the personnel problem as it exists within the operational level of the OBTS System.

This phase of the problem essentially is divided into three areas:

1. Reporting Agency Personnel
2. Central Repository Personnel
3. Field Staff Personnel

These areas are listed in the order of discussion, not in fact by their order of importance.

Realistically one must face the fact that all too often agencies are faced with insufficient staff. This has great impact on the problem discussed here and will impact all areas of system design. How, for example, do you motivate an individual who is consistently faced with backlogs and changing priorities? How do you accomplish the simplest task, that the planner might well have taken for granted, if sufficient personnel are not available? These types of considerations are at the very root of the personnel problem and must be resolved before an effective system can be implemented. We must assume that this problem has been resolved and I will discuss the personnel problem as it exists with or without sufficient staff.

PROBLEM AREA I

Reporting Agency Personnel – This phase of the problem must be addressed with an understanding of who reports to the system.

It is not enough that seminars are conducted for agency heads. Certainly administrators must be made aware of the goals and objectives of the OBTS System and provided with formal presentations on all aspects of implementation. Their support must be solicited and frequently they will be called upon to resolve problems. However, the project director must appreciate that reporting begins at the bottom of the organizational ladder and that the person actually reporting to the system in many instances is a member of the clerical staff.

With this in mind it is essential that a program be developed which provides training to all reporting agency personnel.

Within many agencies the personnel responsible for reporting are not career people, have received no formal criminal justice training, possess relatively little or no real understanding of their agency's role, and cannot relate to other segments of criminal justice. All of these factors must be addressed by the project director. Personnel turnover is a very real problem. New Jersey has experienced a high degree of turnover of clerical personnel at all levels of reporting.

The project director must also realize that people do not become proficient reporters simply because a statute requires them to report, or that the state and federal governments have developed a sophisticated system for capturing the data. Training and motivation are critical to the solution of

these personnel problems. Such a task is the function of a field staff, which I will discuss later.

PROBLEM AREA 2

Central Repository Personnel – Many of the problems present within the reporting agencies also exist at the central repository. However, they can vary with agency structure. It is quite obvious that any new agency must acquire personnel who possess the expertise required to administer the OBTS System, such as Fingerprint Technicians. This will not be an easy task.

Long established bureaus, I will assume, have the expertise required. They may, however, be faced with the problem of being understaffed if they are presently operating under a voluntary submission of fingerprints.

Another problem more unique to established agencies is the need for procedural changes and the reassignment of functions and responsibilities to infuse the OBTS concept into existing systems. These changes can be rather traumatic for some personnel and every effort should be made to prepare them for such changes, as well as to insure against any degradation of present services.

With both the new bureau and established bureaus, personnel will lack sufficient knowledge of the criminal justice process. Thus an additional need for training exists.

PROBLEM AREA 3

Field Staff Personnel – Having considered the personnel problems discussed here as they exist at the reporting agencies and the central repository, the planner must decide upon a method of resolving these problems, a method which will provide broad capabilities since I have only highlighted a few of the more significant personnel problems.

I firmly believe the resolution to these and other problems is the deployment of a field staff. The field staff performs various services, among which are:

- **Training**
  - Seminars
  - Workshops
  - Personal Contacts
- **Corrective Analysis**
- **Technical Assistance**
  - Both within and between reporting agencies
- **Sampling**
- **Quality Control**

A workshop program coupled with routine personal contacts by the field representative meets the demand for training of reporting agency personnel. To be effective such a program must be flexible and provided at the convenience of the reporting agencies. Around the clock service should be provided to cover all shifts. The vital role of the field staff can also be related to the discussions by other speakers you will hear during this symposium.

The need for a field staff imposes still another personnel problem for the planner to resolve. How large a staff will be required? Where do I find the candidates? What qualifications should be considered?

A selection process, qualifications and description of such a staff have been discussed in the technical reports of the Statistical Steering Committee published by Project SEARCH. These reports are available and many of you, I am sure, have already read some of them. I will only touch lightly on some of the items to be considered.

Certainly experience should be a prerequisite for selection. If the field staff is to train personnel at the reporting agencies they must be well rounded in all phases of criminal justice, able to converse, understand, and resolve problems at each level. They should be familiar with their assigned area of responsibility and understand how the various agencies function within that area.

Part of the field man's role can be related to that of a sales representative. Though he provides training and technical assistance he must also function as a public relations man resolving personality and political differences within and between agencies. The project director would be wise to consider the geographical idiosyncrasies of the area of assignment for a particular member of the field staff and match these with the personal characteristics of a particular candidate.

SUMMARY

In summary let me emphasize that the personnel problem as I have described it, unfortunately, in many cases is overlooked by the planner. This can be a fatal error of system design.

As planners, designers, and administrators of Offender Based Transactional Statistics Systems we could allocate unlimited resources into design and implementation of such a system. However, we would not succeed if we failed to address properly the Personnel Problem.

THE DEVELOPMENT, USE, AND PROBLEMS OF A COMMON DATA BASE FOR CRIMINAL HISTORIES AND STATISTICS

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and
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INTRODUCTION

The topic which the committee asked Florida to address was *The Development, Use, and Problems of a Common Data Base for Criminal Histories and Statistics.* The subject is very similar to *Problems Encountered in Developing a State-Level CCH-OBTS System, and Interfacing it with the NCIC-CCH System,* the title of a paper to be presented in tomorrow's session by Commissioner William L. Reed of Florida. If the topic to be presented here were comprehensively covered, it would be in large part a duplication of tomorrow's presentation, which addresses the following problems and issues:

- Federal versus State Control of CCH
- Manpower Resources
- Training and Orientation
- Forms Design
- The Lack of a Pre-Trial Segment in CCH
- Data Element Structure, and
- Data Processing Services

This presentation will, therefore, be limited in scope, addressing only the rationale for integrating criminal histories and offender statistics into a common data base where the same agency is responsible for both programs.

The need for criminal justice agencies at all levels of government to exchange criminal history and statistical information has been cited repeatedly. However, different levels of government require different amounts of information to fulfill their obligations and responsibilities. The concept of an *Information Hiearchy* (among national, state, and local information systems) related to criminal histories has been well documented in the Background and Concept portion of the National Crime Information Center's (NCIC) Security and Confidentiality Policy Statement. Basically, this concept holds that NCIC, at the national level, will retain (with the exception of federal offenders) only summary criminal history information, while state information systems will carry the more detailed histories. While state information systems carry more detailed information than the national system, it must be remembered that *all* original source information and documentation can be found at the local level. When compared to information at the local level, even the state record is a summary. However, the needs for interstate information exchange can generally be satisfied by that level of detail found in the state record.

The interstate exchange of information requires the establishment of standardized data elements and codes in order for the information to have the same meaning to all agencies. This standardization was accomplished for criminal histories through the development of the NCIC Computerized Criminal History (CCH) System. The Project SEARCH Statistical Steering Committee, recognizing the importance of commonality, developed data elements which were, wherever possible, compatible with the NCIC-CCH system. While the SEARCH Offender Based Transaction Statistics (OBTS) System in some instances required more information than NCIC-CCH, in other instances it required less. However, the compatibility that was achieved allowed the potential user to maintain separate files or, with modification and expansion, integrate both systems into a common data base.

THE RATIONALE FOR A COMMON DATA BASE

If a state is currently participating in the NCIC-CCH System, or is planning to participate, and also plans to develop an OBTS System, a decision will have to be made concerning whether to treat these systems separately or merge them into a common data base. In determining whether to establish a common or separate data base for criminal histories (CCH) and statistics (OBTS), the first task is to define each system.

CCH AND OBTS

CCH is an operational information system concerned with an offender's past criminal history and his current status. The information required for a criminal history is generally recorded as each major event of the criminal justice process occurs. The

concept here is that the value of the information decreases proportionately with the time delay between the request and the response; thus the necessity for collecting the information as the event occurs.

OBTS, on the other hand, is an administrative information system concerned with the generation of statistical information relative to the operation of criminal justice during a given period of time. Because the generation of statistics must cover an historical period of time, the urgency of the information is not as great as in CCH where real-time turn-around between the request and response is crucial. Thus OBTS information can be collected periodically, or it can be collected as the event occurs and remain in a dormant status until the end of the time period for which statistics are to be generated.

CCH and OBTS do, however, possess certain common characteristics. For example, they both key on the individual offender and what happens to him as he progresses through the criminal justice process. Further, the same agencies which utilize criminal history records as an information tool will use OBTS as an information tool. In addition, over 50% of the data elements are common to both systems.

RECORD FORMATS AND DATA ELEMENTS

The next task in determining whether to establish a common or separate data base is to examine the record format and the data elements of the NCIC-CCH System to determine areas of compatibility and incompatibility with the OBTS record format and data elements. As stated previously, the NCIC-CCH System is designed to provide criminal history information on individuals, with the information being recorded as each major event of the criminal justice process takes place. To accomplish this the CCH record is divided into various segments referred to as the: 1) Identification Segment, 2) Arrest Segment, 3) Judicial Segment, 3A) Supplemental Segment (Judicial Appeal), and 4) Custody/Supervision Segment. The SEARCH OBTS record is also segmented but somewhat differently than CCH. OBTS segments include: Police (which includes Identification and Arrest), Prosecutor, Lower Criminal Court, Felony Trial Court, and Corrections.

The CCH Identification and Arrest Segments are created at the time of an individual's first arrest for a NCIC "criteria" offense. The Identification Segment contains the name of the individual, physical descriptors, numerical identifiers, fingerprint classification, and caution indicators. The Arrest Segment contains the arresting agency's identifier, date of arrest, arrest offense, and arrest disposition. The SEARCH-OBTS Police Segment is compatible with the NCIC-CCH Identification and Arrest Segments and the data needed for OBTS can be easily extracted from CCH.

A major problem area which hampers the merger of CCH and OBTS files exists between the judicial activities of both systems. The Judicial Segment of CCH contains some data elements which are common to both the Lower Court and Felony Trial Court Segments of SEARCH-OBTS. However, CCH contains no provisions for prosecutive and pre-trial activities found in OBTS. This has proved to be the most difficult CCH-OBTS integration problem encountered. While the state system can create a pre-trial segment for OBTS, this becomes a major difference from the NCIC-CCH System and results in a state's records reflecting one set of information while the national records reflect another. In as much as this issue will be examined further tomorrow by Commissioner Reed, a detailed discussion will not be undertaken here. It is sufficient to note only that Florida is developing a pre-trial segment (including information relative to actions taken by the prosecutor, grand jury, and actions occurring at the preliminary hearing and arraignment) to meet the needs of OBTS, and recommends its establishment at the national level as well.

The CCH Judicial Segment, created at the completion of the judicial action for the arrested offender, contains the judicial agency identifier, the offense tried, disposition, disposition date, sentence provisions, and appeal indicators. The state level CCH system requires expansion and modification of its Judicial Segment to include the following SEARCH-OBTS data elements in order to integrate this segment into a common file: trial starting date, type of charge, plea, type of trial, type of counsel, bail/release action, and a modified version of sentence provisions. Prior to forwarding CCH data to the national level, the state's Judicial Segment can be reformatted to meet national specifications.

The CCH Supplemental (Judicial Appeal), created at the completion of the appellate court action, contains the appeal agency's identifier, offense appealed, disposition, disposition date, and sentence provisions. SEARCH-OBTS does not collect appellate information for statistical purposes so there is no major problem in integration. However, statistical information on appellate action is

important and should be included within the state system in order to serve state needs, whether required at the national level or not.

The CCH Custody/Supervision Segment, created when any major correctional activity occurs (including incarceration, probation parole, release from custody – sentence commuted, completion of sentence, etc.) contains the correctional agency identifier, type of status change, and date of status change. This segment of CCH is compatible with SEARCH-OBTS and OBTS data can be easily extracted.

ADVANTAGES OF A COMMON DATA BASE

The preceding discussion has established the capability of merging CCH and OBTS into a common data base given the proper modification and expansion of the file.

The following reflects some of the advantages of a common data base over separate files:

- Minimum amount of personnel required to collect and process data – data requires processing only one time.
  Separate files result in the creation of separate forms, collection methods, and processing, with resultant duplicate efforts when identical data elements are used.
- Bulk of data elements are merged into a single unit, reducing storage needs and costs.
  Since over 50% of the data elements are common to both CCH and OBTS, separate files require increased capacity to store the same elements twice.
- Software (programs) effort reduced.
  As only one file is utilized, software common to both systems can be created. This includes file loading programs, file manipulation programs, and print programs. Utilization of common programs reduce the computer memory requirements, with resultant savings.
- Modification or addition of data elements require a minimum amount of change.
  Should CCH and OBTS require modification to a common data element, or the addition of a new element, only one file is changed. With separate files both require changing; increasing costs, as well as the possibilities of error.

SUMMARY

The capability of developing a common data base for criminal histories and OBTS has been established, and several advantages of this alternative over maintaining separate data bases were highlighted. However, states should be aware that integration of criminal histories and OBTS into a common file presents certain problems, mentioned in this paper, which must be overcome. Overcoming these obstacles will require not only the expertise of the states, but cooperation from the national level as well.

ADEQUATE LONG RANGE PLANNING AND FUNDING

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The offender-based transaction statistics system in Minnesota has progressed from its initial birth stage to a period of young adulthood. Throughout this growth era a number of problems expectantly developed, were confrontly recognized and were eventually resolved. The experiences of implementing the OBTS system for Minnesota are significant because (1) they are similar in scope with the other test states and (2) they provide general guidelines for other states to follow in designing an OBTS system plan of action. Unfortunately what is ideal for one state is not necessarily applicable to any other state because of a host of variable considerations. This has been affirmed with the separate directions taken by the 5 test states. It is also true that the final growth stages of Minnesota's OBTS system are not complete and hence, the suggestions offered with its operation fall within specific parameters governed quite logically by time and methodology. What is of great importance to note are the growing or transitional pains encountered with the implementation of each operation of the system. The lessons learned by realizing that unexpected difficulties do present themselves with any new system is of vital importance for those states so contemplating an adoption of OBTS. The establishment of realistic guidelines in adoption of an OBTS system is necessary in preparing any application for assistance with any degree of accuracy.

The most apparent considerations of effectively establishing an OBTS system are found in three critical areas; namely, legislation, data collection methods (user input and feedback) and data processing (software and hardware programs). When a state weighs the prospects of implementing such an important system, these three critical areas should be considered within a rational, long range plan of action.

The beginning of implementing any system that is relatively new is found in the definition of the *PROBLEM*. The problem in this case is how best to implement an OBTS system. This definition will be emitted from each particular state in a different context considering the characteristics of that state's criminal justice system within the "legal" or legislative boundaries. A basic element of the definition will be the consideration of both the internal and external environments. The internal environment will consist of the local administrational problems encountered in implementing OBTS effectively by each of the state's criminal justice agencies; while the external problems will deal primarily with the coordinational concerns of having the OBTS administrably acceptable with the national expectations.

Once the problem has been adequately defined the *PURPOSE* of implementing the OBTS system should be listed. The purpose incorporates all the feasible reasons for introducing the system within a particular state. The reasons should precisely indicate the main advantages obtainable to that state and local agencies by implementing the system. It is at this juncture that a prediction, in the form of the reflections of what this system will eventually accomplish, should be formulated. These predictions should be formulated with consideration of legislative limits within that state for introducing such a system. The predictions should also include an overview of the entire system given a national scale of operational effectiveness.

Closely following the problem and the purpose demands of creating an OBTS system are the *PROCEDURES* to be used to accomplish the proposed goals. The procedures represent a methodology based on a logical, concise and complete program for implementing the three areas of the system. The procedures should have, as a foundation, a temporal sequence plan of implementation. The timeliness of reaching the overall goals should be adjustable enough to meet the problems that arise after implementation procedures are begun.

The exactness of precise data collection methods is a necessary tenet for insuring the participating agencies to contribute in a "uniform" manner. Of special consideration will be the cooperational effort needed between the heretofor independent segments of the Criminal Justice System. To highlite the importance of this coordination, it will become necessary to insure that the user input will be returned to the contributors in the form of concise, interpretive and valid feedback data. It follows then, that in order to collect, sort, analyze and re-distribute adequately this data, a sophisticated data processing unit must be formulated and applied. The variations in the data processing methods to be employed will be dependent on the

software and hardware needs of each state as formulated by the agency with the responsibility of implementing the system.

Perhaps one of the most critical temporal concerns is the funding obtainable by implementing an OBTS system. For although it is accurate to infer that federal funding is available, an often neglected concern is that this funding is limited to the establishment of a system and not for its continual operation. It must be realized that after the original conception period of implementing the system, the burden of funding its operations (personnel, material, etc.) will be solely the individual state's task.

Lastly, when an OBTS system is implemented, a necessary task of *CONTINUAL EVALUATION* must be initiated. The evaluation process provides safeguards to insure that the proposed procedures are exactly followed and that an optimizing of effort to implant the system is attained.

In retrospect, the State of Minnesota has learned through the problems encountered with implementing an OBTS system the necessary principles of realistic planning. Because a new system offers unexpected diversions with its implementations these diversions must be accounted for in other state's proposals of actions. A package plan offering an immediate adoption of an OBTS system is very naive and is indeed, faux pas (a false step, error). Many problems occur that cannot be foreseen in such areas as hardware capabilities, software programs, management concerns and internal operations and training. Perhaps a very realistic proposal would be a period of at least three years. These three years would represent the implementation of an OBTS system based on resourceful and intelligent planning and guided by a well balanced scrutiny of effort.

THE SUCCESS OR FAILURE OF AN O.B.T.S. MAY REST WITH THE SELECTION OF AN ADVISORY COMMITTEE

Captain Glenn W. Dafoe
Commanding Officer, Records and Identification
Michigan State Police

The Offender Base Tracking System we speak of here today directly involves police, prosecution, courts, corrections, probation and parole. There are, of course, many other groups who will become involved either directly or indirectly with such a program. Most will be users made up of state and local government and special study groups.

I believe the SEARCH Statistical Committee has established a sound data base as a beginning for any Offender Tracking System. The data elements that have been required by this committee are based on a considerable amount of research, experience and knowledge of people involved with the police, prosecution, courts, corrections, probation and parole. These are basic needs for an Offender Tracking System and should become the starting point where a criminal justice agency committee group is established and begins building on additional needs for that particular state.

I cannot emphasize enough the importance of having adequate representation from the above mentioned groups as there is no individual from one agency who actually knows all the inner needs or problems of another agency. No person puts forth his best efforts in a program that appears to have little need for his advice or participation. There is no better way to receive full cooperation from an individual or a group than to say, "We need your help, we feel that your support may mean the difference between our having a successful venture or a complete failure." There is a strong need in each of us not only to feel we are part of the program, but to know we helped mould such a program, and can take pride in its success. Regardless of the legal requirement, the success or failure in joint ventures such as this, rests primarily with the volunteer participation of individuals in each criminal justice agency. There must be a feeling of pride and team work to achieve a workable and useful system.

Establishing an advisory committee to represent the criminal justice agencies is not only recommended but considered to be the key to a productive program. We feel best results will be obtained by having three representatives from each category – police, prosecution, courts, corrections, probation and parole. This allows each group to select one individual from an area of over a million population, another from an area 25,000-50,000 and one from 1,500-2,000, or whatever is best for your state, which, in turn, provides a cross section of people who should have a good knowledge of the needs of that state from the smallest operation to the largest. Further, having the three individuals normally assures that at least one or two representatives from each agency will be in attendance at all meetings.

Selection of the individuals to represent each criminal justice agency can be handled by asking the association representing that particular group to appoint three people they feel would work in the best interest of their organization. This procedure not only eliminates the problems that can result from a state level selection but usually results in some sincere and dedicated people on your advisory committee.

Although we feel there should be some contact with study groups, universities, social services, etc., regarding any input that might benefit the overall program, experience has proven that adding representatives from these groups makes the committee so large it is not workable. It gets away from the basic needs for starting up the program and into the more advanced stages of usage of the information. I agree, however, that we should know how the information is to be used before we obtain it. Nevertheless, the committee must remain at a workable level.

Each committee must have a chairman, preferably selected by the group. However, in many cases some one at the state level must start the program rolling and it may be in the best interest of all concerned to have that individual act as chairman. He should be a person who does not constantly try to emphasize the importance of his particular agency or try to force issues they oppose on other representatives unless he can do so by justifying the need for such information.

If you attempt to undertake such an O.B.T.S. as we have discussed here today and will keep in mind exactly how you would feel participating in a program you knew little or nothing about, had no say regarding its organization, knew it took additional

time and your people, and were informed it was your duty to submit the required information because the state had received money to develop the system, I am certain the alternative would be an advisory committee made up of a select group of people who would turn this program on and spearhead it in the right direction.

Going on the assumption that you will form such a committee, frequent meetings are desirable to establish ground rules and basic needs of each criminal justice agency. Adequate time must be allowed to receive all input from each member, keeping in mind he most likely is unsure of actual needs and is in many instances looking for support and guidance. As time passes on he will understand the intent and needs of such a system. Arguments between members can be healthy and often result in the elimination of unnecessary data or adding data that is needed. Whenever possible the chairman should attempt to involve members of the same agencies in disputes over data elements. This does not mean that a member of another agency should not make his thoughts known.

As the group becomes more aware of their goals and have resolved the major hurdles, meetings can be less frequent and when the system has progressed to the state of actually having a workable O.B.T.S., this committee can limit meetings to three or four a year. However, in no event should it be discontinued. There must be some group who can make decisions regarding changes in procedures, adding or deleting data, or perhaps the most important need, someone representing the agencies who can personally contact one of those agencies when there is a problem. There are many additional reasons for such an advisory committee; however, in the interest of time and knowing that most of you here have had some experience with committees, whether it be good or bad, I am sure you can see the benefits of a carefully selected and properly chaired committee.

In closing, it is important to keep in mind that with all our streamlining and modern technology the only output is information we receive from participants or contributors, whichever you prefer to call them, so let's not overlook the basic tool or foundation for a successful O.B.T.S., people involvement.

DATA UTILIZATION

Ronald H. Beattie
Chief, Bureau of Criminal Statistics
California Department of Justice

During the past three years a major objective of the SEARCH Project has been to develop an offender-based transactional record system that would provide a complete accounting of adults arrested and disposed of on felony charges. A great deal of time and effort have been devoted to designing a system that, to a large extent, is still theoretical and little more than a model of what a system might be someday.

While it is obviously proper to set forth an hypothesis, define and outline a theoretical model of what should be developed, it is my feeling that efforts to do this have been so excessive that scarcely any attention has been given to the actual existing problem which we face. It would seem from a pragmatic standpoint that in a field in which the myriad of law enforcement agencies and types of records relating to the handling of criminal offenders is so chaotic, disorganized and diverse, much more attention should have been given to analyzing the capabilities of existing record systems to evolve a workable plan of collecting information from these multi-various agencies.

It occurs to me that we have ignored the basic principles of scientific inquiry in which the first step, a survey of the field of existing knowledge, is followed by experimental efforts to probe that knowledge to determine how the information desired can be collected before adopting a full-blown scheme of a complete system. It has been my experience that such models, conceived of in great detail without any effort to determine the usefulness of local records and information, or data source will almost certainly doom to failure the implementation of such models from the start.

The early crime surveys of the 1920's furnished a model which was derived from a pragmatic effort to collect information on offenders from the many agencies engaged in criminal justice. In contrast, much of the time and effort of our committee for the last two years has been spent rehashing and arguing over details of various desired data elements that present records and information systems are incapable of producing at all. Little effort has been made to explore the real limitations and instead there seems to have been a bland assumption that once having designed a model, and the essential forms for collecting data, that there would be no problem in obtaining the desired information from the many contributing agencies. Little attention has been given to the kind of controls and audits that must be developed to insure that the information reported is complete and properly reported.

It is unfortunate that we have assumed that existing record systems can systematically supply a complete history of how each arrested defendant is handled. There are all kinds of unresolved complications to be found in tracing defendants through the criminal justice system. A defendant may be arrested and booked on certain charges and later be rebooked on other charges; complaints may have been filed on a portion of the arrest charges and not on others; a defendant may appear in different courts to answer to portions of these charges at different times, some of which may be final dispositions and others which are left dangling; defendants may be convicted and sentenced on charges which were not even listed in the original booking or complaint and defendants may receive sentences in court on cases where a formal arrest was never recorded. An attempt to follow each offense in an offender-based transactional system to the bitter end usually generates nothing but frustration and defeats the real purpose of an offender-base transactional system which is to determine what is done with individual defendants to the point of either conviction and sentence, or of no conviction and release.

The California report, which has been made available to this meeting, presents information that shows the patterns in dispositions in terms of individual felony defendants who were either convicted or given some type of release. This is the fundamental purpose of an offender-based transactional system. It can supply to those concerned with the administration of criminal justice, be they managers, operators, legislators or general students of the problem, the basic measurements and the trends and results of the overall handling of criminal defendants. The county is used as the basic administrative unit for it is only through the county totals that the full story of arrest, disposition, prosecution and sentence of offenders convicted can be demonstrated.

The report that has been presented is based on

the total dispositions of felony defendants for a given year in given jurisdictions from the point of arrest to the outcome of release or prosecution. The offender-based transactional system implies that offenders are traced through the correctional as well as the prosecution process. In reality, any analysis of the correctional process of such offenders has to be carried out on a somewhat different basis than that used to identify the outcome of the prosecution process. In the correctional area the basic group to be studied is made up of defendants who have undergone a specific type of correctional treatment or handling. The typical method is to select a cohort group of offenders who, in a given year, have been released from such correctional process as probation, parole or from institutional custody and to determine their length of time in custody or exposure to department programs. Follow-up studies provide the data showing subsequent criminal experience of such groups during a given period such as one, two or three years following release. This can be related to the kinds of defendants involved in each group in terms of offense, personal characteristics, prosecution history and kinds of treatment experience.

Such follow-up activity requires access to a basic information system that generates information on subsequent criminal activity of defendants being examined. In California, a high proportion of all persons arrested and charged with criminal offenses are fingerprinted and become the basis for a criminal history in the central identification bureau. Further, the majority of California offenders remain in the state after release from correctional controls which makes it relatively easy to follow and identify subsequent criminal activity.

I firmly submit, therefore, that the proper analytical framework required for the study of offenders under an offender-based record system must show: (1) the outcome of offenders prosecuted in terms of those disposed of during a given calendar year or specific period of time; (2) the experience of a cohort group of offenders released from custody to various forms of treatment in terms of their subsequent criminal activity during a given period of time.

I would like to make one other suggestion based upon our experience in planning a systematic way of assembling information of offenders. We have not found it practical to cover every person arrested; felon, misdemeanant and juvenile, on an individual basis. The volume of arrests, which is all but overwhelming in California and the variation of source material from the many agency levels, make this kind of an effort almost beyond any effective method of control. It is, moreover, appropriate that we focus upon the adult felony defendant since the real concern in our crime problem is the offender who commits serious crimes (felonies) or other lesser offenses of a sub-felony nature.

In California, there are about one million adults a year arrested for non-traffic criminal offenses. About 200,000 of these are originally charged with a felony type offense. Of the remaining 800,000 charged with misdemeanor offenses, only one-eighth, or 100,000, are involved in crimes which most of us would consider criminal in the sense of overt property damage or personal violence. These offenses include theft, assault, a few specific sex offenses, some narcotic offenses and weapons. The other seven-eighths of the misdemeanor arrests, which to me seem more social than criminal problems, are made up of persons taken into custody for such offenses as drunkenness, disorderly conduct, non-support, prostitution and traffic.

It makes for a much more successful control to develop offender-based transactional statistics based upon information on the 300,000 persons arrested for what are clearly criminal offenses than on the entire one million arrestees. It would seem that the 300,000 arrests represent persons who should properly be accounted for on the basis of a state or national information system, while the 700,000 primarily represent relatively minor acts, generally limited to local areas.

There is nothing simple or easy in establishing offender-based transactional systems which are needed to supply information permitting us to understand and measure our crime control efforts. Each state should establish its own statistical center to be responsible for this type of development. Obviously, such a center should be independent of any actual operating agency engaged in law enforcement, prosecution or corrections. The national criminal statistics center of LEAA should promote the development of state centers and furnish the essential guidelines that should be followed by the states, but it must be recognized that each state has its own particular needs and must account for processes and procedures which may differ from those in other states. It is inevitable that several years will be needed to develop a successful, productive system on a statewide basis. I think a successful effort requires that pilot studies be undertaken first in a limited number of jurisdictions and gradually enlarged to cover an entire state as the system moves from theoretical to a working model.

A great deal has been accomplished in California and we are pleased to present the results of an operating offender-based transactional system. There are still several years of effort ahead of us if we are to expand to a statewide basis and fulfill the basic objectives for a complete criminal statistics system. With the help of LEAA many of the states are moving in this direction. From a pragmatic viewpoint, I know considerable time will pass before an accurate, controllable offender-based transactional system can be set up in any state to account for its total criminal justice operations in handling criminal offenders. I would like to feel that our experience in California can benefit other states and that their developments can be accomplished at a much faster pace than our pioneer efforts.

SUMMARY REMARKS FOR THE OFFENDER-BASED TRANSACTION STATISTICS PANEL

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Director, Information Systems
Public Systems incorporated
Sunnyvale, California

In the next few minutes I will attempt to both summarize and emphasize the more significant aspects of the offender-based transaction statistical systems. To simplify the concept it can be looked at or reviewed as "the criminal justice bookkeeping or accounting system." It will describe the remaining segments of data not included in our Uniform Crime Reporting systems. Although UCR does include arrest data along with crime statistics, the system was not intended to describe the criminal justice function.

Project SEARCH, I believe, wisely chose to complete the accounting process started by the Uniform Crime Reports. Although it would appear that there is duplication between these two, they are in fact one and the same from the point of arrest of an offender through his discharge from the criminal justice process.

The United States has come to rely on the FBI's UCR report as a measure of criminal activity and law enforcement response (i.e., crime rates, arrests, etc.) to the criminal offender.

The OBTS system will provide not a measure of criminal activity but a measure of our criminal justice agencies and their response to and processing of the criminal offender. That is why I like to call OBTS an accounting system. It accounts for the action of the criminal justice system.

Most of us would agree that we should have this information if we are to manage the criminal justice system. This statement of "management" brings us to the first real problem in developing OBTS. Who is the manager that is to be served?

We discovered in our efforts to implement the process that there is no single manager and in fact there is no single branch of government responsible for criminal justice.

All branches of government, the legislative, the executive, and the judicial, play significant roles in the "management" of the criminal justice process. Because of this we strongly urge each state, when starting the development of OBTS, to involve each branch in the design and planning through the appropriate agency or body. This management responsibility should be shared also by cities and counties who must also be involved.

You will notice that I said "when" and not "if" they start the program. Seldom do we have a tool that can affect the criminal activity within this country such as OBTS can provide. It will give legislative bodies their first real insight into the process and provide guidance as to where best to place the tax dollar. It will asssist executives, governors, mayors, and agency managers in their planning responsibilities.

It will focus and continue to focus our attention on the total problem. It will force us to face the responsibility that each segment of the criminal justice system is just that, a segment. When a chief of police or a sheriff needs more officers, the prosecutor must have more support, along with the courts, and so on. We can no longer afford the "single agency" executive approach of adding resources to one agency without compensating for the needs of the other agencies. OBTS will show us quickly and effectively when a mistake such as I have described has been made.

I wish to emphasize the need for OBTS information because you will find a great deal of reluctance in many agencies to support an OBTS effort. There are reasons for this reluctance.

An OBTS approach potentially (they think) could point out an agency which appears not to be performing as it might. They also cite "no individual agency payoff," so what do they gain? It is thought to be just another report to the state and just another intrusion into their agency's operations.

Let's analyze their arguments for a moment. In our experience we have discovered that, instead of pointing out a "bad apple," the OBTS efforts have identified overall problems – problems that required the *cooperation* of the criminal justice agencies to solve, *not* to point a finger at the so called guilty party. Let us look at an example. If the release by a prosecutor of individual criminals charged with a felony is 50%, what have we learned?

- A bad process action
- Too much work, not enough help for the prosecutor's office
- Bad arrests
- Poor evidence
- Poor police report

These are just a few of the conclusions you can read. And, as I have said, the response to the problem becomes one of cooperation between the

police and the prosecutor, not one of the police saying the prosecutor is not worth his salt or the police are providing bad arrests.

As for the objections to state intervention with no local agency payoff, there are numerous arguments to the contrary. In the first place, the criminal justice system is fundamentally a local system. Police, prosecutors, courts, even state corrections and probation agencies operate or supervise local activities. This local emphasis requires significant information so that the local agencies and the state can properly exercise their "management" roles.

You have heard considerable about data collection. Careful consideration, planning, and designing of the methodology will result in eliciting cooperation from all those who must report. In our experience even those states with mandatory reporting laws choose to seek the cooperation of local agencies and thus significantly avoid the feeling of imposition.

The simplest method of data gathering should be used. If possible, the combining of documents so as to reduce the local work of supplying the required information is an excellent approach.

Now let's not forget the reporter's needs. He cannot just supply data, he must have the information returned to him in a meaningful form and format. This requires his participation in the design and schedule. Without considering the needs of the local contributors, the continued success of any OBTS systems is jeopardized.

In your review of the documents produced by the project and the comments of the other speakers, you will note the use of minimum data elements. Each state should consider carefully adding elements to this list that will assist the local agencies. I am not suggesting that the state could provide a total management information system nor should they – but the addition of a few data elements in cooperation with local agency needs will support them in a much more meaningful way.

Let me now summarize the summary.

- Build a system
- Work with the local governments
- Give them meaningful data
- Add elements that will help them
- And, finally, learn how to spell COOPERATION.

COMPREHENSIVE DATA SYSTEMS PROGRAM

George E. Hall
National Institute of Law Enforcement
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LEAA may be unique among federal agencies in that it has given itself a goal of working its way out of business. For a batc of bureaucrats to say that their primary goal is to eliminate the agencies, I think you would admit, is at least somewhat different.

As LEAA's name suggests it was established to provide assistance to states and local units of government. It is not by any stretch of the imagination intended to be a criminal justice agency, that is an operating agency, of any sort. However, it is fairly obvious that for the agency to work its way out of business but leave a legacy of criminal justice planning, it has to provide the states and local governments with the where-with-all to conduct that kind of planning.

In order to do any kind of criminal justice planning, you need information, you need statistics, and you need data. Criminal justice may be the oldest social system extant, and yet, criminal justice alone, among social systems, is almost totally devoid of description in any quantitative terms. We have just heard from Ron Beattie whose organization in California has been doing outstanding work over the years. I see a few other people here who have been developing statistics, but by and large there has been no comprehensive quantitative description of criminal justice, although the needs clearly exist.

First, we must know something about justice processes. The panel you just heard described an effort to develop a statistical program to document the administration of justice in the United States.

A related problem concerns the need to describe criminal justice in management terms. For example, we need to know how much money is being expended. This year, approximately $10 billion will be spent for criminal justice, but most criminal justice planning agencies don't know how much money is being expended by agencies within their states; they don't know about their criminal justice facilities, correctional facilities, law enforcement facilities; they don't know how much equipment they have, etc. There is obviously a need to develop extensive administrative data.

Also, units of local government, local agencies and state agencies are crying out for technical assistance to help them in the very difficult area of criminal justice statistics and information.

Finally, there is the need for data on crime. LEAA, as most of you know, has recently been stressing the concept of planning by objectives, that is, crime specific planning. If you don't have good information on the amount of the distribution of crime it is difficult to establish a rational crime specific planning effort.

Those are four basic needs but somehow the information must be made intelligible. Thus we also need someone to analyze data and tell us what the information means.

To address these needs, several months ago LEAA announced what we call a Comprehensive Data System, a major effort of LEAA. Mr. Velde mentioned this morning, to date the agency has earmarked $20,000,000 for this program and present plans for Fiscal 1974 call for even more funding to continue the program. First we require that the state establish a "data center." This was probably one of the most unfortunate parts of the program, unfortunate in terms of semantics. Unfortunately, data center in the data processing world frequently has a connotation of data processing or data collection. Perhaps a better word would have been statistics center. So let me clarify right now the idea that the data center is supposed to be in some way a data processing center. In fact, let me read from our grant guidelines to hopefully put the data center concept in perspective. "The data center should not have either data collection or data processing as its principal function." I'll repeat that, "The data center should *not* have either data collection or data processing as its principal function." And it further says, "If a state wishes to assign the collection processing function to the data center, the state must provide adequate resources to carry out that role." So I want to point that out because there has been some real confusion on that issue. The data center as we envision it in this program has a primary function of *analyzing* and *interpreting* statistical data. It could also do other things but that is the principal function.

Second, I mentioned technical assistance. We are asking the state to accept the responsibility providing that kind of technical assistance for state and local agencies.

Third, we are requiring that the state establish a meaningful administrator and management statistics program.

Fourth, since we have all just heard about OBTS we are requiring the state to establish an offender-based transaction statistics and criminal history system. I tie those together because LEAA's funding, as of this point, for the development of criminal histories is all being channeled through the Comprehensive Data System. You heard Mr. Slade from Florida talking about the need for the advantage of common data bases between OBTS and CCH. In order to qualify for funding under this program a state must have an OBTS program which is compatible with computerized criminal history.

Finally, the state must accept the responsibility for the collection of UCR. This is a program that the FBI has been encouraging for some years and, recognizing the extreme need for data on crime and its distribution, we include this as part of Comprehensive Data Systems.

The states are also required to develop an audit capability for UCR. We are now preparing audit specifications which will be passed on to the states. We didn't invent them. Basically the specifications that are being prepared, a combination of a program that has worked very well in the City of St. Louis, plus an analysis system that the Bureau of the Census has been using in its survey program for some years. But we feel that it is time that the states accept the responsibility to collect UCR data and provide a service to local units of government.

In a nutshell that's the Comprehensive Data System Program.

When we announced the program, I talked to a number of people in the statistical fraternity and told them what we had in mind and what we wanted to do, etc., and they looked at me and said, "Well, that sounds very much like the vital statistics program and it took 50 years to establish a vital statistics program in the United States." Ron Beattie talked about the extreme difficulty. I think all of the people here and the panel you just heard, just in the OBTS area, stressed the problems that we are going to face. And, perhaps, I'm too much of an optimist, perhaps I'm a Pollyana, when I assume that we don't have 50 years. If we are really going to make a meaningful impact on the problem of crime and delinquency in the United States, we don't have 50 years. We cannot continue to operate by-guess and by-gosh and by-the-seat-of-our-pants.

Therefore, I am happy to announce, at least, that I think we've got a pretty good start. The program was announced in the last week in April and as of now we have 21 comprehensive plans at hand. And of those 21 plans, 16 of them have been at least conditionally approved. And I might add that there are not serious problems with any of the others. They are simply still in the approval process.

Beyond that I know that there are other states who are preparing plans and we are looking forward to getting this program off the ground, getting funding into the pockets of the people who need it to establish the program, but, more importantly, to begin to develop a data base that all of us need locally, at the state level, at the national level, if we are to be able to mount any kind of successful attack on crime and delinquency in the United States.

LEAA'S NATIONAL CRIME PANEL

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In July of this year, there began one of the most ambitious statistical data collection programs ever undertaken by the Federal Government. The National Crime Panel – so-named – is a nationwide survey of both citizens and businesses, whose purpose is to provide regular statistical data on the incidence of common crime, its cost, the characteristics of victims and the characteristics of criminal events. This program, which will provide national data on a quarterly basis, has been under technical development for two and three-quarters years.

The Statistics Division of the National Institute of Law Enforcement and Criminal Justice, LEAA, in conjunction with the U.S. Bureau of the Census, has conducted a number of research and development projects to resolve various methodological problems inherent in this type of survey. This preliminary work points to the possibility of many interesting findings from the crime panel.

The core questions of this survey will provide measures of the incidence of serious crime and the effect on its victims. Data available will include such estimates as the number of stranger-to-stranger events of theft or violence (except murder), the number of burglaries, the economic cost of these crimes, what the victim perceives the characteristics of the offender to be, the relationship between the victim and the offender, the circumstances surrounding the event, when and where it occurred, what weapons were used, and a host of other details.

Data will be available to display the socio-economic and demographic distribution of events and victims. Estimates will show not only the amount of crime and the number of victims, but also such measures as the *proportion* of individuals who have been victimized by stranger-to-stranger confrontations, the *proportion* of households which have been burglarized, and the *proportion* of businesses and other organizations which have been victims of burglary and/or robbery during some specified previous period.

The developmental work done by LEAA and the census bureau included a national feasibility test. We now have a few preliminary and fragmentary results. They are inconclusive. And they certainly do not form the basis for any firm judgments. But they at least give very initial indications of some of the things that the National Crime Panel is expected to produce on a regular basis.

The fragmentary results from the early test suggests that assaultive violence may occur between strangers only about 50 percent of the time; that daytime robberies may account for about two-fifths of all robberies; and that one in six of the victims of robbery and/or assault during the course of a 12-month period may have been victimized more than once during that period.

While the preliminary data are only fragmentary at this point, stranger-to-stranger incidents show interesting differences.

The rate of victimization for criminal assault occurring between strangers appeared much higher for males than for females (the ratio is greater than 2.5 to 1). By age, this rate decreases as the population gets older. Young people 16-24 years old are victimized about 1.5 times more frequently than persons 25-39, who in turn are victimized over twice as frequently as 40-64 year-olds; and the latter group is assailed about twice as often as the elderly – 65 and over. A black person appears to have more than a 50 percent higher probability of being held up by a robber than a white person has.

The National Crime Panel will provide this kind of information along with other socio-economic data about people who become victims of crime. Such data will permit the development of new strategies for a more effective attack on crime in the nation. Moreover, information of this type which is so critical in national planning and evaluation in the fight against crime cannot be obtained from any other existing source.

How are data for the National Crime Panel collected? Personal interviews are conducted by Bureau of the Census interviewers. The survey began in July 1972, and is conducted monthly on a regular basis. Each month's interviews utilize a representative, probability sample of 10,000 households and about 1,500 businesses nationwide.

In addition to the national survey, similar information is being developed through independently selected samples for sixteen large cities during the next 12 months. Eight of those cities (Atlanta, Baltimore, Cleveland, Dallas, Denver, Newark, Portland, and St. Louis) are those in-

cluded in the LEAA high impact crime reduction program. The remaining eight cities include the five largest – New York, Chicago, Los Angeles, Philadelphia, and Detroit – and three other large cities – San Francisco, Oakland, and Miami. With the exception of the five largest cities, which will be surveyed annually, the large cities will be interviewed every three years. In each 3-year cycle, more than 40 cities will be surveyed. Thus in the largest cities, those in which the crime problem is most acute, frequent detailed data will be available to help combat the problem of crime.

IMPACT CITIES

For the eight cities mentioned above in connection with the high impact program, these surveys will provide estimates of crime for the one-year period July 1971–June 1972: the baseline "before" measurement, just prior to the implementation of the impact program. The principal estimates being made are the amount of burglary and stranger-to-stranger violence.

In order to measure the changes that have occurred following the implementation of the impact program, a second survey will be conducted in January 1975 in each of the eight cities. Data will be collected for the period January-December 1974. This time period is chosen because it is two years after the impact program can be expected to be in "full swing." (It is reasonable to assume that if city programming begins in July 1972, actual effects or impact will be negligible for about the first six months.) This survey is expected to be statistically reliable enough so that a five percent estimate of change can be measured in total crime. Burglary and stranger-to-stranger offenses can probably be measured at the five percent change level if we combine the results of the eight cities).

What geographic data will be available from the National Crime Panel? For local planners, evaluators, SPAs, and others a broad array of geographic detail will be available from the National Crime Panel, which will be of considerable value in the assessment and evaluation of local efforts to combat crime. Initially, as mentioned above, data will be published for 16 of the nation's largest cities, where common crime is heavily concentrated.

Later, the coverage of NCP will be expanded to provide data for the central cities of an additional 20 SMSAs.

For individual state statistics, we are exploring the cost and feasibility of providing the crime data for the largest (perhaps top 15) states. At this point, data for each of the remaining 35 states on an individual basis could not reasonably be provided without an enormous increase in sample coverage and hence, cost.

The data will be tabulated for each of the ten federal regions, which, of course, are the same as the LEAA regions. In addition, data will be shown for cities in aggregate in the following size groupings:

50,000–249,000 POPULATION
250,000–499,999 POPULATION
500,000–999,999 POPULATION
1,000,000 OR MORE POPULATION

Moreover, tabulations will be provided for suburban metropolitan areas (balance of SMSAs, excluding central cities) as well as small urban and rural territory, so that trends in the incidence of violence and common theft can be charted for change in these important segments of America.

What is the relationship between NCP and the FBI's uniform crime report?

COMPARISON TO UCR

The crime incidence measures from the crime panel will complement the crime index figures from official police statistics released through the FBI's *Uniform Crime Reports*. The crime panel will provide estimates of the amount of crime that goes unreported to police and an assessment of citizen reasons for failing to report crimes to the police. In addition to showing overall crime rates, as does the UCR, the panel will provide victim rates for the relevant populations: it will show rates for stranger-to-stranger offenses, and a host of detailed characteristics about crimes and victims not regularly available to police departments and thus not in FBI statistics. On the other hand, a large amount of police-reported or police-related data regularly issued in the UCR will not be addressed by the National Crime Panel for a variety of both substantive and technical reasons. For example, in its early stages, NCP will make no attempt to measure certain types of larceny which do appear in the FBI series – notably, shoplifting and employee theft. Neither will the NCP contain information on number of arrestees or clearance rates.

SURVEY FLEXIBILITY

The basic survey questionnaire, which is used on a monthly basis, will provide the fundamental estimates of crime amount and type on a regular basis. The survey is, however, an omnibus collection vehicle, to which periodic supplements can be added as needed. To this end, as new problems

arise in the criminal justice community which are amenable to statistical study via the panel, questions can easily be added to the basic questionnaire.

To this end, we fully expect to be continually utilizing the panel for ad hoc needs, including such things as victim contact with the court system and prosecutors; outcome and degree of satisfaction with such contact.

One supplemental survey which has already been attached to the crime panel was interviewed in September. This supplement dealt with attitudes concerning citizen utilization of public services, restaurants, streets and entertainment facilities. In addition, respondents were queried about their opinions on crime in their area, whether they feel their local police are doing a good job, and other topics.

The attitude supplement, incidentally, is also part of the basic interview coverage in each of the independent surveys conducted in the 16 large cities.

PUBLICATION SCHEDULE

LEAA hopes to begin publishing quarterly indices of change for some of the more patient statistics collected in the national portion of the survey around August 1973.

The first detailed annual report will be ready for publication at the end of 1974 and will relate to crime data for calendar 1973. Prior to this we expect to publish a detailed report covering the 6-month data period July 1972 – December 1972.

For the impact cities, data are expected to be tabulated about May 1973. The remaining cities will follow in about 3-4 months.

In addition, it is planned that a number of in-depth, analytical monographs or other papers will be generated from within the Statistics Division and from the Research Operations Division of the National Institute.

SESSION II

STATE-OF-THE-ART PAPERS

SESSION II-A
POLICE INFORMATION AND STATISTICS
COLONEL JOHN R. PLANTS, CHAIRMAN

SESSION II-B
COURTS INFORMATION AND STATISTICS
LARRY POLANSKY, CHAIRMAN

SESSION II-C
CORRECTIONS INFORMATION AND STATISTICS
DR. LAWRENCE A. BENNETT, CHAIRMAN

SESSION II-D
CRIMINAL JUSTICE INFORMATION SYSTEMS
DESIGN AND IMPLEMENTATION
JAMES R. DONOVAN, CHAIRMAN

SESSION II-E
IDENTIFICATION SYSTEMS
GARY McALVEY, CHAIRMAN

SESSION II-F
INFORMATION FOR CRIMINAL JUSTICE PLANNING
ROBERT CREW, CHAIRMAN

SESSION II A

POLICE INFORMATION AND STATISTICS

Colonel John R. Plants, Session Chairman
Director
Michigan State Police

The session on Police Information and Statistics gave to the attendees a broad view of the great strides that have been taken in this area in recent times. The knowledgeable people that presented papers left no doubt that this is a vastly expanding field, and we have just scratched the surface of computer uses in law enforcement.

Papers were presented which covered the broad spectrum of law enforcement uses of computer applications. These included complete descriptions of the extremely versatile Alert II system operating in Kansas City to systems for recognizing patterns of crime and suggesting responses to these patterns. The session was well attended, which indicated further the high interest law enforcement holds in this area.

The question and answer periods following each presentation were never sufficient to handle all of the questions, which was a tribute to the caliber of the paper and the expertise of its presentor.

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LONG BEACH PUBLIC SAFETY INFORMATION SYSTEM

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INTRODUCTION

In recent years there has been a dramatic increase in the challenge of city management. A growing crime rate, mass civil disorders, problems with the ecology, urban transportation and the like provide great tests of management skill for today's municipal executive. Information about people and the urban environment is a critical requirement for effective municipal management. Recent technological innovations in the computer sciences offer a means for greatly improving the processing of information through the municipal structure and provide the availability of that information to city management. It is both vital and natural that computer based information systems be implemented to serve on-going operating activities and provide management with data for the analysis and control of municipal functions.

However, the development of a comprehensive municipal information system is a costly and complex task. An independent effort by a municipality to research, develop, and implement a system would require substantial technological resources, together with a large appropriation of local tax dollars to fund the project. Furthermore, individual projects across the nation would lead to great duplication of effort, use of resources and cost.

It was with these facts in mind that the major Federal agencies concerned with urban programs established a coordinated research effort to develop municipal information systems.

The Urban Information Systems Inter-Agency Committee (USAC) Program was established on September 10, 1968, by the Secretary of the Department of Housing and Urban Development. Sponsoring the program were representatives from 9 Federal agencies, currently 10 with the addition of the National Science Foundation:

- Department of Housing & Urban Development
- Department of Justice
- Department of Transportation
- Department of Labor
- Department of Commerce
- Department of Health, Education & Welfare
- Bureau of the Budget
- Office of Economic Opportunity
- Department of the Army, Office of Civil Defense

The USAC Program, supported by multi-agency funding, initiated two classes of effort: One, a long range program directed at total municipal information systems, and a second directed toward functional systems as illustrated in Figure 1.

During July, 1969, the Department of Housing & Urban Development, acting on behalf of USAC, initiated a nation-wide procurement action inviting 250 cities to compete for two classes of contracts. Under one class, two contracts were to be awarded for long range programs in total municipal information systems. Charlotte, North Carolina, and Wichita Falls, Texas, were selected to undertake those projects. The second class of contracts was directed at four specific municipal functions; Public Safety, Physical and Economic Development, Public Finance, and Human Resources. One development contract was awarded for each functional system. The cities selected for these projects were:

• Public Safety	Long Beach, California
• Physical & Economic Development	Reading, Pennsylvania
• Public Finance	Dayton, Ohio
• Human Resources Development	St. Paul, Minnesota

PUBLIC SAFETY SYSTEM

A consortium of the City of Long Beach, Mauchly-Wood Systems Corporation (now known as the Systems Development Division, Digital Resources Corporation) and the Institute for Police Studies, California State University at Long Beach, was formed to develop the USAC Public Safety System.

Public safety is that function of municipal government concerned with the protection of human life and property. Activities associated with public safety are conducted principally by the police department, fire department and civil defense units. However, public safety as a municipal function cuts across the organizational lines of all city departments and is a responsibility carried out at many levels of city management.

The Public Safety System under development in Long Beach, California, is intended to support the on-going operational activities and decision-making requirements of the city's police, fire, civil defense and licensing/code enforcement functions. In addi-

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MUNICIPAL INFORMATION SYSTEM

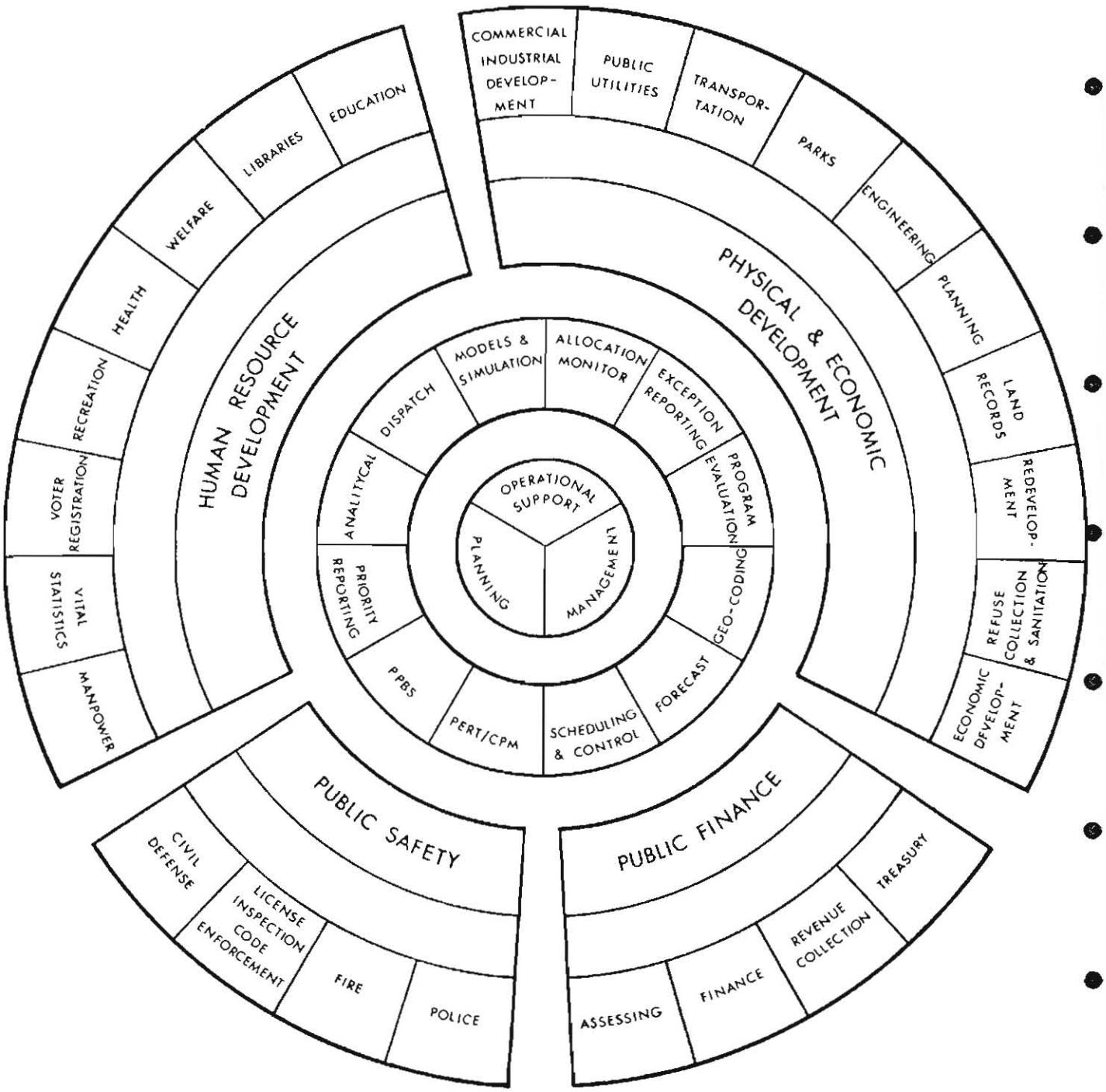

Figure 1

tion, the system is also intended to accept data from outside the municipal structure (regional, state, and federal) that have a direct bearing on the internal data requirements. In turn, information accumulated from city operations could be made available to other government bodies and jurisdictions.

LONG BEACH STORY

Located in Southern California, the City of Long Beach is at the southern-most end of Los Angeles County and is contiguous with the Orange County border. Situated on San Pedro Bay, with the Port of Long Beach harbor complex, it is the second largest city in the County and fifth largest in the state.

Covering approximately 50 square miles, with a population of 385,000 and a transient population of 500,000, the City is included in the Greater Los Angeles Basin Area and is part of the Los Angeles-Long Beach Standard Metropolitan Statistical Area (SMSA).

The City has had a Council-Manager plan of local government since 1921. Its Police Department, with 670 sworn and 180 civilian personnel, operates out of a modern 6 story Public Safety Building that also houses the Fire Department Administrative Headquarters. Its Fire Department, with 457 uniform and 9 civilian personnel, operates 18 fire stations, 3 boat stations and 1 aircraft crash rescue station throughout the City. The Department of Emergency Preparedness, with 4 civilian personnel, operates from the subterranean Emergency Operations Center located at the Municipal Airport. The City's Data Processing Division, responsible for all computer operations, is providing the necessary hardware and support for the System.

Due to this Symposium's emphasis on criminal justice information systems development, this paper will not cover the concurrent activities in the Fire Department and the Department of Emergency Preparedness.

The Police Department, headed by a Chief of Police, is organized into three bureaus. An Assistant Chief and two Deputy Chiefs each command one of the Bureaus (Administrative Operations, Field Operations and Investigation Operations).

The Department maintains its own jail and crime lab. It utilizes modern techniques which include the 4-40 plan for field operations deployment, operation of its own helicopters (3) and it is a contributor to and user of the computerized Regional Automated Want/Warrant System (AWWS).

ANALYSIS

The first task of the Long Beach Project was identified as Systems Analysis. The objective of this task was to identify and document current information processes within the Police Department. The findings obtained in the analysis facilitate the identification of activities which can be assisted by improvements to the system. It will also provide the detailed data from which to derive a system design that will satisfy the operational and management needs.

Methodology employed to gather information involved the use of some new innovative analysis techniques. Information on current processes was gathered during more than 250 interviews with personnel performing the various activities and documented in more than 2000 work flow diagrams. Some 1088 separate forms and 1048 separate files were identified and their contents reviewed. These findings were subsequently consolidated, through automated techniques known as Meta Data, to reflect overall departmental operations and data dependencies. The use of this automated technique also facilitated the identification of all data elements appearing on forms now in use as well as the locations that collect and maintain redundant information.

Using the cost data developed in the Meta Data reports, it was possible to identify the comparative costs associated with processing particular forms. Based on the relative figures, the ten most costly forms processed by the Police Department were identified as:

1. Crime Report
2. Field (Crime) Report
3. Vehicle Accident Report
4. Parking Citation Notice to Appear
5. Report of Arrest
6. Teletypes (in and out)
7. Radio Log
8. Additional Information Report
9. Alpha File Index Card
10. Report of property

More than 50% of the total forms processing cost is attributable to these ten forms. They produce approximately 750 other reports or summaries and more than 650 files are created to store the information. This indicated that the major information processing problems are fairly well isolated and the amount of file duplication, of file decentralization, indicated a need for rapid and

repetitive access to the same basic information by various details and individuals.

The analysis findings identified that there is also duplication in the review and decision making processes. As a result of this, the analysis of information requirements and needs was performed in conjunction with the data element analysis. Primary prerequisite for eliminating much of this duplicated effort is to provide an efficient and rapid access to centralized files. Such a solution could also provide increased information to field units which is not presently available on a timely basis.

Additionally, the relationship of the police function to other municipal operations and to other governmental agencies was also examined to identify all external interfaces that would impact the system design.

With the analysis complete and the needs identified the second task of the Project was undertaken, developing the concept.

CONCEPTUALIZATION

The primary objective of the Conceptualization Task was to develop a plan which would consider all major information elements, describe how these elements would bind various system components together and provide for an incremental and orderly implementation of components that comprise the integrated subsystem.

When considering police information requirements, they can be grouped into three broad categories: operational, supportive and environmental. The operational category includes the traditional police-citizen contact reporting where crimes, citations, field interviews, etc. are recorded for subsequent use in the prevention, suppression and investigation of crime and traffic problems. It is this category of information that is being used to develop the police components. The supportive category includes those reporting tasks not directly related to the crime or traffic problems, but whose purposes support a city-wide system such as personnel record keeping, financing, inventory and stock control, etc. The supportive informational needs are not directly addressed in this system since the primary focus is on operational needs. Environmental Information, also not addressed, is concerned with data about the community served. It is anticipated that the latter two categories of information will become available as the city implements other subsystems in the future.

The methodology employed was designed to realize maximum benefit from state-of-the-art technology, personal experience of the project staff, experts in the field of public safety, and the analysis findings. Extensive interaction between the project team and city operating personnel served to insure development of concepts which are truly responsive to departmental requirements.

Surprisingly, the different inputs resulted in basically the same ideal system. As a result of these inputs, the concept centered around eight major components, which were identified as:

1. In-Custody
2. Case Reporting
3. Traffic Reporting
4. Investigation Support
5. Calls for Service
6. Want/Warrants
7. Vehicles and Licenses
8. Stolen Property

Through these eight components, virtually every source of operational information that is documented within the Police Department was covered.

The conceptualized components incorporate both horizontal (within the city) and vertical (within the county, state or nation) linking mechanisms via the system data bases. Careful consideration has been directed toward the interrelations and data dependencies of police functions with other municipal agencies such as the City Prosecutor and Traffic Engineer. In addition, appropriate regional, state and federal systems were included in the design because of their effect on normal operating requirements of the Long Beach system. In the State of California and in the County of Los Angeles, in which Long Beach is located, the need for Want/Warrants, Vehicles/Licenses and Stolen Property Components was not necessary, as those are all currently being done either by the State or the County. Therefore, the first five components are those toward which the Long Beach project directed its efforts.

The computer selected for the System was IBM's 370/145 (512K and virtual memory feature) and its software package, IMS. Major improvements in data acquisition such as on-line data entry, via CRT, directly to the on-line system will be possible through the use of data base management technology and the IMS Package. With this capability, data will be captured at the time the report or information first reaches the station thereby providing an operationally oriented, centralized data base.

The CRT (Sanders 622) and teletypewriter terminals (IBM2740), using a flexible inquiry capability rather than a structured inquiry format, will access the data base and provide for hard copy

printout. The use of remote terminals in this manner is expected to improve dramatically the timeliness and accessability of report information, in any form, for those units that have a need for the data.

Data security and confidentiality will be provided by way of data base administration, software techniques and increased security measures adopted by the Data Processing Division.

An important characteristic of the Public Safety System will be its adaptability to changing needs.

SYSTEMS DESIGN

At the completion and acceptance of the Conceptualization Plan, priorities for implementation of the various components were assigned by police management and the design task for the first component began.

System design details the component and applications required to implement the envisioned system. During this task, the information system elements required, whether manual or automated, are specified in detail and the relationships between components, data bases and applications firmly established. The Conceptualized Plan provided the guidance required to define all components which will interface and to identify program modules which could be applied to more than one component.

DEVELOPMENT & IMPLEMENTATION

Detailed functional specifications were then written to guide the programming staff in generating the computer software.

As the programs became operational and the necessary hardware was installed, tested and accepted, the first component, Investigative Support, was brought on-line to serve the Long Beach Police Department.

Each succeeding component will be developed in a similar manner, i.e., the detail design, development of the software and implementation with the existing on-line system. The following descriptions outline the basic concepts behind the development of each component.

INVESTIGATION SUPPORT COMPONENT

The purpose of this component is to provide a broad and readily accessible base of information to aid police investigators in linking suspects to crime occurrences. It will be used to assist in the process of identifying possible suspects by allowing the information base to be searched relative to specific criteria and then displaying all information in the base which matches the criteria specified.

The information base upon which the system can act will contain data derived from Field Interview Cards (F.I.'s), Moving Traffic Violation Citations, and Pawn Shop Tickets. The F.I.'s are used to record the fact that a contact was made between the Police and an individual or group. Interview information is not collected for all contacts between officers and citizens but is intended primarily to document suspicious occurrences for which no criminal violations can be identified. Citations are written to document the fact that a violation of the law has occurred. The information recorded can, however, also be utilized to identify the location of an individual or vehicle at some particular time. Pawn tickets are utilized to provide information about persons who have pawned articles as well as information about the article. This information is used to aid in the recovery of stolen articles as well as providing a broader source of people oriented data which could assist in matching crimes with suspects.

The data will be entered into the system by an on-line CRT terminal located in our statistical section. Inquiry to the system will be made available to the investigators by an on-line CRT terminal and a hard copy keyboard device. Thus, it is envisioned that the officers of the investigative bureaus will be inquiring into the system as opposed to having operators perform that function for them.

This system was designed to allow inquiries to be made through a form of language identified as keyword. It simply means that every element of information in the data base can be searched by a keyword and there are approximately 42 different areas for searching. The advantages of a keyword language is that it can be used on either a hard copy or CRT device and it allows for ease of expandibility when new components or new information is added to the system. The investigator will prepare his keywords prior to making the inquiry and establish the parameters with which he is concerned. These parameters can be in several relationships which allows the investigator to search a broader base. An example would be the investigator's searching between certain dates or to search in an "and" or "or" relationship. The investigator will be able to tailor his inquiries into the system to meet his needs.

This component, which is the first of the System to be implemented, is now operating on-line and is available to investigative personnel.

CASE REPORTING COMPONENT

One of the major information documents utilized by a police department is the "Crime" or case report which records incidents of criminal and non-criminal acts as reported to the police. This document triggers the police response and sets into motion those processes designed to control the situation. Patrol units must be promptly alerted to the problem and may be required to intensify coverage in the area. Knowledge of prior criminal occurrences in the same area is of vital importance in assessing the extent of the problem and in the allocating of resources in an effort to apprehend the suspect or at least reduce further instances of crime. Investigative efforts must be initiated at once to gather all information pertinent to the case and if not already in custody, the suspect must be identified and apprehended.

To provide this level of service required, in addition to the patrol and investigative staff, a sizable civilian force operating in the background to type, duplicate, distribute, index, keypunch, file, log, retrieve, tally or report on the volumes of information is necessary to support the patrol and investigative functions.

The Case Reporting Component is intended to serve as a readily accessible repository of pertinent case report information that will automatically provide this support, and more, in a timely fashion. As the reports reach the station and are reviewed and approved by supervisory personnel, select data will be entered, via CRT terminals, directly to the on-line system. With the report information now resident in a computerized file, it can be manipulated so as to provide instant utilization of the data that is now manually processed.

The System will provide daily reports for each patrol watch that summarizes select crime occurrences and groups them by car district to pinpoint crime activity and optimize available patrol time. Weekly and monthly reports of the same type will also provide data beneficial for deployment planning. Management type reports for patrol will provide for such diverse information as crime statistics for local and state reporting requirements to personnel report writing activity for the month.

Investigative units will have the capability to manipulate vast amounts of crime report information in a rapid manner as an aid in correlating similar crimes for purposes of suspect identification, developing a strategy for apprehension or for "clearing" crimes. They will also have the capability to retrieve or update case report information to satisfy public inquiry and management reporting.

In conjunction with the Investigative Support Component, the System, which will include a local stolen property file to enhance the State's identifiable stolen property file, will automatically compare input pawned property items with stolen items in file. The capability also exists for the investigator to search the pawned property file for previously reported stolen items.

Clerical personnel will be able to retrieve summary report information instantly, via CRT and an automated index feature, and to expedite file searches in response to departmental and public inquiries.

The implementation of this component is expected to increase the effectiveness of the patrol forces, investigative personnel and clerical staff by rapid retrieval, increased utilization of data and the reduction of redundant processing of case report information.

Further enhancements will be possible with the addition of a message switching capability to the System via a regional source or local procurement.

The detailed design phase of this component has been completed, functional specifications have been documented and the programming staff is at present developing the software.

IN-CUSTODY COMPONENT

The arrest and subsequent booking of an individual is the beginning of a series of paper generating processes that impact virtually every major unit in the police department and also dilutes the available patrol force for that period of time necessary to complete the booking and report writing process.

Another important consideration is the rapid, position identification of the arrestee in order to determine accurately if the subject is wanted elsewhere under the same name or an alias, prior to his release on bail or own recognizance. This same type of information, in the form of a "Rap" sheet, is a necessary ingredient to the investigator handling the arrest followup; a District Attorney in establishing bail in a felony case as well as to a Judge once a guilty verdict has been entered. Another requirement is to make this arrest information, as well as any court disposition, available as soon as possible so that inquiring family members and friends can be informed as to the charge, bail, court date, etc. There is still another use for this information that is slowly declining primarily because of a time factor. That is the "Record Check" by field units via police radio. Many consider this type of information to be extremely beneficial because it provides yet another dimen-

sion that better equips the field officer to evaluate the situation at hand and, based upon that evaluation, to take whatever action is deemed necessary.

This component, currently in the detail design stage, is concerned with the initial booking process and the subsequent activity associated with that process. The System will collect and store primary booking data, entered via a CRT terminal at the booking location, at the time of booking. At the conclusion of the data entry, the System will assign a booking number and print a multipage, multi use arrest and booking document at the booking location. This multipage set will include such documents as the Arrest Report, Prisoners' Property Receipts, Booking and Identification Sheet, Jail Custody Card, etc., thereby relieving the officers or clerical personnel of the need to initiate these documents manually. In the case of some pages (arrest, etc.) there would be additional information added to the document after the booking process was completed.

Records personnel would then update the computer record with the arrestee's local and/or state criminal identification number and on the first time through the system, a summary of the arrestee's prior arrest history. The system would then, automatically, make a check through the regional warrant system, the Los Angeles Police Department's Automated Want/Warrant System (AWWS) as well as an automatic update to another regional system, the Los Angeles Sheriff Department's Automated Jail Information System (AJIS).

Each day prior to court, the system will print out the court list for the jailer, the bailiff and the investigators. Included in the investigators' printout will be a "rap" sheet type summary of the arrestee's prior arrest history as it appears in the system. For certain select crimes (burglary, robbery, etc.) the investigator may update the record with M.O. and trademark codes particular to the arrestee. These become part of the permanent record and may be useful when searching the known-offender file for specific M.O. or trademark characteristics in an effort to identify an unknown suspect.

At the conclusion of the arrestee's case (released, sentence served, etc.) the system will printout a brief summary of the record and all transactions for filing in the arrestee's package. The bulk of the data will then be purged and an index of the arrest and disposition will be appended to the arrestee's permanent system record. This permanent system record is then available for on-line record checks. It is anticipated that a records check and a want/warrant check will be made simultaneously, and automatically in a matter of seconds at the request of the inquiring officer.

Inquiry terminals will also be installed at the Records Section and the Public Information Counter as the system will act as an automated index with response summaries designed to satisfy the informational needs at these locales.

TRAFFIC REPORTING COMPONENT

Another important area of concern for the police administrator, as well as the City Traffic Engineer, is traffic safety. In this regard, two basic police documents, the traffic citation and the traffic accident report(s), serve as the source document in developing an effective traffic safety program. Historically, traffic accident is correlated to the traffic enforcement effort (citations) on a monthly basis. From this correlation a plan is designed to bring the enforcement effort in line with the accident problem. It also serves as an indication of an individual officer's efforts in the enforcement phase.

These same documents are also an important source of vehicle information useful to the detective investigator as well as the accident followup investigator. However, the normal indexing and filing of the documents do not lend themselves to any type of search except by violator's or driver's name or perhaps the day involved. As a result, they are seldom searched except in extreme situations that warrant the time involved. And as with the other documents already covered, these are repeatedly indexed, listed, summarized, tallied, logged, etc.

The Traffic Reporting Component will process select data from the traffic citation and the traffic accident report and will provide an automatic capability designed to produce a variety of citation/accident correlation reports. These reports, formatted for car plan and/or motorcycle beats, will provide supervisory personnel as well as field personnel with sufficient data to monitor effectively and influence the traffic accident/enforcement picture in any given area of the city. Other management reports, e.g., monthly officer activity, monthly accident totals, etc., would be provided as a by-product.

In conjunction with other components, data from these traffic-related reports will be available for on-line search by investigative personnel. For this reason, citation data is now being captured under the Investigative Support Component.

CALLS FOR SERVICE COMPONENT

The Calls for Service Component includes those information processes which support the dispatching of police units in response to request from the public, officer initiated activity and officer request for information to support operational needs. All the processes within this component are directly or indirectly triggered by requirements for police service. The processes identified in this component involve extensive man/machine interaction. The concept, at the present time, will add CRT terminals within the dispatch center for transmission of information to the computer.

The Calls for Service Component will function in the following manner with regards to the request from the public for service. The citizen will call the police department emergency number and ask for a police unit for service needs. The service desk officer would receive the call and, at the time of talking to the citizen, input through a CRT the address and the type of call that is being requested. While still talking to the citizen on the phone the service desk officer will receive verification of the address if it is within the City. Once he has verified this and made any corrections if necessary, he then forwards the information to the dispatcher. The dispatcher will receive the information after it has passed through the computer, which will additionally tell the dispatcher the appropriate unit to send, if the unit in that beat or surrounding beats are in service, and any incident history pertaining to that address. This incident history considers previous dispatches, arrest and other related police activity which can be important for operational needs.

The officer initiated service will allow the officer in the field to call the dispatcher and advise the dispatch operator of the type of activity he is involved in. The dispatcher will be able to input into the system the unit number, the activity, verify address, and receive incident history information which he can then relay back to the officer in the field. Additionally the dispatcher will be able to inquire into the system with regards to arrest history, want and warrant information, Department of Motor Vehicle registration, stolen vehicles, and many other informational services which might be of importance to the field officer.

Through this type of informational system the dispatcher and the supervising officers will be able to monitor the activities for security and supervision of field personnel.

MANPOWER RESOURCE ALLOCATION

Manpower resource allocation actually encompasses information from all of the various components combined. This gives us information about the time the officer is spending in the field with regards to calls for service, officer initiated activities, field interview cards, traffic citations and accidents, arrests, and crime reports.

A true manpower resource allocation system is based on total time spent by the officer in the field with relation to all activities he must perform, thus actual crime vs. patrol time correlations become meaningful. With this information readily available, the management staff of the department will have increased capability to determine effective deployment most beneficial to the department and the city.

CONCLUSIONS

The impact of implementing a public safety information system on a police department can only be speculated and projected upon as this total systems approach has not been implemented in a municipal police agency anywhere in the country.

The present operational procedures of the police department will have to be modified to utilize fully the capacity of this sytem. Some of these modifications have been mentioned in the various component descriptions. Others, while not as a result of automation, came about because the initial detailed analysis provided an overall view of the Department's operations heretofore not possible. And because Long Beach police officers will be living with computers and CRT's for many years to come, the officer training program will include computer applications and terminal operations.

This system should be beneficial in creating a team approach towards solving crime. Currently, police agencies across the country have over specialized to the level of expertise. As a result many officers in the various divisions never consult or consider the problems of the field officers and vice versa. Many times information that is maintained by one officer is not readily known or available to another officer. Through this system we can create a team approach, even to the point of developing a generalist/specialist approach of operations, dependent upon the wishes of the department. This can be done because the information will be gathered one time at its source for ready and rapid accessability. Thus, ease of data manipulation based on the need of the individual will be one of the keynotes of this system.

An additional benefit to the criminal justice field and municipalities across the country is concept transferability. It is felt that total transfer of a system is not practical nor possible. However, the basic concept, analytical methods, documentation and some programming techniques can be utilized elsewhere thus reducing the cost for development and implementation of a police system. Another major benefit of the concept is that it can serve as a master plan for action, which can be developed and funded on an incremental basis. Additionally, although currently designed for a municipality, the System is expandable for multiple users. Thus, it could serve a regional application.

We are developing a prototype system. Our concepts are based on detailed knowledge gained from a thorough analysis, interpreted by personnel with extensive backgrounds in law enforcement and the computer sciences and concurred in by police and computer science experts in the academic community.

The experiences to date indicate that our concepts are sound. However, the on-going development of this system requires attention to detail and a close working relationship between designers, users and computer shop personnel. We are continually on the alert for problem areas so that they may be mutually and expeditiously resolved. We anticipate some changes. There is no easy road.

The Long Beach Project Staff has taken the position that a total system requires total understanding.

We look forward to bringing you up to date at the next symposium. Meanwhile, should you visit the City of Long Beach, we would be happy to arrange a demonstration for you.

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RESULTS AND EVALUATION OF THE PATRIC OPERATIONAL TEST-BED

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INTRODUCTION

The *Pat*tern *R*ecognition and *I*nformation *C*orrelation (PATRIC) Project, an automated approach to tactical information correlation and retrieval, addresses the problem of dealing with the tremendous amount of crime and crime-related reports processed by the Los Angeles Police Department. Each day, the LAPD is inundated with approximately 650 Part I Crime reports. In only a few months, the quantity becomes staggering and prohibits the effective utilization of the data for other than purely statistical purposes. For example, it is virtually impossible for an investigator to survey crime reports outside his particular division of assignment for similar elements of *modus operandi* (MO), suspects, or vehicle description. Thus, potential information leading to case clearance may be lost. In patrol divisions, radio cars are deployed on crime patterns ascertained by a laborious manual search and tally of recent crime occurrences.

As a result of analyzing the problem of unmanageable data, it became increasingly obvious that an automated system of storage and access should be developed. The PATRIC Project was thus conceived to meet the following goals:

1. Provide efficient and effective use of tactical and investigative police MO, suspect, vehicle, and stolen/pawn information files.
2. Provide users with timely, correlated, and condensed data.
3. Maintain a dynamic system capable of being readily modified as tactical MO considerations change to reflect contemporary conditions.

In order to meet the expected goals, a three-step developmental effort was undertaken. Step I, from January 1, 1971, through February 28, 1972, provided for the definition of the data base, incorporating elements of crime reports, Field Interviews, Investigators' Final Reports on felonies, Registered Sex Offender registrations, and pawned/stolen property information; and the establishment of an on-line test-bed operation to research and validate the PATRIC concept. City-wide information was made available to investigators and patrol supervisors. Step II, March 1, 1972, through August 31, 1972, encompassed the completion of the research objectives, definition of system requirements, and presentation of several development and design alternatives. Step II-A, September 1, 1972, through April 30, 1973, will produce partial programming and purchase specifications for the final system. Programming will be completed and the necessary software and hardware purchased and installed during Step III, May 1, 1973, through December 31, 1973. Implementation of the final system is scheduled for January 1, 1974.

The development of PATRIC through Step II will be discussed in the subsequent sections of this paper, including a description of the test environment, results of the test-bed operation, and a comparison of alternative development and design approaches to achieving an operational system. Appendices I and II will enumerate specific system requirements and costs for development and annual operation.

THE TEST ENVIRONMENT

Realizing that theoretical designs do not always meet the needs of the real world, it was decided to implement a prototype on-line PATRIC System in a limited test environment. Not only would the feasibility of the PATRIC concept be explored, but also a degree of operational support for police functions could be provided. Thus, on July 6, 1971, the PATRIC Project implemented on-line access to its preestablished data base.

Hardware and software support was provided by the System Development Corporation, Santa Monica, California. The initial software system, the Commercial Data Management System (CDMS), was used until May 22, 1972, when a change was made to the prototype DS/3 data management system. This change resulted in significantly reduced response times and more easily understood output.

The test-bed operation included eight interactive terminals operating in six adjacent geographic police divisions of the City of Los Angeles. The six test divisions involved were Central, Rampart, Southwest, Hollywood, Seventy-Seventh Street, and Wilshire, which cover a total area of 92.9 square miles, and contain a combined population of over one million people. These divisions encom-

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pass highly concentrated commercial-industrial districts, lower economic inner-city neighborhoods, high-rise apartment areas, and middle-income residential areas. The selection of these divisions represented a cross-section of most socio-economic groups found in Los Angeles.

THE PATRIC DATA BASE

The data base established by PATRIC for the test was composed of eight files, grouping like crimes together and permitting the storage of six months' worth of data on each disc pack before a given file would require purging. The file name, number of entries, and crime type included as of August 31, 1972, the end of Step II, are listed below. Approximately eight months of data are currently included due to the increased storage capacity of the prototype system.

File Name	*Number of Entries*	*Crime Type*
Crime	15,520	Aggravated Assault Child Annoyance Child Molest Homicide Indecent Exposure Kidnap and Attempts Miscellaneous Sex Crimes Prowl Rape and Attempts
Robbery	41,891	Bunco Drunk Roll Grand Theft Auto and Attempts Pickpocket Purse Snatch Robbery and Attempts Theft from Person and Attempts
Burglary	43,182	Burglary and Attempts
BTV	26,345	Burglary from Vehicle and Attempts Grand Theft from Vehicle Theft from Vehicle and Attempts
Field Interview (FI)	80,939	Auto Field Interviews
Suspect	7,357	Sex Registrants Investigator's Final Report
Pawn	6,602	Pawn transaction in following categories: Guns and equipment Business Machines Cameras and equipment Watches Jewelry Radio and TV equipment Power tools
Property	Discontinued April 1972	

THE PATRIC RESEARCH ANALYST

Located in each of the test divisions was a Research Analyst (RA), who served as the link between Department personnel and the testbed PATRIC operation. The Research Analyst operated the computer terminal and performed the *modus operandi* analytical activities on an operational basis for Department personnel while operating on a research basis for PATRIC Project personnel. This dual responsibility made it difficult at times to carry out both functions satisfactorily.

Basic job requirements established for the Research Analyst position included a bachelor's degree, a minimum of six months' experience with the Los Angeles Police Department, and analytical experience or ability. The six months' experience allowed for opportunity to become familiar with crime reports, concepts of MO and general police jargon. The analytical ability was essential for determining patterns of crimes, both for case clearance and repressive patrol. Adaptability also proved to be a key factor to success because of such factors as new MOs appearing, unexpected results being obtained through the correlation process, and several different software systems being employed. The Civil Service classification chosen for the Research Analyst position was Administrative Assistant.

Working in the test divisions the Research Analysts encountered different needs between patrol and detective processing. Even within the two major segments of patrol and detective, there were differing approaches developed early in response to the nature of the requests received.

The Research Analyst in a detective division familiarized himself with the various methods of investigation. Basically, he found that the detective could utilize PATRIC information in two ways. The first method began with an unsolved case. A search was made for similar cases by matching MO, suspect description, or vehicle description, or some combination of the elements. Three files were usually searched: the appropriate crime file, the Field Interview file, and the Suspect file. The searches produced matching crimes which often provided better physical descriptions, additional elements of MO, additional victims for future identification of possible suspects, or even named suspects from already cleared cases, F.I. cards on involved vehicles, and data on suspects known to have committed similar crimes.

The second approach to PATRIC was to link crimes to a suspect already in custody. Reports

obtained from this type of search helped build a case against a suspect, decreased paper work by clearing many crimes simultaneously, and assisted detectives in other divisions who may not have known the suspect had been arrested.

Between the correlation attempt at the terminal and the presentation of information to the investigator, there was an intermediate step of gathering related data and screening it to determine its utility. Correlated hardcopy crime reports were pulled and read to insure that the information was kaypunched correctly. Other data, such as copies of Field Interview cards, mug shots, criminal history records, and vehicle registrations were collected in order to prepare a complete package of PATRIC-obtained data for the investigators. It was observed that detectives were more willing to use PATRIC information if the entire package was prepared for them. Therefore, Research Analysts provided this service.

Before attempting a correlation, it was essential that the analyst have an opportunity to question the concerned investigator regarding MO and solicit as complete a picture of the known facts of the case as possible. This was often the only way to obtain MO information known only to the investigator.

The analysts had to be familiar with everyday police jargon so that they might communicate in terms familiar to police personnel. This had a distinct, positive effect on user confidence. Having interacted with the investigator, experience showed, the analyst could proceed to query the system effectively without having the investigator present.

System output also had to be returned to the investigator by the analyst and reviewed in detail to insure that pertinent information was called to the detective's attention. User interest diminished when printouts were forwarded without personal interaction, often resulting in no further requests for PATRIC processing.

Some Detective Bureau-wide procedure to insure adequate coordination between divisions was found necessary to avoid duplicative information processing and, much more important, to allow for interdivisional teaming of investigators or some other method of conserving investigative resources in such cases.

The goal of the Research Analyst in a patrol division was somewhat different from that of his counterpart in a detective division. Rather than being concerned with individual suspects and case clearances, he directed his attention to developing crime patterns within a certain area and deploying patrol units as a repressive measure to decrease the frequency of crimes. Several suspects and vehicles were identified as being active within the area, so that patrol cars had specific things to look for, in addition to just being a visible deterrent to crime.

There were two primary methods by which the Research Analyst approached the task of supporting patrol deployment. In the first method, the geographic division was surveyed to identify the crime problem of greatest concern, i.e., the area of greatest increased activity. A profile of the problem area was then composed, identifying crime types, time of day, day of week, method of operation, suspects/vehicles involved, and so forth. A particularly useful feature of the software system called 'grid' allowed the plotting of two elements such as time of day and day of week, for a given crime type within a specified geographic area. Later in the project a third approach examined the concept of 'adjacencies', a term used to denote a reporting district and all its surrounding (adjacent) reporting districts. An historical seasonal norm of crime occurrences for each adjacency set was established. Thus, when subsequent statistical reports of crime occurrence by adjacency groups were generated by the PATRIC System, they could be compared to the norm to measure the decrease/increase of crime in the area. A significant increase in an area triggered the procedure necessary to produce a current, useful area profile.

With the above described resources of test divisions, hardware/software configurations, and Research Analysts, the PATRIC Project was able to conduct a productive fourteen months' on-line test.

RESULTS OF THE TEST-BED OPERATION

The test-bed operation was subject to both statistical and subjective evaluation. Whenever possible, evaluative measures were introduced to gauge the effect of a given activity. The research results can be categorized by the following areas of activity: investigative support, automatic correlation strategies, patrol deployment support, direct data input, stolen property/pawn connect-up, and identification of multiple occurrences of selected data elements.

CORRELATION RESULTS

In pursuit of a statistically valid sample for investigative processing, a goal of 2400 correlation attempts was established. The goal was first divided

proportionately according to frequency of occurrence among ten major crime types: burglary, robbery, homicide, grand theft auto, theft from person, rape, bunco, child molest, indecent exposure, and kidnap. Subsequently, a revision was made to reflect the additional factor of demonstrated amenability to computer processing. Each correlation attempt, upon completion, was classified as "successful" or "unsuccessful" by the Research Analyst according to the information retrieved. If information was retrieved which matched on a minimum number of descriptive elements stipulated by the investigator, the correlation was deemed an apparent success. Where the information retrieved included a name, vehicle license number, or booking number, the correlation was further designated a "primary" success; all other successful correlations were designated "secondary".

During the period July, 1971, through June, 1972, a total of 3262 correlations were attempted, and of these correlation attempts, 1112 or 34% met the success criteria set by the investigators. For the final results of Step I and II, it was decided that the required minimum of 2400 correlations would not include the results of the first two months of test-bed experience, due to difficulties experienced in attaining adequate data for the various files. Therefore, the correlation total from September, 1971, through June, 1972, is 2,473 by previously specified crime type, and 312 "Other" crimes for an overall total of 2,785 attempts. Successful correlations accounted for 1,044 attempts, or a success rate of 37 percent. This percentage may be translated into a more meaningful statement: in approximately two out of every five cases, PATRIC was able to supply the investigator with additional information.

The monthly success rate fluctuated from a low of 24 percent in September to a high of 48 percent in January. Figure 1, found at the end of this report, illustrates the percentage of successful attempts on a monthly basis for the nine-month period previously considered. The steady increase in percentage of successful correlations from September through January resulted from a number of factors. First was the improvement of the quality and quantity of the data in the PATRIC data base. Second was the increased interaction between the analysts and the investigators, and third was the increased ability of the Research Analyst to use the PATRIC System effectively. The decrease in successes after February may have been due to discontinuity in the Analyst's activities between Steps I and II, and the failure to maintain the files during the 17 day hiatus.

While the statistical results were impressive, they should be considered in light of the "effective" results, i.e., the extent to which the information actually assisted in case investigation. To this end, interviews were scheduled with detectives who used the PATRIC System during Step I to determine the benefits derived from successful correlations. Over 50 interviews were conducted; however, the quantity of data derived from the interviews was disappointingly low. Several major problems were encountered: 1) a detective's work load often precluded his devoting a sufficient amount of time to preparation for the interview; thus, the PATRIC case was not fresh in his mind and, while he could give a general opinion of the value of PATRIC information, he could not give quantitative data about the results; 2) when interviews were scheduled shortly after the PATRIC information was given to the investigator, he had frequently not had enough time to make use of the information, and PATRIC work load requirements prohibited expending time on follow-up interviews; and 3) the interviews were necessarily brief so as not to impose a burden on the already overworked detective; however, it was found that the amount of time allotted was often consumed by general discussions of the system's capabilities rather than reporting specific results on any given correlation attempt.

PATRIC, even when unsuccessful in correlating reports or identifying suspects, provided a valuable tool for the detective by eliminating various avenues of investigation. Other comments from the interviews centered around suggestions for improving the system, most of which are reflected in the requirements delineated in Appendix I (a subsequent section) of this paper.

In summary, the interviews showed that "effective" results of Step I were favorable, but that a new approach was needed to capture quantitative data about such results.

At the beginning of Step II, a program was implemented to provide routinely for feedback on numbers of arrests, crimes cleared and investigative hours saved as a result of PATRIC assistance. The resultant "PATRIC Correlation Evaluation" form was sent to detectives with the information retrieved on each correlation attempt.

As of July, 1972, 270 evaluation forms had been received by the project. These represented 9 arrests made as a result of PATRIC information, 122 cases cleared, and 1,209.5 investigative hours saved. One

hundred twenty-five of the forms indicated that the investigation had not been completed. The comments made by detectives corroborated the benefits derived from the system. These ranged from a succinct "Great! Good connect-up!" to a report that information from PATRIC was instrumental in assisting the investigator in conducting a more useful interrogation of a suspect who later became cooperative and assisted in identifying the remaining suspects on a case; PATRIC was also able to arm the detective with information on other cases of the same type which provided a tool to induce the suspect to admit to the crimes. Even on cases where the investigation had not been completed, several of the comments indicated that the PATRIC information was proving useful to the investigator.

PATROL DEPLOYMENT RESULTS

Evaluation of the effect of PATRIC assistance in strategic patrol deployment was difficult to accomplish. The Patrol Bulletin by which crime pattern information was transmitted to patrol officers included a section for recording arrests and field interviews which resulted from the directed deployment. Table I shows the number and results of PATRIC Patrol Bulletins between July, 1971 and June, 1972. PATRIC results also incorporate results obtained by the Metropolitan Division task force operating for a short period in several test divisions. They were deployed only partially on PATRIC information, but it was impossible to separate the statistical results.

During the course of patrol processing, a number of problems were identified. The currentness of the data on which bulletins were based was never less than 9-12 days old, due to the number of steps currently involved in the data processing stream. Patrol users lost confidence in the system because of the inability to improve the currentness of data.

During April and May, 1972, the feasibility of remote data input from a geographic division to achieve 24-hour data currentness was tested at Southwest Division. The test proved that remote data input was possible and that the improved currentness of data had a significant bearing on the effectiveness of deployment plans. The test was suspended when the change to the second software system was effected. The concept of direct data input will be further explored in Step II-A.

Another problem encountered in the patrol divisions was the lack of available patrol time by regularly deployed radio cars. Although the divisions were chosen because of their high crime rate, it soon became apparent that the radio units also had a greater amount of calls for service and less available time for special, repressive patrol. Two other divisions with more available time – Venice and Newton – were supplied information sporadically to test the utility of PATRIC-generated patrol bulletins.

The most effective use of PATRIC data was made by the divisional special operations squads, where they existed. The eight to twelve-man team was available to work any time period in any area on any problem, free from the constraints of radio calls. They also had the option of working in uniform or plain clothes as the situation warranted. The research analyst was able to deploy effectively this squad on problems which he discerned, or on information compiled at the request of the squad supervisor.

In addition to the problems of data currentness and unavailability of patrol time, it became obvious that many of the crime patterns discovered by Research Analysts were of marginal utility. Frequently, patterns identified by PATRIC turned out to be historic patterns dictated by demography, such as street robberies in the city's skid row section or residential burglaries in the housing projects. These historic patterns were well known by patrol personnel; hence, PATRIC did not add anything new in such cases.

Consequently, as a part of the conversion from CDMS to DS/3 for patrol processing during May, 1972, a reassessment of the types and formats of deployment information was undertaken. The concept which gained prominence was to establish historic crime occurrence norms by geographic area, which could then be monitored automatically by the system. When the crime rate fluctuated beyond a predefined tolerance in a given geographic area, the system would trigger a report calling this to the attention of analytical personnel.

The establishment of crime occurrence norms for individual reporting districts proved to be impractical. The number of crimes occurring in a single reporting district during a fixed time interval (one day a week) was too small to permit establishment of a meaningful norm. In many reporting districts there were only one or two repressible crimes per week. Therefore, it was decided to use a larger geographic area, or "Adjacency Group". The Adjacency Group was defined as a reporting district and all those reporting districts which physically touch it.

The Adjacency Report was produced in two versions, a Summary Report, shown in Figure 2,

and a Detailed Report, shown in Figure 3. Both were in two-dimensional array or matrix format. The Summary Report presented a count of crimes by crime type and by day of the week for each Adjacency Group. An Adjacency Group was indicated by the central Reporting District and included all the Reporting Districts that were contiguous. In effect, the summary represented a crime index by Adjacency Groups which pinpointed the geographic center of the highest concentration of crime. The detailed report provided a matrix where the vertical axis represented the individual reporting districts that comprised an Adjacency Group and the horizontal axis represented the days of the week. The total line for each Adjacency Group Detailed Report formed a line in the Summary Report.

The greatest benefit of this type of automatically triggered report was that random searching by Research Analysts for a deployable crime pattern was eliminated. This represented a substantial saving in man-hours and machine time spent on unproductive random searching for crime patterns.

Although the Adjacency Report concept for PATRIC patrol deployment processing was introduced too late in the research phase to show operational results from its use, evaluation of patrol supervisors indicated that it was more meaningful than the prior PATRIC bulletin information. Standard question sets to enable generation of Adjacency Reports in a batch mode were developed and will be utilized again in Step II-A.

AUTOMATIC CORRELATION STRATEGIES

Imbedded within the general categories of investigative and patrol processing were several other tasks of sufficient importance and magnitude of effort as to be considered "mini-projects". The first of these several tasks was the determination of automatic correlation strategies.

It has been assumed that among the approximately 250,000 Part I Crimes in the City of Los Angeles each year an as yet undetermined number contain sufficient information to be processed in a batch mode, employing automatic (program-controlled) correlation strategies in an operational system. Working towards that end, an analysis was conducted to identify the elements of information used by the Research Analyst in attempted crime correlations. The project staff collected, recorded, and analyzed 206 successful and unsuccessful correlations. Several crime types were examined in this manner to see if the approach to correlation attempts was greatly influenced by the type of crime.

The analysis was conducted with the expectation that MO correlation strategies could be developed from the PATRIC correlation results. However, the results indicated that MO correlation strategies, *per se*, were used infrequently. In the majority of correlation attempts, the Analyst included a combination of vehicle and suspect description information; he very seldom used MO information exclusively.

Because standard approaches to classes of crimes could not be derived from the results of the on-line strategies, the PATRIC staff developed crime correlation strategies that could retrieve crime reports containing similar MO, suspect, and vehicle descriptions. The approach was to develop strategies using premise, trademarks, and other MO information from the crime report. Vehicle and suspect information (other than descent) was not included in the strategy. Further analysis and refinement will be accomplished by running the current strategies in a batch-processing mode during subsequent phases of the project.

Although MO strategies were not developed from the above analysis, the research into the derivation of automatic correlation strategies indicated that when a vehicle license plate number, or a suspect's name, or the description of a suspect's vehicle is contained in the crime report, that piece of information should be correlated against information in the existing files.

Additionally, an iterative process involving three major steps was used to arrive at potential correlation strategies for each crime type. Briefly, the following steps were involved:

1. Initial correlation strategies concepts were based on crime reports, data base contents, and LAPD experience. Only certain elements of information were found to be helpful in retrieving similar crime reports, e.g., location of crime, type of crime, suspect's descent, trademark category (boldface headers on crime report) and trademark name (individual descriptors).
2. Strategies were coded for computer processing, run in a batch-processing mode, and the resultant printouts analyzed to identify potential correlations.
3. Strategies were evaluated, modified, processed through the computer again, and modified until they began to produce a higher number of correlations.

The resultant correlations were then sorted by descent and geographic location. In this manner correlation strategies were developed for indecent exposure, kidnap, child annoying, child molesting, rape, robbery, burglary, theft from person, purse snatch, and bunco. The recommended strategies have been documented in PATRIC Design Requirements Volume II: Research Results, TM-L-4953/002/00, published jointly by LAPD and System Development Corporation.

MULTIPLE OCCURRENCE DETECTION

Another mini-project to which effort was directed was the detection of multiple occurrences of data elements. The importance of detecting multiple occurrences is based on the assumption that at a certain level recurring elements form a pattern that could be of appreciable tactical and investigative value. In order to validate this concept the Field Interview (FI) file was searched for multiple occurrences of whole names and license numbers. Between July, 1971, and April, 1972, eight separate analyses were made, each time selecting from the FI file those names and license numbers that occurred five, six, seven, eight, and nine times. The number of occurrences was called the screening level.

The printout resulting from the file search was examined to determine valid multiple entries. The corrected data were then compiled into standardized reports using the report preparation capability of the PATRIC System under CDMS. Two reports were produced, separating multiple occurrences determined by license numbers and those determined by whole name.

The final multiple occurrence report was distributed to various detectives throughout the City upon request, and to the Watch Commander of the Burglary/Auto Theft Division (BAD). Although only a small amount of feedback from these users has been received, it has been quite favorable. Several detectives used the printout as an effective interrogation tool, pinpointing the suspect's associates and locations he frequented. Other detectives appreciated the opportunity to keep abreast of unusually large numbers of FI stops within their particular areas. Several multi-FI subjects were arrested and now appear in the suspect file (felony arrestees), lending credence to the assumption that their movements should be brought to the investigators' attention.

Two major problems were encountered with the FI multi-occurrence reports, specifically in the areas of preparation and evaluation. A great deal of time was expended in the preparation of the report. Data conversion programs united in a single FI entry only those FIs that were identical in the first 24 characters.[1] If the time recorded by the field officers varied by even five minutes or if the reporting district was miskeyed, the entry appeared as a unique transaction, distorting the number of actual multiple occurrences. Approximately half of the values were eliminated or reduced each time through visual screening as described above. This process needs to be automated, linking entries within a given range of times or reporting districts if other elements appear to be identical. Many times additional occurrences are also overlooked owing to a slightly different spelling of a name or to the transposition of characters in a license number. These occurrences are usually discovered accidentally; currently there is no specific method for finding the values with slight variations.

Part of the problem of preparation was alleviated by raising the screening level from five to six, which reduced the qualifying entries to a workable number. Screening could then be accomplished in a shorter period of time, and the resulting report was smaller and more apt to be used. Tests were conducted on a file containing only about six months' worth of data. It is foreseeable that the screening level would be raised even higher if a longer period of time were included, although a screening level of six and a time period of six months seems quite satisfactory. Producing the report on a monthly basis rather than bimonthly would also decrease preparation time. An example of a "Multiple Occurrences of License Numbers" report appears in Figure 4.

STOLEN PROPERTY PROCESSING

The last mini-project of significance was the processing of stolen property. The first approach to the file was an analysis of the distribution of stolen property item categories to determine if there was operational utility in such information, either by itself or when compared to a similar analysis of the typology of pawned items. Knowledge of any radical change in classes of items that are the object of attack might be predictive to some extent and might be usefully included in citizen-education campaigns. Initial file profiles were established, but were not maintained long enough to discern significant changes by category.

In the general correlation strategy, only minimal usage was made of the Property file. The file was not a usual part of the correlation attempt, which sought for crimes with similar MO suspects, or vehicles.

Also, inaccurate data, caused by serious errors in reporting, coding, and keying procedures inherent in the variability of the data and lack of standard procedures, discouraged use of the file. Few positive results were ever obtained in the property file.

In a sample of four weeks' correlation attempts, 633 queries were made of the files, coupled with 313 search requests. Of the queries, only 20 were made of the Property file; 12 searches were conducted of the Property file. The Property file was

used only 3.4 percent of the time, counting both queries and searches.

The pawn file, containing all pawn transactions from seven major categories, was to have been an important link in the recovery of stolen property and the apprehension of criminals. This was to have been accomplished by linking items from the Property file with pawn transactions and thereby identifying a potential suspect. However, as a result of the difficulties encountered in data input for the essential crime files, the Pawn file received little attention until late 1971. By that time, many of the problems with the Property file had been realized, and successful stolen property/pawn linkages could not be made.

As of April 12, 1972, updating of the Property file was suspended indefinitely. Infrequent use of the file, coupled with retrieval difficulties, could not justify the cost involved in data conversion and file maintenance.

DEVELOPMENT AND DESIGN APPROACHES

The culmination of PATRIC research and the final link in requirements for the operational system was the document published at the conclusion of Step II, describing several design alternatives for the final system. The three alternatives considered include:

1. Custom software development
2. Procurement of an off-the-shelf software package
3. Procurement of an off-the-shelf software package with modifications

In reviewing the alternatives, it was discovered that the first alternative must be rejected on the basis of an estimated two-year development schedule, an estimated cost of over $1,000,000, and other uncertainties involved. The second alternative, off-the-shelf software, was seen as a way of attaining a reliable data processing capability at a minimum cost and short lead time. However, a review of 164 known software packages revealed that only a few systems can be considered as candidates. In fact, no available system could meet all PATRIC software design requirements without modifications.

Therefore, the third alternative of procurement of a package with modifications was adopted as the most feasible method of satisfying PATRIC requirements at the least cost, least risk, and within the available time period.

Four data management systems were selected for comparison: System Development Corporations's DS/3; TRW's Generalized Information Management (GIM); IBM's Generalized Information System/Version 2 (GIS/2); and MRI's System 2000. A comparative evaluation was conducted utilizing various system requirements weighted according to importance. The four systems were very close in overall evaluation, and a definitive choice would have been hard to make. However, the true purpose of the evaluation was to illustrate some specific guidelines for package evaluation, rather than the selection of a specific software system.

Based on the system requirements and the suggested approach of procuring a software system to be modified as needed, bidding specifications can be prepared and requests for proposals distributed. At the present time, the projected schedule plans for opening of bids at the end of April, 1973, and the awarding of the contract by August 1, 1973. The system should be tested and fully operational by the implementation target date of January 1, 1974.

CONCLUSION

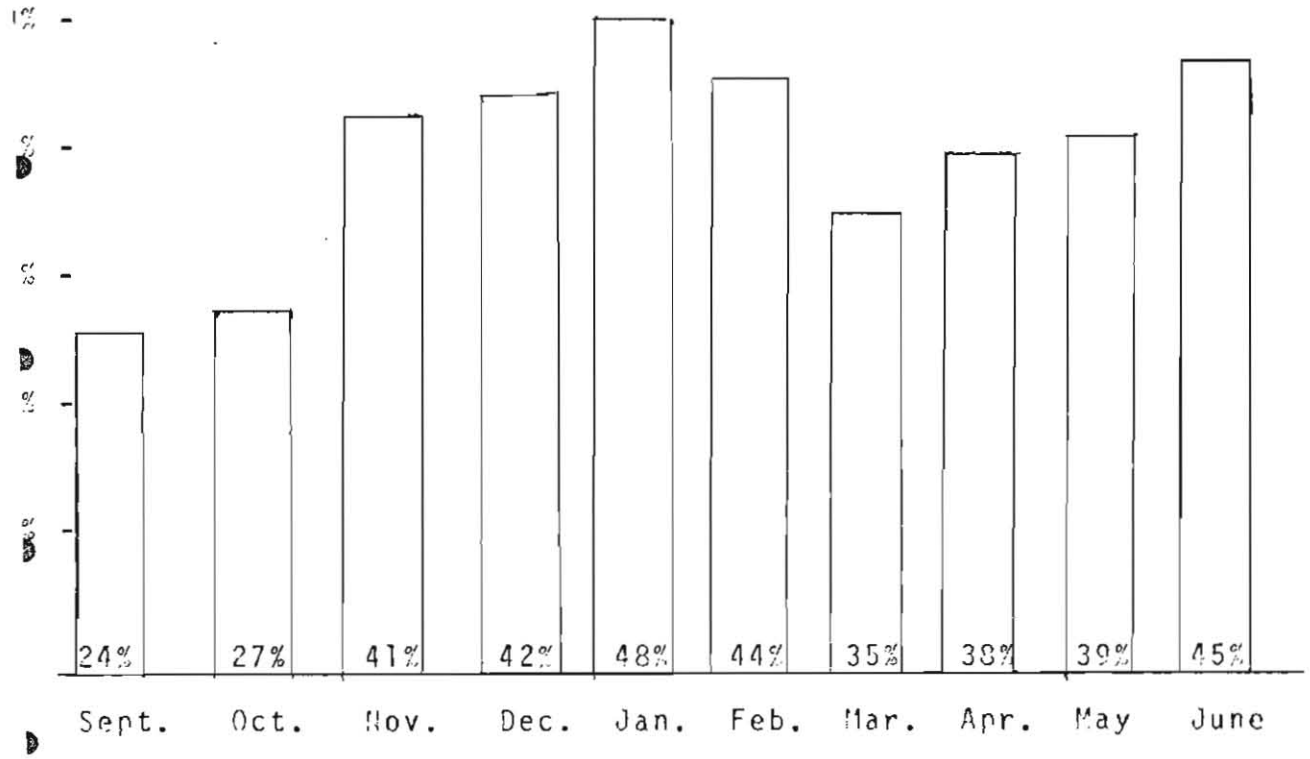
Having completed its basic research and defined requirements for an operational system, the PATRIC Project is preparing to write the system specifications. Operational support will continue to be provided by a limited on-line system. Extensive training will be conducted to educate present and potential users. Regional applications will be investigated, and other systems will be surveyed to determine the best method and timing for implementation of the final system. The PATRIC Project is well on its way to becoming an objective reality and an integral part of the operation of the Los Angeles Police Department.

FOOTNOTE

[1]The first 24 characters contain: date of report, time, reporting district, license, and state.

Figure 1

Percentages of Successful PATRIC Correlation Attempts by Month from September, 1971, through June, 1972.



06/10/72 ADJ GROUPS FOR A BURG AND BURG PAGE 1

ADJ	CNT MON	CNT TUE	CNT WED	CNT THU	CNT FRI	CNT SAT	CNT SUN	CNT TOTAL
0365	18	8	22	16	20	22	10	116
0367	20	10	18	6	16	20	10	100
0368	16	8	10	2	12	18	16	82
0371	18	16	18	16	10	12	14	104
0373	30	18	18	30	26	18	14	154
0375	18	6	14	10	16	12	6	82
0377	20	16	16	16	22	16	18	124
0378	22	10	10	2	12	10	20	86
0381	2	2	10	0	4	2	0	20
0382	8	12	10	4	12	8	6	60
0383	8	22	10	6	24	14	12	96
0384	26	26	14	26	36	14	20	162
0385	22	14	16	20	18	8	16	114
0386	14	22	28	16	24	10	10	124
0387	22	23	24	18	28	10	10	140
0388	24	23	30	26	36	4	12	160
0389	24	28	26	16	26	4	10	134
0391	16	14	10	16	12	14	10	92
0393	24	22	10	28	26	14	14	138
0395	28	26	20	26	28	16	20	164
0397	16	16	14	18	18	12	18	112
0398	22	12	12	6	12	12	18	94

Figure 2 Summary Report of Burglaries by Adjacency Group

CRIMES BY ADJACENCY GROUP

05/05/72 322,777,778,323,333,332,331,321,776 PAGE 1

RD	CNT MON	CNT TUE	CNT WED	CNT THU	CNT FRI	CNT SAT	CNT SUN	CNT TOTAL
0321	0	0	1	0	0	0	0	1
0322	2	2	0	2	1	3	0	10
0323	1	2	1	0	3	2	1	10
0331	1	1	0	3	1	2	0	8
0332	1	1	2	0	2	0	0	6
0333	0	0	1	0	0	3	0	4
0776	0	1	0	0	0	0	0	1
FINAL TOTALS	5	7	5	5	7	10	1	40

40 ENTRIES (9% OF DB) QUALIFY

Figure 3 Detailed Report of Crimes by Reporting Districts Comprising an Adjacency Group

Figure 4 Sample Multiple Occurrences of License Numbers in the FI File.

LICENSE*	DATE STOPPED	TIME	RD	MAKE	DOB	NAME*
	04/04/71	0830	1405	CHEV	04/18/57	
					08/27/54	
	06/04/71	2345	0125	CHEV	07/04/52	
	10/05/71	0130	1162	CHEV	05/01/49	
	10/20/71	0015	0412	CHEV	05/01/49	
	10/21/71	1040	1162	CHEV	05/01/49	
	05/12/71	1715	1405	FORD	08/03/46	
	09/05/71	1610	1417	FORD	08/03/46	
					10/31/44	
					08/03/46	
	09/20/71	1605	1413	FORD	08/03/46	
	09/23/71	1100	1419	FORD	08/03/46	
	10/10/71	0615	1435	FORD	10/12/50	
	08/28/71	0245	1047	CHEV	02/25/55	
					09/18/52	
	02/31/71	2325	0925	CHEV	09/18/52	
	09/08/71	0110	1069	CHEV	09/18/52	
	09/17/71	2215	1069	CHEV	09/18/52	
					01/31/55	
	10/12/71	2120	1059	CHEV	08/11/52	
		2130	1059	CHEV	09/18/52	
	10/25/71	1200	1559	CHEV	02/25/56	
	10/28/71	2025	0976	CHEV	11/04/56	
		2030	0976	CHEV	04/09/57	
					09/18/52	
	08/18/71	0530	0246	DODG	05/19/43	
		0535	0246	DODG	06/27/39	
	08/27/71	0515	0226	DODG	06/27/39	
		0520	0226	DODG	08/30/41	
	09/21/71	1130	0228	DODG	06/27/39	
			0228	DODG	09/07/47	
	10/02/71	0915	0226	DODG	06/22/41	
	10/18/71	1815	0239	DODG	02/23/38	
					09/07/47	
	05/12/71	1045	1137	CHEV	09/14/53	
					04/08/53	
	07/29/71	1030	1341	CHEV	01/15/45	
	08/28/71	0215	1161	CHEV	10/05/53	
		0230	1161	CHEV	02/16/56	
	10/17/71	1300	1143	CHEV	10/26/53	
			1143	CHEV	10/26/53	
	10/18/71	0430	1134	CHEV	05/27/52	
		0930	1134	CHEV	08/10/57	

*Deleted to insure privacy.

TABLE 1

NUMBER AND RESULTS OF PATRIC PATROL BULLETINS
(July 1971–June 16, 1972)

Division	No. of Burglary Bulletins	No. of Robbery Bulletins	No. of Other Bulletins	Total Bulletins	No. of Arr.	No. of FIs	Total A + FI
Central	19	9	7	35	19	59	78
Venice	6	0	3	9	2	7	9
Newton	10	1	6	17	2	73	75
Wilshire	4	1	0	4	0	0	0
Southwest	56	23	3	82	603	812	1415
77th Street	21	27	5	53	405	141	556
TOTALS	115	61	24	200	1031	1092	2123

The arrest and FI figures for Southwest and 77th Street Divisions include those that were logged in by the Department's Crime Task Force while deployed on composite 77th Street and Southwest Divisional crime patterns identified by PATRIC.

APPENDIX I

As a result of the test-bed research conducted in Steps I and II, requirements have been defined for the final PATRIC operational system. Many of the requirements have been inferred in the section on results of the test-bed operation. The definitive document for system design is *PATRIC Design Requirements Volume I: System Requirements,* TM-L-4953/001/00, published jointly by LAPD and System Development Corporation. Briefly, grouped according to function, the major requirements are as follows:

DETECTIVE SUPPORT REQUIREMENTS

- PATRIC should provide detectives, when possible, with a suspect's name or the license number of a suspect's vehicle, or if this is not possible, it should provide a physical description of the suspect or of the suspect's vehicle. It should also provide reference to other crimes that may have been committed by the same suspect.
- PATRIC processing support should be provided and terminals should be located at the detectives' normal work locations; the system should be on-line for eight hours each workday.
- PATRIC operators should have ready access to several data files of different crime types.
- File groupings should be separated into files of crime reports, identified persons, and pawned property descriptions.
- Certain correlation processing should be accomplished on-line, interactively, to support detectives' immediate needs.
- Certain prespecified correlations and analyses should be processed automatically in a noninteractive mode.
- The PATRIC data base should be updated with new crime reports and follow-up reports within 24 hours.
- On-line PATRIC files should consist of reports reflecting at least the most recent 26 weeks, with the exception that files containing felony suspect descriptions and pawn transactions should be purged selectively and not on a periodic basis.
- PATRIC computer printouts should use no codes and should be readable without special training.
- The Field Interview and Pawn files should be processed periodically to identify the multiple occurrence of specific values.
- When querying a file by suspect name and description, a ranked list of similar names that might qualify as the suspect should be provided.

PATROL DEPLOYMENT REQUIREMENTS

- PATRIC should provide patrol divisions with crime pattern identification that includes geographic areas, time ranges, available vehicle and suspect information, and unique crime characteristics.
- Analysis of crime problems for patrol deployment processing should be performed on divisional, adjacency group, and interdivisional bases using the reporting district as the unit of analysis.
- The system should be capable of displaying data elements in a two-dimensional grid and in sorted, formatted reports.
- Patrol deployment data should be retrieved on-line and interactively.
- Standard question sets related to crime patterns should be processed automatically in a noninteractive mode.
- The Repressible Crime file should be updated with new crime reports within 24 hours.
- The Repressible Crime file should remain on-line for 28 days.
- All repressible crimes should be grouped into one file structure with the capability to subset the file by specific crime type.

FELONY VEHICLE PROCESSING REQUIREMENTS

- A capability should exist to identify and report on all vehicles associated with felonies found in the PATRIC data base.

MANAGEMENT REPORTING REQUIREMENT

- The PATRIC System should prepare periodic reports to management reflecting the general and overall performance of the system.

INTERFACE REQUIREMENTS

SYSTEM	PATRIC Interface Required		TYPE OF INTERFACE
	Obtain Info From	Provide Into To	
AWWS	X		PATRIC terminal should access AWWS through the Front-End Communication System.
LEMRAS		X	Manual distribution of PATRIC Patrol Bulletins to Supplement LEMRAS reports.
STATS	X	X	Common data collection, quality control, and data conversion; preparation of special reports.
Auto FI			None—function should be incorporated into PATRIC.
ARMS	X		PATRIC terminal should access ARMS through the Front-End Communication System.
RJIS	X		PATRIC Analyst verbal request to RJIS terminal located in LAPD.
PSIS	X	X	Detective verbal request for reports of crime correlations.

SYSTEM CONSTRAINTS

- The PATRIC System should operate within the environment of the Los Angeles City Data Service Bureau computer facility.
- PATRIC should interface with the DSB Front-End Communication System (FECS).
- PATRIC should be compatible with the DSB teleprocessing monitor.

SYSTEM RESPONSE REQUIREMENTS

- The PATRIC System should provide three-minute maximum response to interactive queries.
- PATRIC noninteractive (batch) requests should receive overnight turnaround service.

DATA COLLECTION REQUIREMENT

- Data should be collected, using the PATRIC crime reports as source documents, and preprocessed for computer usage.

DATA INPUT REQUIREMENTS

- A noninteractive data input and data base generation capability should be provided.
- A noninteractive capability should exist for adding entries to current files.
- A noninteractive capability should exist to update data values and to delete entries from current files.

DATA SUBSET REQUIREMENT

- An interactive and noninteractive user of PATRIC should have the capability to create and retain smaller files containing entries selected from larger existing files.

DATA BASE DESIGN REQUIREMENTS

- The PATRIC data base should contain the data elements and values recorded in the LAPD crime report forms
- PATRIC should have the capacity for storing 360,000 records comprising 60 to 70 million bytes of data, not including the data management system overhead.
- Data base elements and element relationships should be variable, and a method should exist that permits user definition of the data relationships and contents.
- The user should have the capability to specify data element names.
- The user should have the capability to specify element type designators, element value delimiters, and mandatory value elements.
- A capability should exist for defining embedded elements or subelements.
- The PATRIC data base should allow linking of data describing suspects with the separately maintained description of each suspect, and it should allow recording of multiple values for a single data element in a single logical entry.
- An option should exist for defining a fixed field input record format, the byte locations within the record from which each element's values are to be extracted, and a value translation array for each element.

DATA RETRIEVAL AND DISPLAY REQUIREMENTS

- PATRIC should provide multiple, remote user, on-line, interactive data retrieval capability.
- PATRIC should allow processing of retrieval requests in a noninteractive batch mode.
- Interactive inputs and all PATRIC outputs should use English-language forms.
- The user should be able to qualify specific entries from his file and to display the total entry or specific element values within the entry.
- The user should be able to display data definitions, values, and counts of values in an easy-to-read format
- The user should be able to repeat execution of retrieval statements.
- The user should be able to cancel an output sequence while it is in process.
- The output format for interactive retrieval should be controlled by the user.

REPORT GENERATION REQUIREMENTS

- A user-oriented report generation capability should be included in the PATRIC System.
- The report generation capability should include user control of report format and content.

GENERAL SOFTWARE REQUIREMENTS

- The Remote Job Entry (RJE) facility of the IBM operating system, or its equivalent, should be available to PATRIC.
- A complete set of support and utility programs should be available.

SECURITY REQUIREMENT

- Access to the PATRIC System should be controlled by both hardware and software techniques to ensure the security of the PATRIC files.

EQUIPMENT REQUIREMENTS

- PATRIC files should be stored on high-speed random access devices.
- The PATRIC operating programs and data base should be stored on magnetic tape for back-up purposes.
- Interactive terminal devices should be provided.
- PATRIC batch-processing output should be directed to a high-speed lineprinter at a central LAPD location.
- A Remote Job Entry card reader should be provided to accompany the lineprinter.
- A data transmission control unit should be provided.
- Communication lines and data sets should be provided to link the terminals located in each geographic division with the central computer located in the DSB facility.
- A communication line should be provided to link the remote data transmission control unit, for the printer and card reader-punch at Parker Center, to the computer located at the DSB facility.

IMPLEMENTATION REQUIREMENT

- Steps II-A and III should be pursued, as described, in order to achieve an operating PATRIC System.

ECONOMIC REQUIREMENT

- Funding should be authorized, in the necessary amounts, in order to achieve an operating PATRIC System.

PATRIC TRAINING REQUIREMENT

- A training program should be developed and presented to division commanders, detective and patrol personnel, and PATRIC Analysts.

PATRIC ANALYST REQUIREMENTS

- The PATRIC Analyst should complete a special PATRIC training program; he should have experience with a computer terminal or teletypewriter; he should have the ability to organize and analyze crime data; and he should be able to interact positively with police personnel.

ORGANIZATIONAL REQUIREMENTS

- A PATRIC System Project Office should be authorized and created.
- Responsibility for data input should be centralized.
- System interaction should be decentralized.

APPENDIX II

The estimated cost for development of the PATRIC System for Steps II-A and III (September 1, 1972 to January 1, 1974) and the estimated annual operating cost of the system are presented in the following tables:

Estimated Development Cost of the PATRIC System

(September 1, 1972 to January 1, 1974)

A. DEVELOPMENT COSTS (Step II-A)

Task	*Man-Months*	*Cost*
System Specifications	25	$ 44,000
Special Purpose Specifications	6	10,000
FECS Specifications	1	1,500
Purchase Specifications	15	27,000
Vendor Selection	4	7,000
		$ 89,500

B. DEVELOPMENT COSTS (Step III)

System Software Package		$ 100,000
Software Modifications:		
Grid Display	24	100,000
Data Definition	12	50,000
Retrieval by Number of Occurrences	6	25,000
Data List	6	25,000
Weighted Name Search	24	100,000
Group Subset	12	50,000
		$ 450,000
Off-line Programs:		
Adjacency Group Report		
Felony Vehicle Report		
Basic Car Area Summary		
License Plate Report		
Vehicle Description Report		
FI and Pawn Multiple Occurrence		
Automatic Correlation Processing		
Utility Programs		
	72	$ 120,000

C. COMPUTER TIME	*Hours*	*Cost*
On-Line System Test	252 (@$375)	$ 94,500
Off-Line Program Test	216 (@$200)	$ 43,200
		$ 137,700

D. EQUIPMENT (nonrecurring) COST

Install 21 Telephone Lines	$ 294
50 Magnetic Tapes	1,000
Extended Core Memory (512K bytes)	277,000
1 Disk Storage Unit	174,000
4 Disk Packs	4,000
20 CRT Terminals (including hardcopy device and data set)	93,153
1 Printer/Reader/Card Punch (including adaptor unit)	35,000
	$ 584,447

SUMMARY OF DEVELOPMENT COSTS

A. Specifications and Vendor Selection		89,500
B. On-Line Software and Modifications		450,000
Off-Line Programs		120,000
C. Computer Time		137,700
D. Equipment Cost		584,447
	TOTAL	$1,381,647

Estimated Annual Operating Cost of the PATRIC System

	Gross	Displaced[1]	Net
A. Computer Time 300K @ $17,500/mo.	$210,000		$210,000
B. Data Preparation Cost @ $28,931/mo-MSO $ 5,961/mo-DSB	$418,704	$418,704	$ 0
C. Telephone Line Charges:			
1. Twenty-one Low-Speed Lines @ $776/mo.	$ 9,312		$ 9,312
D. Personnel:[2]			
1. DSB System Maintenance, Operation, and System Improvements	$ 60,693	$ 18,937	$ 41,756
2. Operating Divisions			
17 Analytical Ofcrs. (AA - $14,428/yr.)	$313,225	$313,225	$ 0
18 Sr. Clerk Typists ($9,312/yr.)	$214,038		$214,038
SUBTOTAL	$527,263	$313,225	$214,038
3. System Project Office			
1 Supervisor (Sgt. II - $18,333/yr.)	$ 23,943		$ 23,943
2 Sr. Admin. Asst. – ($17,017/yr.)	$ 43,462		$ 43,462
2 Admin. Asst. – ($14,428/yr.)	$ 36,850		$ 36,850
1 Clerk Typist – ($7,705/yr.)	$ 9,839		$ 9,839
SUBTOTAL	$114,094		$114,094
SUBTOTAL PERSONNEL CHARGES	$701,357	$333,225	$368,132
TOTAL ANNUAL OPERATING COST	$1,340,066	$750,866	$589,200

1 Displaced cost represents cost currently being expended that could be applied directly to PATRIC.
2 Personnel at full time, full benefits and top step. Employee benefits: 27.7% civilian, 30.6% sworn.

SUMMARY OF NET OPERATING COSTS

A. On-Line Computer Time	$210,000
B. Data Preparation	0
C. Telephone Line Charges	9,312
D. DSB Personnel	41,756
LAPD Analyst Personnel	214,038
SPO Personnel (LAPD)	114,094
	$589,200

ILLINOIS LAW ENFORCEMENT AGENCIES DATA SYSTEM

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We are living in the "Change Revolution". There is nothing sacred in this day and age, which still has any relevance, that has not undergone drastic change. But this is not a new concept, and telling you this is of little significance. What is important though is the fact that *change is changing.*

This concept is evident in the book entitled *Society As It Is* by Glen Gaviglio and David Raye, where we read the following:

> "In order to illustrate what this means, we will use the media again and the metaphor of a clock face. Imagine a clock face with 60 minutes on it. Let the clock stand for the time men have had access to writing systems. Our clock would thus represent something like 3,000 years, and each minute on our clock 50 years. On this scale, there were no significant media changes until about nine minutes ago. At that time, the printing press came into use in Western culture. About three minutes ago, the telegraph, photograph and locomotive arrived. Two minutes ago: the telephone, rotary press, motion pictures, automobile, airplane, and the radio. One minute ago, the talking picture. Television has appeared in the last ten seconds, the computer in the last five, and communications satellites the last second."

Beginning in January of 1966, or about one tenth of a second ago on our clock face, at a meeting attended by individuals representing the Department Administration, the Data Processing Division, and the Communications and Operations sections of Illinois State Police it was resolved that a computerized network of terminals to serve all Illinois law enforcement agencies was needed. These people organized a group known as the Illinois Law Enforcement Agencies Data System Development and Control Group. This group then set about to plan, organize and develop the concept of the Law Enforcement Agencies Data System. The group also served as the governing body, making decisions regarding operation, policy, criteria, and regulations.

After considerable planning some field trips were made to evaluate similar projects in other states and in Washington, D.C.

These trips included visits to NCIC, the PIN system in Alameda County, California, the Auto Status system in Sacramento, the NYSIS and New York State Police Systems of New York. Shortly thereafter, the feasibility study was concluded and the go ahead decision was obtained.

The general design was then begun and finally concluded about January, 1968.

A very important aspect of this effort was the continued participation of the Sheriffs, City Police Chiefs, State Police Command and line personnel, Bureau of Radio Communications, National Auto Theft Bureau Chicago Office, Secretary of State's Office, Chicago Police Department and our own Data Processing Staff.

Demonstrations were arranged and held using a terminal, on-line to the Police Information Network (PIN System) and the Auto Status System in California. These demonstrations were presented to the Director of the Illinois Department of Law Enforcement, the Illinois Legislature, and the Governor.

The Detail Design effort began in early 1968. At this time the Data Processing Division of the Department of Law Enforcement was utilizing an IBM 1401 computer with 12K storage. Since the LEADS system called for on-line data collection, storage and retrieval on upgrading of computer facilities became prerequisite.

Since our operation, up to this point, had been programmed entirely in the COBOL Language, the conversion of over 400 programs was not as difficult as it might have been.

An IBM 360/Model 40 with 128K was installed in February of 1969 and testing of the on-line system began in March, 1969. Terminal and line installations began in March of that year as well as operational training. The Bureau of Communications of the Illinois State Police formed a group of radio operators and technicians. These Communication Coordinators, as they are called, have to date trained over 3,000 operators.

Terminals and lines were obtained from Western Union and are comprised of Teletype Model ASR/35 on 110 baud lines.

Initially the Queued Teleprocessing Access Method or QTAM was used. IBM, of course, said that the ASR/35 device would not work under QTAM so it became necessary to modify QTAM. The cost per terminal location was a primary consideration as many of the agencies we hoped would participate in the system operate on a very low budget. We felt we had succeeded when we were able to offer unrestricted LEADS system participation for $243.50 per month.

In May, 1969, the LEADS system was made operational with 100 terminals. The files on-line include Stolen Vehicles, Wanted and Missing Per-

sons, Stolen and Recovered Guns, Articles, Stolen and Lost License Plates.

Each agency from the first day of operation has been totally responsible for the Entry, Modification, Cancellation and Voiding of their own records and prohibited from affecting any other agencies data. They, of course, have had inquiry capability to all of the files and in addition have had the facility for message switching to any other agency. Those terminals located in the Districts and Sub-Posts have had the options of broadcasting messages to all terminals within a specific district or selected districts or statewide.

A grant application was submitted to the Illinois Law Enforcement Commission and in March of 1970 the grant was approved. The funds from this grant were used to cover 60% of the terminal costs, thus reducing each agency's expenditure to $97.50 per month for upgraded computer facilities.

In June of 1970, the IBM 360/Model 40 was replaced by a 360/Model 50 with 512K of storage, and in September of the same year the second 360/Model 50 was installed and the system peripheral equipment was also expanded thus providing 100% backup.

From that time forward a record of system availability has been maintained, of which we feel very proud, at 96.54% including all downtime.

The installation of the second computer system, in addition to providing backup, facilitated the testing of new programs, modifications and off-line processing.

There has been a steady increase in the number of agencies which have had terminals installed since May of 1969 when the LEADS system became operational with 100 terminals and there are currently 257 terminals on-line and six on order.

However, from May of 1969 until September of 1970, a period of difficulty was encountered. We had a considerable amount of problems which seemed attributable to the following factors:

1. Rumors of problems at the user level began to reach us, but seldom directly since no defined procedure existed for reporting trouble or complaints,
2. Response to user complaints was, at best, in a scattergun fashion and often misdirected and late,
3. Forecasting of problem areas or planning improvements did not have the benefit of direct user involvement.

The remedy, then, became clear. An established means of communications was vital. We had to have a way of tuning ourselves in to the user environment and also informing them of changes and/or new developments in the overall system.

A full time LEADS liaison staff member was hired in September of 1970. This individual filled a very important position as his responsibilities included the writing and dissemination of all printed materials such as statistics, system bulletins, new releases and handouts. This man also makes many appearances on behalf of LEADS to local agencies and community organizations to promote a better understanding of the operation and benefits of the LEADS system.

LEADS presently has on file approximately 81,000 Stolen Vehicles, 25,000 Lost or Stolen License Plates, 12,000 Stolen Articles, 10,000 Wanted or Missing Persons, 8,000 Stolen or Recovered Guns, 1¼ million Registered Firearm Owners. In addition to the aforementioned, we maintain an Alias Name File, Securities File, Highway Conditions File, Accident Records, Traffic Arrest and Warning Records, and Stolen Boats.

It is worthwhile to mention at this point, that Illinois developed their own edit procedures and criteria for Vehicle Identification Numbers which has worked extremely well and of which copies of the documentation have been supplied to twenty different states and to NCIC.

In June of 1972, two very significant events occurred, the first of which was the completion of the computer to computer interface with the office of the Secretary of State, thus allowing on-line inquiry to the Drivers License and Vehicle Registration Files. Inquiries which formerly averaged a response time turn around of 1/2 to 3/4 of an hour now are answered in less than 10 seconds. The second major event was the upgrading of the computer equipment for the third time in four years as the two 360/Model 50's with 512K each were replaced with two 370/Model 155's with 1 MEG of Core each and the two 2314 disk drives with two 3330 disk drives.

For the last two and one-half years LEADS has been a major user of the NCIC system, second only to Michigan until July of this year when LEADS assumed the number one position. There is no doubt that LEADS has proven itself successful.

There is one question which comes to mind at this point, that being, "What is forthcoming and how will it effectively combat crime?"

Some major projects are now under development in Illinois Law Enforcement which will play a significant role in the effective allocation of Law Enforcement resources to those areas of need as evidenced by criminal activity.

Computerized Criminal Histories will be a reality in Illinois this month! This will enable on-line entry, modification, updating and inquiry of records containing data on those persons who have a his-

tory of criminal behavior. Approximately 45,000 records of this type have been converted from manually filed and maintained jackets to on-line records available by direct access inquiry. Fourteen thousand of these are those who have had the most frequent and recent contacts with the basic elements of the Criminal Justice System, that is the Law Enforcement, Courts and Correctional institutions.

In Illinois, we have committed ourselves to a policy of converting the complete jacket of data whenever possible rather than only the identification and most recent arrest and conviction event, feeling that if Criminal History is really vital, then the entire record is, by its very nature, equally important and vital.

It is estimated that in excess of 700,000 Criminal History records, now maintained by the Bureau of Identification, will meet the criteria established by NCIC for inclusion in the National File.

Those agencies which will have access to this data have signed agreements prepared by the Illinois Department of Law Enforcement, which has also signed an agreement with NCIC as the controlling agency in Illinois.

The Illinois Uniform Crime Reporting System, although already operational, is included in this category of future developments because we have only begun to scratch the surface of meaningful crime reporting. We are now collecting data from over 900 Law Enforcement agencies in Illinois by means of a preprinted form which is centrally key punched and subsequently processed by the Law Enforcement Computer System. This data is presently used to supply the Federal Bureau of Investigation with the data heretofore requested from each agency on an individual basis and to generate summary reports for analysis by the Crime Studies Section of the Law Enforcement Department. Included in the preprinted forms presently being used, are all the Crime Codes required by the FBI, plus many additional codes which will enable a more detailed scrutiny of the reported data. Also included is a means for each agency to collect, in a uniform and standardized manner, information upon which each reporting agency may construct and maintain operational statistics, such as man hours expended in activities related to the entire function of enforcing law and order.

The Uniform Crime Reporting system as it is now constructed will change shortly as the preprinted form method of input is replaced by the on-line entry of criminal activity data thus placing the burden of summarization of this data on the computer rather than the reporting agency. The on-line entry capability should be available in the next 12 to 18 months and is dependent to a large degree on the progress toward the Uniform Police Records System.

The Uniform Police Records System, Judicial Reporting and Retrieval System, Supervision of Parolees and The Corrections Data Systems comprise the bulk of the remainder of the elements required for inclusion in the Illinois Criminal Justice Information System. The collection of data has become increasingly more common, almost to the point of obsession, not only in the area of Criminal Justice but in the areas of commercial and social activity as well.

All this leads us to the point that the collection of data itself should take its rightful place in the setting of goals and objectives. That is, that collecting data should never be a final objective or preoccupation, but rather a means to provide the necessary facts for analysis and conclusions which result in meaningful and progressive action—in this case, those actions which will effectively not just deal with crime by arresting and convicting the violator, but rather more to prevent crimes from being committed.

I will readily grant that the prevention of crime does not rest solely with the Law Enforcement Branch nor the Judicial Branch nor the Corrections Branch, but rather with every institution of society, churches, schools, homes, and social clubs as well. Crime is not something which can be passed off as a "Yes we ought to do something about it" element. Crime is a devastating, crippling, social disease. It affects every man, woman and child.

Our efforts must be directed so as to produce the kind of environment which inspires man to do his best instead of forcing him to do his worst.

I would like to close with the following two quotations. The first by President Nixon:

"A Nation can only be as great as its people want it to be.
"A Nation can only be as free as its people insist that it be.
"A Nations laws are only as strong as its people's will to see them enforced."

The second by Albert Einstein:

"The concern for man and his destiny must always be the chief interest of all technical effort."

ALERT II – PROGRESS TOWARD A COMPUTERIZED CRIMINAL JUSTICE SYSTEM

Melvin F. Bockelman
Manager Computer Systems Division
Kansas City Missouri Police Department

ALERT I

POLICE COMPUTER SYSTEMS

Alert I was implemented in 1968 primarily to serve law enforcement's need for a consolidated and coordinated information system in the battle against crime.

The system was developed in an environment where the computer served the informational needs of the officer in the field, and where computer technicians adjusted their workload to the needs of the police environment. The computer functioned in the police environment, and no attempt was made to regimentate the police into a computerized environment.

The primary function of the ALERT system was to provide information on wanted persons, autos and potentially dangerous subjects to the officers in the field as rapidly as possible. Secondary functions were:

1. To provide comprehensive information on arrests, offenses, traffic tickets, vehicular reports, and serialized stolen property to interested agencies on a real time basis.
2. To provide management with reports designed to evaluate the effectiveness of the total system and the various subsystems which comprise the total system.
3. To provide users with verification and statistical reports which will enable them to maintain the information in the files.

The following listing is a very brief description of the various subsystems contained in the ALERT system:

A. A criminal information system that contained warrants, wants and warning information.
B. An offense reporting system that recorded names of victims as well as statistical and historical data in the files about each incident.
C. A traffic ticket system that recorded the names of traffic violators as well as statistical and historical data about each incident.
D. A court docket system that contained the data needed to print the court docket and officer notifications.
E. An arrest system that recorded arrest information for statistical and historical purposes. Information was available by individual arrest.
F. A vehicular accident reporting system which had statistical and historical data available concerning accident reports.
G. An applicant system which contained information about those persons who have applied for a license in a number of fields requiring a permit from the Police Department.

Today, the telecommunication services of the Kansas City Missouri Police computer serve all regional area law enforcement agencies including twenty-six police departments, six county sheriffs, the Kansas and Missouri Highway Patrols, the Kansas City FBI, the U.S. Postal Inspector and the U.S. Internal Revenue Service.

The Computer Systems Division, the agency responsible for automation within the police department, developed eighteen systems which consist of about 200 programs in operational status.

1. Telecommunications System
2. Finance/Payroll
3. Resource Allocation
4. Traffic Violation Analysis
5. Uniform Crime Reporting System
6. National Safety Council
7. Detective Workload System
8. Municipal Court Docket System
9. Crime Laboratory System
10. Computer Utilization
11. Patrol Workload
12. Offense Reporting
13. Modus Operandi ID System
14. Arrest Reporting System
15. Planning Model Simulation (COPPS)
16. Traffic Ticket Accountability
17. Traffic Accident System
18. Dispatch System

Successful automated information systems require a great deal of thought, foresight and design effort. A procedural instruction manual was published which contained departmental policy, doctrine and procedures with respect to "Automated Information Systems." The document contained a list of terminology and definitions new in the police terminology which had to be comprehended by law enforcement personnel involved in automated systems.

The procedural instruction document conveyed the personal philosophy of the Chief of Police as to the concept and use of computers that are employed in police operations; it conveyed the district officers' requirements for use of automated systems; it explained the supervisors' responsibility for use of the system and the necessity for taking a positive attitude toward automation.

COMPUTER CONTROLLED MOBILE TERMINAL OPERATIONS

Computer technology has reached the sufficiently advanced stage where it is possible to design, program and operate remotely controlled mobile terminals. Through this technology, a control center can effect greater control over the remote operational activity of field units. Information vital to a complex operation can be exchanged, received or transmitted, and additionally, the status of a field unit can be monitored more accurately from the central control center.

Within the police environment, law enforcement operations must provide the officer on patrol with rapid responses to his queries about people, vehicles and property. Accurate and timely response information is valuable both for the safety of the police officer and the protection of the citizen from unnecessary detention. Law enforcement agencies have collected vast amounts of data on criminals and are making this data available via inhouse computer terminals. Records maintained in the Kansas City Missouri Police Department reflect the fact that the dissemination of information has increased 400 per cent as compared to that of pre-computer days. However, the problem of how to give the officer on patrol direct and accurate access to a criminal data base still remains.

A mobile terminal system, now tested and perfected, makes possible the issuing of control commands from the computer and relayed by radio to remote mobile terminals in operational locations. The mobile terminal can, in return, "request" the computer to search its memory banks and supply the operational unit with productive information.

In this sytem, each patrol unit has direct access to the computer. Verbal transmission of data is not required. The mobile terminal system also provides the capability for law enforcement agencies to enter field reporting information directly into computer files. The terminal is "computer addressable," so that certain sensitive files or portion of files can be "closed" to the field terminals if this is considered advisable.

I – INQUIRY – MOBILE TERMINAL SYSTEMS

With the advent of the computer, the dispatchers are equipped with computer terminals so that they can respond to inquiries made by officers on patrol. Obviously, this is a significant step forward in providing prompt information to field officers. The dispatcher's workload is, however, increased because he must dispatch vehicles to handle complaints as well as respond to patrol officers' requests for information. Records generally indicate that the requirement for information is the greatest when the dispatcher is least capable of responding because he is already busy. This necessitates the need for field officers to "queue up" to obtain information about a person or vehicle which can be unacceptably long.

As the entire criminal justice data base becomes available by computer terminals through the dispatchers, the number of inquiries initiated by patrol officers normally increases. This increase in inquiry volume will generally result in an increase in the length of time between when an officer wants to make an inquiry and when he can receive a response. As more data on individuals become available, the time required to actually transmit the information to the requesting officer will increase.

Mobile terminals can relieve the field officer of waiting for a dispatcher to service his information needs as follows:

1. The field officer can initiate inquiries without other human intervention.
2. By use of modern day technology, voice traffic is not interrupted. Digital transmission is either on a dedicated frequency or transmitted at high speed between voice transmission.
3. Accuracy of inquiries and responses is increased because voice transmission of information, with the possibility of misunderstanding, is not involved.
4. The officer obtains a response direct from the computer, the result of his personal request.
5. Digital data transmission provides increased confidentiality of inquiry messages, a vital element in maintaining the integrity of modern day transmissions.

The following list of productive tasks of computer controlled mobile terminals is submitted:

1. *Significantly reduces the response time* for requests for information by eliminating manual interventions and relieving the field officer's dependency on a radio dispatcher to process requests for information.
2. *Eliminates repetition of requests* for information or orders by producing a hard copy of the message on CRT.
3. *Reduces administrative duties* of the patrol officer by gathering information at the time of occurrence.
4. The cause of security and privacy is enhanced by reducing the amount of voice communications required for dispatching and information inquiry.

A major effect of the mobile terminals is eliminating wasted time and effort along with providing accurate, timely information. *Each patrol officer is now more efficient and better equipped to handle requests for his service.*

II – REMOTE MOBILE TERMINAL DISPATCHING

The capability for swift response to calls for service is a major objective of a police force. The capability to apprehend or prevent a crime is related to how rapidly the officer can respond to a call for police service. Computer assisted dispatching provides the capability to reduce the response time for calls for service and improve resource utilization.

Benefits realized from utilization of a computer assisted dispatching system are swift response to calls for service, reduction of administration workload, information for workload studies and analysis and accountability of field force status and control.

Each time a police vehicle responds to an incident (disturbance, accident, crime, traffic violation or call for service), data vital to the statistical facts of the incident need to be captured. The information is processed by the computer, then it correlates the incident data with geographic area, patrol beat, and field status data entered using the status keys of the mobile terminal. Available field units from adjoining beats may then be dispatched to the area of the incident. If the field unit normally assigned to handle calls at that location is already committed, the system may provide a list of nearest available units in service. The system has the capability to monitor the situation and can determine whether dispatching should be immediate or whether it should be delayed until more units are available.

Operational dispatching is addressed directly to the terminal by digital transmission. The computer has the capability to alert the control center if acknowledgement from the mobile terminal is not received within a specified period of time. The dispatcher would be notified so that he could take follow-up action. Acknowledgement of the computer dispatched call for service is accomplished by the depression of a single status key on the mobile terminal.

As dispatch action is initiated, the field officer can enter into the system from his mobile terminal information relative to location, codes to indicate the type of activity he is involved in and status keys which transmit "in service" or "out of service" and so forth. The system will automatically record data such as the time, the car or the beat.

III – POLICE FIELD REPORTING – MOBILE TERMINALS

Police field operations may be characterized with one word, "dynamic." Command and control cannot be achieved without the high speed and precision recording of vital information. Since the majority of all information originates "in the field," the day must come when technology gives the field officer the capability to record his report through more meaningful and efficient means. The mobile terminal presents the capability for the field officer to record this directly into the computer real time system.

The officer may recall the incident from the computer system, adding additional data without repeating data entered from the original dispatch. After he enters the type of incident, a specific format can guide him through the desired data required, supplying codes as needed. Date and time supplied automatically by the computer on each event saves manual entry and provides an accuracy not previously available.

Miscellaneous calls frequently account for a large portion of a department's activity. These activities can be disposed of by entering a simple statement of disposition to complete the basic record stored in the computer as a function of dispatching.

Efficiencies gained through such a system are as follows:

1. Data can be quickly verified.
2. Dispatch files are instantly updated.
3. Manual production of reports are eliminated.
4. An officer can report events as they occur.
5. Copies of reports are reproduced immediately so investigative work can be started.
6. Name, license, case and address inquiries can be programmed and available along with the follow-up assignment to speed up investigation.
7. Coding is significantly reduced.
8. Miscellaneous activities can be reported with disposition of events.

Advantages to the Police Administrator include:

1. Greater uniformity of data collection relative to field operators.
2. More accurate and timely data on workload for manpower allocation.
3. Automatic assignment of case numbers to all cases.
4. Dispositions currently available to investigative divisions for cases assigned investigation activities.
5. Greater control over cases for follow-up suspense of complete reporting and greater accuracy in crime statistics.
6. Elimination of much typing and coding requirements.
7. Elimination of required conversion processes.
8. Greater command and control over the entire field operations activity.
9. Detailed information on incidents immediately accessible to headquarters or field supervisors.

POLICE PATROL WORKLOAD SYSTEMS

Police departments are experiencing a steady increase in manpower costs. Approximately 90 per cent of most police budgets relate to personnel costs. The public is demanding a higher level of services from law enforcement agencies but financial allocations do not normally allow for expansion of law enforcement services. The only recourse is for police departments to make more effective use of their available manpower. Since a large portion of police manpower is used for patrol functions, it is important that greater productivity must be obtained from patrol operations.

An information system which collects patrol events can be extremely helpful in monitoring workload statistics and providing helpful clues for a department in determining future patrol assignments where the greatest need exists.

The basic ingredients of a patrol workload reporting system consist of the following elements:

1. Records the time call received
2. Records address of incident and patrol beat
3. Records an incident code
4. Records cars to be dispatched
5. Records time cars are dispatched
6. Upon completion, stamps time cards clear

Dispatch incident cards are then sent to the computer center for update of the dispatch file.

Reports from this sytem tell the administrator which of his patrol beats has the highest workload, which hours of the day have the highest workload, the average amount of time it takes to handle a traffic violation, the amount of time his patrolmen are spending at the garage while their car is being serviced, and hundreds of other matters like these to assist him in making decisions.

A computerized patrol workload can provide administrators answers to some of the following questions:

A. Does the current beat structure provide the desired distribution workload?
B. Are activities that may be scheduled (warrant service, vehicle preventative maintenance, administrative functions) actually occurring when service activities and preventative activities are at their lowest levels?
C. Is the current shift scheduling providing manpower when it is needed?
D. Is a predetermined amount of preventative manpower available when the need is greatest?
E. How much would service be improved with the addition of manpower to an area?
F. How much would service be degraded with a reduction in manpower to an area?

COMPUTERIZED PLANNING SYSTEM

Planning is a decision-making process. It is a way for an organization or institution to meet expected change, produce desired change, and prevent undesired change. The need for planning, then, is due to the changing environment, the complexity of operations, the ever-increasing requirements for funds, the increasing number and complexity of regulations, and the inadequacy of the old informal planning methods. Computerized planning systems increase an organization's capability to take an "in depth view" of the problems in the future. It assists an organization in developing a course of action to meet short-range and intermediate goals and needs as well as long-range goals and needs.

Quite often, however, planning attempts produce negative responses in those who should be involved. Some common responses from those who are approached about planning include: "We've survived without planning this long; who needs it?", "It's too blue sky," "It's just another job and I don't have the time," "It won't change anything," "It's inflexible," and "I know we're not doing as well as we can now, but if only they would . . ." To counteract criticisms and to provide a strong basis for planning, the plan must incorporate several elementary principles. First, the planning process must be simple enough to be understood by all those who should be involved with it. Second, the plan must be selective in placing proper emphasis on various elements, and it must be adaptable and flexible enough to accommodate change. The payoff of the plan, or the final benefit to be derived, must be visible and worthwhile to all who are working with the plan. Finally, the planning process must not involve complicated, tedious paperwork to convert the desired goals into meaningful programs.

For planning purposes, the computer model will portray real or expected conditions in the operation of an organization. The representation will be based upon the planner's experience and observation of how the organization functions through time. The model will be constructed by assigning, quantitative values and relationships to the elements, or planning items, that characterize the organization.

A computerized simulation system is a powerful and useful tool to the characteristic "what if . . ." kind of question that frequently arises in formal planning. However, this system is no more than a powerful and useful tool.

To assist in the development of a computerized planning system for police organizations, a program known as "Computerized Police Planning System" was developed and given the acronym of COPPS. The technique involves the construction of a computer simulation model that represents the organization's functions.

A simulation model that accurately reflects the complex and dynamic interrelationships of organizational elements has several substantial advantages. The simulation model can:

- Stimulate the imagination and improve perspectives.
- Assist in designing, manipulation, and examining various references.
- Facilitate communication among the people involved in planning the policy-making by presenting a physical point of reference
- Clarify and examine issues and focus effort on the major ones.
- Teach the planners and policy-makers how to plan better by permitting insight into patterns of crisis.
- Develop contingency plans and anticipate crisis with planned action.
- Create methodologies, procedures, and frameworks for problem solving.

The answers that the experiments provide can permit sound policy decisions to be made with relative ease. As changes are noted, they can readily be incorporated into the model, keeping it viable and accurate in representing the organization. This simulation system represents a unique approach. The approach itself is not a model but simply a *system* that planners can use to develop models. One important contribution to planning success is the capability to assess a large number of alternatives rapidly and accurately.

Computerized Planning Systems provide administrators with a powerful capability to project accurate resource requirements for long range programs. A major factor is management's desire to project future needs by using a simulation model.

The following case is an example of the COPPS program which was used to determine the area requirements and resulting costs to accommodate anticipated 1982 personnel in a new Police Headquarters Building.

All aspects affecting salaries, equipment, personnel strength and additional space requirements, were analyzed and appropriate factors were established which could be used for our computations.

Approximately 200 items of basic information were required by the model for calculating the Headquarters space requirement as follows:

1. Current area requirements and manpower requirements of the offices of Chief of Police, Assistant Chief, Public Information, Community Relations, Computer Systems, Patrol Bureau, Special Operations, Investigations Bureau, Administrative Bureau, Planning & Research, Auxiliary Services, Personnel, Fiscal, Records, Identification, Communications, and Helicopter Units.
2. One per cent Personnel strength growth per year factor.
3. 1.23 sq. ft. land for 1 sq. ft. of area required factor.
4. Five per cent inflationary factor per year current land costs.
5. Calculated cost of individual units.
6. Calculated area requirements by 1982.
7. Outside consultant cost.
8. Total of major area requirement.
9. Total of major area cost.
10. Total of major area manpower.
11. Total overall area manpower.
12. Total overall area requirement.
13. Total overall area cost.

ALERT II

CRIMINAL JUSTICE SYSTEM DESIGN CONCEPTS

During 1970, efforts were made to build a new data base from remote terminal operations in which keypunch operations would be drastically reduced. The on-line files were structured around a three-file concept which would support all elements of the criminal justice process. The system was renamed Alert II in January, 1972, to indicate a new sense of direction in serving the entire needs of the criminal justice process.

The files designed for the new system were a name index, a general purpose index and a master data file. The general index file will, by nature of the key, be divided into logical sub-files.

The purpose of the name index file is to provide an alphabetic grouping of all names involved in any way with system participants. This file will contain true names, alias names, moniker names and those business names that have reason to be in our files.

The general purpose index file is the central index file where a check can be made for any numeric identifier which may be associated with a person, address, automobile, offense or ticket, vehicle accident and arrest. Also included will be index entries for court system purposes which will have court date and time as the key, offense system entries which will be used for the daily crime summary (Part I offenses committed within past twenty-four hour period) and injury accidents occurring within past twenty-four hour period.

The types of data included in this file will be as follows:

1. license number
2. vehicle identification number
3. address
4. warrant number
5. free format numbers
6. traffic ticket numbers
7. court date and time
8. case report number for arrest system/civil index (case number index)
9. four formats of an offense cross-index record
10. case report number for vehicle accident
11. arrest number index
12. prosecutor's office number
13. magistrate court case number
14. appeal case number

The master file is the central file where all data concerning an individual or an automobile can be stored together. One seek by the disk device can

THE FOLLOWING SPACE COST FACTORS WERE USED IN CALCULATING A POLICE HEADQUARTERS BUILDING REQUIREMENTS:

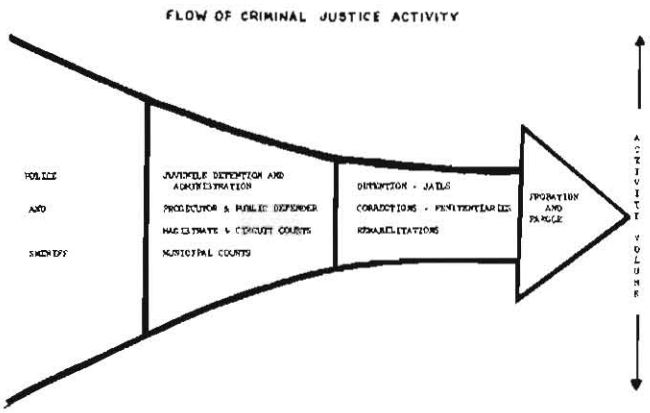
	PLANNING ITEM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
						COST FACTORS (DOLLARS) & PER SQUARE FEET						
194	CNSTR COST/SQ FT OFFICE	34.0	35.7	37.5	39.4	41.3	43.4	45.6	47.8	50.2	52.7	55.4
195	DETENTION	55.0	57.7	60.6	63.7	66.9	70.2	73.7	77.4	81.3	85.3	89.6
196	MAINTENANCE	18.0	18.9	19.8	20.8	21.9	23.0	24.1	25.3	26.6	27.9	29.3
197	ENCLOSED PARK	10.0	10.5	11.0	11.6	12.2	12.8	13.4	14.1	14.8	15.5	16.3
198	OUTSIDE PARK	1.3	1.4	1.4	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.1
199	PURCHASE PRICE OF LAND	5.0	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.4	7.8	8.1

LINES 200 THROUGH 206 BELOW SHOW THE RESULTS OF THE COPPS PROGRAM CALCULATIONS. THIS IS THE COST BY YEAR FROM 1972 THROUGH 1982 AND IS BASED ON THE THIRTEEN (13) AREA AND MANPOWER PROJECTIONS IDENTIFIED ON THE PREVIOUS CHART TOGETHER WITH SPACE FACTOR COST OUTLINED IN THE PRECEEDING CHART:

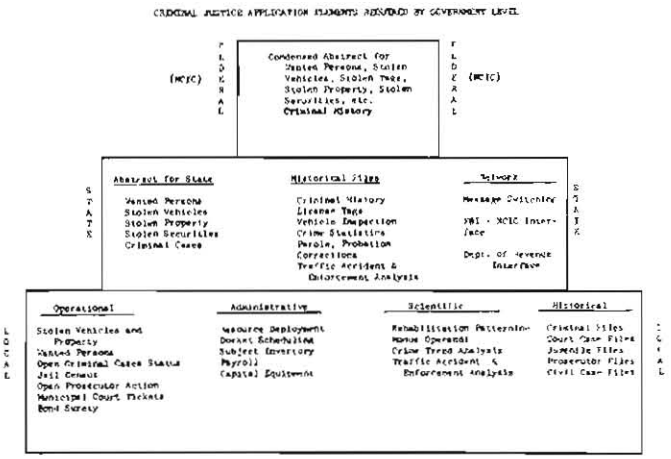
		COST IN DOLLARS									
200	COST OF HQ OFFICE SPACE	$4,900,000	$ 5,300,000	$ 5,900,000	$ 6,400,000	$ 7,000,000	$ 7,600,000	$ 8,300,000	$ 9,100,000	$ 9,900,000	$11,000,000
201	COST OF HQ DETENTION SPACE	725,820	797,517	874,569	957,333	1,046,186	1,141,531	1,243,796	1,353,433	1,470,924	1,596,781
202	COST OF HQ MAINTENANCE SPACE	1,204,853	1,323,869	1,451,775	1,589,161	1,736,657	1,894,929	2,064,886	2,246,683	2,441,717	2,650,637
203	COST OF HQ ENCL PARKING	345,907	380,076	416,797	456,240	498,586	544,025	592,761	645,012	701,005	760,985
204	COST OF HQ OUTSIDE PARKING	256,004	281,292	308,469	337,661	369,000	402,629	438,699	477,369	518,810	563,201
231	HQ COST SUBTOTAL	7,400,000	8,100,000	8,900,000	9,800,000	11,000,000	12,000,000	13,000,000	14,000,000	15,000,000	16,000,000
232	HQ CONTINGENCY COSTS	739,572	812,627	891,139	975,470	1,066,007	1,163,159	1,267,360	1,379,075	1,498,792	1,627,033
233	HQ CONSULTANT COSTS	739,572	812,627	891,139	975,470	1,066,007	1,163,159	1,267,360	1,379,075	1,498,792	1,627,033
205	COST OF HQ LAND ACQUISITION	704,199	773,760	848,517	928,815	1,015,021	1,107,526	1,206,744	1,313,115	1,427,107	1,549,214
206	TOTAL COST FOR BUILDING	9,600,000	11,000,000	12,000,000	13,000,000	14,000,000	15,000,000	16,000,000	18,000,000	19,000,000	21,000,000

pick up all associated data. The data in this file will be grouped together by an ALN (Alert Number). Within an ALN, several different suffixes will cause the data to be grouped and displayed in the sequence desired. The sequence of a complement of records will be as follows:

1. name records
2. numeric identifier records
3. address records
4. license records
5. warrants or wants (in degree sequence)
6. informational records
7. arrest information (abstract)
8. prosecutor records
9. traffic arrest
10. ASAP records
11. appeals records
12. vehicle accidents
13. offense records
14. juvenile court records
15. Civil Index (case number index)



This chart represents in diagrammatic form the volume of activity experienced by the various segments of activity in the Criminal Justice System. The height of the arrow is a proportional representation of the volume of work experienced, or volume of cases experienced by each of the agencies in that relative part of the Criminal Justice System. The apprehension agencies (police and sheriff operations) handle the largest volume of Criminal Justice System traffic. The adjudicatory agencies, as represented by Juvenile Courts, Prosecutor and Public Defender offices, and Magistrate, Circuit and Municipal Courts, handle the next largest volume of criminal activity. The smallest volume of criminal justice activity is handled by corrections, including penitentiaries, detentions, jails, and rehabilitation centers. A significant number of cases are handled by probation and parole departments and their correctional or semi-correctional activities.



The chart represents a synopsis of hierarchy of stored and processed data which one can expect to find at the various governmental levels for use by all criminal justice agencies participating in an integrated information system. It reflects those data elements stored at the federal level by NCIC which are of interest to all criminal justice agencies and all levels. The data stored at the state level is of common interest to all agencies of a state as well as providing reporting and service to state level criminal justice agencies. The data stored, processed, and used at the local agency level is of an operational, administrative, scientific and historical nature.

Federal level information or NCIC information can be of value and benefit to everyone in the United States. The files, as described in the chart, will provide a common data base for use throughout the country identifying significant events from point of apprehension to and through disposition and dismissal from the Criminal Justice System. The data found at the state level includes more detailed information relative to criminal history, motor vehicle registration, crime statistics, parole, probation, corrections and usually state level agency systems. At the local level, we find more requirements for scientific processing because of environmental conditions, geographic situations and criminal habits which are restricted to given geographic areas and can be treated much better on a local level than they could on either a state or federal level.

The local record is divided into two parts for effective space utilization purposes. For example, the name record has certain data missing a large percentage of the time. A solution was to divide the name record into one segment of data that is present most of the time, and another segment that

is missing frequently. The second segment is called the numbers record and contains all numeric identification an individual normally uses. Another example of segmenting records is in the offense and traffic systems. These systems collect two types of data, statistical and historic. The historic data has to be retained for inquiry purposes for a period of one to two years. Statistical data is necessary only long enough to produce management reports. These records have been segmented on that basis, and the statistical records are released from on-line files and recorded on magnetic tape.

The system philosophy required "multi-threading" concepts and a priority of processing actions that must be implemented in order to guarantee the volume of "throughput" and processing of quantities of data as required by system specifications. To achieve this goal, the Real-Time Teleprocessing Program was designed to consist of the *Main Task and seven sub-tasks.* These sub-tasks are:

1. Line Control Program
2. Output Queue Routine
3. Input Queue Routine
4. Faster Transaction Processor II
5. Faster Transaction Processor I
6. Source Data Collection Processor
7. Message Switch/Error Handler

These tasks are attached in that priority. That is, if two tasks require central processing unit control, the task with the highest priority gets control and performs its function. When it no longer requires CPU control, the other task takes over and performs its function. Under this arrangement, a task can interrupt a lower priority task or can be interrupted by a higher priority task.

Line Control, Input Queuing and Output Queuing are *low* volume processing service routines that require priority control in order to perform their services and keep the whole system running effectively.

The Main Task serves as the executive program of the ALERT System. It recognizes all seven subtasks and maintains control and priority assignments over the seven sub-tasks in their relation to each of the various tasks.

Alert II was designed with the objective that an accurate real time law enforcement data base must be fully operational. This prerequisite exists because the offender's first contact in the criminal justice system is with a law enforcement agency.

Beyond the law enforcement agencies, however, the flow of data for judicial analysis leads from a complex group of people, firms and agencies which exist outside the court system's administrative control. These trial practice law firms, police prosecutors, (public) defenders, sheriffs and probation officers prepare a myriad of legal documents in the form of dockets, complaints, warrants, indictments and summons which are a major part of the judicial operation.

With such a broad information base, it is required that the court system with its many individual segments and the complex group outside the court system be able to draw upon common resources.

MUNICIPAL COURT OF KANSAS CITY MISSOURI

The Municipal Court of Kansas City, Missouri is charged with the responsibility of processing and rendering decisions on the thousands of traffic citations written by the Kansas City Missouri Police Department. The court is composed of seven divisions, and each of these divisions holds four sessions of court daily with the exception of Friday afternoons. There are seven judges, one of which is elected by the others each year to serve as the presiding judge.

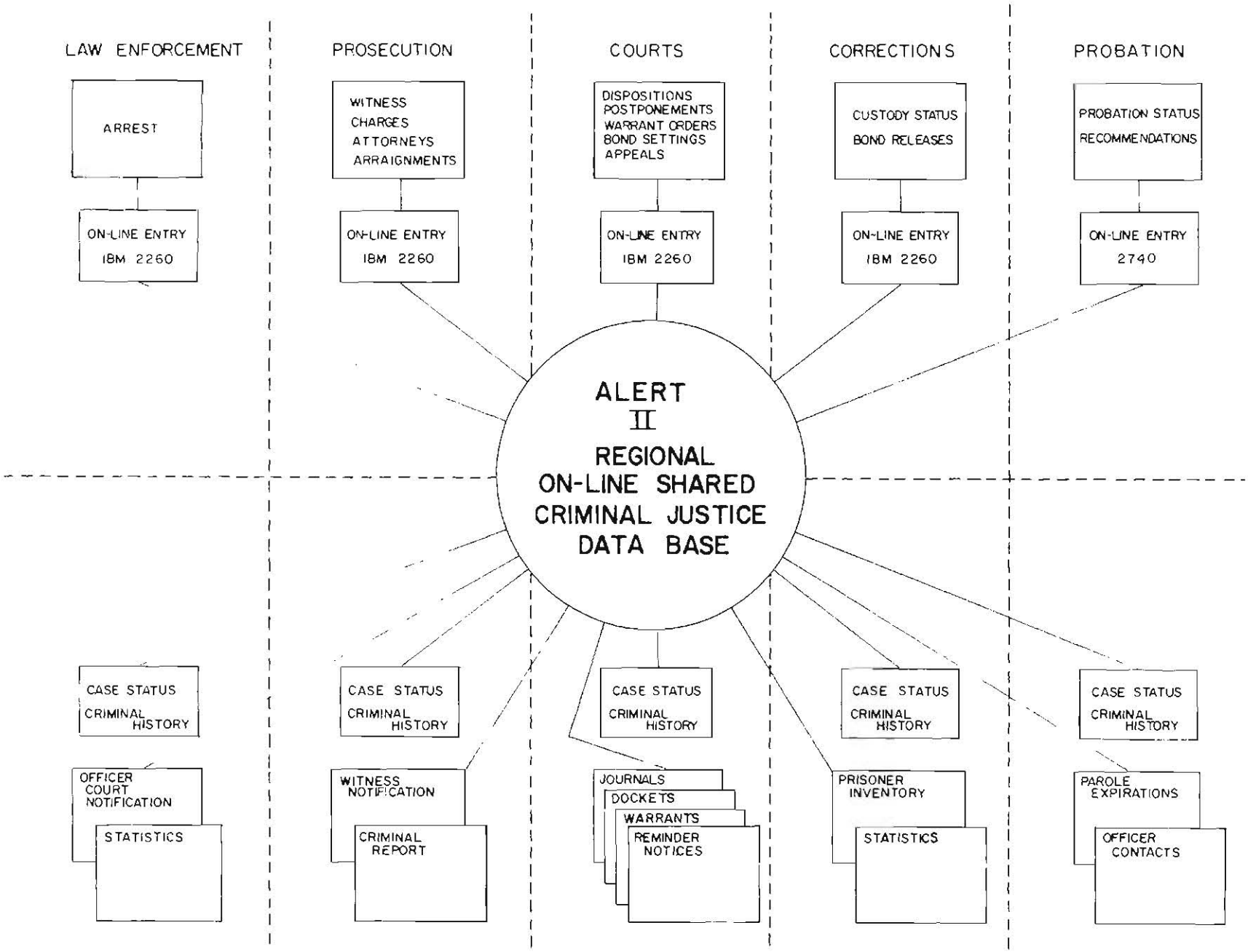
The relationship between the police and court is one that allows the following activities by each agency.

Police:
a. Initiates the cases.
b. Sets first court appearance date.
c. Appears in court as witness.
d. Provides court with prior driving record with this city.
e. Provides dockets and journals.

Court:
a. Hears cases and updates computer.
b. Continues cases and updates court date setting.
c. Provides state driver's history.
d. Updates computer with all dispositions.

The police department and the municipal court entered into an agreement to process the records of the court by using electronic data processing methods as follows:

a. Accountability for traffic tickets begins when the Police Department requisitions large blocks of tickets from the Municipal Court. The traffic division of the Police Department is responsible for the tickets until they are requisitioned in smaller blocks from the various patrol stations. Finally, when an officer gets a book of these tickets from his station, he must sign for them and is held responsible for the tickets until he writes a citation. An on-line inquiry will show who is responsible for the citation from the time it is received by the police until long after it is disposed of by the court.
b. The officer is released from accountability as each ticket is entered into the on-line system.
c. The court docket is automatically produced from the data entered from the traffic ticket. The docket is produced for each of the 7 divisions of court by time of day.
d. For parking tickets, the computer produces a 'Reminder Notice' which is mailed to the registered owner of the vehicle.


LAW ENFORCEMENT
PROSECUTION
COURTS
CORRECTIONS
PROBATION
ARREST
WITNESS
CHARGES
ATTORNEYS
ARRAIGNMENTS
DISPOSITIONS
POSTPONEMENTS
WARRANT ORDERS
BOND SETTINGS
APPEALS
CUSTODY STATUS
BOND RELEASES
PROBATION STATUS
RECOMMENDATIONS
ON-LINE ENTRY
IBM 2260
ON-LINE ENTRY
IBM 2260
ON-LINE ENTRY
IBM 2260
ON-LINE ENTRY
IBM 2260
ON-LINE ENTRY
2740
ALERT
II
REGIONAL
ON-LINE SHARED
CRIMINAL JUSTICE
DATA BASE
CASE STATUS
CRIMINAL HISTORY
CASE STATUS
CRIMINAL HISTORY
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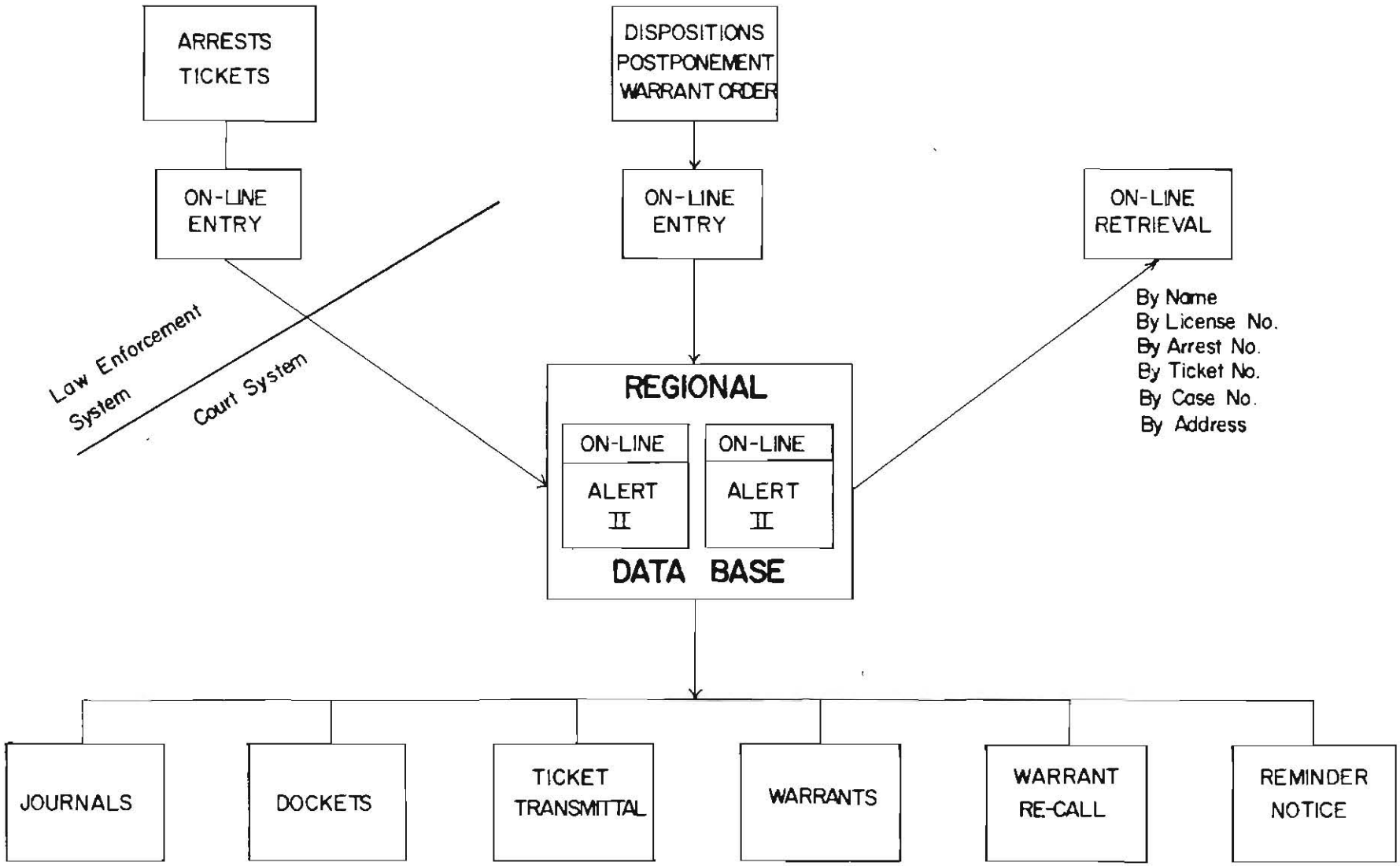
CRIMINAL HISTORY
CASE STATUS
CRIMINAL HISTORY
CASE STATUS
CRIMINAL HISTORY
OFFICER
COURT
NOTIFICATION
STATISTICS
WITNESS
NOTIFICATION
CRIMINAL
REPORT
JOURNALS
DOCKETS
WARRANTS
REMINDER
NOTICES
PRISONER
INVENTORY
STATISTICS
PAROLE
EXPIRATIONS
OFFICER
CONTACTS

MUNICIPAL COURT SYSTEM



e. A warrant is automatically generated by the computer if the parking ticket is not satisfied within ten days from date of issue and a warrant disposition code is entered by Municipal Court employees.
f. The disposition to each case is entered into the computer by the Clerk of the Court. If the citizen fails to show up in court, the disposition will result in a warrant automatically being generated for the citizen's arrest.

The entry of Municipal Court records into this system is generated as follows:

a. Entry of traffic ticket or parking ticket
b. Entry of registered owner's name on parking ticket
c. Entry of disposition to each case
d. Entry of continuances
e. Entry of General Ordinance arrests

JACKSON COUNTY MISSOURI PROSECUTING ATTORNEY'S SYSTEM

The county prosecutor of Jackson County is charged with the responsibility of prosecuting those cases stemming from: a) complaints made by citizens of the county b) those arrests submitted by law enforcement officers.

Agreements have been made between the prosecutor and the Kansas City Missouri Police Department to accomplish the following data entry tasks.

A. Police Department entry responsibility:
   1. Name of defendant
   2. Address of defendant
   3. Arrest information
   4. Police officer making arrest

B. Prosecutor responsibility:
   1. Charges filed
   2. Arraignment information
   3. Bond information
   4. Witness information
   5. Disposition information

By participating in this type of arrangement all parties can benefit in the following:

1. Minimum amount of work by each agency.
2. Minimum amount of on-line computer storage space.
3. Broader data base.
4. More accurate information.
5. Current data.

There are seven magistrate districts within Jackson County Missouri. Five of them are located in the Jackson County Courthouse, one of them is located in Independence, Missouri and the other one divides time between Raytown and Grandview, Missouri.

The Computerized Prosecutors System provides docketing on criminal reports for those courts physically located in the Jackson County Courthouse.

The Docket Select Program selects data from the Master File and General Index File and produces the Magistrate Court Docket, and also the Witness Notification Labels.

The Criminal Report Select Program selects data from the Master File and General Index File and produces the Magistrate Court Criminal Report.

The system was designed to provide the capability of cross indexing to relate police records to corresponding records of a case that has been referred to the prosecutor and the Court. The values to be derived from such a system are enormous. The criminal justice process has long suffered from a lack of coordination from its many parts and this facet of automation represents a significant step forward in developing automated criminal justice systems.

OVERVIEW OF PROSECUTOR'S ON LINE-SYSTEM

The primary purpose of the Prosecutor's On-Line System is to provide information pertaining to any case that is involved in the prosecutor's process as rapidly as possible. This on-line information system has two features which can be of great assistance in the operation of the prosecutor's office. These features are:

A. Ability to inquire directly into the computer's memory bank concerning a criminal's past and present relationship with the prosecutor with almost instant reply.
B. Ability to update on-line records into the system.

The entry of prosecutor records into the system is accomplished as follows:

a. Entry of prosecutor statistical information.
b. Entry of additional defendants.
c. Entry of witness names and addresses.
d. Entry of arraignment and/or bond information.
e. Entry of defense attorney's names.
f. Entry of remarks.
g. Entry of continuances.
h. Entry of dispositions.

The following inquiry codes are used in update-cancel records in the on-line system:

i. Update statistical information.
j. Update/cancel witness names and addresses.
k. Update arraignment information.
l. Update/cancel bond information.
m. Update/cancel defense attorney's information.
n. Update disposition information.
o. Cancel remarks.
p. Cancel continuances.
q. Cancel dispositions.
r. Cancel statistical information.
s. Cancel arraignment information.

JACKSON COUNTY JUVENILE COURT

The Jackson County Juvenile Court is charged with the responsibility of handling those cases involving defendants that are too young to be handled by the adult courts. A notable exception to this is those cases where a youth is certified as

INQUIRY ON SUBJECTS TRAFFIC TICKET, ALCOHOL INFLUENCE,
COURT TRIAL AND PROBATION INFORMATION

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ND.TEST.ZXAMPLE.RIPPINGOOD..WM.010101

ZXAMPLE          RIPPINGOOD     WM  010101

MOKPD00  CRN = *0207859   TA-001 TC-000 OA-000 OC-000 MA-000 MC-000 FA-000 FC-000

                  1      2          3      4          5
A  MOKPD00  |111111| |113|  |OCC:01/01/72| |2330| |RPT:01/01/72|      01
                  6          7          8      9
   |INVOLVED| |CRT:02/15/72| |0930| |RM:A|

                                    10
   MOKPD00  |7517 _____PROSPECT____KANS CITY MO| 1111/1111  00000000

                  1      2          3          4          5       6      7
B  MOKPD00  |00A00001| |111111| |OCC*01/01/72| |BAC*REFUSAL| |VIDEO TAPE| |1111| |1111|

                  1      2          3      4      5      6      7      8      9      10
C  MOKPD00  |00111111| |01/02/72| |COURT| |MS=Y| |PSY=Y| |SOC=Y| |MED=Y| |FAM=Y| |JS=Y| |DPF=Y|

                  11                 12                      13
   |PRIOR PROB=Y| |CURRENT PROB=Y|      |ALCOHOL PROBLEM=UNDET|

                  1      2      3      4
D  DOR/  |DUI=02| |OTH=02| |SUS=5| |REV=5|

ALERT/0207859                100%
```

A. TRAFFIC TICKET INFORMATION
   1. TRAFFIC TICKET NUMBER
   2. ORDINANCE CODE
   3. DATE OF OCCURRANCE
   4. TIME OF OCCURRANCE
   5. REPORT DATE
   6. INVOLVED IN CRASH (BLANK IF NOT)
   7. COURT DATE
   8. COURT TIME
   9. COURT ROOM
   10. LOCATION OF ARREST

B. ALCOHOL INFLUENCE INFORMATION
   1. CASE REPORT NUMBER
   2. TRAFFIC TICKET OR ARREST NUMBER
   3. DATE OF OCCURRANCE
   4. BREATH TEST RESULT
   5. VIDEO TAPE TAKEN (BLANK IF NOT)
   6. ARRESTING OFFICER SERIAL NUMBER
   7. OFFICER SERIAL NUMBER ISSUING TEST

C. PROBATION INFORMATION
   1. TRAFFIC TICKET OR ARREST NUMBER
   2. DATE DETAILED INVESTIGATION COMPLETED
   3. REASON FOR INVESTIGATION:
      COURT = ORDER OF COURT
      PROB = NORMAL PROBATION PROCEDURES
      PROS = REQUEST OF PROSECUTOR
   4. MEDICAL SIGNS OF ALCOHOLISM
      Y= YES
      N= NO
   5. PSYCHOLOGICAL DEPENDENCE
      Y= YES
      N= NO
   6. PREVIOUS CONTACT WITH SOCIAL AGENCY
      Y= YES
      N= NO
   7. PREVIOUS CONTACT WITH MEDICAL AGENCY
      Y= YES
      N= NO
   8. FAMILY PROBLEMS
      Y= YES
      N= NO
   9. JOB STATUS
      Y= EMPLOYED
      N= UNEMPLOYED
      M= EMPLOYMENT UNSTABLE
   10. DRINKING PROBLEM IN FAMILY
      Y= YES
      N= NO
   11. PRIOR PROBATION
      Y= YES
      N= NO
   12. CURRENT PROBATION
      Y= YES
      N= NO
   13. ALCOHOL PROBLEM
      NONE
      ESTAB = ESTABLISHED
      UNDET = UNDETERMINED

D. DEPARTMENT OF REVENUE SUMMARY INFORMATION
   1. TOTAL DUI CONVICTIONS
   2. TOTAL OTHER (NON-DUI) CONVICTIONS
   3. TOTAL SUSPENSIONS OF LICENSE
   4. TOTAL REVOCATIONS OF LICENSE

(This inquiry provides information to the Municipal Court on problem drinking drivers and information related to case history).

```
C1T.TEST.0000015


C1T.TEST.0000015

ZXAMPLE            BARRY       A                                          MOKPD0000

KKKKKKKKK  1909      E     333        ST KANS CITY  MO       052272
    1           2    3 4   5  6  7
A- MOKPD0000  XXXX0015 MO 2  PC 72 EDSE
    1         2     3            4          5        6          7
B- MOKPD0000 0000015 001    OCC:01/01/72   1111 RPT:01/01/72   10
                                                                  9    10     11
MOKPD0000 1111       11            8            KANS CITY  MO 1111/1111 00000000
                    1            2                        3
C- MOKPD0000 DISP:01/31/72      GUILTY                   $025

ALERT/0725077
```

A.

1. ORI
2. License #
3. License State
4. License Year
5. Vehicle Type
6. Vehicle Year
7. Make

B.

1. ORI
2. Ticket #
3. Ordinance Code
4. Date Of Occurrence
5. Officer Serial #
6. Report Date
7. Unit
8. Address Of Location
9. Reporting Beat
10. Beat Of Occurrence
11. Census Track and Block

C.

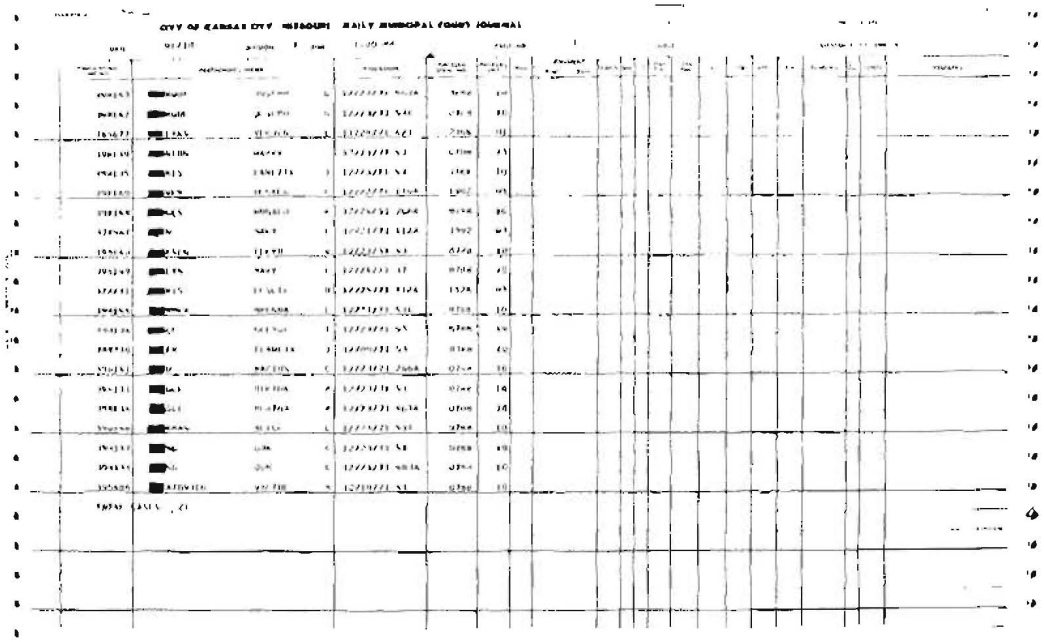
1. Date of Disposition
2. Disposition Type
3. Sentence

(This inquiry is by case number and is used by Municipal Court to determine the status of a case).

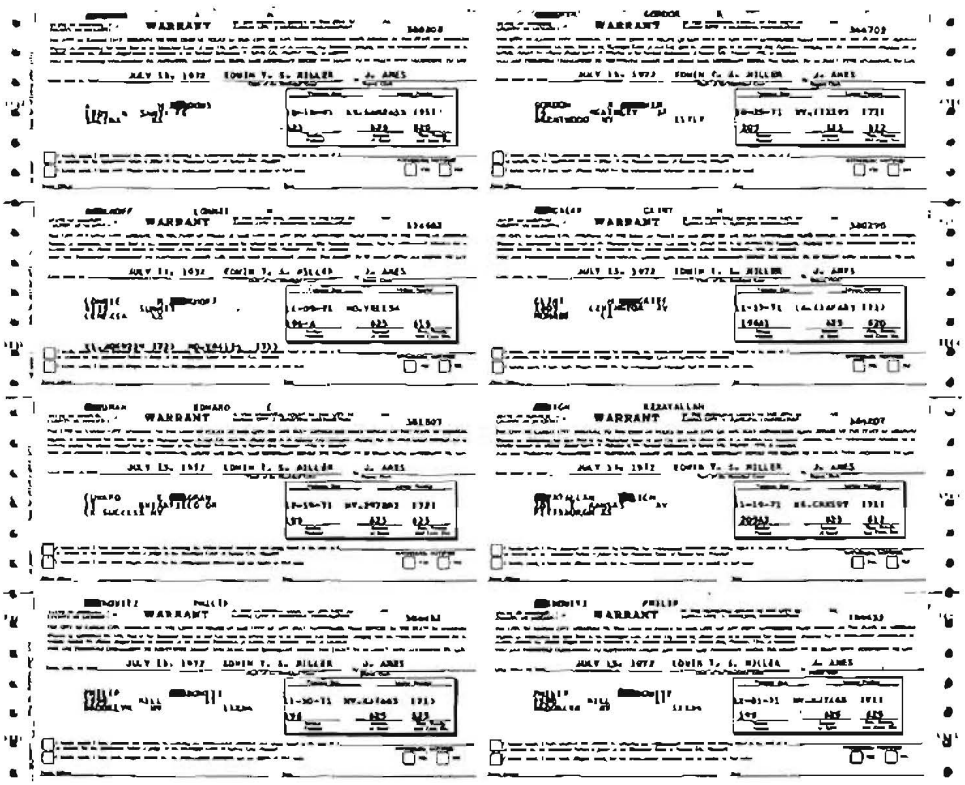
EXAMPLE OF PAROLE HIT

```
N.400.ZXAMPLE.BENJAMIN.D.W.M.010240
HIT ON PAROLEE MADE BY   400   05/24/72
0456 HRS.                TERMINAL = KCP9
ZXAMPLE        BENJAMIN     D  WM  010240  KS  509  155  BR  BR
MOKPD00  FBI= 933340F  SOC= 515288186  OLN=        NIC=W044911515
MOKPD00  1619          S  GENESSEE  ST  KANS CITY  MO        082171
MOKPD00  184779    MO  0  TK    CHEV  TK
MOKPD00    00926554  KC W JUDGEMENT ORDER 092471
MOKPD00    0B057903  JA W BURGLARY 2D DG  071371          0869
MOKPD00    00891825  KC W PROBATION VIOL  081771
MOKPD00  00041724 ON PAROLE KANS CTY PAROLE 0 INDEFINITE
MOKPD00  JKT = 00ZXAMPLE  TV-010  TC-010  OV-000  OC-000  MA-001
MC-000  FA-003  FC-001
MOKPD00  FPC = 20 02 13 18 17
               18 TT 10 17 15
ALERT/0000010                          100%
MOKPD00  1106        E  PACIFIC    ST  KANS CITY  MO    022671
```

(Each time a subject in parole status is inquired upon by the officer in the street, the computer automatically transmits a message to a computer terminal located in the Parole Office providing that agency instantaneously with pertinent facts concerning the contact and a summary of the subjects history).



A page of the Municipal Court Docket generated automatically by the computer from the entry of traffic tickets.



Warrants for the arrest of citizens are printed by the computer when the citizen fails to show up in court for trial.

MUNICIPAL COURT
1021 McGEE STREET
KANSAS CITY, MO. 64108
DATE OF THIS NOTICE 05/15/72

REMINDER NOTICE
PARKING VIOLATION
IF YOU HAVE MAILED YOUR REMITTANCE OR PERSONALLY PAID THIS TICKET, PLEASE IGNORE THIS NOTICE.

OFFICE HOURS 8 A.M. TO 5 P.M. MONDAY THRU FRIDAY
TELEPHONE CR 4-1261

TRAFFIC TICKET NO	VIOLATION DATE	PLACE OF VIOLATION	STATE LICENSE NO	AMOUNT DUE	IF PAID ON OR BEFORE THIS DATE
1002785	05/08/72	63 ST PASEO BD	AL26178	$ 2	05/18/72

[redacted]
1718 E. BRIGHTON
KANSAS CITY, MO
64135

PLEASE READ
THE LAW PROVIDES FOR ADDITIONAL COSTS OF $10.50 IF THIS TICKET IS NOT SATISFIED ON OR BEFORE ABOVE DUE DATE.

MUNICIPAL COURT
1021 McGEE STREET
KANSAS CITY, MO 64108
DATE OF THIS NOTICE 05/15/72

REMINDER NOTICE
PARKING VIOLATION
IF YOU HAVE MAILED YOUR REMITTANCE OR PERSONALLY PAID THIS TICKET, PLEASE IGNORE THIS NOTICE.

OFFICE HOURS 8 A.M. TO 5 P.M. MONDAY THRU FRIDAY
TELEPHONE CR 4-1261

TRAFFIC TICKET NO	VIOLATION DATE	PLACE OF VIOLATION	STATE LICENSE NO	AMOUNT DUE	IF PAID ON OR BEFORE THIS DATE
1002791	05/08/72	1217 S OAK ST	M997776	$ 5	05/18/72

[redacted]
1204 W 13 ST
KANSAS CITY, MO
64106

PLEASE READ
THE LAW PROVIDES FOR ADDITIONAL COSTS OF $10.00 IF THIS TICKET IS NOT SATISFIED ON OR BEFORE ABOVE DUE DATE.

MUNICIPAL COURT
1021 McGEE STREET
KANSAS CITY, MO. 64108
DATE OF THIS NOTICE 05/15/72

REMINDER NOTICE
PARKING VIOLATION
IF YOU HAVE MAILED YOUR REMITTANCE OR PERSONALLY PAID THIS TICKET, PLEASE IGNORE THIS NOTICE.

OFFICE HOURS 8 A.M. TO 5 P.M. MONDAY THRU FRIDAY
TELEPHONE CR 4-1261

TRAFFIC TICKET NO	VIOLATION DATE	PLACE OF VIOLATION	STATE LICENSE NO	AMOUNT DUE	IF PAID ON OR BEFORE THIS DATE
1002891	05/08/72	1721 S BROOKLYN AV	CLH645	$ 10	05/18/72

[redacted]
409 N JACKSON
KANSAS CITY, MO
64031

PLEASE READ
THE LAW PROVIDES FOR ADDITIONAL COSTS OF $10.00 IF THIS TICKET IS NOT SATISFIED ON OR BEFORE ABOVE DUE DATE.

2041

Parking tickets result in a 'Reminder Notice' being printed by the computer for the citizen.

JOIDALE — KANSAS CITY MISSOURI ALCOHOL SAFETY ACTION PROJECT — PREPARED BY: KCMPD COMPUTER SYSTEMS DIVISION

TABLE 44

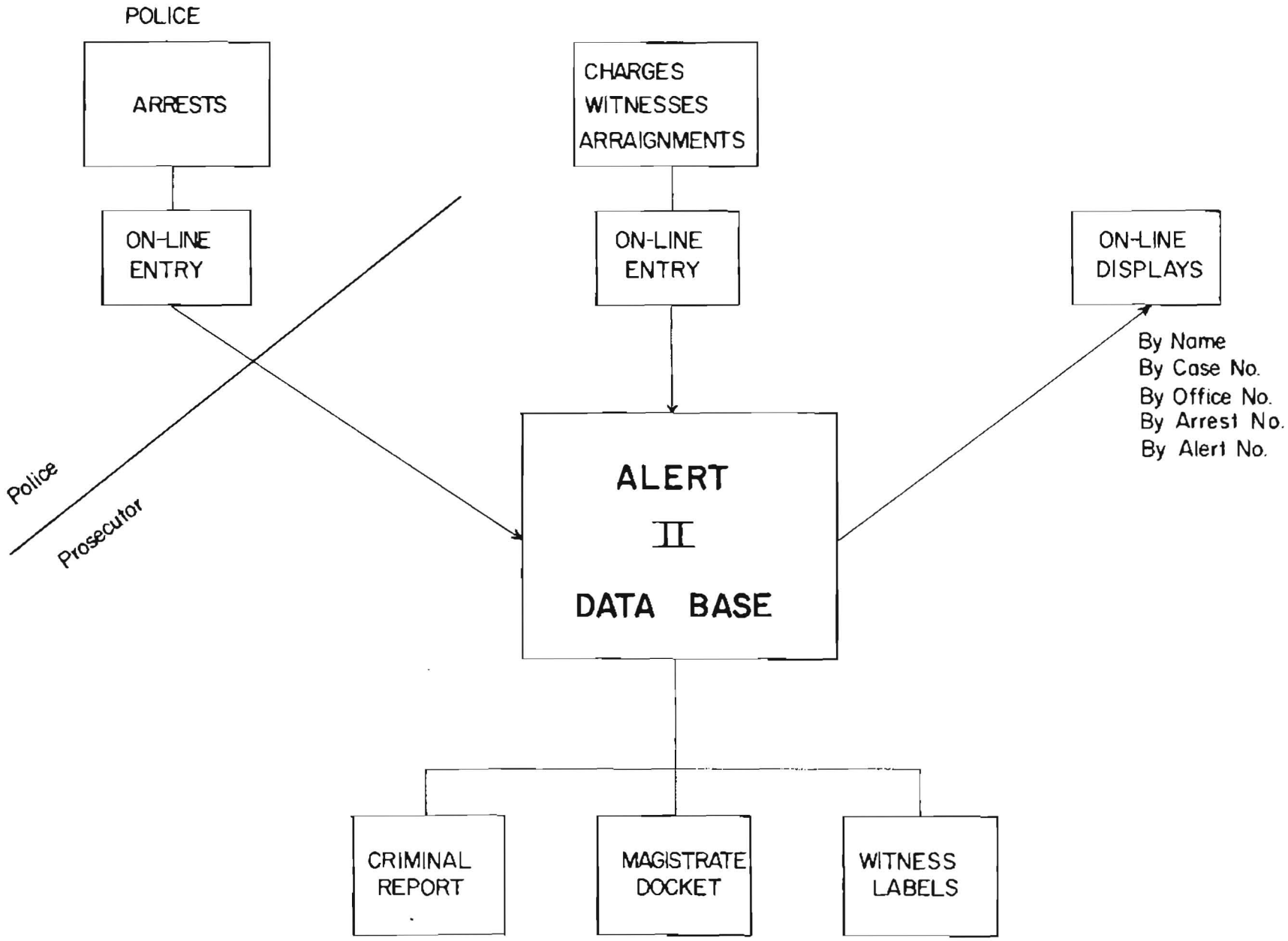
TOTAL PROJECT IMPACT — QTR ENDING 053172

CRASH DATA

EVALUATION MEASURE	BEFORE QTR MONTH 1	MONTH 2	MONTH 3	QTR TOTAL	BEFORE QTR MONTH 1	MONTH 2	MONTH 3	QTR TOTAL	BASELINE QTR MONTH 1	MONTH 2	MONTH 3	QTR TOTAL
TOTAL CRASHES	2251	2376	0	4627	2570	2301	2198	7159				
A/A CRASHES	215	204	0	419	271	329	260	760				
DET BY BAC	89	64	0	153	65	78	94	237				
OTHER	128	140	0	268	206	151	166	523				
SINGLE VEHICLE	233	300	0	533	297	266	305	808				
A/A CRASHES	52	48	0	100	56	40	76	172				
DET BY BAC	12	8	0	20	9	13	31	32				
OTHER	40	40	0	80	41	24	45	114				
MULTI-VEHICLE	2074	2077	0	4001	2748	2087	1810	6245				
A/A CRASHES	150	155	0	314	220	147	178	586				
DET BY BAC	77	55	0	129	55	66	81	182				
OTHER	87	100	0	187	165	171	118	404				
FATAL CRASHES	7	13	0	20	9	5	13	25				
TOTAL KILLED	7	13	0	20	7	5	13	25				
TOTAL INJURED	5	11	0	16	6	5	10	23				
A/A CRASHES	2	1	0	3	3	3	4	10				
DET BY BAC	0	0	0	0	0	2	1	3				
OTHER	2	1	0	3	3	1	3	7				
SINGLE VEHICLE	3	3	0	6	4	3	7	14				
A/A CRASHES	1	1	0	2	3	2	3	8				
DET BY BAC	0	0	0	0	0	0	1	2				
OTHER	1	3	0	7	3	1	3	4				
MULTI-VEHICLE	4	4	0	13	5	7	3	5				
A/A CRASHES	1	0	0	1	0	1	1	2				
DET BY BAC	0	0	0	0	0	0	0	1				
OTHER	1	0	0	1	0	0	1	1				
HEDES/FATAL CRASHES	0	1	0	1	0	0	3	3				
DRIVER HBD	0	0	0	0	0	0	0	0				
DET BY BAC	0	0	0	0	0	0	0	0				
OTHER	0	0	0	0	0	0	0	0				

Alcohol is unfortunately an important cause of some of the 26,000 vehicle accidents that occur in Kansas City each year. This report produced by the computer reflects statistical facts regarding some of the alcohol related accidents.

COUNTY PROSECUTORS SYSTEM



PIDT.0101.8888884.ALL

```
ZXAMPLE              BERRY        D
                 1            2
ARREST NO *0000011 PON 888888 4 PROS 03
                 4                5
DATE COMP 10/22/71 CUSTODY J
            6                    7
FIN DISP BY CIR  CHGS DECL N
                 8
REF CASES 0000000 0000000 00000000000000
         9
CHGS 00101 00000

     10    WITNESS NO 04

JOHN SMITH                        CARDS Y

9103 WORNALL


KANSAS CITY      MO 64112    3613617
                11      12      13        14
ARRAIGNED 02/01/72 CIR DIV 03 JUDGE 03
       15      16                  17
 PROS 13 PLEA N ORIG CT DT 02 10 72 0900
            18                19     20       21
 TR DT 02/25/72 0900 DIV 03 JD 03 PRO 13
                22      23     24       25
 CONTS BY ST 00 DEF 01 CT 00 AGR 00
                    26                  27
 COURT CASE NO 123456 DISP POSTED YES
            28              29              30
BOND CT CIRCUIT     TYPE S NUMBER 654321
            31              32              33
     AMT 0001500 NAME LIBERTY     ROR N
                 34                      35
     AMT FOR 0000000 SET ASIDE    0000000
                 36                      37
     RED JDG 0000000  COLLECTED   0000000
                                38        39
CONTINUANCE REQUESTED ON 02/20/72 BY L
                40                      41
        TO 02/25/72 HR 0900 PROS  13
                                42        43
DISPOSITION FOR CHG 1 ON 02/20/72 IN CIR
            44                          45
 ORIG CHG00101              FIN CHG 00101
    46      47       48              49
DIV 03 JUDGE 03 PROS 03 DISP TYPE FG
                    50          51
DATE SENTENCED 02/29/72 FINAL DISP
         52          53
SENT TO MD     FOR 075 YRS 000 MOS 000 DY
         54                  55        56
FINED 0000000 TO RUN CONCURRENTLY W/CRED
                    57
              PROB 000 YRS 000 MOS 000 DY
         58                      59
PROB REVOKED ON 00/00/00 PRE-SENT INV
                                  60
                          DISP APPEALED
```

1. Arrest Number
2. Prosecutor Office Number (Case Number)
3. Prosecutor That Filed Charges In This Case
4. Date Of Complaint
5. Custody Status Of Defendant
6. Current Status Of This Case
7. Charges Declined
8. Referral Case Numbers
9. Charges In This Case
10. Witness(es) In This Case
11. Arraignment Date
12. Arraignment Court
13. Arraignment Division
14. Arraignment Judge
15. Arraignment Prosecutor
16. Arraignment Plea
17. Original Court Date
18. Current Court Date
19. Current Court Division
20. Current Court Judge
21. Current Court Prosecutor
22. Number of Continuances By State
23. Number of Defendant
24. Number of Court
25. Number of Agreement
26. Court Case Number
27. Disposition Posted
28. Bond Court
29. Bond Type
30. Bond Number
31. Bond Amount
32. Name of Bondsman
33. Released on Recognizance
34. Bond Amount Forfieted
35. Amount of Forfieture Set Aside
36. Amount of Forfieture Reduced to Judgement
37. Amount of Forfieture Collected
38. Continuance Requested Date
39. Continuance Requested By
40. Continuance Requested To
41. Continuance Requested Prosecutor
42. Disposition Date
43. Disposition Court
44. Original Charge In This Case
45. Final Charge In This Case
46. Disposition Court Division
47. Disposition Judge
48. Disposition Prosecutor
49. Disposition Type
50. Date Defendant Sentenced
51. Final Disposition
52. Sentenced To
53. Sentenced To (Length Of Sentence)
54. Amount Of Fine
55. Sentence To Run Concurrently With Another Senten
56. Credit For Time Already Served
57. Length Of Probation
58. Probation Revoked Date
59. Pre-Sentence Investigation Ordered
60. Disposition Appealed

(This is a prosecutors inquiry on a given prosecutor case number. It is used to ascertain the witness on a particular case and it gives detailed information about the status of a case as it progresses through the Criminal Justice System).

```
MD.TEST.0000011

ZXAMPLE          BERRY        D   WM 070444 KS 504 148 GY BN          MOKPD0000

ZRXCES           HENRY        S   WM 070444 KS 504 148 GY BN          MOKPD0000

ZEMBULIST        PITT         A   WM 070444 KS 504 148 GY BN          MOKPD0000

SUPERMAN         MONIKER          WM 070444 KS 504 148 GY BN          MOKPD0000

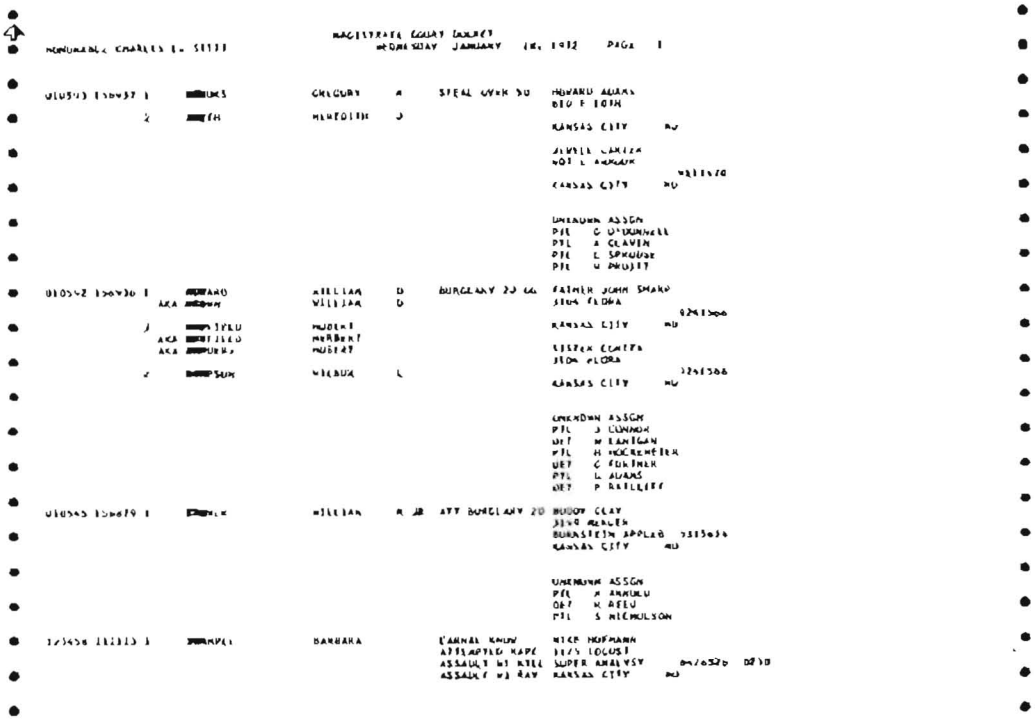
MOKPD0000  FBI=          SOC=            OLN=Z845114940      MO

MOKPD0000  107       C     300         ST KANS CITY  MO       031572

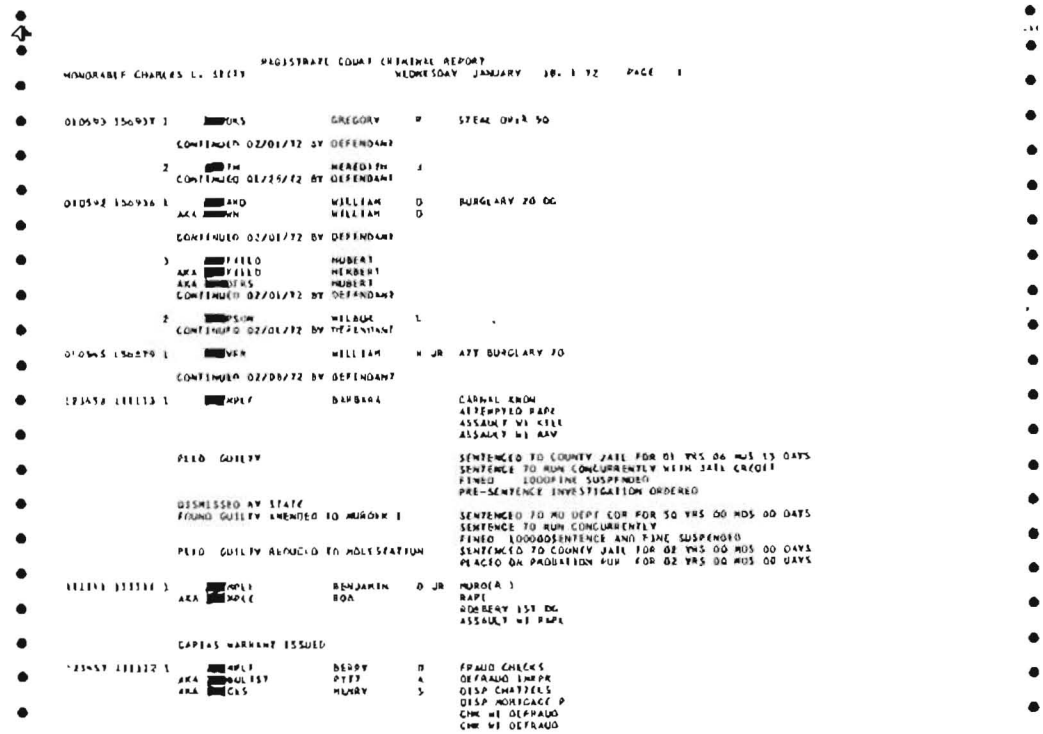
MOKPD0000  ZZZZ87    MO 2  PC 66 LINC CON     WHI      987654332
                1          2        3              4             5
ARREST NO=*0000011 PON=888888 4 PROS=08 DATE COMP 10/22/71 CUSTODY=IN JAIL
        6          7                                  8
FIN DISP BY CIR  CHGS DECL=NO            REF CASE=0000000 0000000 0000000 0000000
        9
CHGS=00101 00000
     10          11   12        13        14     15        16
ARRAIGNED 02/01/72 CIR DIV=03 JUDGE=03  PROS=13 PLEA=N ORIG CT DT 02/10/72 0900
        17          18     19    20                 21
TR DT 02/25/72 0900 DIV=03 JD=03 PRO=13 CONTS BY ST=00 DEF=01 CT=00 AGR=00
    22          23
COURT CASE NO=123456 DISP POSTED=YES
    24          25          26        27          28          29
BOND CT=CIRCUIT    TYPE=SURE NUM=654321 AMT=0001500 NAME=LIBERTY    ROR=NO
    30          31                    32          33
AMT FOR=0000000 SET ASIDE=0000000       REM JDG=0000000  COLLECTED=0000000
          34                35          36          37
CONTIN REQUESTED ON 02/20/72 BY DEFEN   TO 02/25/72 AT 0900 PROS=13
      38          39          40          40A         41
DISPOSITION FOR CHG 1   02/20/72 IN CIR ORIG CHG=00101          FIN CHG=00101
  42      43      44      45              46              47
DIV=03 JUDGE=03 PROS=03 DISP TYPE=FG    DATE SENTENCED 02/29/72 FINAL DISP
    48          49              50          51          52
SENT TO MD  FOR 075 YRS 000 MOS 000 DAY FINE 0000000 TO RUN CONCURRENTLY W/CRED
        53                  53A         53B         54
PROBATION 000 YRS 000 MOS 000 DAYS                  PRE-SENT INV
      54A           55
                DISP APPEALED
```

1. ARREST NO. OR *ALERT NO.
2. PROSECUTOR'S OFFICE NO. AND SUFFIX
3. PROSECUTOR - SEE LIST
4. DATE COMPLAINT MADE
5. CUSTODY
6. FINAL DISP
7. CHARGES DECLINED
8. REFERRAL CASE NUMBERS
9. CHARGES
10. ARRAIGNMENT DATE
11. ARRAIGNMENT COURT
12. ARRAIGNMENT DIVISION
13. ARRAIGNMENT JUDGE - SEE LIST
14. ARRAIGNMENT PROSECUTOR - SEE LIST
15. ARRAIGNMENT PLEA
16. ORIGINAL COURT DATE AND TIME
17. TRIAL DATE AND TIME
18. TRIAL DIVISION
19. TRIAL JUDGE
20. TRIAL PROSECUTOR
21. CONTINUANCES REQUESTED BY
22. COURT CASE NO.
23. DISPOSITION POSTED THIS ARRAIGNMENT
24. BOND COURT - CIRCUIT, MAGISTRATE
25. BOND TYPE
26. BOND NUMBER
27. BOND AMOUNT
28. BONDSMAN
29. RELEASED ON RECOGNIZANCE
30. AMOUNT OF BOND FORFEITED
31. AMOUNT OF FORFEITURE SET ASIDE
32. AMOUNT OF FORFEITURE REDUCED TO JUDGEMENT
33. AMOUNT OF FORFEITURE COLLECTED
34. DATE CONTINUANCE REQUESTED
35. CONTINUANCE REQUESTED BY
36. CONTINUED TO DATE AND HOUR
37. PROSECUTOR RESPONSIBLE
38. DISPOSITION DATE FOR CHARGE NO.
39. DISPOSITION COURT
40. ORIGINAL CHARGE CODE
40A. REDUCED CHARGE
41. FINAL CHARGE CODE
42. COURT DIVISION
43. DISPOSITION JUDGE
44. DISPOSITION PROSECUTOR
45. TYPE OF DISPOSITION
46. DATE SENTENCED
47. FINAL DISP OR NOT
48. SENTENCED TO
49. LENGTH OF SENTENCE
50. AMOUNT OF FINE
51. TO RUN CONCURRENTLY
52. JAIL CREDIT
53. LENGTH OF PROBATION
53A. BLANK DOES NOT APPLY, PROBATION REVOKED
53B. BLANK DOES NOT APPLY, DATE PROBATION WAS REVOKED
54. PRE-SENTENCE INVESTIGATION ORDERED
54A. SENTENCE SUSPENDED, FINE SUSPENDED, OR SENTENCE AND FINE SUSPENDED, BLANK DOES NOT APPLY
55. DISPOSITION WAS APPEALED

(This inquiry is made by Computer Number by the Prosecutor and displays all police and prosecutor information on a given subject).



A Magistrate Court Docket is produced by computer to convey the official agenda of the court for the date given.



A Criminal Status Report is produced by computer to record the official results of that court appearance and trial.

WARRANT DESK
DAILY REPORT

OFFICE OF
PROSECUTING ATTORNEY
JACKSON COUNTY, MO.

NOVEMBER 20 1972

OFFICE NO.	DEFENDANT	DETAILS
150001	(1) EXAMPLE, TRAFONE B 02/08/41	11/19/72 CHG1 MURDER 1 CHG2 MURDER 2 CHG3 MANSLAUGHTER CHG4 MANSL BY AUTO C/W RICHARD SMITH 102 EAST 12TH KANSAS CITY, MO
	(2) ZXAMPLE, CHARLES 01/18/41	
	(3) ZXAMPLE, BERTRAM 09/28/40	
	(4) DELBERTSON, SAMUEL T 07/03/39	
	(5) SMITH, WILLIAM A 01/05/42	
	(6) SMITH, JOHN L 04/18/47	
150002	(1) EDIE, BOB L 11/23/38	11/19/72 CHG1 MURDER 1 CHG DECL CHG2 MURDER 2
150003	(1) JACKSON, JOHN B 01/05/42	11/20/72 CHG1 LARCENY C/W HENRY WIGGINS 789 MONROE DUNN, MO
150004	(1) BACARDI, JUAN B 07/05/52	11/20/72 CHG1 MANSL BY AUTO CHG2 STOLEN AUTO CHG3 COMMON ASSAULT C/W RONALD SMYERS 4031 CAMPBELL KANSAS CITY, MO
150005	(1) BRONSON, WILLIAM C 03/14/29	11/20/72 CHG1 ARSON CHG2 STOLEN VIN CHG3 ATT AUTO THEFT CHG4 STEAL OVER 50 C/W RICHARD DOUGLAS 1709 EAST SIBBLING SPRINGFIELD, MO

(This computer response is sent to the Prosecutor at the end of each day to determine all cases filed on a given day and the report is circulated among interested Criminal Justice Officials.)

an adult, and can thereafter be tried in the adult courts.

Many of the cases that go before the juvenile court originate from an apprehension by the police. Most of these referrals come from the Kansas City Missouri Police Department.

Officials of the Kansas City Missouri Police Department and the Jackson County Juvenile Court have agreed to use the same computer and data base in the mechanization of these juvenile cases.

Specific responsibilities for shared data entry are as follows:

A. Police
   1. Name and personal identities.
   2. Address of defendant.
   3. Vehicle information, if any.
   4. Details of apprehension.
   5. Officer making apprehension.

B. Juvenile Court
   1. Youth life number.
   2. Deputy Juvenile Officer assigned.
   3. Arraignment information.
   4. Court information.
   5. Disposition information.

The primary purpose of the Juvenile Courts on-line system is to provide information to the case worker and administrative staff about juveniles referred to the court as rapidly as possible.

This system has the following features:

- On-line inquiry for case status and defendant history.
- On-line update of records.
- Automated arraignment scheduling.
- Automated consent docket.
- Automated judicial docket.

The following charts are flow charts of the Update-Retrieval system and one for the batch reporting system.

The Juvenile Court System is essentially an index and a record of a juvenile violation of state statutes and city ordinance violation. The system contains a variety of information of interest to the Juvenile Court such as the case worker assigned to the offender and other items pertinent to the case.

Programming locks are built into the system to prevent unauthorized access to the on-line juvenile records.

MANAGEMENT AND THE COMPUTER

The computer is frequently resisted because it represents a catalyst toward "change." The computer must first be made a part of the organization it serves, and it must operate in the mainstream of that organization to gain acceptance. A computer is only an electronic machine and does not make mistakes of its own accord. Only the human element which directs the management process and the technicians who guide the system process can induce an error into the automation process.

Computer technicians are frequently poor managers of automated systems. They tend to design extremely sophisticated systems to the limits of technology rather than simple systems that serve managers well. A man cannot program a computer to perform properly until he first has a thorough understanding of what the management wants to do and how it wants the job done. To make these decisions, management must be familiar with the concepts of automation and the techniques of computer technology. Management must establish a data processing department which is an integral part of the entire organization with viable channels of communication from the department to all other departments.

The computer is a firmly entrenched segment of our organization so the question is no longer whether the computer should be used but rather how best to utilize the computer to meet the organizational needs and management goals. Presently, the computer is used to report summarization of historical data. Future objectives may include the forecasting of events and "reporting by exception," a system where only statistical data, rates or trends above or below pre-established limits, are printed. For maximum efficiency in setting out these new objectives and others, management must require cost-conscious service of value from the data processing department while setting out specific corporate objectives to be achieved.

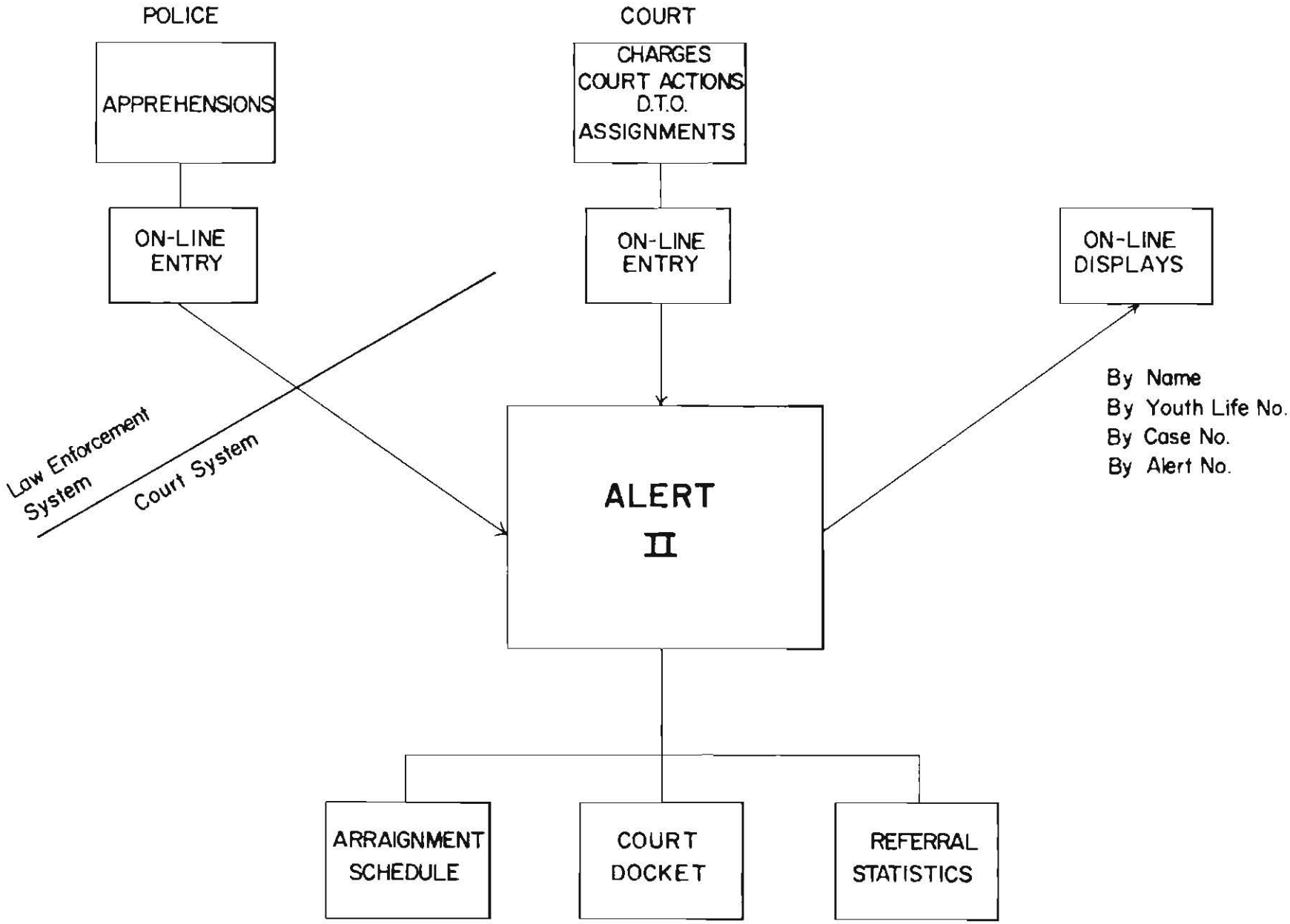
The following guidelines are suggested to insure computers serve an organization efficiently:

a. Management must be familiar with concepts of automation, and techniques of computer technology.
b. Establish an effective data processing department and fit it into the mainstream of the company organization.
c. It is no longer a question of "whether or not to use the computer," but rather "how to use the computer best in order to satisfy managements needs."
d. Computers should be looked upon as a resource for increasing the efficiency and productivity of the department's objective.
e. Management should require cost-conscious service of value from data processing to the corporation.
f. Data Processing should expect management to define corporate objectives so data processing can be in a position to help management achieve those goals.
g. Computers are but the extension of man's ingenuity; it represents one of man's newest and most versatile tools. It should be used as a contribution to improve the quality of life for mankind.

PRIVACY AND THE COMPUTER

The right to retain personal privacy in a modern world where powerful computers are processing

JUVENILE COURT SYSTEM



INQUIRY BY JUVENILE'S REFERRAL NUMBER

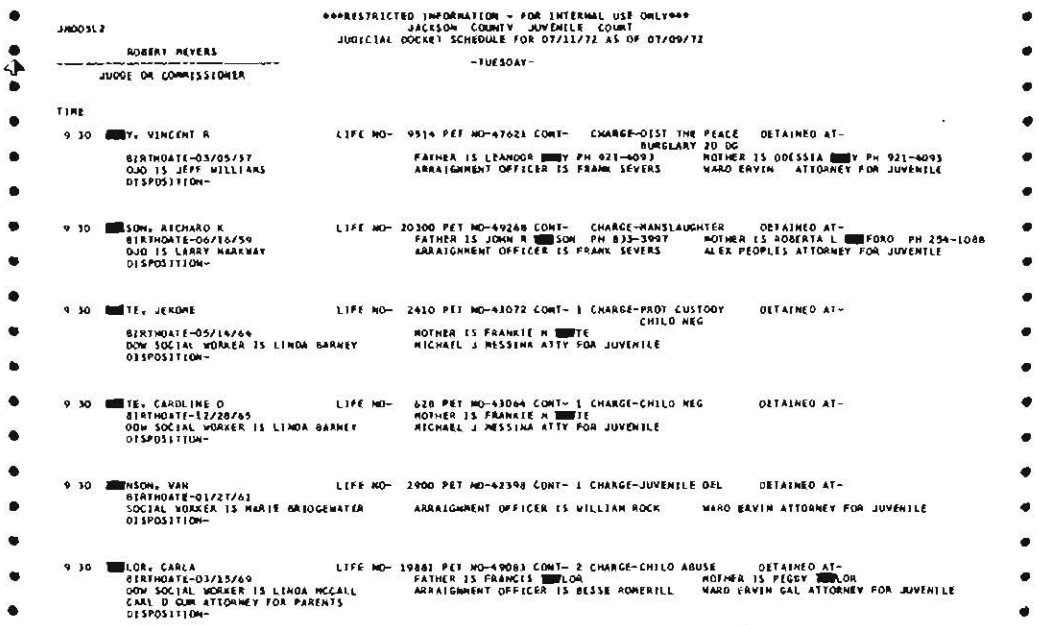
```
JV2.0017.M0048JV00.7299999

ZXAMPLE                JUDY                    J          WF 112359 KS 500 105 BN BL

MOKPDOO  2320  B          E  300                          ST KANS CITY  MO                    03227
                1                          2                          3                4
MOO48JV      LIFE NO/990099          STATUS/01                  REFERRALS/001  PETITION NO/ 09933  00000
5                          6                          7          8                          9
SCHOOL/ SCARRITT           PARENTS STATUS/ SEP        AREA/4     JUV LVS WTH/SISTER         DICT/000000
               10                  11              12  13      14                    15                    16
MOO48JV      REF/7299999     DT/030172       BY/A TP/1      CHG/0602  LARC        ARRGN DT/030272      TM/1500
17                  18          19          20          21              22                        23
HRNG DT/030272      TM/1500     DOCK/J      CONT/01     DISP ST/030272  CHG/0602  LARC            TYPE/16
               24                  25          26              27
MOO48JV      BK  NO/987654       LOC/TG      IN/030272       0602      0/000000
               28
MOO48JV      C7299999  J  JOHN  DOE  ATTORNEY  FOR  JUVENILE
               29
MOO48JV      J0000105   DJO IS PATRICIA BRASINGTON
ALERT/0647777
```

1. Life Number of juvenile. Assigned by Juvenile Court.
2. Court Status. See codes section, page 2.
3. Referrals – the number of times juvenile has been referred to Juvenile Court.
4. Petition number. Assigned by Juvenile Court.
5. School juvenile attends.
6. Parents marital status.
7. Geographical area in which juvenile lives. See codes section, page 5.
8. Person with whom juvenile lives.
9. Dictation Date. Used by Juvenile Court.
10. Referal number. Assigned by Juvenile Court.
11. Date juvenile was referred.
12. Agency that referred juvenile. See codes section, page 1.
13. Referral type. See codes section, page 1.
14. Charge for which juvenile placed in custody. Shows the 4 digit charge code and an explanation of the charge code.
15. Date juvenile was arraigned.
16. Time juvenile was arraigned. (24 hour clock)
17. Date of court hearing.
18. Time of hearing. (24 hour clock)
19. Court Docket Type. J = Judicial Docket, C = Consent Docket
20. Number of continuances.
21. Date of disposition.
22. Charge for which juvenile arraigned.
23. Type of disposition. See codes section, page 3
24. Booking number. Assigned by Juvenile Court.
25. Location of juvenile. See codes section, page 4.
26. Date juvenile is in detention.
27. Reason juvenile is in detention. (Charge code of offense)
28. Counsel Code, Referral Number, and name of juvenile's attorney.
29. Alert number and name of Deputy Juvenile Officer. (DJO)

(This inquiry produces a response that is restricted to Juvenile Court terminals and provides information to juvenile authorities about juveniles who are in the judicial process).



JM005L2 ***RESTRICTED INFORMATION - FOR INTERNAL USE ONLY***
JACKSON COUNTY JUVENILE COURT
JUDICIAL DOCKET SCHEDULE FOR 07/11/72 AS OF 07/09/72

ROBERT MEYERS — JUDGE OR COMMISSIONER — -TUESDAY-

TIME

9 30 [redacted]Y, VINCENT R — LIFE NO- 9514 PET NO-47621 CONT- CHARGE-DIST THE PEACE BURGLARY 2D DG — DETAINED AT-
BIRTHDATE-03/05/57
OJO IS JEFF WILLIAMS
DISPOSITION-
FATHER IS LEANDOR [redacted]Y PH 921-4093 — MOTHER IS ODESSIA [redacted]Y PH 921-4093
ARRAIGNMENT OFFICER IS FRANK SEVERS — WARD ERVIN ATTORNEY FOR JUVENILE

9 30 [redacted]SON, RICHARD K — LIFE NO- 20300 PET NO-49248 CONT- CHARGE-MANSLAUGHTER — DETAINED AT-
BIRTHDATE-06/16/54
OJO IS LARRY MARKWAY
DISPOSITION-
FATHER IS JOHN R [redacted]SON PH 833-3997 — MOTHER IS ROBERTA L [redacted]FORD PH 254-1088
ARRAIGNMENT OFFICER IS FRANK SEVERS — ALEX PEOPLES ATTORNEY FOR JUVENILE

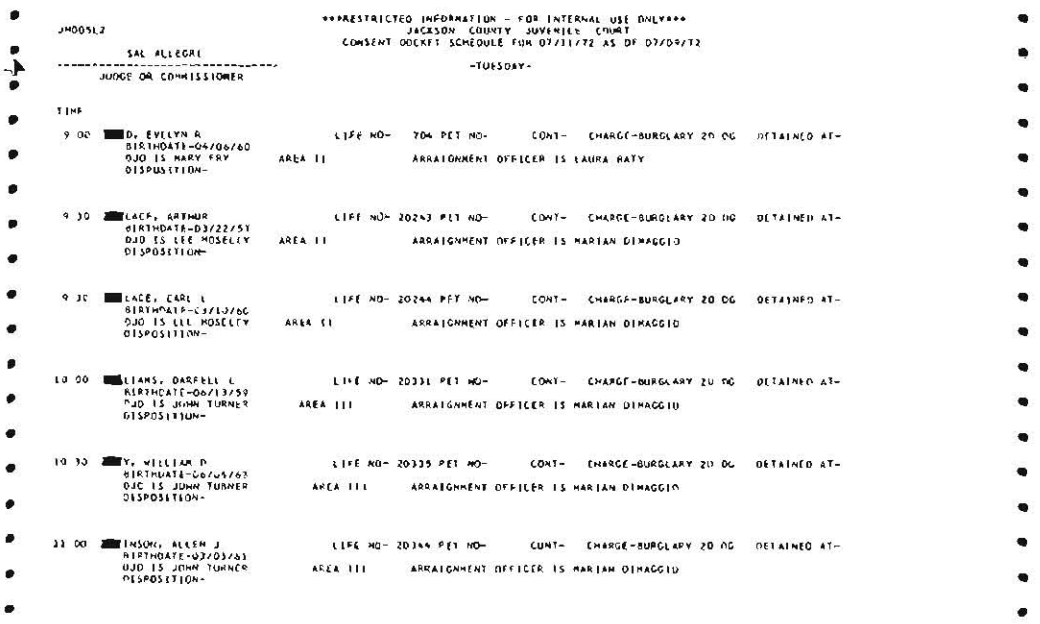
9 30 [redacted]TE, JEROME — LIFE NO- 2410 PET NO-43072 CONT- 1 CHARGE-PROT CUSTODY CHILD NEG — DETAINED AT-
BIRTHDATE-05/14/64
DOW SOCIAL WORKER IS LINDA BARNEY
DISPOSITION-
MOTHER IS FRANKIE M [redacted]TE
MICHAEL J MESSINA ATTY FOR JUVENILE

9 30 [redacted]TE, CAROLINE D — LIFE NO- 620 PET NO-43064 CONT- 1 CHARGE-CHILD NEG — DETAINED AT-
BIRTHDATE-12/28/65
DOW SOCIAL WORKER IS LINDA BARNEY
DISPOSITION-
MOTHER IS FRANKIE M [redacted]TE
MICHAEL J MESSINA ATTY FOR JUVENILE

9 30 [redacted]NSON, VAN — LIFE NO- 2900 PET NO-42398 CONT- 1 CHARGE-JUVENILE DEL — DETAINED AT-
BIRTHDATE-01/27/61
SOCIAL WORKER IS MARIE BRIDGEWATER
DISPOSITION-
ARRAIGNMENT OFFICER IS WILLIAM ROCK — WARD ERVIN ATTORNEY FOR JUVENILE

9 30 [redacted]LOR, CARLA — LIFE NO- 19881 PET NO-49083 CONT- 2 CHARGE-CHILD ABUSE — DETAINED AT-
BIRTHDATE-03/13/69
DOW SOCIAL WORKER IS LINDA MCCALL
CARL D CLM ATTORNEY FOR PARENTS
DISPOSITION-
FATHER IS FRANCIS [redacted]LOR — MOTHER IS PEGGY [redacted]LOR
ARRAIGNMENT OFFICER IS BESSE ROMERILL — WARD ERVIN GAL ATTORNEY FOR JUVENILE

The Juvenile Court Judicial Docket is a scheduling instrument of juvenile cases that are to be tried before a judge of the Juvenile Court.



JM005L2 **RESTRICTED INFORMATION - FOR INTERNAL USE ONLY***
JACKSON COUNTY JUVENILE COURT
CONSENT DOCKET SCHEDULE FOR 07/11/72 AS OF 07/09/72

SAL ALLEGRI — JUDGE OR COMMISSIONER — -TUESDAY-

TIME

9 00 [redacted]D, EVELYN R — LIFE NO- 704 PET NO- CONT- CHARGE-BURGLARY 2D DG — DETAINED AT-
BIRTHDATE-04/06/60
OJO IS MARY FRY
DISPOSITION-
AREA II
ARRAIGNMENT OFFICER IS LAURA HATY

9 30 [redacted]LACK, ARTHUR — LIFE NO- 20243 PET NO- CONT- CHARGE-BURGLARY 2D DG — DETAINED AT-
BIRTHDATE-03/22/51
OJO IS LEE MOSELEY
DISPOSITION-
AREA II
ARRAIGNMENT OFFICER IS MARIAN DIMAGGIO

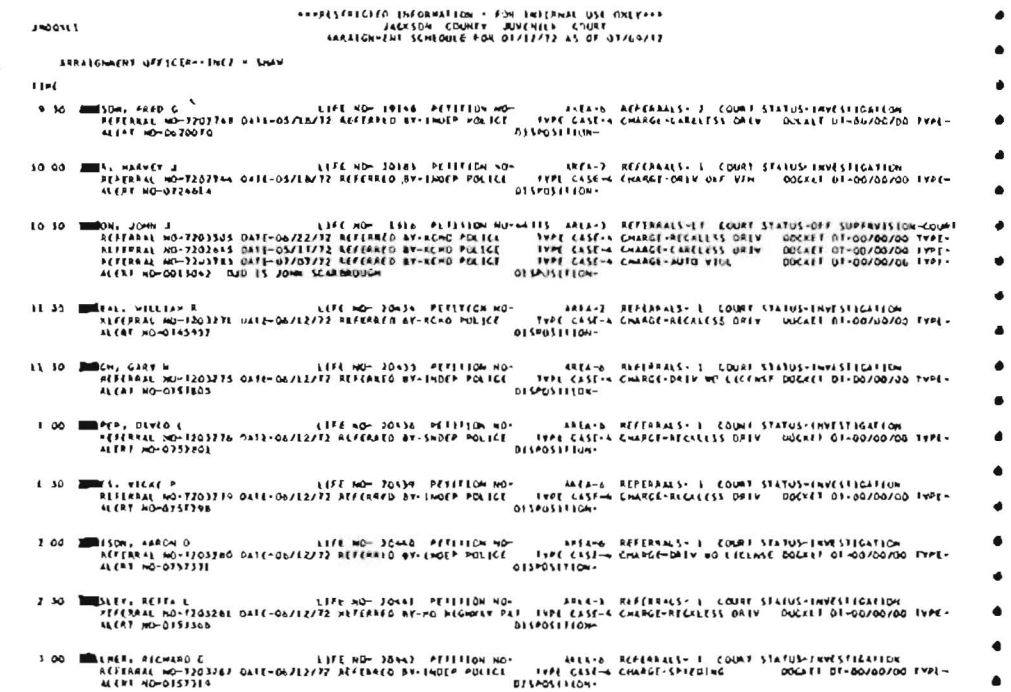
9 30 [redacted]LACK, CARL L — LIFE NO- 20244 PET NO- CONT- CHARGE-BURGLARY 2D DG — DETAINED AT-
BIRTHDATE-03/13/50
OJO IS LEE MOSELEY
DISPOSITION-
AREA II
ARRAIGNMENT OFFICER IS MARIAN DIMAGGIO

10 00 [redacted]LIAMS, DARRELL L — LIFE NO- 20331 PET NO- CONT- CHARGE-BURGLARY 2D DG — DETAINED AT-
BIRTHDATE-06/13/50
OJO IS JOHN TURNER
DISPOSITION-
AREA III
ARRAIGNMENT OFFICER IS MARIAN DIMAGGIO

10 30 [redacted]Y, WILLIAM D — LIFE NO- 20335 PET NO- CONT- CHARGE-BURGLARY 2D DG — DETAINED AT-
BIRTHDATE-06/05/63
OJO IS JOHN TURNER
DISPOSITION-
AREA III
ARRAIGNMENT OFFICER IS MARIAN DIMAGGIO

11 00 [redacted]INSON, ALLEN J — LIFE NO- 20344 PET NO- CONT- CHARGE-BURGLARY 2D DG — DETAINED AT-
BIRTHDATE-03/03/63
OJO IS JOHN TURNER
DISPOSITION-
AREA III
ARRAIGNMENT OFFICER IS MARIAN DIMAGGIO

The Juvenile Court Consent Docket is a report produced for the orderly processing of those cases that do not require a judicial hearing.



RESTRICTED INFORMATION - FOR INTERNAL USE ONLY
JACKSON COUNTY JUVENILE COURT
ARRAIGNMENT SCHEDULE FOR 07/12/72 AS OF 07/10/72

ARRAIGNMENT OFFICER--INCL = SAW

TIME

9 30 [redacted]SON, FRED G LIFE NO- 19146 PETITION NO- AREA-6 REFERRALS- 2 COURT STATUS-INVESTIGATION
REFERRAL NO-7202768 DATE-05/18/72 REFERRED BY-INDEP POLICE TYPE CASE-A CHARGE-CARELESS DRIV DOCKET DT-00/00/00 TYPE-
ALERT NO-0670070 DISPOSITION-

10 00 [redacted]L, HARVEY J LIFE NO- 20183 PETITION NO- AREA-2 REFERRALS- 1 COURT STATUS-INVESTIGATION
REFERRAL NO-7202744 DATE-05/18/72 REFERRED BY-INDEP POLICE TYPE CASE-A CHARGE-DRIV UNF VEH DOCKET DT-00/00/00 TYPE-
ALERT NO-0726818 DISPOSITION-

10 30 [redacted]ON, JOHN J LIFE NO- 1616 PETITION NO-44115 AREA-3 REFERRALS-17 COURT STATUS-OFF SUPERVISION-COURT
REFERRAL NO-7203505 DATE-06/22/72 REFERRED BY-RCMD POLICE TYPE CASE-A CHARGE-RECKLESS DRIV DOCKET DT-00/00/00 TYPE-
REFERRAL NO-7202645 DATE-05/11/72 REFERRED BY-RCMD POLICE TYPE CASE-A CHARGE-CARELESS DRIV DOCKET DT-00/00/00 TYPE-
REFERRAL NO-7201785 DATE-03/07/72 REFERRED BY-RCMD POLICE TYPE CASE-A CHARGE-AUTO THEFT DOCKET DT-00/00/00 TYPE-
ALERT NO-0013042 DUP IS JOHN SCARBOROUGH DISPOSITION-

11 35 [redacted]AL, WILLIAM R LIFE NO- 20434 PETITION NO- AREA-2 REFERRALS- 1 COURT STATUS-INVESTIGATION
REFERRAL NO-1203271 DATE-06/12/72 REFERRED BY-RCMD POLICE TYPE CASE-A CHARGE-RECKLESS DRIV DOCKET DT-00/00/00 TYPE-
ALERT NO-0145937 DISPOSITION-

11 50 [redacted]GH, GARY W LIFE NO- 20433 PETITION NO- AREA-6 REFERRALS- 1 COURT STATUS-INVESTIGATION
REFERRAL NO-1203275 DATE-06/12/72 REFERRED BY-INDEP POLICE TYPE CASE-A CHARGE-DRIV WO LICENSE DOCKET DT-00/00/00 TYPE-
ALERT NO-0151805 DISPOSITION-

1 00 [redacted]PP, DAVID L LIFE NO- 20438 PETITION NO- AREA-6 REFERRALS- 1 COURT STATUS-INVESTIGATION
REFERRAL NO-1203276 DATE-06/12/72 REFERRED BY-INDEP POLICE TYPE CASE-A CHARGE-RECKLESS DRIV DOCKET DT-00/00/00 TYPE-
ALERT NO-0751801 DISPOSITION-

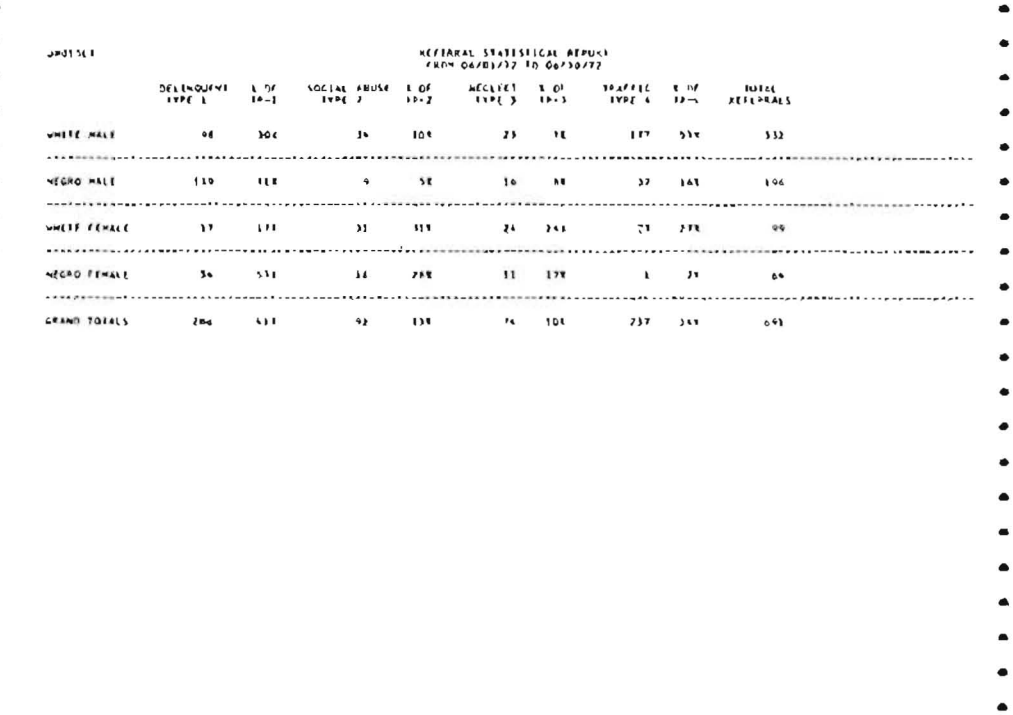
1 30 [redacted]S, VICKI P LIFE NO- 20439 PETITION NO- AREA-6 REFERRALS- 1 COURT STATUS-INVESTIGATION
REFERRAL NO-1203270 DATE-06/12/72 REFERRED BY-INDEP POLICE TYPE CASE-A CHARGE-RECKLESS DRIV DOCKET DT-00/00/00 TYPE-
ALERT NO-0757798 DISPOSITION-

2 00 [redacted]ESON, AARON O LIFE NO- 20440 PETITION NO- AREA-6 REFERRALS- 1 COURT STATUS-INVESTIGATION
REFERRAL NO-1203280 DATE-06/12/72 REFERRED BY-INDEP POLICE TYPE CASE-A CHARGE-DRIV WO LICENSE DOCKET DT-00/00/00 TYPE-
ALERT NO-0757731 DISPOSITION-

2 30 [redacted]SLEY, RITA L LIFE NO- 20441 PETITION NO- AREA-3 REFERRALS- 1 COURT STATUS-INVESTIGATION
REFERRAL NO-1203281 DATE-06/12/72 REFERRED BY-MO HIGHWAY PAT TYPE CASE-A CHARGE-RECKLESS DRIV DOCKET DT-00/00/00 TYPE-
ALERT NO-0153360 DISPOSITION-

3 00 [redacted]LMER, RICHARD C LIFE NO- 20442 PETITION NO- AREA-6 REFERRALS- 1 COURT STATUS-INVESTIGATION
REFERRAL NO-1203282 DATE-06/12/72 REFERRED BY-INDEP POLICE TYPE CASE-A CHARGE-SPEEDING DOCKET DT-00/00/00 TYPE-
ALERT NO-0157314 DISPOSITION-

The Juvenile Court Arraignment Schedule is designed to be used by the arraignment officers in the timely processing of arraignments for that period.



REFERRAL STATISTICAL REPORT
FROM 06/01/72 TO 06/30/72

	DELINQUENT TYPE 1	% OF ID-1	SOCIAL ABUSE TYPE 2	% OF ID-2	NEGLECT TYPE 3	% OF ID-3	TRAFFIC TYPE 4	% OF ID-4	TOTAL REFERRALS
WHITE MALE	98	30%	34	10%	23	7%	177	53%	332
NEGRO MALE	119	11%	9	5%	16	8%	32	16%	196
WHITE FEMALE	37	17%	31	31%	24	24%	23	23%	99
NEGRO FEMALE	36	53%	18	28%	11	17%	1	2%	66
GRAND TOTALS	284	41%	92	13%	74	10%	237	34%	693

The Referral Statistics Report is produced for administrators of the Juvenile Court and is designed to give a statistical analysis and view of the number and percentage of referrals by type and race.

information at "nano" second speed is indeed a matter of deep concern to all citizens.

To the criminal justice family, the security and confidentiality of computerized data banks takes on a special meaning since it frequently reflects the shortcomings of a citizen. It has been suggested that people hate computers because they are the first machine in history to really move in on our intellectual and emotional lives. The machine is suspected of recording everything in our lives from the womb to the tomb and serves to replace the activities of numerous individuals. Computers are by nature like all other machines, functioning in a state of neutrality. They can, therefore, be used just as effectively against humanity as they can in the service of mankind.

Computers seem to some Americans to symbolize unresponsiveness and insensitivity of modern day life. There is a fear among some that data banks know a great deal more about us than we know about data banks. To others, computers symbolize all that is wrong with a slightly tarnished American dream. The problem is: a familiar machine with total retention which can memorize more than a human being could in a hundred lifetimes has been found to be a threat to the quality of life and society as we know it. Why? Because privacy has and still continues to be abused as man fails to understand the need to evaluate and establish ethical controls over the computer's effect on the individual's life.

Personal privacy has been defined as "the right to be left alone," "the right to control the outflow of information about oneself," "the most comprehensive of the rights of man." The concept of privacy stems from a person's inner desire to shield and control his actions, thoughts, desires and accomplishments or lack thereof from overexposure to the outside world. It is obviously a highly subjective and sensitive area of human personality. Privacy involves a host of things which make us "think as we think, do as we do, and act as we act." It conveys the total sum of what we are and what it is that makes us function as a unique personality. It is the electronic computer with its capabilities of speed and superhuman thoroughness which cannot miss finding either the good or bad about us that seems repressive to human beings. Within thousandths of a second, a computer system can pull together and retrieve all facts in one answer which portrays an individual's glorious successes, his dismal failures, his most positive personality traits and his most embarrassing habits. It is that capability of the computer which seems to leave the citizen powerless with a feeling of insecurity. These feelings are triggered by the most powerful and consistent motives, namely individual self-interest.

It is absolutely imperative the computers must serve the mainstream of a business concern or government agency. If the computer is fully serving the mainstream of the entire organization, then that management is more likely to exercise greater control over the information processing system and dissemination of data. The following rules govern the regional Kansas City Criminal Justice Network System with respect to confidentiality of computer systems.

1. Data included in the system must be limited to that based on a source document utilizing unique case numbers for each report which is maintained on file in the agency exercising management control over the system.
2. Approximately five per cent of our total automation budget must be committed to a careful and permanent program of data verification in support of the validation of automated information files. We accomplish this task in three steps.
   a. Printout of automated files for validation against source documents which were the original authority for the data entry in the first place.
   b. Creation of computer programs which can identify incorrect codes and data, earmarking these for correction against the source document of entry.
   c. Creation of computer programs which can edit against relationship conditons and requirements. This is a very valuable "caution indicator" and has in many instances alerted our department to a whole series of inconsistencies.
3. Education programs are administered for all who access data from remote terminals.
4. The computer is programmed to screen all inquiries to exclude those inquiries inconsistent with system rules.
5. Our telecommunications system activity is logged for all actions occurring on the network and this permanent record of activity may be examined at any time.
6. Program systems are designed to provide for Locked Data Files in which records cannot be accessed until the proper codes or terminal identity is read and matched to the master terminal access list that is core resident.
7. Rigid security and inventory controls are in effect in computer library operations to prevent duplicating files and removal of the same to unauthorized sources.
8. Discarded criminal record printouts are all subjected to a shredding machine to insure the contents cannot be reconstructed for later use.
9. Remote terminal operations are under programmed control to rigidly control access to only those real time files that the user has prior clearance to access.
10. Users of system data have been informed that careless use of system data represents unprofessional conduct and may be subject to disciplinary or litigation action.
11. An Operating Procedure has been published which clearly identifies to whom data may be released, under what circumstances, and it requires the removal of names and addresses before any reports are released to non-criminal justice agencies.
12. Access to the computer complex is rigidly controlled by electronic locks.
13. Arrest records are purged when the facts substantiate a citizen's application to expurge his arrest records.

It is absolutely essential that we continue to move with great rapidity in developing ethical standards for use of automated systems, or the citizens of this country will force the government to do it for us. Our first move must be to establish domain and control over that product of technology which has too often been considered a "necessary evil," "a status symbol," "someone else's responsibility," or really, "nobody's responsibility at all." In the final analysis, these considerations all boil down to a balancing of values between the need for informed managers of government and industry and the need of the citizen to expect ethical control by government and industry in the use of data about himself and his private life. Neither value should be sacrificed for the other. These principles are all dedicated to the enhancement of both individual freedom and effective automated systems.

CONCLUSION

The computer is being implemented as an efficient tool in the criminal justice family. It is generally felt that the efficiency and productivity of the criminal justice system has been increased as a result of automation practices. The following specific instances are cited as examples where automation is improving the efficiency of the criminal justice family:

1. Consolidation of all active area criminal warrants/wants into one regional criminal activity data bank with the capability of retrieving all facets of a case history.
2. Cross indexing the criminal data bank for access by: (a) subject's name, (b) alias, (c) moniker or nickname, (d) vehicle license number, (e) vehicle identification number (or arrest/criminal identification number).
3. Response within ten seconds of information needs of the officer in the field.
4. Provision of information to district officers and intelligence officers on movements of organized crime subjects.
5. Provision of follow-up information to the local parole officers on persons interviewed by the district officers and identified by the computer to be in parole status.
6. Production of reports which reflect the identity of selected suspects by fingerprint classification.
7. Provision of statistical data of high vehicle accident areas so that commanders may realign patrol forces to increase enforcement in high accident areas.
8. Preparation of a list of wanted persons by residence address within beat for the district officer.
9. Provision of automated abstract criminal records for the district officer's informational use and investigative purposes.
10. Provision of summaries of investigator's work by case, by category or work within cases.
11. Development and provision of current payroll budgetary information and projected cost of specific projects to police administrator.
12. Provision of the capability to search computerized files by "method of operation" or "method of commission of a crime incident" in an effort to identify likely suspects based on previously established criminal patterns.
13. The simulation of a raw police program and accurate determination of the cost factors and resource requirements as far as ten years in advance through a Computerized Police Planning System (COPPS).
14. Daily recording of crime indices and reporting of these indices to each Patrol Division Commander.
15. Time reporting and analysis of specialists' work levels in the Crime Laboratory Center.
16. Prediction with 95 per cent accuracy of police "call for services" workload within each of the 620 "police reporting areas."
17. Provision of computerized access to the civil index of all accidents, traffic/parking tickets and offenses.
18. Calculation of uniform crime statistics for transmission to the FBI.
19. Computation of statistical information related to the National Safety Council Accident System.
20. On-line access to vehicle license registration and drivers license history for the state of Missouri.
21. Transmission of messages to ALERT, MULES, and national LETS message switching systems.
22. Access to national wanted files maintained in the National Crime Information Center at FBI headquarters.
23. Retrieval of FBI rap sheet summaries from the FBI computer through the ALERT System.
24. Provision of a daily crime summary report and a daily clearance summary report which allows patrol officers the opportunity to evaluate crime trends and police effectiveness on a daily basis.
25. On-line data entry of all offense, arrest, accident, traffic and dispatch statistics as well as on-line payroll entry, handling, punching and tabulating of statistics.
26. Provision of criminal identification number, FBI number and fingerprint classification as additional identifiers.
27. Traffic accident information which allows for designation of locations which need selective enforcement and the evaluation of selective enforcement patrol operations.
28. Calculation of crime information which allows for analysis of related problems within the city.
29. Production of robbery evaluation information which is utilized to prepare monthly reports for the Board of Police Commissioners.
30. Provision of answers to specialized requests for historical data related to specific crimes and offenses by location.
31. On-line entry of cases filed by the prosecutor in Magistrate and Circuit Court.
32. Preparation and printing of Magistrate Court dockets and witness notification cards.
33. On-line retrieval of prosecutor information by name, prosecutor's case number, Magistrate Court case number, and Circuit Court case number.
34. Printing a report of dispositions made by the county prosecutor.
35. Grading analysis of the Sergeants Examination.
36. Preparation of a court journal for Municipal Court. (This allows for the orderly handling of traffic cases docketed in the Municipal Court).
37. Automatic preparation of warrants for arrest of citizens when they fail to appear in court as a result of on-line entry of cases when failure to report in court is involved.
38. On-line recording of dispositions from cases tried in the Municipal Court.
39. Production of a daily report for the Alcoholic Safety Action program (ASAP) cases in Municipal Court, the prosecutor's office and the probation department on cases involving drunk driving charges.
40. Production of a daily report on pre-sentence information usually given to the judges. (The report reflects information from police, probation, and Missouri Director of Revenue files.)
41. Production of a listing produced for Juvenile Court of all referrals from the Kansas City Missouri Police Department Juvenile Unit.

42. Printing of arraignments for Juvenile Court.
43. Preparation of a court docket for Juvenile Court.
44. Production of employee paychecks, payroll records to the city treasurer and withholding tax information to the state and federal revenue offices.
45. Case report number accountability for the Kansas City Missouri Police Department.
46. Traffic ticket accountability to the police department and to the Municipal Court of Kansas City, Missouri.
47. Printing and dissemination of a report in license sequence of wanted vehicles for those police agencies who do not have access to computer terminals.
48. Production of "reminder notices to citizens on parking violations" after ten days of time have elapsed.

The computer's real potential remains untapped but hopefully one day will be utilized to analyze the underlying causes of crime as follows:

A. Assist in the analysis of land usage and avoid development of unfavorable environmental conditons that promote and foster crime or conflict.
B. Develop trends that will predict future social problems if not altered.
C. Create systems to deal with unacceptable behavior patterns before crimes or accidents are caused.
D. Analyze treatment and correctional programs and behavior patterns of individuals to determine the success of the correctional system.
E. Develop individual patterns of persons having trouble functioning in society.

48290

LAW ENFORCEMENT INFORMATION SYSTEMS A DISCUSSION OF MANAGEMENT RESPONSIBILITIES

William R. Nelson
Systems Consultant
International Association of Chiefs of Police

The management of criminal justice information systems is one of the more esoteric problems facing today's modern police agency. It is a problem of management control of computerized information systems with challenges originating both inside and outside of the law enforcement community. The purpose of this paper is to explore the role of the law enforcement executive as the management official responsible for an information system. The paper will review management standards for an automated information system and how these standards relate to management in a police agency. The objective is better information through more effective management with positive control over both resources and information. The principles of management will be developed specifically in relation to automated information systems in a police agency but the theory will be applicable universally, both inside and outside of the criminal justice community.

The techniques and technology of electronic data processing have been slow in making their entry into police work. There have been departments which started with the earliest models of punched card processing equipment and now there are many departments with the latest in computer equipment. In many cases the computer is the most recent piece of equipment added to the agency's technical services bureau. The entry of the computer into law enforcement has paralleled the lines of entry into business, industry or government.

It is a basically simple matter to automate a single function or a group of related functions. It is yet another matter to develop a centralized law enforcement information system. It becomes an even more complex problem if the system is to cross into other functional areas.

Advances in information technology over the past twenty years have been overwhelming. Automated information systems have become a competitive necessity in business and an operational necessity in government. The volume of information to be handled grows as the information systems increase in size and sophistication. Contrary to early predictions based on industrial automation, information automation seldom has reduced staff or saved money. Information technology brings to law enforcement a highly increased capability to carry out its mission with greater effectiveness.

The law enforcement executive who learns to manage and control his information system is the one who will achieve the maximum degree of effectiveness. This same law enforcement executive has become an expert long-range planner and resources management specialist, in addition to increasing constantly his responsibilities as an officer of the law. The achievement of success in these three functions can be affected greatly by the completeness of the information upon which the decision process is based. The quality and reliability of the information is affected directly by the completeness of the management guidance given to the development of information sources and systems.

The concept of the chief executive of a law enforcement agency using systematically developed information in the management decision process can turn the computer from a practical tool into a pertinent asset to management. Of course, it is not the computer that becomes the asset, but the information system in its entirety. The key element in the information system is the staff which develops and manages the system. The knowledge and interrelationship of this staff with the goals and objectives of management have a critical effect on whether the system becomes a true asset.

The development of a complete police information system capable of management support is not a simple project. It could not happen in a short period of time even if the department had the resources to accomplish the task. The resultant changes in discipline and procedures would be more than most organizations could accept in a short period of time. However, the development of functional parts of the system may fail to support the total management system. This failure occurs frequently when a detached management role is taken during the systems development phases. The end result is attributed to the failure of EDP to understand the problem. While this statement is true in part, the basic problem is the lack of management direction in the design process and the

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failure of the EDP systems staff to require this direction.

Pertinent examples of this might occur in the development of specific police applications. The data system could start with the officer's field report on the criminal event with supplemental reports being placed in a criminal history file or a stolen property application. The system is sophisticated by the use of automatic cross-indexing techniques. Such a system usually can be programmed to provide management statistics on crime and make a major contribution to the Uniform Crime Report. Having satisfied most of the records requirements, the system could provide information on where and when each type of crime was happening and the timeliness of patrol in answering the complaint or even patterns for preventing the crime from happening. Management reports, such as work effectiveness analysis, are a natural part of the next tier of reports.

In a parallel situation the same sequence of information events can occur in a traffic case. A field report is filed by the officer. The pertinent information is dispersed to the record in the vehicle or operator file. Statistical data is accumulated for accident reports or highway safety reports. Information on location is made available to the traffic engineer. The system is capable of correlating data on where and when the traffic incidents occur with data arrays to support the assignment of patrol or traffic enforcement units. In each situation a common system with a single point of entry for the data is capable of providing the variety of services indicated.

In both examples a functional information system application has been expanded to provide useful information to other functions such as planning or patrol management. More data beyond the basic records application was required to provide the capability for additional support outside of the records system. Although this type of information is available in all agencies, the capability to capture and process the information does not exist in all systems. There are numerous reasons why such a capability might not exist; the first reason might be that it was not a requirement. Other reasons might be that the systems analyst held the scope of his design effort too narrow to perceive this capability and this narrow scope was approved in the management review of the design specifications.

The techniques of developing an information system involve many factors. No one person can be held totally responsible for a system except in a small and isolated case. This statement applies equally to successful and unsuccessful systems. The development of an information system or even a sub-system involves the effort of many personnel working as a team. The average team would consist of personnel to design the system, to write the computer programs, to provide the data to be processed, to operate the equipment and to use the information produced. Since it normally is easier to assemble this type of a team within a functional area, the scope of the information system becomes limited to that function. The responsibility for the effort is to meet the requirements of that function.

Before proceeding any further, it must be acknowledged that this may be all the management that is required. Assuming that an effective design effort has been done on the application and that the equipment was selected on the basis of the system designed, the job can be accomplished with little additional burden to management. It is entirely possible and often most economical to design a computer system to meet a specific problem and to install this system in a functional area. More often a larger general purpose computer is acquired to solve the problem, with the result that only part of the potential capability of the equipment is used. If the system as it is implemented satisfies all of the requirements for the functional area, the additional processing capabilities can be disregarded or made available to another functional unit. The latter option is the classic way many special purpose information systems become multiple purpose systems.

The development of a law enforcement information system must include all of the components that are required in solving any information problem. A development effort from a management point of view contains a number of phases. The detailed techniques are omitted here to emphasize the role of management interface. Each development project starts with a requirement for information. The person representing the information requirement presents the requirement to the level of management with the authority to expend resources. The user might employ the assistance of a systems analyst in defining his requirement, but the basic need for information is that of the user and not the systems personnel. If resources are available and approved to be expended, a systems analyst has completed a review of the requirement, he presents to the requestor and to management a proposed solution to the requirement. The proposed solution must include the recommended approach to satisfying the requirement, the estimated cost of the effort, assumptions and con-

straints affecting the effort and alternative solutions.

Using this approach to systems development, two decisions have been made at the command (management) level prior to the commitment of any extensive amount of technical resources on the project. The user has expressed his requirement and a professional study has been completed to present the facts. The management team reviews the facts and makes a decision that best serves the agency. The result is that the information system specialists design the system but management makes the critical decisions concerning the agency's information requirements. This same process is repeated at the end of the design phase and again after the implementation phase. The development specifications describe the best solution, the design describes how the solution is going to work and the review of the implementation determines that the system does work as directed.

This approach enables management to keep fully informed on the status of their information systems and ensures that the systems' effort will meet management objectives. It also permits the systems staff to expend the full force of their professional talent towards developing more effective and more reliable systems rather than diluting their effort in trying to guess what the true information requirements really are. The approach does not lessen the requirements for trained personnel but rather assumes fully qualified information systems personnel will be available. The law enforcement executive must have reliable information systems personnel if he is to have a reliable system. No longer is there a shortage of data processing personnel but *quality* data processing personnel, just as are *quality* law enforcement personnel, are difficult to find and to keep. The quality of the information system upon which your officers are to base their decisions, and possibly even their lives, can not be too high.

The ultimate responsibility for the integrity of the information system must rest with the chief executive law enforcement officer. One method of executing this top management role is to establish an EDP Steering Committee. The purpose of this group is to apply the policy and guidance of the chief executive to the requirement expressed by the user in establishing the agency's information plan. The group is composed of the command level officers of the units using information services plus the top planning and financial officer if he is not included already. The head of the information system support unit should be included even if this support unit is external to the agency. The group meets to review information systems plans, requirements, proposals, designs, and evaluations. The information to be reviewed is presented by the systems analyst or the user in sufficient detail to support a management decision. The chairman of the EDP Steering Committee reports directly to the chief executive.

Problems related to information systems management can be made less complex if the agency has an information systems plan. The development of a complete information system is a long and expensive process. It is difficult and generally impossible to change directions in a poorly conceived development effort. Unplanned changes to a system or even a program are costly and sometimes disasterous. The plan is a management tool that ties together the policies and objectives of the agency as they relate to information requirements. The plan is developed by the planning and the systems staff. It is reviewed by the EDP Steering Committee and ultimately approved by the chief executive. The plan must be dynamic since it is the guideline for the management of the information system.

The concept and organizational status of automated information systems can vary with each criminal justice agency. It is up to management to determine what this role is to be and to place the system accordingly within the agency. No automated system can produce results that are better than the information on which the system is based.

Neither computers nor the people who run them are decision makers in the complete sense of the word. Their capability to provide information upon which operational or management decisions can be made is virtually unlimited. This capability cannot be achieved in a vacuum. An information system that is subordinated to a technical or an administrative function will provide its most complete information to that function.

There is a challenge in developing an information system that will provide effective and reliable information. There is also a fear on the part of an executive with an improper management system that he might not be able to cope with quality information. With a well developed management system and a dynamic organization supported by a properly established information system, law enforcement can meet this challenge with assured results.

Only through effective control can the law enforcement executive be master of the system. Effective control is the essential ingredient in

responsible management of an information system. Management control must be developed, not inherited, if it is to be effective and withstand challenge. To this end, law enforcement has a choice. The ultimate gauge, however, is not management for management's sake but an information system with the quality and reliability necessary for good law enforcement.

THE USE OF COMPUTERS BY POLICE: PATTERNS OF SUCCESS AND FAILURE*

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INTRODUCTION

Since 1968 the number of computer applications reported by police departments throughout the country has more than doubled. This growth seems related to a recent surge in the application of technology to law enforcement. Computers, helicopters, special television cameras, radar devices, and elaborate riot-control equipment have been both praised and criticized as police departments move towards the "space age."

Naturally, technology costs money. Industrial sources estimated that the expense of such police equipment in 1971 would soar to about $700 million, up about 50% from four years earlier.[1] What has stimulated this rapid rise, and do the benefits of such tools justify the cost? Critics claim that many of the expenses have been a waste of money stimulated by industrial pressure and the opportunity for federal dollars through the Law Enforcement Assistance Administration (LEAA).[2] On the other hand, advocates point to improved police efficiency and the potential for a decrease in the crime rate.

This report will focus on the use of computers by the police. Although it is too early to reach a final conclusion as to whether the benefits of technology justify the costs, particularly in global terms, three basic issues will be addressed:

- First, how (and why) are computers used by police departments throughout the country?
- Second, what are some of the benefits and costs of such computer applications?
- Third, since success in using computers varies from police department to police department, what characteristics and approaches seem most important in influencing the effective use of computers by the police?

RESEARCH METHODS

Two primary research tools have been utilized in order to document the growth, extent, and impact of computer use by police departments. First, in the summer of 1971 the International City Management Association sent a questionnaire to a total of 498 police departments throughout the country. This sample included all police departments in cities over 50,000, and 25% of police departments between 25,000 and 50,000; 376 or 75.5% responded, and Table 1 provides a complete breakdown of this response.[3]

Second, to back up this mailed survey and to answer more evaluative questions in areas such as impact, effectiveness, and success, fourteen police departments were visited throughout the country. Interviews were held with 143 law enforcement personnel, 127 sworn and 16 civilian. A formal questionnaire was not administered, but an effort was made to ask a common set of questions of all of them. As a consequence, some numerical tabulations of the responses have been made.

The fourteen police departments were selected in such a way as to obtain a variety in terms of city size, geographic location, stage of implementation, and initial impressions of success. Their names are not listed here for the sake of confidentiality, although some departments will be referred to for illustrative purposes as the article proceeds.

A period of three to four days was spent in nine of the police departments, and interviews were held with a broad range of people from the chief to a sampling of patrolmen in the field. In the other five departments briefer contacts were made, focusing on specific questions or areas. No precise attempt was made to select interviews according to any random sampling process, but it is felt that a broad range of people and opinions was solicited.[4]

Some of the results of both the mailed survey and the site visits have already been reported in an article in the 1972 *Municipal Year Book*, "Police and Computers: The Use, Acceptance and Impact of Automation". This report represents a continuation and further analysis of the information utilized in that article.

THE EXTENT OF COMPUTER USE

Police use of computers began in the early 1960's, and in 1964 St. Louis became the first city in the U.S. to install a real-time police computer system. Since then the growth of police computer usage has been widespread. In the 1971 survey it was found that more than a third, or 38.8% of the

* Originally prepared for the International City Management Association's Urban Data Services, April, 1972.

police departments responding were using a computer – whether it was owned by their department, the city, or a service bureau (Table 1). In addition, 11% of the 230 police departments who indicated that they were not using computers did acknowledge that punch card equipment was used, bringing the percentage of police departments who were using either computers or punch card equipment to 45.5%.[5] It is expected that future growth will continue at a rapid rate. By 1974 almost two thirds (62.5%) of the police departments responding plan to be using a computer. (Table 2)

As expected, the most important single factor in determining whether a police department used a computer, according to the survey, was the size of the city in which the department was located. Of those departments in cities over 100,000, 69.8% were using computers while in cities under 100,000 the percentage was three times smaller (23.4%). City size will continue to be an important factor in predicting computer use in the future. (See Figure 1, Table 2).

It was also found that police departments in central cities tended to use computers more than departments in suburban or independent cities; and that police departments in council-manager cities displayed a greater percentage of EDP use than did departments in cities with mayor-council, commission, or town meeting forms of government. A geographic analysis showed that computer users were from the south, west, and north central regions of the United States, in that order, with a comparatively striking lack of use in the northeast region of the country.[6]

HOW DO THE POLICE USE COMPUTERS?

Computers receive a wide range of use in police departments. In the survey mailed out by the ICMA, twenty-two specific computer applications were identified. These in turn were grouped into eight basic application areas: (Figure 2)

1. *Police patrol and inquiry.* These applications allow a police officer to make rapid "real-time"[7] inquiries about the identification of people or property to see if they are wanted, stolen, etc. Applications included in this area were files of *outstanding warrants*, *stolen property* files, and files providing listings and cross-references for *registered vehicles* and their owners.
2. *Traffic applications.* Such uses provide automated records of *traffic accidents, traffic citations* and *parking violations.*
3. *Miscellaneous operations.* Several applications related to police operations are found in this area. They include files related to *jail arrests* in order to keep track of people who have been arrested, released, released on bail, etc., and files related to *intelligence records.*
4. *Computer aided dispatch.* Computers are used in this application area to provide for the partially automated command and control of units in the field in order to speed up and more effectively handle the *dispatch* of patrolmen in answer to calls for police service.
5. *Criminal investigation.* Applications here provide an officer or detective with supporting information for investigating and solving crimes. It may include information on crime patterns, *modus operandi* (an individual or group pattern or method of operation), automated access to *field interview reports*, nickname files, and *fingerprint* matching.
6. *Crime statistical files.* Here are included basic files on the type and number of *criminal offenses and arrests* and on *juvenile criminal activity.* Such records receive a wide variety of use in filling out reports, supplying historical records, providing basic information for program formulation and planning, and supplying data for criminal investigation.
7. *Police administration.* Computer use here corresponds closely to administrative uses in other government and business organizations. *Personnel records, payrolls, budget analysis and forecasting systems, inventory control files,* and *fleet maintenance records* all can be automated to aid in the administrative operation of the police department.
8. *Resource allocation.* Here computer programs are widely used to *analyze police service* more effectively and to provide for the effective *allocation and distribution of patrol units.* In some cities, programs have been developed which can help to predict workloads and alter police deployment so as to meet changing crime patterns as they vary on an hourly, and seasonal basis.

EVOLUTION OF COMPUTER USE

The scope of computer use in police departments over the last five to ten years has evolved and expanded significantly. The earliest computer applications reported in the ICMA survey were traffic accident files established in two police departments in 1960. From such an initial use for statistical tabulation and "housekeeping" administrative tasks, the computer has advanced to a number of applications related to operations, management, and program planning. Specifically, there seem to be three distinct eras in the evolution of computer use by the police: (1) *1960 to around 1967*, when traffic and crime reporting were most prominent (2) *1967 - 1971*, highlighted by the rapid expansion of systems for police patrol and inquiry; and (3) *1971 - to a more hazy future*, with an increasing focus on the more difficult and perhaps potentially more beneficial applications related to resource allocation, criminal investigation, and command and control.

1960 - 1967 This was the initial era of computer use by the police. First applications began in the traffic area, closely followed by the development of crime related files so that the computer could be used as a tool in filling out local, state, and national crime reports (e.g. The FBI Uniform Crime report).

By 1967, according to the ICMA survey, almost half of all computer applications (46.4%) were devoted to either traffic or crime related files. Figure 3a indicates the average percentage of computer applications found in each area at that

Table 1 POLICE COMPUTER USE RESPONSE, 1971

Classification	No. of departments surveyed (A)	No. of departments responding: No. (B)	No. of departments responding: % of (A)	No. of departments responding: % of total responding	No. of departments using computers: Yes: No.	Yes: % of (B)	No: No.	No: % of (B)	No. using EAM only[1]: No.	EAM only: % of (B)	No. using EDP and EAM: No.	EDP and EAM: % of (B)
Total, all cities	498	376	75.5	100.0	146	38.8	230	61.2	25	6.6	171	45.5
Population group												
Over 500,000	26	20	76.9	5.3	20	100.0	0	0	0	0	20	100.0
250,000-500,000	30	29	96.0	7.7	23	79.3	6	20.7	4	13.8	27	93.1
100,000-250,000	98	77	78.6	20.5	45	58.4	32	41.6	6	7.8	51	66.2
50,000-100,000	227	175	77.1	46.6	45	25.7	130	74.3	15	8.6	60	34.3
25,000- 50,000	117	75	64.1	19.9	13	17.3	62	82.7	[1]	[1]	[1]	[1]
Geographic region												
Northeast	–	92	–	24.5	13	14.1	79	85.9	8	8.7	21	22.8
North Central	–	100	–	26.6	41	41.0	59	59.0	8	8.0	49	49.0
South	–	91	–	24.2	46	50.5	45	49.5	4	4.4	50	54.9
West	–	92	–	24.5	45	48.9	47	51.1	8	8.7	53	57.6
City type												
Central	–	203	–	54.0	103	50.7	100	49.3	17	8.4	120	59.1
Suburban	–	141	–	37.5	38	27.0	103	73.0	8	5.7	46	32.6
Independent	–	32	–	8.5	5	15.6	27	84.4	1	3.1	6	18.8
Form of government												
Mayor-council	–	134	–	35.6	47	35.1	87	64.9	7	5.2	54	40.3
Council-manager	–	211	–	56.1	89	42.2	122	57.8	17	8.1	106	50.2
Other[2]	–	31	–	8.3	10	32.3	21	67.7	2	6.5	12	38.7

[1] Question asked only in Part B of questionnaire which did not go to departments in cities between 25,000 and 50,000.
[2] Includes cities with commission, town meeting, and representative town meeting government.

Table 2 FUTURE COMPUTER USE

Classification	No. of departments reporting (A)	No. of departments using computers: Yes: No. (B)	Yes: % of (A)	No: No. (C)	No: % of (A)	Number planning on future use: Yes: No. (D)	Yes: % of (C)	No: No.	No: % of (C)	Uncertain: No	Uncertain: % of (C)	No. of computer users by 1974: No. (B + D)	No. of computer users by 1974: % of (A)
Total, all cities	376	146	38.8	230	61.2	89	38.7	36	15.7	105	45.6	235	62.5
Population group													
Over 500,000	20	20	100.0	0	0	–		–		–		20	100.0
250,000-500,000	29	23	79.3	6	20.7	3	50.0	0	0	3	50.0	26	89.7
100,000-250,000	77	45	58.4	32	41.6	16	50.0	2	6.3	14	43.7	61	79.2
50,000-100,000	175	45	25.7	130	74.3	53	40.8	16	12.3	61	46.9	98	56.0
25,000- 50,000	77	13	17.3	62	82.7	17	27.4	18	29.0	27	43.6	30	39.0
Geographic region													
Northeast	92	13	14.1	79	85.9	24	30.4	15	19.0	40	50.5	37	40.2
North Central	100	41	41.0	59	59.0	23	39.0	8	13.6	28	47.4	64	64.0
South	91	46	50.5	45	49.5	20	44.4	8	17.8	17	38.8	66	72.5
West	92	45	48.9	47	51.1	22	46.8	5	10.6	20	46.6	67	72.8
City type													
Central	203	103	50.7	100	49.3	45	45.0	15	15.0	40	40.0	148	72.9
Suburban	141	38	27.0	103	73.0	33	32.0	15	14.6	55	53.4	71	50.4
Independent	32	5	15.6	27	84.4	11	40.7	6	22.2	10	37.1	16	50.0
Form of government													
Mayor-council	134	47	35.1	87	64.9	31	35.6	19	21.9	37	42.5	78	58.2
Council-manager	211	89	42.2	122	57.8	49	40.2	12	9.8	61	50.0	138	65.4
Other[1]	31	10	32.3	21	67.7	9	42.9	5	23.8	7	33.3	19	61.3

[1] Includes cities with commission, town meeting, and representative town meeting government.

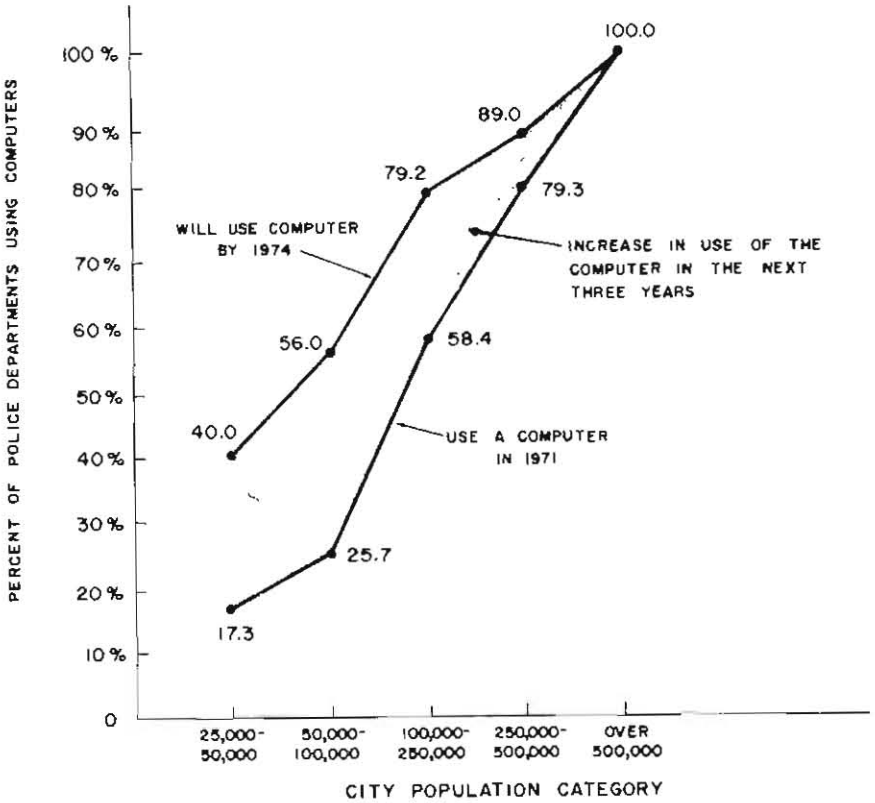


Figure 1 *Influence of city size on current and projected use of computers by police departments*

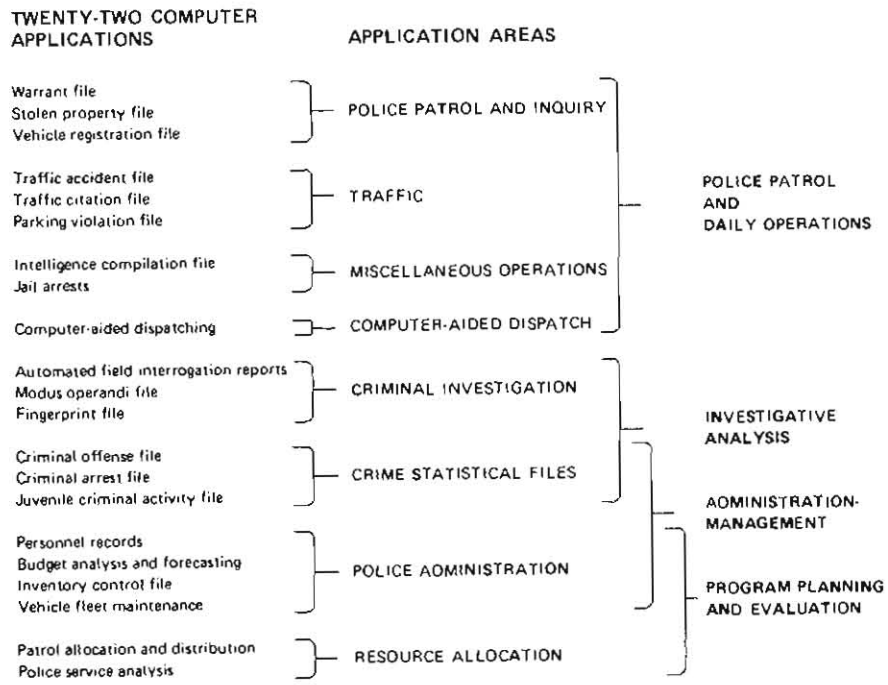


Figure 2 *Computer use by police*

time. The chart clearly illustrates the early emphasis on traffic and crime reporting uses.

1967-1971 In the middle 1960's there began to be a shift in focus. Police departments continued to install traffic and crime related files, but the development of real-time computer systems to provide a rapid feedback of information based on the inquiry of the patrolmen in the field became popular. In 1964 the St. Louis Police department installed the first real-time police computer system. Soon other cities joined St. Louis, and in the last few years the growth of computer application related to police patrol and inquiry has been remarkable. In 1971 one out of every five computer applications was devoted to the rapid retrieval of information pertaining to outstanding warrants, stolen property or vehicle registration. (Figure 3b, Table 3a). The cumulative total of certain application areas for each year since 1960 is illustrated in Figure 4. Note the relative "leveling off" of traffic uses and the doubling of police and inquiry applications between 1969 and 1971. Figure 4 also demonstrates the continuing importance of crime statistical files among law enforcement computer users.

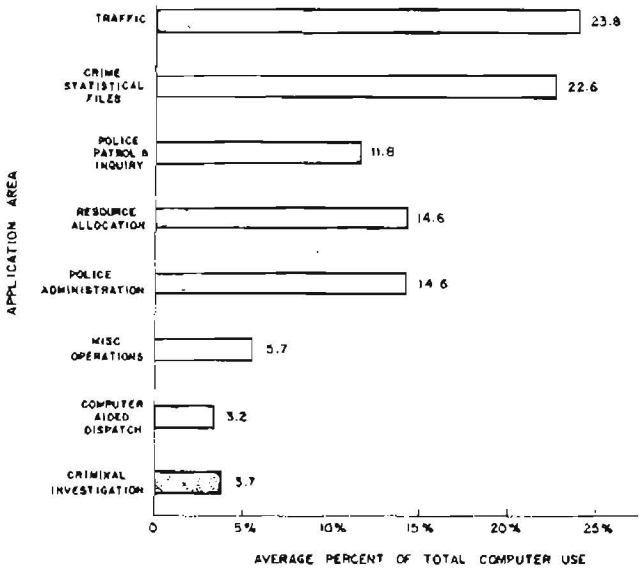


Figure 3/a *In 1967*

Figure 3 *Average percent of computer use by police (3/a – in 1967, 3/b – in 1971; 3/c – in 1974). (Average percent of computer use is obtained by dividing the total number of applications reported by all departments in each 1 of the 8 areas by the number of application types in that area. These numbers are then totaled and an average percent of the total is derived. This number is calculated to compensate for the fact that several of the application areas have 3 application types, while others have only 1 or 2.)*

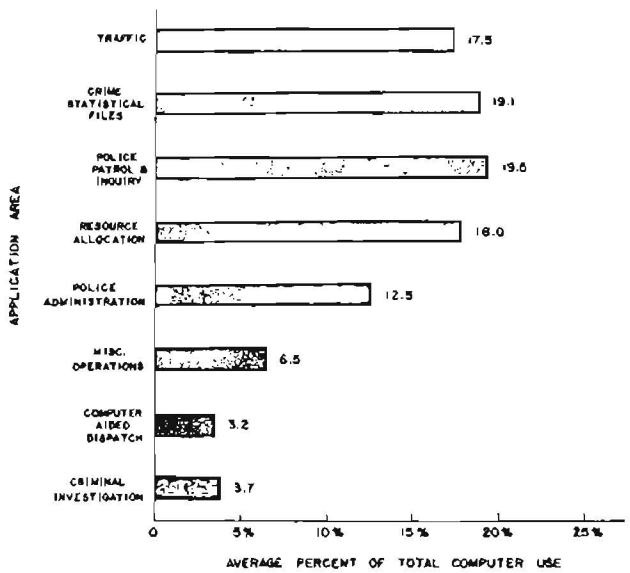


Figure 3/b *In 1971*

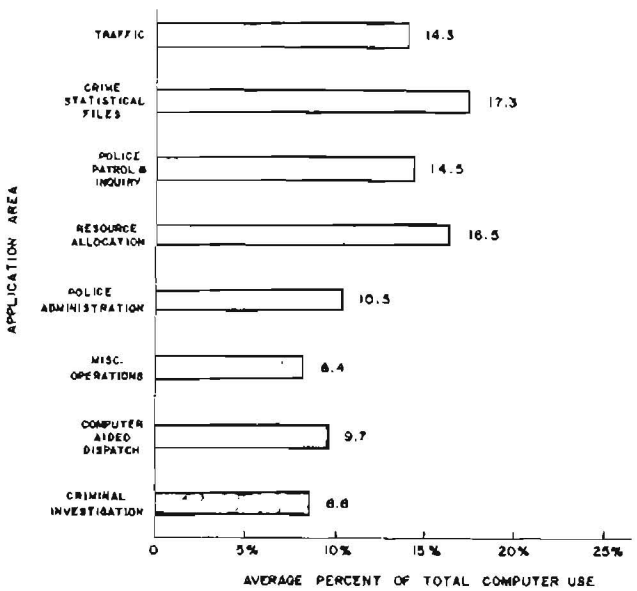


Figure 3/c *In 1974*

TABLE 3(a)

POLICE COMPUTER APPLICATIONS

Application Area	Current Use – 1971: No. of Depts. Reporting Computer Application (A)	% of Total Computer Applications Reported	Average No. of Applications per Application Area (B) (B ÷ A/AT)	% of Total Average No. of Applications (% of Total B)	Extent of Use in Depts. Based on Depts. Responding (B ÷ 122)**	Future (Next 3 Years): No. of Depts. Reporting Future Applications Planned by 1974 (C)	% Increase (C/A)
Police Patrol and Inquiry (AT* = 3)	180	19.9%	60	19.5%	49.2%	138	76.7%
Traffic (AT* = 3)	162	17.9%	54	17.5%	44.3%	151	93.2%
Miscellaneous Operations (AT* = 2)	40	4.4%	20	6.5%	16.4%	83	207.5%
Computer Aided Dispatch (AT* = 1)	10	1.1%	10	3.2%	8.2%	61	610.0%
Criminal Investigation (AT* = 3)	34	3.8%	11.3	3.7%	9.3%	158	464.7%
Crime Statistical Files (AT* = 3)	177	19.5%	59	19.1%	48.4%	203	114.7%
Police Administration (AT* = 5)	192	21.2%	38.4	12.5%	31.5%	191	99.5%
Resource Allocation (AT* = 2)	111	12.2%	55.5	18.0%	45.5%	131	118.0%
TOTAL	906	100.0%	308.2	100.0%	–	1116	123.2%

*AT = Number of application types.

**Average number of applications per application area (B)/122 (the number of departments responding to this part of the questionnaire).

TABLE 3(b)

POLICE COMPUTER APPLICATIONS (continuation of Table 3(a)

Application Area	Total Use By 1974: Total Number of Departments Using Computer by 1974 (D) (Total A & C)	% of Total Applications Expected by 1974	Average Number of Applications Per Application Area (E) (E = D/AT)	% of Total Average Number of Applications Expected (% of Total E)	Extent of Expected Use in Depts. Based on Depts. Responding (E÷122)
Police Patrol and Inquiry (AT* = 3)	318	15.7%	106	14.5%	86.9%
Traffic (AT* = 3)	313	15.5%	104.3	14.3%	85.5%
Miscellaneous Operations (AT* = 2)	123	6.1%	61.5	8.4%	50.4%
Computer Aided Dispatch (AT* = 1)	71	3.5%	71	9.7%	58.2%
Criminal Investigation (AT* = 3)	192	9.5%	64	8.8%	52.5%
Crime Statistical Files (AT* = 3)	380	18.8%	126.6	17.3%	100.0%
Police Administration (AT* = 5)	383	18.9%	76.6	10.5%	62.8%
Resource Allocation (AT* = 2)	242	12.0%	121	16.5%	99.2%
TOTAL	2022	100.0%	731.0	100.0%	–

*AT = Number of application types.

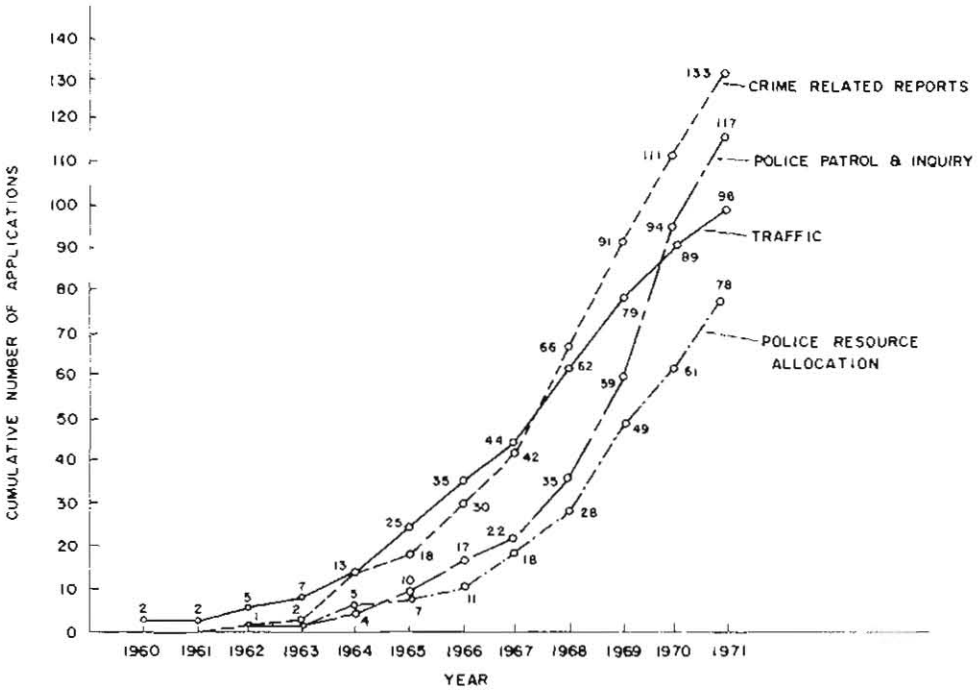


Figure 4 *Cumulative numbers of certain application areas, 1960-1971*

As one would suspect, the emphasis in the establishment of police patrol and inquiry systems has been on rapid inquiry and response. If a policeman stops a speeding car it is extremely helpful for him to know if the car is stolen *before* he approaches the driver so that he can anticipate the latter's potential reaction rather than waiting until it is too late. Thus, one would expect a majority of police patrol and inquiry systems to be "real-time" to facilitate a response in seconds rather than minutes. And indeed, such is the case. Of the 180 applications reported 150, or 83.3%, were real-time. Real-time applications related to police patrol and inquiry made up close to half (46.7%) of all real time police computer applications in 1971. (Table 4)

During the period of 1967 - 1971 major steps had also been made to provide access for local police department to regional, state, and national real-time computer networks. On January 27, 1967, the FBI established the National Crime Information Center (NCIC) as a pilot operation with 16 law enforcement agencies throughout the country on-line with an FBI computer in Washington, D.C. In essence, the NCIC was designed to be a record index and inquiry system on wanted persons, stolen property, and criminal events. By January 1, 1970, over 2,000 law enforcement agencies had direct access to the NCIC through state or local computer terminals.[8] More than 1,737,500 active records were stored on wanted persons, vehicles, boats, license plates, articles, guns, and securities.

Many states have established, or are in the process of establishing, state information systems. For many small police departments the link to NCIC will often come through a state computer system. In addition, regional systems have been established in metropolitan areas throughout the country where information on such matters as local warrants, stolen automobiles, stolen property, dangerous persons, etc., are kept at a central computer facility. Access is then provided to surrounding localities, usually through real-time direct terminal to computer hook-up. Such a service may be "free of charge" as in Kansas City or St. Louis, or it may be maintained on a "shared cost" basis as in northern and southern California. As an illustration, the Los Angeles Police Department and the Los Angeles Data Service Bureau established an "Automated Want Warrant System" which services over fifty associated law enforce-

Table 4 REAL-TIME POLICE COMPUTER APPLICATIONS

Application area	Current use: No. of departments reporting computer applications (A)	Current use: No. of real-time applications (B)	Current use: % of real-time applications (B/A)	Current use: % of total real-time applications (% of total B)	Future use (next 3 years): No. of EDP applications installed (C)	Future use (next 3 years): No. of real-time applications (D)	Future use (next 3 years): % of real-time applications (D/C)	Future use (next 3 years): % of total real-time applications installed (% of total D)
Police patrol and inquiry	180	150	83.3	46.7	138	127	92.0	15.1
Traffic	162	30	18.5	9.4	151	89	58.9	10.6
Miscellaneous operators	40	19	47.5	5.9	83	77	92.8	9.1
Computer aided dispatch	10	6	60.0	1.9	61	59	96.7	7.0
Criminal investigation	34	18	52.9	5.6	158	132	83.6	15.7
Crime statistical files	177	57	32.2	17.8	203	175	86.2	20.8
Police administration	192	22	11.5	6.8	191	95	49.7	11.3
Resource allocation	111	19	17.1	5.9	131	88	67.2	10.4
Total	906	321	35.4	100.0	1,116	842	75.5	100.0

Table 5 ACCESS TO NONLOCAL COMPUTER FACILITIES

Nonlocal facility	Access among noncomputer users: No. indicating (A)	% of total no of nonusers (N = 230)	Northeast: No. (B)	Northeast: % of (B)	North Central: No. (C)	North Central: % of (C)	South: No. (D)	South: % of (D)	West: No (E)	West: % of (E)	Access among computer users: Total no indicating	No. indicating terminal access	No indicating direct computer interface
Total departments responding	213[1]	.	69	..	55	..	43		46	.	[2]	.	.
NCIC	180	78.3	50	72.4	52	94.5	33	76.7	45	97.8	109	96	13
State police systems	183	79.6	63	91.3	50	90.9	32	74.4	38	82.6	100	91	9
Regional police systems	84	36.5	23	33.3	17	30.9	15	34.9	29	63.0	56	54	2
Other	29	12.6	..	..	..	.	.	.	..	.	16	14	2

[1] 213 departments of 230 departments not using the computer responded to the question on access.

[2] Because of the way the question was phrased, it is not possible to determine the total number indicating

ment agencies in the greater Los Angeles area and provides a response to inquiries within seven to ten seconds.

The number of non-computer user police departments who are tied to one or several of these three potential linkages is striking. More than three quarters of departments responding to the ICMA survey have direct terminal access to information generated from NCIC and state police information systems (Table 5). Regional systems are often the most useful on a day-to-day basis, and over one-third of the non-users are tied to a regional network.

THE FUTURE. Although the future is often difficult to predict with confidence, police department estimates indicate that there will be another shift in the utilization of computers by the law enforcement community. Police departments were asked to indicate in the ICMA survey what their specific plans were for computer use by 1974. Apparently, real-time systems will continue to be important, but the emphasis is shifting toward police resource allocation. Further, there will be a rather striking increase in the installation of systems to aid criminal investigation and computer aided dispatch.

The significance of police resource allocation has already begun to appear. Figure 4 indicates the rising utilization of applications in this area. Whereas police patrol and inquiry uses increased by more than five times between 1967 and 1971, the percentage rise in applications for resource allocation was only shortly behind, with a four fold jump. More important, though, the projected increase in 1971 to 1974 in police resource allocation was 118.0%, while the increase in police patrol and inquiry was only 76.7% (Table 3a). Figure 3c illustrates that if estimates from the ICMA survey are valid, the average percentage of total computer use devoted to resource allocation will actually be slightly greater than that devoted to real-time inquiry. Crime related files are predicted to have the highest average use, by 1974, closely followed by resource allocation. Use of police patrol and inquiry applications will be third with traffic uses remaining fourth.

Though the use of the computer for criminal investigation and dispatch has received little attention to date, the mailed survey indicates that this

will change in the future. Uses for computer aided dispatch are predicted to increase by more than six times between now and 1974, going from an average of 3.2% to 9.5% of total computer use; and applications for investigations will more than quadruple, rising from 3.7% to 8.8% of the average total police computer use. (Table 3a, 3b, Figure 3c)

It should be remembered, though, that the future is still hard to predict. These estimates are based on the responses by police departments to the ICMA survey. They represent informed opinion, but should be viewed with at least a certain amount of skepticism. Estimates often tend to be overly optimistic. It is also possible that Federal sources of funds may decrease in the next few years. Further, although a response rate of 75% is considered good, one must still remember that one fourth of the cities surveyed did not reply. Departments that use computers are perhaps more likely to respond to such a survey than those who do not. As a consequence, the numbers given for current and predicted use may be slightly high.

However, it is interesting to note that the predicted emphasis on resource allocation corresponds directly with the attitude of law enforcement personnel. In the mailed survey police departments were asked to indicate which three applications they considered the most significant. The ranking of importance for each area is provided in Figure 5. Police deployment and resource allocation was clearly regarded as the most important computer use, with crime related files (used for investigation and analysis as well as reporting) and police patrol and inquiry as a second and third respectively. Although the police utilize the computer principally in areas related to daily police operations, they still consider resource allocations to be the most important application. It is also significant that although computer aided dispatch and criminal investigation applications receive relatively little use by police departments now, they were still ranked in importance above traffic, police administration, and miscellaneous operations.

When considering the overall development of computer use, the various shifts in emphasis of use by the police seem logical. Computers have traditionally been used first to replace "housekeeping", record-keeping activities within an organization. Thus, the initial emphasis on traffic and reporting uses. However, with the advent of third generation computers (utilizing integrated circuits to facilitate increased computation speed) and real-time concepts, it seems reasonable that the police would take advantage of this tool to implement real-time inquiry systems. Still, from a technical point of view, such inquiry systems to handle wanted warrants, stolen property, and motor vehicles are relatively straightforward. In fact the applications which have received greatest use to date (police patrol and inquiry, traffic, police administration, and crime statistical files) would in general have to be classified as somewhat "routine" uses involving the straightforward manipulation and inquiry of prescribed data. For the sake of identification they can be classed as applications to "structural" problems or situations.

However, there is another area where applications become more elusive and "complex". It is in this "unstructured" area that the machine becomes a tool for decision making, strategic planning, and man-machine interaction. In law enforcement this includes such application areas as resource allocation, the investigation of crime, and command and control. Naturally, it would be a mistake to consider "structured" and "unstructured" categories as sharply defined classifications.[9] It is more reasonable to consider them as opposite ends of a continuum. For example, moving toward the unstructured end, systems design becomes more difficult; and behavioral, personality, and organizational considerations become increasingly significant. For more unstructured applications to be successful there must be an effective interaction between man and machine. Establishing the proper balance is often the key to successful implementation. It is also in this more "complex" area that the consideration of costs and benefits often becomes more difficult.

To date, police use of computers has been almost entirely in structural applications. However, since it seems likely that in the future increased emphasis will be placed on the more unstructured application areas, it is important to consider the relative impacts of both. Only time will tell the ultimate effect, but the next section of this report will begin to explore some of the possible advantages and disadvantages of structured and unstructured applications.

COMPUTER IMPACT

As a starting point it is useful to ask why computers are being implemented by police departments throughout the country. Naturally, there is no simple answer. Each department is different, and a whole set of motivations are often involved.

First, police departments need to process large amounts of information with speed and precision.

Table 6 WHAT ARE THE MAJOR REASONS FOR USING A COMPUTER?

Reasons	Departments ranking as most important effect		Departments ranking as second most important effect		Departments ranking as third most important effect		Weighted total ranking[1]
	No. (A)	% of total (A)	No. (B)	% of total (B)	No. (C)	% of total (C)	
Makes internal operations more efficient	27	23.7	26	23.0	16	14.3	149
Helps monitor performance of precincts or units	0	0.0	6	5.3	11	9.8	23
Improves patrolmen's ability to identify and apprehend	35	30.7	16	14.2	10	8.9	147
Improves ability to investigate crime	7	6.1	13	11.5	11	9.8	58
Improves surveillance	0	0.0	1	0.1	1	0.1	3
Improves service to public	38	33.3	17	15.0	14	12.5	162
Gets better management information	5	4.4	29	25.7	34	30.4	107
Serves as a part of "professionalization"	0	0.0	3	2.6	12	10.7	18
Other	2	1.8	2	1.8	3	2.7	13
Total	114		113		112		

[1] Based on a composite score combining and weighting (A), (B), and (C). The total is derived as follows: 3 x (A) + 2 x (B) + 1 x (C) = weighted total ranking.

Table 7 INFLUENCE OF THE LEAA ON COMPUTER USERS

Received LEAA funds	Number indicating (A)	% of total responding	For those receiving funds, has the computer made a difference: Yes, no computer without help		Yes, smaller computer without		Uncertain		No, would be the same		Other	
			No.	% of (A)	No.	% of (A)	No.	% of (A)	No.	% of (A)	No.	% of (A)
Yes	51	42.5	10	19.6	24	47.1	6	11.8	6	11.8	5	9.8
No	48	40.0	–	–	–	–	–	–	–	–	–	–
No, but have or will apply	21	17.5	–	–	–	–	–	–	–	–	–	–
Total responding	120	100.0										

The computer is ideally suited for such purposes. When asked in the mailed survey to indicate their major reasons for using a computer, the top three responses were to improve service to the public, to improve the patrolman's ability to identify and apprehend criminals rapidly, and to make internal operations more efficient (Table 6). All three of these reasons reflect a desire to increase police efficiency and effectiveness.

However, computers are also being installed because large amounts of money are presently being spent by the federal government to support police and criminal justice operations. One of the areas for the allocation of these dollars has been the improvement of police hardware and technical innovations. In some instances the primary reason for installing a computer is simply that the money is there. In the ICMA survey it was found that four out of ten of those departments who were using computers had received funds from the Justice Department's Law Enforcement Assistance Administration (LEAA) to aid in their automation effort. Another two out of ten indicated that they had not yet received aid but had applied or were planning to do so. In addition, more than half of the non-users planning to transfer to computer use (51.6%) indicated that they were hoping to receive aid from the LEAA. Among those departments receiving federal aid, seven out of ten indicated that LEAA funds had made a difference. Five out of ten indicated that their EDP operation would have been smaller, and another two out of ten said that they would not have had a computer without assistance. Only one out of ten indicated that computer usage would have been the same without the LEAA (Table 7).

Visits to various police departments also confirmed this fact. In several cases department personnel reported that computer development took place as long as federal money was available. One civilian employee went so far as to say that his work (primarily related to resource allocation and scheduling) was considered a luxury in the department: as long as outside sources could fund the effort it was fine; but if such sources were to falter, his work would almost certainly cease.

This report does not maintain that there is anything wrong with such motivations. In fact, one of the primary purposes of the LEAA is to help police departments utilize programs and techniques which

they could not afford on their own. It does mean, though, that if a computer is sometimes considered a "luxury", an effort should be made to assess what the impact of such a tool has been and whether or not its use should be promoted. Examination should be made of the factors that seem to lead to more successful utilization.

WHAT HAS BEEN THE EFFECT OF COMPUTER USE?

As stated earlier, many aspects of police patrol and daily operations are particularly suited for computer processing. This is especially true in applications related to routine or structural tasks. Computers are ideal for the storage and rapid access of large amounts of information. Systems providing for real time response to inquiries from the policeman in the field have already proven their worth, although efforts have been far more successful in some departments than in others. Administration uses, basic record keeping files, and traffic applications have also demonstrated that they are valuable aids in achieving efficient operation and the rapid processing of routine activities. Although police departments give these applications a low priority (Figure 5), city revenues have been increased as a result of more efficient administration and collection. For example, in Tulsa, Oklahoma, it is estimated that an additional $180,000 of revenues was brought in as a result of the first year's operation of a new automated traffic citation system. Similar increases have been witnessed in other police departments around the country.

However, in other areas of unstructured application, it seems that in most instances the potential for computer use has not been met. Although the possibility for impact seems greater, once you go beyond the area where the computer is simply being used to duplicate "routine" activities which are already being done manually and start to move into the realm where the computer is used as a tool for planning and decision-making, implementation and application become far more difficult. It is in this unstructured realm (e.g. resource allocation, criminal investigation, computer dispatch) that the potential for computer use has not been fully met. In some cases, the use of the computer by the police has fallen short of expectations; in others, it is still too early to determine what the actual benefits or ultimate potentials might be.

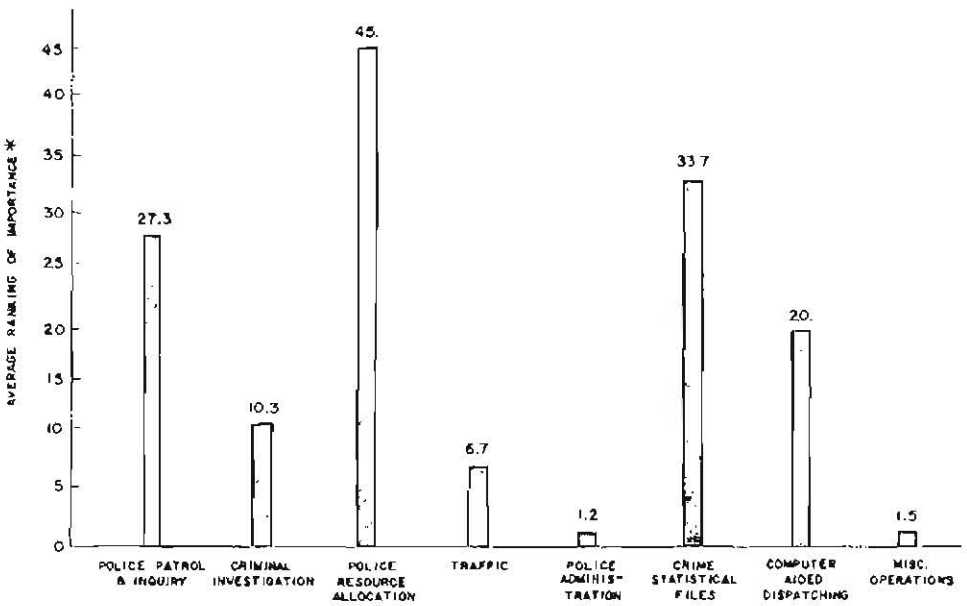


Figure 5 *Importance of computer applications as ranked by police departments. (Ranking is based on average number of times applications were selected by police departments as 1 of their 3 most important applications.)*

In some departments efforts have been made to use the computer and quantitative analysis to allocate police resources more effectively, but results have generally been mixed. Some publications or applications for project grants would lead one to believe that we will soon be distributing law enforcement resources automatically and that cars will be dispatched to the scene of a crime by machine. Although initial efforts and experimentation with such techniques are underway, widespread use is still years away, and at this point it is not clear that the benefits of such computer applications will justify the social or the monetary costs.

The surface has only been scratched when it comes to the use of the computer for criminal investigation. During the site visits several police departments indicated that they have had considerable success in automating their field interview reports.[10] There are also several experiments underway to establish modus operandi files for use of the computer in tracing criminal patterns and in linking crime to known offenders. (The feelings of the law enforcement community seem split, though, over the utility of modus operandi efforts). Although it is still early to make firm predictions it is quite possible that the computer will have a major influence on the police investigative function. For example, various police officers talked of using the computer to assign cases to investigative officers on the basis of the probability of cases being solved and of the constant interaction between man and machine at all phases of the investigative process. However, problems exist and experiments still need to be proved. Perhaps the most significant issues revolve around questions of privacy and the protection of individual rights.

Applications for computer aided dispatch and command and control systems have received good publicity,[11] but a number of technical and behavioral issues still remain. Developing "car locators" at a reasonable cost, placing an accurate "map" in the "mind" of the computer, and overcoming the behavioral resistance of the patrolman who does not want to be monitored continually are illustrative examples of the problems that must be settled. There is still a need to bridge the gap between theory and reality. As particular situations are encountered, compromises must often be made. For example, one of the primary reasons for computer aided dispatch is to speed the process of dispatching patrol cars to given calls. In Tulsa, Oklahoma, the police department is installing a modified command and control system. It will provide extensive information for analysis, reporting, investigation, etc. However, the department has also discovered that it will actually take slightly longer to dispatch a car because of the time required to input all the pertinent data before a response can be obtained. Tremendous gains will be made in terms of new information available, but compromises must also be accepted.

In order to assess more fully the advantages and liabilities of computers in both structured and unstructured uses, two application areas will be singled out for more extensive discussion: first, rapid retrieval for police patrol and inquiry (toward the structured end of the continuum), and police resource allocation (toward the unstructured end).

Before going on, though, it is important to sound one additional note of caution. Surely the computer is here to stay, but it would be a mistake to think that it will play a major role (at least in the short run) in revolutionizing the police or many of the major issues that they face. The conditions of the police are, to a large extent, determined by the conditions of our society. As a consequence, the computer will have only a marginal impact on their ultimate problems. Improved efficiency, shorter response time, better investigation of committed crimes, and improved management may be some of the benefits that result. Still the bigger law enforcement issues such as the prevention of crime, the handling of offenders, police-community relations, etc., must still be resolved in the larger context of the society as a whole. Further, from the visits to police departments conducted as a part of this study, it was learned that the general nature of each department and the variations from city to city have a major impact on the use and acceptance of the computer. Thus, in many departments the traditional nature of the police force may have a larger effect upon computer operations than the computer will have on the police.

RAPID RETRIEVAL FOR POLICE PATROL AND INQUIRY.

In the area of rapid retrieval for police patrol and inquiry the computer has proven to be a very effective tool. For example, Kansas City, Missouri, a city with a population of 507,000, has established a regional system which links with more than 40 law enforcement agencies. These agencies utilize more than 75 terminals and service a population of 1.5 million citizens across 9,000 square miles and

eight counties in eastern Kansas and western Missouri. Inquiries are made pertaining to name, address, etc., and responses are provided within an average time of 4.9 seconds each. Other such regional systems are found throughout the country.

Police acceptance of real time police patrol and inquiry systems is demonstrated by the increased use of such systems by the men in the field once they discover the benefits that they bring. In every city visited where a real-time system has been installed, there was a continuing rise in the average number of inquiries per man as time went on. Figure 6 illustrates this increase in use in several selected cities.

This type of rapid retrieval has a number of benefits. First, better information is made available many times faster than was ever possible manually. Second, it not only saves the time of police officers thereby allowing them to spend more time in preventive patrol or in responding to calls, it also saves the time of the citizen who has been stopped. Instead of a ten or fifteen minute wait for a records check to be run, now, it can be done instantly and innocent people can be sent on their way. Third, policemen are protected from the unknown or unsafe. With rapid inquiry it is possible to notify a policeman whether a car has been stolen or the owner is wanted *before* the officer approaches the driver of a stopped car, thus letting him know what to expect. Some systems will even allow for an address check to see if any problems have occurred at a particular location recently, thus providing a safety warning for cars that might be dispatched.

Real-time inquiry systems also improve patrolman efficiency and increase apprehension ability. This fact can be readily documented. For example, on March 23, 1970, the Long Beach Police Department became a part of the Los Angeles regional Automated Want/Warrant System (AWWS) originally established through the joint efforts of the Los Angeles Police Department and the City Data Service Bureau. On June 8, 1970, the Long Beach Department started entering information in the system regarding outstanding Long Beach warrants. Figure 7 illustrates the growth that occurred in the number of warrant arrests as a result (an increase in total warrants arrests of 1,114, or 31.5%, over 1969, and an increase in Long Beach warrant arrests of 769, (25.2%). It is especially interesting to note that this increase occurred almost solely as a result of the increase in arrests of people wanted for Long Beach warrants by other law enforcement agencies, since the number of local warrant arrests actually decreased slightly in 1970.

The cost of utilizing the AWWS by the Long Beach police department is estimated at $50,000 per annum including equipment and a "rental fee" paid to Los Angeles. On the other hand, it was estimated that the annual revenues received from various warrants for 1971 was around $375,000. (The actual revenue for January 1, 1971 thru June 30, 1971 was $187.576).[12] Based on a 769 increase in Long Beach warrant arrests, this would indicate increased benefits of somewhere around $75,370.[13] The use of automation in this case shows a very positive relationship of benefits to costs incurred, particularly at this simple level of analysis.[14]

However, it was also found in the site visits to police departments that some departments are far more effective than others in implementing computer use. In one city for example, a real-time computer system for police patrol and inquiry had been in operation for several years. Yet due to a series of complications, the average time required to get information back to the policeman in the field was as much as ten minutes instead of ten seconds. As a result, slow response had led to a certain disenchantment with the system. On the other hand, in a second city of similar size, a new system had just been established within the last two years. Particular emphasis had been placed on rapid response, though, and replies to inquiries from patrolmen would consistently return in five to ten seconds. The consequence was that in the second city computer use, as measured by average inquiries per uniformed policemen, was almost three times greater than in the first. (Figure 8)

The final section of this report will examine why such differences exist. The point that should be made at this time is that even in the area of real-time uses for police patrol and inquiry, one of the most straightforward areas of computer use, there are significant differences in the costs and benefits between different departments. This suggests two things: first, that it will always be difficult to make generalized statements about the impact of automation since such variations exist; and, second, if a police department is planning to utilize a computer, it should take the time and effort to ensure that it is implemented properly. Otherwise, what has been shown to be beneficial in one department will prove to be a waste of money in another.

Finally, it is important to point out that there are certain social costs and dangers involved in the

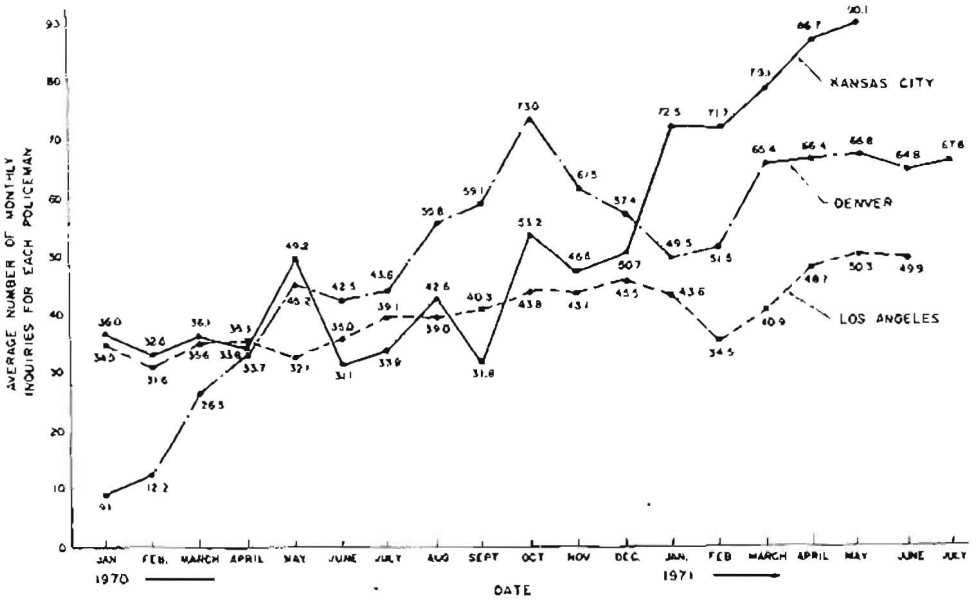
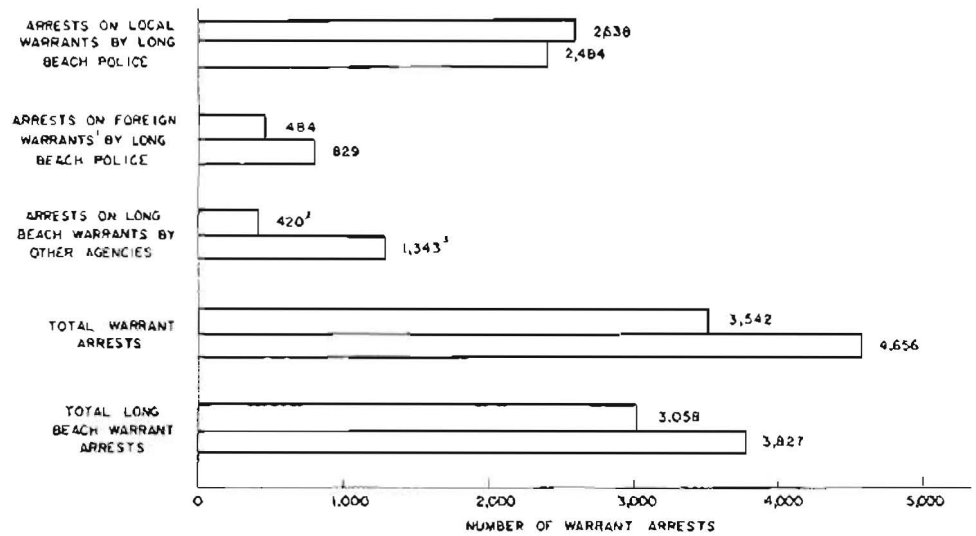


Figure 6 *Rise in computer inquiries from policemen in 3 selected cities in 1970-1971 (This chart should* not *be used to compare cities Exact use of inquiries can vary substantially from city to city. The chart does indicate a general rise in use in these 3 cities.)*



[1] Outstanding warrants in cities other than Long Beach.
[2] Estimate for year from warrant detail supervisor.
[3] Only for six months: June – December 1970.

Figure 7 *Impact of Automated Want/ Warrant System in Long Beach, California, in 1969-1970*

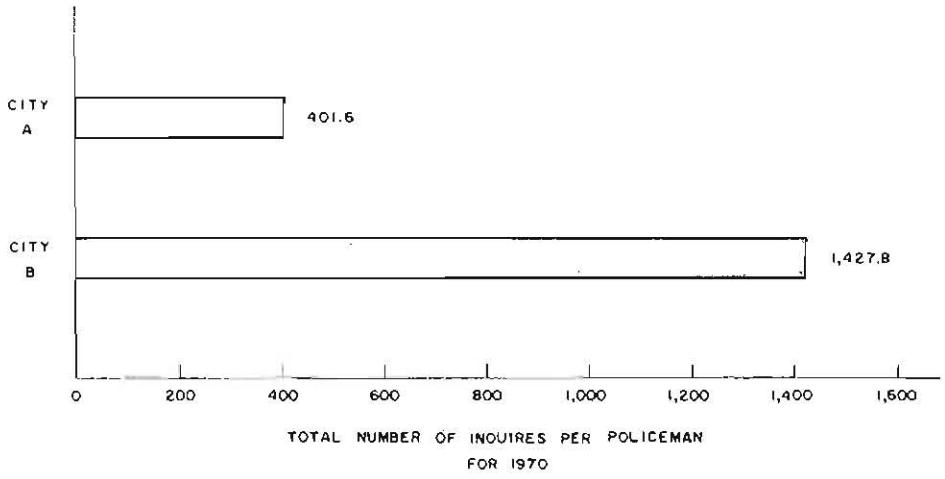


Figure 8 *Computer use in 2 cities of similar size in 1970*

use of computers for the rapid retrieval of law enforcement information. In particular, questions pertaining to privacy, the handling of information, and access to computerized records must be raised. The computer has great ability to perform tedious tasks precisely, rapidly, and without fatigue; tasks that would drive mortal man out of his mind. However, it is also a machine without a sense of values. It is therefore our responsibility to determine how the machine should be used and to insure the necessary protection of individual rights.

Since June, 1969, work and experimentation have been underway for PROJECT SEARCH, a project to establish a national system for on-line retrieval of criminal offender history files. The potential for law enforcement is great, but particular consideration must be made to prevent unauthorized disclosure or misuse of data. Special care should be taken to limit the system to necessary information and source documents, to provide a constant verification, to prevent access to unauthorized parties, and most important, to assure the individual citizen the right to know what information the system has concerning him. As use of computers by the police grows, as this study shows it will, continuing attention must be paid to the protection of privacy and individual rights.

RESOURCE ALLOCATION

The use of the computer for resource allocation is an application of automation to aid in the decision making process, an application in which the machine interacts with man through the use of analysis to influence policy. Utilization in this area is more than just having the machine duplicate a manual process already being performed. Successful implementation must make careful consideration of behavioral and organizational factors.

In the ICMA survey resource allocation was felt to be the most important computer use by the police (Figure 5), yet the results thus far have been mixed. It is still not clear what the ultimate potential may be, but to date use has fallen short of initial expectations. In part, this has been the result of the interaction of behavioral influences.

Almost all of the police departments that are using computers already have some sort of application related to resource allocation and deployment (45.5%), and this percentage is expected to skyrocket by 1974. (Of the 122 departments that indicated in the ICMA survey that they were using a computer, 99% or 121 already use the computer for resource allocation or plan to do so within the next three years). Of the fourteen police departments visited, eight had some program underway or in the experimental stages in which the computer is used as a tool in resource allocation. What does all this mean?

The demand for police services varies according to the time of the year, the day of the week, the time of day, the geographic area, the socio-economic conditions of the community, etc. The basic concept in programs for police deployment is to utilize the computer and various forms of analysis to allocate limited law enforcement resources more effectively so that the police can meet these varying demands rather than constantly assigning the same number of people to a set beat

24 hours a day, 365 days a year. The procedure for achieving this varies from department to department.[15]

In Dayton, Ohio, a system has been developed whereby the workload, represented by the total number of crimes, arrests, and dispatches, is predicted on the basis of past experience for various times of the year. These figures are then used to build patrol beats automatically. Effort is made to "draw" every beat using the computer so that each will have an equal workload. The objective is to achieve such a distribution that no one beat varies more than 4% above or below the average. The method is an effective one, but there are problems. First, the significant factors used to determine beat distribution are measures of input instead of output or performance. There is no way to evaluate whether the selected beat distribution improves police service. Further, only three factors (and often just one, number of dispatches) are used to determine workload. Little analysis has been conducted to see if these are the most significant in determining demand for law enforcement resources. And finally, there are often problems in determining workloads according to separate beats because of the large numbers of interbeat dispatches.[16]

Nonetheless, the system has been a helpful one. Whereas in 1965 Dayton had three generally equal patrol shifts, one of which rotated every week, now the computer is used to determine equitable beats, and a permanent shift system has been established to get more policemen in the field at those times of the day and year which are shown to be most critical. The computer, then, in this situation is used primarily as a means of processing large amounts of information. Relatively little quantitative analysis is involved.

In St. Louis, resource allocation has been approached somewhat differently. According to some sources this is the most advanced operational method of patrol force deployment currently in use.[17] In this procedure, which began experimentally around 1966, a distinction was made between two aspects of the police patrol function: (1) calls for service, or responding to calls or complaints from the public; and (2) preventive patrol, or all patrol activities directed at the prevention of crime or apprehension of criminals. The demand for police services, measured by the expected number of criminal incidents, was then predicted by area and time of year, week, and day. Information was also gathered on the distribution of time required to dispatch patrol cars to service these criminal incidents. Then, based on relatively simple mathematical techniques using queueing theory, an estimate was made of the number of patrol cars needed in a given area or beat so that a certain percentage of the predicated calls for police services could be met without any dispatching delay. In other words the program could show the number of men that would be required if the department desired to respond to 85 percent of the calls without delay, 90 percent, 95 percent, etc. Men were then assigned to the two different patrol functions, calls-for-service and preventive patrol. Enough men were assigned to each beat to respond to calls-for-services so that 85 percent of the predicted incoming calls could be met without delay. The remainder of the patrol force was assigned to preventive patrol.

Perhaps the greatest conceptual criticism of the St. Louis effort is that it utilizes only one criterion in determining the number of cars assigned to a beat to respond to calls for services, the fraction or percent of calls that cannot be answered without delay. Related to this, "requirements for preventive patrol are not explicitly considered when assigning cars and the question of the relative value of a car on response and on preventive assignments is not addressed."[18] However, the accuracy of the system in predicting workload has proved very successful, and based on the work and procedure in St. Louis, IBM Corporation has put together a computer program package known as LEMRAS (Law Enforcement Manpower Resource Allocation System) which is currently being leased by several police departments around the country.

Additional experimentation is also underway to implement several recently developed techniques. Richard C. Larson has devised an allocation formula and simulation model which is designed to address the basic questions of police deployment.[19] The method requires police administrators to specify a number of policy objectives for each command area or beat. These are stated in terms of constraints. For instance, average travel time for urgent calls should not exceed four minutes. Other objectives can involve preventive patrol, administrative considerations, or any other factors deemed important. As a consequence, some of the objections of the St. Louis and LEMRAS systems that they do not consider enough factors have been overcome. The procedure determines the minimum number of units required for each beat so that all objectives are fulfilled. If the total number of units to be allocated is insufficient to satisfy objectives, then the method computes the deficiency and

requires a more modest set of objectives. If there are additional units to allocate beyond those needed solely to satisfy constraints, they are deployed using a mathematical optimization technique known as "dynamic programming" in order to fulfill some city-wide objectives (for instance, minimization of average overall waiting time for dispatch). This method has been applied to the New York City Police Department and played a role in the efforts of the Mayor and Police Commissioner to obtain a fourth platoon which now operates from 6 p.m. to 2 a.m.[20] The model is also being implemented in Boston and several other U.S. and Canadian police departments.

EVALUATION OF RESOURSE ALLOCATION

It is difficult to fully evaluate the success of many of the resource allocation efforts. A number of variables are involved, both technical and behavioral, and in many cases it is still too early to tell. Critics are skeptical, but most departments still seem enthusiastic. For example, Kansas City has been working for over a year on a program of computer aided deployment related to traffic enforcement. Between 1969 and 1970 with this program in action, the city experienced a 5% reduction in traffic accidents even though there was a smaller number of men on traffic patrol. The department did not claim there was a direct correlation between selective enforcement and reduced accidents because of the difficulty of isolating casual relationships in such a case, but there were "strong suspicions" that a correlation existed.

However, resource allocation in traffic control is probably easier than the allocation of manpower in the prevention and response to crime. In the case of traffic it is possible to isolate troublesome roads and corners and to saturate those areas at critical times. Further, it is easier to influence the type of enforcement which occurs. Police work in general is highly discretionary. Although instructions can be given from the top, the major part of law enforcement work is carried out by the "man in the street." The public's image of the police is based on whether a particular policeman responds rapidly and efficiently to a call and on whether or not he writes that ticket. The police department is more likely to be able to determine and maintain an approach to traffic control than it is to establish a system in most areas of criminal apprehension or investigation. As a consequence, the use of computer analysis seems better suited to the allocation of resources for traffic enforcement than in other areas of law enforcement work.

Allocation of resources for criminal apprehension and patrol for example, seems more difficult. For a start, it is often hard to understand the relationship between resources used and the effect which they have. Because so many factors seem to influence the crime rate, it is very difficult to predict what influence an increase or decrease in the number of policemen in the field will have on crime prevention. As a consequence, it is often difficult to assess the impact of resource allocation efforts.

Some of the initial experiments to date seem to have achieved less than had initially been hoped. In St. Louis resource allocations efforts began around 1966, and in 1970 the city began using this deployment program city wide. However, reactions and the actual impact on the department have been mixed. The precise distinction between cars for preventive patrol and cars responding to calls for service has been dropped. According to one source, it was discovered that policemen who were assigned to preventive patrol felt that their activities should be limited to patrol. When the workload demanded that preventive patrol cars should respond to calls, or vice versa, the men were somewhat dissatisfied. As a result, a compromise method has evolved. Now, a determination is made of the number of cars needed in a district to respond to calls. This number is allocated, and where possible extra cars are provided which can be used as the District Commander desires (e.g. for preventive patrol). However, a precise distinction is no longer made between cars for patrol and cars for calls for service. In fact, the workload is often such that in the busier districts, at least, all cars have to be utilized to respond to calls, patrolling on the side where possible. It was also discovered that when changes were suggested to alter the time of shifts, etc., there was strong resistance from the patrolmen. They were used to their time schedules and did not want to change, thus demonstrating that behavioral considerations are an important factor in implementing computerized resource allocation.

Still, St. Louis continues to utilize the resource allocation program. Twice a year "maps" outlining alternative and suggested beats for each shift are prepared by computer and distributed to each district. Whether or not these "maps" are used is a decentralized decision left to the District Commander. (At one point control over implementation of the resource allocation program was centralized). Attitude toward the system varies. As one of the people who has been working on the

project for some time now put it: "Just tell me what you want to hear (good or bad) and I can take you there (someplace in the department) and you can hear it." Whereas several people in the department offered glowing reports, one district commander responded: "Resource allocation? Oh, I thought we gave that up!"

However, whether or not the details are accepted, it is clear that the overall philosophy of resource allocation has caught on in the St. Louis Police Department. As one person put it: "The big thing that they've accepted is a variable number of beats for a district", depending on time of day, week and year. The basic approach has become a fact and way of life. This in itself is a major change from when the project began, and thus reflects a significant impact on the department.

There are some law enforcement people who feel that the time may ultimately come when specific patrol beats will be discontinued. An officer reporting for duty would simply call in and be assigned to patrol or answer calls in a particular area, an area which has been designated through the analysis of available information and the aid of computer technology. However, other law enforcement people feel strongly that such a move would be a backward and not a forward step. To them it is important for the officer to have a beat and to get to know the residents in that area. An entirely "fluid" or moving force would prevent, or at least hinder, the development of appropriate relationships between the police and local citizens. The potential is there for the computer to have a "depersonalizing" effect on the law enforcement task.

The resource allocation efforts to date in Los Angeles give some indication of the basic dilemma which may arise. The Los Angeles Police Department has been using the IBM package, LEMRAS, (Law Enforcement Manpower Resource Allocation System) on an experimental basis in one division over the last several years. In this division the program is set so that 95% of incoming calls for service can be answered without delay. Other cars are assigned to preventive patrol. In one study of evaluation it was found that forecasts predicting the number of calls-for-service were 95.5% accurate.[21] It was also found that 95.2% of the calls-for-service were answered without delay. Further, a comparison of crime statistics for arrests before and after the introduction of LEMRAS indicated an observable increase in efficiency.

However, there were problems. Although response to 95% of calls could be accomplished without delay, that figure was an average one, and for some people in the division it did not seem to be enough. Officers cited what they felt were too many occasions each day when backlogs of calls would occur, as a consequence of which citizens would have to wait too long for police service. It was felt that LEMRAS was too inflexible and did not consider enough variables in arriving at its predictions. Calls for services did not seem adequate as the primary determinant, and other suggested factors included number of arrests, response to crimes observed by the police, station calls for administrative business, and other administrative duties. (e.g. court attendance thus making an officer unavailable for patrol.)

The main problem cited, though, was that LEMRAS sometimes seemed to conflict with the Los Angeles Police Department "Basic Car Plan." The Basic Car Plan is a program under which one basic car is assigned to a geographic area. Enough men are allocated to the car to staff the vehicle twenty-four hours a day, and one officer is made responsible. This car is expected to spend 50% of its time working with the people in the area. The idea is to improve police-citizen relations and to build a trust and pride in law enforcement service.

However, it was found in one rough survey in the division utilizing LEMRAS that the Basic Cars were responding to calls outside their area about 30% of their time, thus making it almost impossible for them to spend half of their time working with the people. Although effective overall allocation was being provided (as illustrated by the statistics in response to calls for service cited above), for at least some of the men in the division this meant a decreased opportunity to work with people and a deemphasis on the sometimes forgotten human side of police work. The solution of one officer would have been to use LEMRAS, but to set the program so as to respond to as close to 100% of calls without delay as possible.[22] This would mean taking most if not all cars off preventive patrol and putting them into "basic areas", thus allowing for smaller basic car beats and increasing manpower to respond to calls.

In conclusion, then, it should be clear that the benefits and costs of computerized resource allocation are still mixed. The reality does not live up to some of the glowing reports which are sometimes made. However, at a minimum, planning and deployment efforts have already done much to show that there are more ways to fight crime than simply to "get more men out on the street". Naturally, most chiefs will continue to ask for

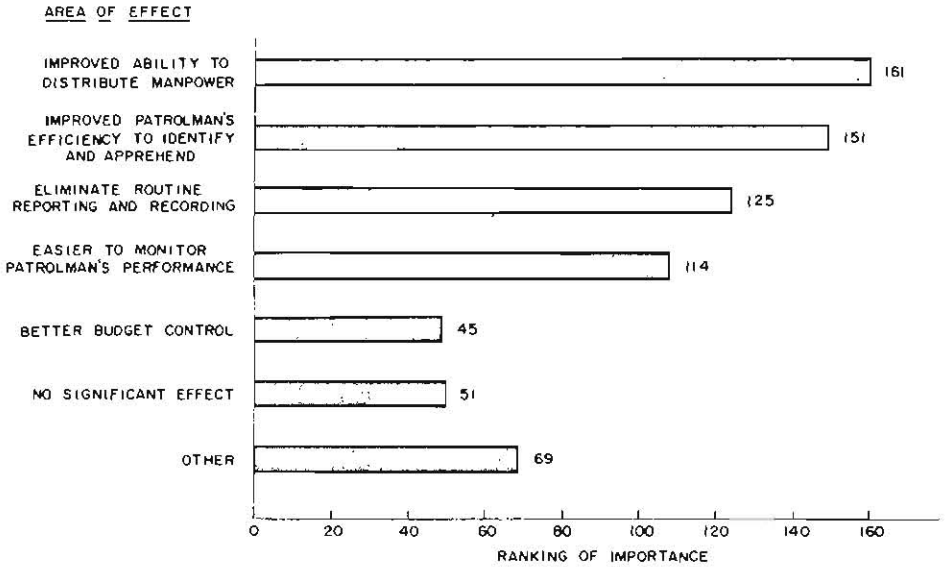


Figure 9 *In what areas has the computer had its greatest effect? (Ranking is based on number of times a department ranked each area of effect as first, second, or third in importance. A weighting factor has been applied – as in Table 6.)*

more men and in some cases rightfully so. However, this approach will increasingly be supplemented by the concept of achieving a better utilization of the men who are available. In fact, according to the ICMA survey, resource allocation and deployment was the area where police felt that the computer had had the greatest effect to date (Figure 9).

Still, it must always be remembered that there is a difference between simply generating better data and providing real law enforcement payoffs. People are still the key in utilizing any information acquired. New techniques can be devised, but if the people are unable to use them, little change will occur. For example a police officer in one of the cities visited felt that computers would really have little impact on decisionmaking in his department, at least with the current administrators. "They're used to making decisions based on their seat of the pants judgment. Having a computer won't change that, not with these people". Or as another officer put it, the potential is there, but there are only a few police departments in the country where they are really ready to put the computer to use in anything more than to provide rapid retrieval of information.

A very basic question, then, is what can a department do to take full advantage of computer potential? The next section of the report will be devoted to a discussion of what variables seem most important in achieving successful implementation.

WHAT FACTORS ACCOUNT FOR SUCCESS AND FAILURE?

There is no "school solution" to computer success. Every city and police department must adopt and modify what seems to be best for its particular situation and need. However, some departments are distinctly more successful than others, and upon examination, certain variables seem particularly important in helping to achieve this success.

Among the nine police departments visited actually using the computer extensively or having plans to do so in the immediate future, an evaluation was made of the overall acceptance of the computer, the attitude and understanding of the police, the range of applications, the level of use and performance, and the problems encountered both past and present. Any classification must be regarded as somewhat arbitrary; nonetheless, the nine departments can be broken down into three basic groups: two that were unmistakably successful; four that were performing adequately but for which it was still too early to determine the ultimate outcome; and three that were definitely

having difficulties of one sort or another. In trying to examine what factors seem to contribute most to computer success or failure, this report will look first at the problems which seem to be hindering computer operations, and secondly at those variables which seem to be important in determining differences between those departments that were unmistakably successful and others that fell short of expectations.

WHAT PROBLEMS ARE HINDERING COMPUTER OPERATIONS?

In the mailed survey, departments were asked whether any of eleven specific problems was bothering them now and which, if any, had caused difficulties in the past. In the personal visits to individual departments, questions were also raised about the most pressing problems encountered. The striking conclusion from both sources is that it is not technical difficulties that are holding back development but rather behavioral and people-oriented difficulties. However, enough departments are having success so that even these sorts of problems do not seem insurmountable. In fact, the results of the mailed survey indicate that in the eyes of respondents, overall problems are decreasing (Figure 10).

The two most significant problems seem to be in determining priorities for computer use and in integrating the computer operation and quantitative decision making with the rest of the department. In the mailed survey, the number one difficulty expressed was scheduling and the determination of priorities. What is more, the magnitude of this difficulty has increased over time (Figure 10). Visits to the police uncovered the same perplexity in several departments. In one city, nine sworn personnel out of the eleven interviewed volunteered that their primary problems were with agreement on priorities. The city data processing personnel, they claimed, were not giving police systems sufficient attention, and further, when time was spent on police work, they were implementing the wrong applications first. Instead of concentrating on those applications that would aid police operations, such as resource allocation or better feedback for investigations, the EDP personnel gave priority to applications that would raise revenue, such as more efficient parking ticket and traffic citation systems. On the other hand, the EDP people who were interviewed in the same city felt that the main problem was a lack of understanding of computer operations on the part of the police. Both sides were sincere, but an obvious gap existed.

Such a situation highlights what was perhaps the greatest difficulty discovered when visiting police departments – communication between police and data processing personnel and the overall integration of the operations of the computer with the rest of the department. Successful departments seem to do a good job in this regard, but others have real difficulty. In the two most successful departments visited, not a single person felt there was a gap between EDP and operating personnel. On the other hand, in one of the departments that was having problems, more than seven out of every ten officers interviewed said that there was such a gap. Difficulties revolved primarily around policemen feeling that data processing personnel did not understand their problems nor how the police system operated, and in turn, data processing people believing that the police were unwilling to understand and evaluate computer applications. Training sessions were regarded as essential since in most departments there was a widespread lack of understanding regarding what the computer could do and how it could improve police work. The use of "User Committees" of police and civilian personnel to determine the utility and priority of various applications also was found to help. Perhaps even more important was an honest commitment on each side to understand the position of the other.

Another problem which seemed to be significant was "oversell". This was particularly true in the departments that were the least successful. When the computer was initially introduced extensive promises were made. Interviews with department personnel showed that these expectations had not been met. Implementation of computer applications almost always takes longer than expected, and if too much is promised initially, disappointment will result. This same phenomenon was also found in the mailed survey. Departments were asked if the police computer system had met the expectations which they originally had. More than half (54.2%) responded positively, but there was still a significant number, better than one out of every 5 (22.2%) who felt that expectations had not been met or were still mixed. An additional one out of five (19.4%) felt that it was still too early to tell. (Table 8) The general impression from the visits to police departments was that although every department did not have a problem with unmet expectations, in those that did, it resulted in

an overall negative reaction to computer use, thus thwarting the potential for future applications.

TABLE 8

HAS THE COMPUTER MET EXPECTATIONS

Response	Number Indicating (A)	% of Total Responding
Yes, in fact, has exceeded	15	10.4
Yes, has met	63	43.8
No, has not met	13	9.0
No, and major changes required	8	5.6
Reactions mixed	11	7.6
Too early to tell	28	19.4
Other	6	4.2
TOTAL RESPONDING	144	

Other problems which seemed to be mentioned fairly often in visits to police departments were the design of forms and reports that were difficult or impossible for operations people to read or use, computer systems that were too slow and inaccurate, and problems with the computer being "down" or out of order. In part, the difficulties expressed over "down time" reflect expectations. Once a police officer has become used to receiving information in thirty seconds, it becomes a major imposition when the computer is down to have to revert to a manual back-up system, if one exists, that might take from fifteen to thirty minutes.

Technical problems related to equipment performance, reliability, and maintenance exist, but comparatively they seem to be only of moderate concern. According to the mailed survey, they also seem to be declining to some extent (Figure 10).

WHAT ACCOUNTS FOR THE DIFFERENCES BETWEEN SUCCESS AND FAILURE?

Based on an analysis of the ICMA survey and interviews and information from the site visits, five variables stood out as being particularly important in determining the differences between those departments that were unmistakably successful and others that fell short of expectations:

1. The involvement and quality of leadership at the top;
2. The involvement of other police personnel (and the ability to bridge the gap between EDP and police);
3. The basic approach and establishment of priorities;
4. The caliber of computer systems and technical staff; and
5. The emphasis placed on human-computer interaction.

In addition, it was found that success did not seem based on computer ownership by the police.

The Involvement and Quality of Leadership at the Top. Police departments tend to be fairly rigid organizations with well-established and precise chains of command. Thus, understanding, support, and involvement from the top are essential if computer operations are to be used to their full potential. When asked in the ICMA survey who had made the initial proposal to use the computer, more than half indicated it had been the chief, and seven out of ten said either the chief or the assistant chief (Table 9). However, it is not sufficient just for the chief to make the initial proposal or to be in favor of computer use. Visits to computer users indicate that the chief (or, at minimum, a very capable top assistant) must fully understand and be involved in the operation and implications of computer applications. In the top police departments this understanding and involvement was obvious. For example, in one of the two best, more than half of the sworn personnel who were interviewed volunteered that the involvement of their chief and a top-notch assistant chief had been one of the crucial factors determining success.

TABLE 9

WHO MADE THE INITIAL PROPOSAL FOR COMPUTER USE?

Response	No. Indicating (A)	% of Total No. Responding* (N = 118*)
Chief of Police	60	50.8
Asst. Chief of Chief's Direct Staff	23	19.5
Data Processing Manager	11	9.3
Planning, Research Director	15	12.7
Other Administrative Officer	12	10.2
Office of Mayor or City Manager	24	20.3
Outside Consultant	9	7.6
Other	9	7.6
Total Responding	163**	138.0**

WHAT STIMULATED THEIR INTEREST?

		(N = 111***)
Professional Meetings	42	37.8
Journals or Written Reports	29	26.1
Activity in other Cities, States	72	64.9
Computer Salesman	8	7.2
Outside Consultants	14	12.6
FBI Crime Reporting	19	17.1
IACP Department Surveys	17	15.3
Federal Assistance	16	14.4
Other	15	13.5
Total Responding	232**	208.8**

*Of 146 departments using computers, 118 responded to this question.
**Multiple responses possible.
***Of 146 departments using computers, 111 responded to this question.

The Involvement of Other Police Personnel. Involvement of the chief is a necessary condition for success, but it is not sufficient. Police at the

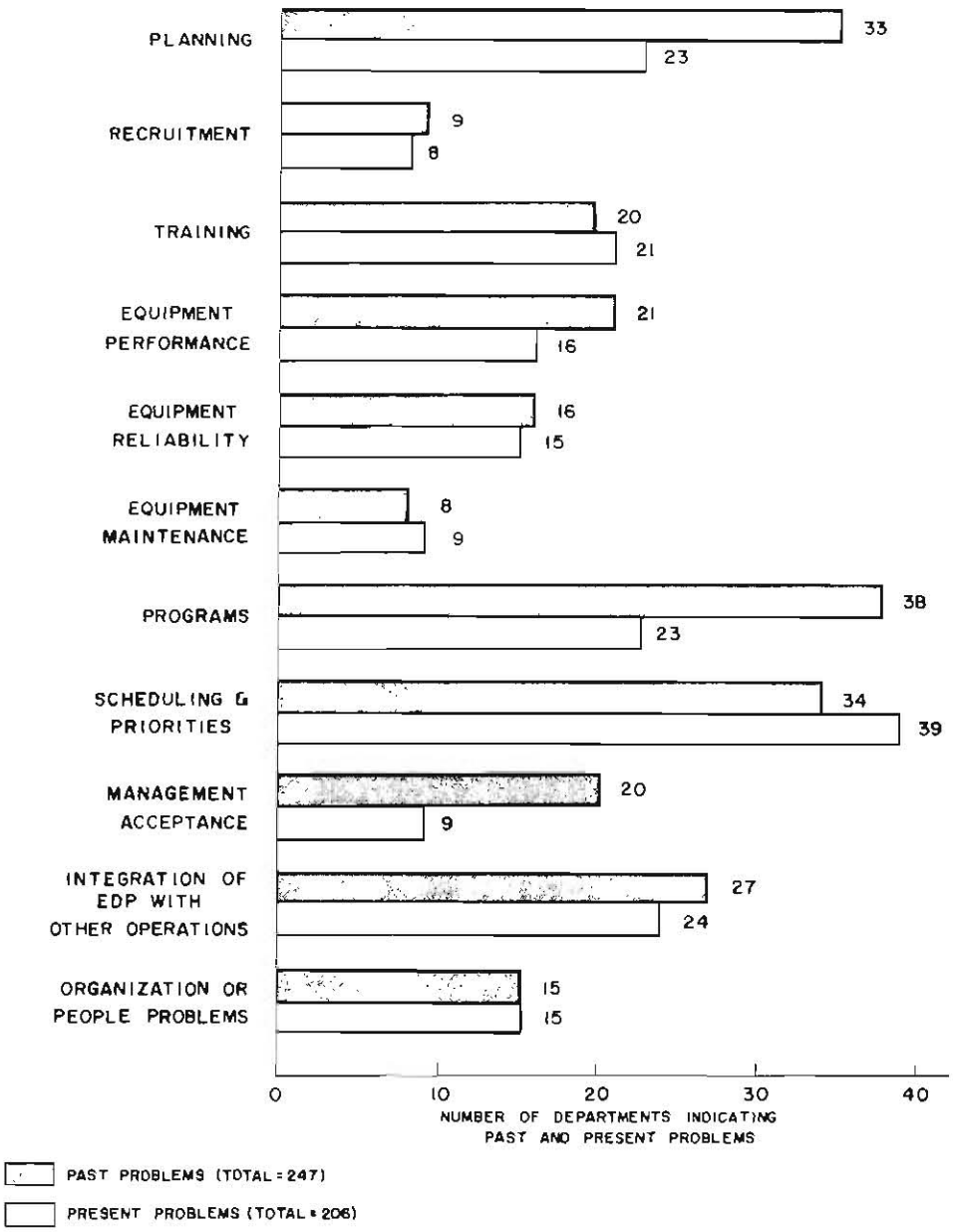


Figure 10 *Problems hindering computer operations*

operating level must also be involved in the design and development of computer systems. In one department, the data processing manager, who was also a policeman, put it this way: "You can train a policeman to be a programmer, but you can't train a programmer to be a policeman." Police officers can be suspicious of outsiders and change, so methods must be devised to bridge the gap between EDP and police. When the computer operation was instituted in Kansas City, eight policemen were selected through a series of special tests to become programmers and systems experts. In order to cultivate and maintain their interest, a special technical pay scale was introduced. Throughout the department, sworn personnel would refer to the involvement of these eight policemen as one of the keys to success.

This is not to say that the only way to succeed is for policemen to become programmers. Clearly the actual technical task of programming can be performed by a civilian or someone who is unfamiliar with police work. However, the full potential of

the computer in police operations may not be realized until sworn personnel are intimately involved in the *design* and *development* of computer applications.

In Los Angeles the Police Department has evolved a very successful working relationship with the City Data Service Bureau. A number of police officers work in the department's Advanced Systems Development Section where the major systems analysis and design of computer applications is carried out. In turn, though, the Data Service Bureau appoints a "task force" of technical people who work with the Advanced Systems Section and are responsible for the programming and technical aspects of each application.

The Basic Approach and Establishment of Priorities. The basic approach to computer applications and the process of determining priorities plays an important role in achieving success. The most effective formula apparently is to start with a specific definable product which has not been oversold, do a good job, and from that point add from one item of success to another. For example, both of the top two departments visited had set out early to help the "man in the street" by providing almost instant response regarding wanted cars, property, persons, dangerous suspects, etc. Because this first step was accomplished so well, the atmosphere in both departments is now conducive to major technical innovations in administration and management; and numerous other applications are under way. Other departments have put their initial focus more on housekeeping details (e.g., payroll, personnel) or on areas that have less direct positive utility for the patrolman in the field (e.g., resource and patrol allocation). As a result, the enthusiasm about the computer is far lower.

The Caliber of Computer Systems and Technical Staff. A good data processing man makes an important difference, whether the computer is controlled by the police department or by the city. He must be an individual with technical skills and a broad perspective which will allow him to see beyond his computer expertise and to communicate with the police department and be able to envision the use and implication of various applications. In order to obtain such individuals, a city or police department must be willing to pay competitive wages.

The Emphasis Placed on Human-Computer Interaction. There is sometimes a tendency to think of the computer as a replacement for man. This is both unrealistic and inefficient. One of the most critical variables for the efficient and effective operation of any computer system is the development of a proper balance in the interaction between man and machine.

For example, in one city visited a real-time system was established to provide rapid response to the man in the field. However, the method established for retrieving information from the computer was inefficient. The patrolman would call in to the dispatcher and make a request for information, say, on whether a car was stolen. The dispatcher would write this down and hand it to a terminal operator who would query the computer. The time taken for the operator to get a reply from the computer was seldom more than thirty seconds, and often faster. However, the terminal operator was servicing several dispatchers, so a line or queue would often form and a delay would result. Once the terminal operator received a response he would write it down and hand it back to the dispatcher, who in turn would contact the patrolman. The result – a ten minute wait and sometimes more for the patrolman in the street. To him the system was not much better than the manual operation the department had before.

In direct contrast to this is the example of one of the departments most successful in computer use. In this case the patrolman calls in his request to the dispatcher. The dispatcher has a video terminal directly in front of him, and while the request is being made he is entering the information into the computer. Response is almost instantaneous, and the dispatcher relays it immediately to the officer in the field. The result – a ten second response and an extremely satisfied policeman (to say nothing of the citizen who only has to wait for ten seconds instead of ten minutes).

The machine will not replace the human element in police operations, and just because something can be automated it is not a clear sign that it should be. If we are to utilize the computer fully as an aid in law enforcement work, more time must be spent on working out the best relationship between man and technology to obtain the optimum performance from both.

Success Does Not Seem Based on Computer Ownership by the Police. One of the interesting discoveries of the research is that the success or failure of the computer system does not seem to depend on whether or not the computer is owned and/or controlled solely by the police (instead of being owned and controlled by the municipality). In fact, the results of the mailed survey showed that the large majority of police computer systems today are a part of computer systems owned and operated by the municipality rather than by the

TABLE 10

OWNERSHIP OF POLICE COMPUTER SYSTEMS

Classification	No. of Departments Responding (A)	Type of Ownership: Service Bureau Only No.	% of (A)	Police Department Only No.	% of (A)	City Only No.	% of (A)	State Only No.	% of (A)	Joint City and Police Department No.	% of (A)	Joint Police Department and Other No.	% of (A)	Other No.	% of (A)
Total, all cities	124	8	6.5	9	7.3	76	61.3	3	2.4	11	8.9	3	2.4	14	11.3
Population group															
Over 500,000	19	0	0	4	21.1	7	36.8	0	0	5	26.3	1	5.3	2	10.5
250,000-500,000	23	0	0	2	8.7	15	65.2	1	4.3	1	4.3	2	8.7	2	8.7
100,000-250,000	42	2	4.8	2	4.8	29	69.0	1	2.4	3	7.1	0	0	5	11.9
50,000-100,000	40	6	15.0	1	2.5	25	62.5	1	2.5	2	5.0	0	0	5	12.5
25,000- 50,000	*														
Geographic Region															
Northeast	8	1	12.5	4	50.3	3	37.5	0	0	0	0	0	0	0	0
North Central	30	1	3.3	3	10.0	17	56.7	0	0	4	13.3	1	3.3	4	13.3
South	45	1	2.2	2	4.4	33	73.4	2	4.4	3	6.7	1	2.2	3	6.7
West	40	5	12.5	0	0	23	57.5	0	0	4	10.0	1	2.5	7	17.5
City Type															
Central	95	4	4.2	9	9.5	57	60.0	3	3.2	10	10.5	3	3.2	9	9.5
Suburban	28	4	14.3	0	0	19	67.9	0	0	1	3.6	0	0	4	14.3
Independent	1	0	0	0	0	0	0	0	0	0	0	0	0	1	100.0
Form of Government															
Mayor-Council	38	2	5.3	5	13.2	20	52.6	1	2.6	5	13.2	2	5.3	3	7.9
Council-Manager	79	6	7.6	4	5.1	50	63.3	2	2.5	6	7.6	1	1.3	10	12.7
Other	7	0	0	0	0	6	85.7	0	0	0	9	0	0	1	14.3

*Question asked only in Part B of questionnaire which did not go to departments in cities between 25,000-50,000.

police department. More than six out of every ten computers used by police departments are owned and controlled by the municipality within which the department is located. Less than one of fourteen are owned and controlled exclusively by the police department. One out of every eleven is owned and controlled jointly by the city and police department. (Table 10)

The police departments that own their own computer are primarily in the larger central city municipalities, two thirds in cities over 250,000. According to the survey, no police departments in suburban cities own their own machine. Geographically, the police departments that do own their own computer are found in the east and north central regions. No police departments in the west were found to own their own computer.

The fact that success in computer use does not seem to depend on ownership and control of the computer facilities by the police department was particularly evident in the on-site visits. Of the two cities that were unmistakably successful, one was part of an integrated city-wide system and the other was dedicated solely to police operations. Of the three departments that were having problems, two were dedicated systems and one was part of a city-wide system.

Both methods of ownership seem to have advantages and disadvantages. Dedicated systems provide police departments with primary control over their computer use. As a consequence the department has the entire or primary responsibility for determining priorities. It tends to be less slowed down by bureaucratic processes and approvals that become an issue when control of data processing facilities is at another level. In a system dedicated wholly to police work there is no one else to blame for failure. There is less potential difficulty in involving members of the department in EDP operations and in bridging the gap between the computer and the police. However, dedication offers no panacea. In one of the departments visited which had an exclusively police operated system, two thirds of the sworn personnel interviewed felt that there was a gap between those running data processing and those in the street doing police work.

On the negative side, there can be cost inefficiencies with dedicated systems. Economies of scale that can be gained through the sharing of a larger machine among a number of city functions are lost. Further, it is possible for computer power to "go to waste." In one of the cities visited, a large computer facility was fully utilized for only

one of three potential shifts, or eight hours a day instead of twenty-four. In addition, benefits which come from sharing information are lost. For example, in Tulsa the police now have automated access to the records of utility companies, which can be used to locate the occupant of a particular address. If they were not a part of a city-wide integrated computer system this opportunity would not be available.

Integrated systems thus offer the advantages of cost savings and information sharing. In some cities real-time systems could not possibly be made available due to budget constraints were it not for an integrated approach. Objections are sometimes raised, however, with integrated systems about the security of information and the potential problem of access by unauthorized personnel outside of the police department. However, this is really not a problem. Current technologies are such that they can permit the sharing of central computer facilities and still provide for complete security and confidentiality, file protection, prevention of unauthorized use, and overall monitoring of the use of the system.

Perhaps the greatest potential disadvantages of integrated systems are the lack of absolute control by the police in setting priorities and the problems that may be caused in getting approvals and commitments at another bureaucratic level. These can be overcome, though, by a good data processing manager of the centralized computer facility, one who is willing to take the time to understand the needs of the police and to give them the proper priority.

It does seem that as the size of city decreases, the case becomes even stronger for a city-wide computer operation. Two of the fourteen cities contacted had a population under 200,000. Both had chosen a smaller scale involvement with automation. However, one had purchased its own punch card equipment, while the other was getting essentially the same series of outputs through the use of the city's computer facilities. The current data processing costs for the two cities is comparative, but the potential benefits for the department that is tied into the city-wide operation is far greater. That city will soon be purchasing a larger computer, and the police department there will be able to enjoy the benefits of an on-line, real-time system. The other department is far away from such an advance, particularly at its current cost level for data processing.

In fact, it seems that there is a point at which it becomes unreasonable for police departments that are interested in real-time information, but are below a certain budget level (and therefore generally below a certain size) to consider only a dedicated system instead of an integrated one. In Kansas City approximately $735,000 is spent each year to run the dedicated computer facility, 5% of an overall police department budget of $14,346,363 in 1970. It is estimated that approximately $250,000 - $500,000 is needed to run a small real-time computer operation.[23] If a department wants to spend no more than 5% of its budget for data processing, no department with a budget of less than $5 million (generally in a city with a population below 250,000) can afford a real-time computer system dedicated solely to police work.

However, whether dedicated systems become more and more the style may not be a matter of logic but one of attitude. The general feeling among police departments is strongly in favor of police control; but when confronted with the realities of the situation, only a relatively small percentage actually seem concerned with the loss of control. When asked in the ICMA survey who should control the computer used by the police, close to half said the police department alone, while only slightly more than one out of ten indicated that the city or county government should have full control (Table 11). On the other hand, when departments were asked if they thought their computer system was likely to become a part of a city-wide information system, six out of every ten responded "yes", with another two out of ten being uncertain. Of these, only one out of six said he thought there would be a problem about losing control of police information in such a city-wide system (Table 12).

TABLE 11

WHO SHOULD CONTROL THE POLICE COMPUTER?

Response	*No. Indicating (A)*	*% of Total Responding*
Police Department Only	53	45.3
City or County Government Only	13	11.1
Joint Police Department and City	23	19.7
Joint Police Department plus other criminal justice	19	16.2
Other	9	7.7
Total Responding	117	

TABLE 12

LIKELIHOOD OF POLICE SYSTEMS BECOMING PART OF CITY-WIDE INFORMATION SYSTEMS

Likelihood	No. Indicating (A)	% of Total Responding	If "Yes," Is loss of control feared? Yes No.	Yes % of (B)	No No.	No % of (B)	Uncertain No.	Uncertain % of (B)
Yes	64 (8)	59.3	9	14.1	46	71.8	9	14.1
No	24	22.2	–	–	–	–	–	–
Uncertain	20	18.5	–	–	–	–	–	–
Total Responding	108							

CONCLUSIONS AND PROSPECTS

Over the last few years use of the computer by the police has grown significantly. The application of automation has become a reality of law enforcement work, and this utilization will continue to expand. Certainly much of the growth must be attributed to the fact that federal dollars have been available to help finance the costs. A determination as to whether or not this expense is appropriate is contingent upon an examination of the benefits and impact of computer use.

At the beginning of this report the question was raised whether the expansion of computer use by the police is an unnecessary waste stimulated by industrial pressure. The conclusion is that it depends, although an ambiguous response may not be satisfying for those who are looking for either a positive or negative endorsement. Departments vary widely in the success or failure of their computer use. The factors outlined in the previous section point to the variables which seem most important in achieving favorable performance. The computer, though, is viewed by some departments as being a nice but dispensable luxury, and there is always the potential for waste. What proves successful in one police department may be far less profitable in another.

Further, some applications of computer use seem to be more appropriate than others. Applications pertaining to routine or structural areas, particularly, have proven effective, although major differences remain among departments. The computer has already demonstrated its utility in providing rapid real time inquiry to the questions of patrolmen in the field and in improving police performance; although questions of privacy must constantly be considered. Use of computers in police administrations, traffic control, and crime reporting has been shown to bring added revenues and to lighten the paper work burden of law enforcement personnel. This level of implementation, though, is primarily one of handling somewhat routine activities which were already being performed manually, although most often far less efficiently. Institutional and major behavioral changes have not been required for their implementation.

Beyond these basic areas, when computer implementation begins to take on unstructured applications, the design and execution becomes more difficult and the results less clear. The theory as presented in the literature is often at odds with the reality that exists. Most police departments collect large amounts of information, but often it is not the data that would be most useful in providing relevant inputs into major patrol and tactical decisions. Further, when it comes to computer aided dispatching and resource allocation, behavioral factors must be considered carefully; and results still remain mixed. In many cases it should be realized that it is not the technical but the behavioral, organizational, and administrative difficulties that will hold the police back from achieving the full potential of computer use. The computer will not change people's basic nature. In fact, it seems that there are only selected departments that are ready to use the computer for more than a useful, but relatively routine, system of retrieving information rapidly. As one police data processing manager put it: "Millions of dollars have been spent, but there's still an awful lot of garbage coming out of police computer systems." A lot of computer hardware has been sold to police departments which don't need it or don't know how to use it.

Computers should not be expected, at least in the next few years, to make major alterations in the law enforcement function. Certainly, technical benefits will be achieved, but it would be deceptive to predict that the major issues of law enforcement will be solved through the use of a machine. These are a function of society as a whole. Still, as time goes on more subtle yet far-reaching effects may begin to emerge. In fact, if utilization in unstruc-

tured areas ever succeeds, it may result in a more systematic approach to law enforcement or at least to a rise in importance of those who are able to manage or manipulate such an approach. The result of all this may be institutional change, and naturally there will be trade-offs involved. For example, several of the police officers interviewed felt one of the greatest potential impacts of the computer would be to raise the quality of personnel at all levels in the department and to force better administration. According to one assistant chief of police: "As the computers come in, we're going to see the last of the old time policeman, and that's good. It's going to take a bright young man to learn how to use this thing. Either I'm going to learn to think computers or I'm going to have to get the hell out of here." This is not to say that a man is going to have to use the computer in order to rise to a high level in a police department. It does mean, though, that police administrators will have to be increasingly able to digest statistical information and to be capable of administering computer technology. In the view of the assistant chief quoted, this would have a long run affirmative effect on the quality of law enforcement personnel.

Also, there are indications that computer use may lead to centralization of power. It was found that almost everyone interviewed during the on-site visits (96%) felt that computer use would lead to better information and to greater control of the police department by those at the middle and top management level. If increased computerization leads to centralization, one may ask how this coincides with the currently popular ideas of decentralization and/or community control. Certainly it is possible to centralize control in certain areas (e.g. investigation of major crimes, centralized records, overall allocation of resources) and still leave a certain amount of local autonomy. At this point though, it is still to early to tell what the actual consequence will be.

Finally, it should be remembered that the field of computer technology is still in its infancy. The first commercially sold stored-program computer, the Universal Automatic Computer, or Univac 1, was produced only twenty-one years ago in 1951. The third generation of computers has been commercially available only since the late 1960's. Perfection should not be expected instantly in an area so young and rapidly changing. On the other hand, there is a certain mystique, as well as commercial force, surrounding the application of computers. This has led to high expectations and in some respects to over-sell: The reality of the state of the art is often far less than the general impression portrayed in the literature. It has also meant that critical questions involving privacy and the protection of individual rights have often been forgotten or brushed aside as "progress" marches forward. As a consequence, there is a need for a continuing assessment as to the benefits and impacts of computer use. Computers can be a valuable tool in bringing the improvement of law enforcement activities, but there is also the constant potential for misuse and wasted expense.

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1. Les Gapay, "Beyond Dick Tracy: Police Go Space Age In Big Cities and Small, To Dismay of Critics", *The Wall Street Journal*, August 9, 1971, pp. 1, 21.
2. In 1965 the Law Enforcement Assistance Act was passed and the Office of Law Enforcement Assistance (OLEA) was established within the Department of Justice to administer programs funded under the Act. In 1968 the Omnibus Crime Control and Safe Streets Act was passed and the OLEA was replaced by the Law Enforcement Assistance Administration as the agency to administer programs under the Act.
3. The survey consisted of two parts. The first part (identified as Part A) was brief and primarily for evaluative purposes. It consisted of twelve questions, eight to be filled out if the department was using a computer and four if it was not. The directions stated that Part A should be filled out by the chief of police. The second part (identified as Part B) was to be filled out by all police departments that were either using a computer or punch card equipment. This portion of the survey was longer and more technical, and the directions indicated that it should be filled out by the data processing manager or whoever in the department seemed most appropriate. Only Part A was sent to the 25% sample of cities between 25,000 and 50,000 in population, but both parts were mailed to all other cities. A second mailing was sent to cities that did not respond initially.
4. The site visits were conducted by the author and several students at the Massachusetts Institute of Technology. The related costs were supported in part by the MIT Undergraduate Research Commission, in part by the International City Management Association, and in part by the Joint Center for Urban Studies of MIT and Harvard. The students who participated in the study were Jim Ebright, Dan Greenbaum, Richard Prather, Roger Waldon and Roger Jeanty.
5. In the survey a distinction was made between electronic data processing (ED) and automated data processing (ADP). EDP equipment refers only to computer equipment whereas ADP is a broader term and includes not only computer equipment but punch card equipment (referred to as electronic accounting machinery and abbreviated EAM).
6. If the reader is interested in greater detail concerning the breakdown of computer use among police departments, he should refer to the 1972 *Municipal Year Book* article mentioned previously, "Police and Computers: The Use, Acceptance, and Impact of Automation," by Colton.
7. Real-time or on-line access refers to direct access, through a terminal, to computer files at any time so that all inquiries will receive almost immediate response – for example, real-time access to a file of stolen vehicles through a video display terminal.
8. "The FBI's Computer Network," *Datamation*, June, 1970, pp. 146-147, 151.
9. The distinction between "structured" and "unstructured"

problems related to computer applications first came to the author's attention in G. Anthony Gorry and Michael S.S. Morton, "Management Decision Systems: A Framework for Management Information Systems", Working paper Number 458-70, Alfred P. Sloan School of Management, MIT, April, 1970. (The terms "programmed" and "unprogrammed" have also been used by Herbert A. Simon in *The New Science of Management Decision*, Harper and Rowe, 1960, p. 6, to draw a similar distinction).

10. A field interview file is a file of interviews or interrogations conducted by patrolmen. Such records are used to provide initial leads, for example, to identify people who were in close proximity when an unsolved crime was committed.
11. See for example, *Task Force Report: Science and Technology*, A Report to the President's Commission on Law Enforcement and Administration of Justice, Prepared by the Institute for Defense Analysis, Washington, D.C., 1967. See particularly, Chapters 3 and 6.
12. Memorandum dated July 18, 1971 to William J. Mooney, Long Beach Chief of Police, from Officer S.R. Eakin, A.W.W.S. Coordinator. Subject: "Semiannual Automated Want/Warrant System Statistics."
13. 769 (increase from 1969 to 1970) ÷ 3,827 (total Long Beach warrant arrests in 1970) = 20.1% (% increase from 1969 to 1970 was of total 1970 warrants). Therefore, 20.1% X $375,000 = $75,370.
14. In fact the actual financial benefits are even greater given that the number of people in the warrant detail in the police department has been reduced since the implementation of AWWS. The majority of warrants are now handled by the patrol division instead.
15. One of the most widely used formulas for allocating police resources is the "Hazard Formula or Plan". This procedure identifies a series of factors which are felt to be significant in determining the demand for police patrol services. Significant factors may include the number of crimes against person, total of all crimes, calls-for-service, population, area, juvenile delinquency, accidents and aided cases, school crossings, and licensed premises. Each one of these factors is weighted according to its perceived importance, and totals are calculated in order to arrive at a single "hazard number" for a particular area. This number is supposed to represent the "hazard" in a geographic district and consequently the proportion of police. (For a critique of Hazard Formulas, see Jan M. Chaiken and Richard C. Larson, *Methods for Allocating Urban Emergency Units*, The New York City Rand Institute, R-680-HUD/NSF, May 1971, pp. 13-16.)
16. See for example Chaiken and Larson, Op. cit., p. 32.
17. See for example a study by the RAND Corporation on a variety of resource allocation techniques in six police departments, James S. Kakolik and Sorrel Wildhorn, *Aids to Decisionmaking in Police Patrol*, A Report Prepared for the Department of Housing and Urban Development by the RAND Corporation, February 1971, R-593-HUD/RC and R-594-HUD/RC.
18. Kakolik and Wildhorm, Op. cit., p. 8.
19. Richard C. Larson, *Urban Police Patrol Analysis*, M.I.T. Press, 1972.
20. The New York City Rand Institute, *First Annual Report*, October, 1970, p. 26.
21. "Evaluation of the Law Enforcement Manpower Resource Allocation System" prepared by the Advanced Systems Development section, Los Angeles Police Department, October, 1969.
22. In essence, it is mathematically impossible to set the program so that 100% of calls could be responded to without delay. See for example Chaiken and Larson, Op. cit., pp. 16-22.
23. It is figured that the hardware computer costs for a small real-time computer system (50,000 records with 52 characters/record) would be somewhere around $12,000 - $14,000/month. Further, it is usually estimated that such hardware costs (rental or purchase of the computer) usually run about 1/3 of the costs of the overall computer operation (Computer personnel, overhead, etc.). Assuming conservatively that hardware computer costs of $12,000 - $14,000/month will range from 1/3 to 1/2 of total costs, the annual budget for such a police computer facility would range from $250,000 - $500,000. In comparison, it is estimated that to operate and staff a one-man patrol car in a medium sized city twenty-four hours a day annually costs approximately $70,000 - $100,000, while a two man car probably ranges from $140,000 - $200,000.

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48291

A COMPUTER SIMULATION OF POLICE DISPATCHING AND PATROL FUNCTIONS

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INTRODUCTION

The first attempt to apply a computer simulation model of the police dispatch and patrol function to the full-scale operations of a police department is currently underway in Washington, D.C. The scope and far reaching potential of the effort is revealed when it is realized that currently in Washington, D.C., there are 138 Scout Car beats and during the course of a year some 3/4 million dispatchable calls for service must be handled.

In order to research this operational environment, a means of testing and evaluating proposed alternative policies and solutions is necessary to give us the ability to conduct controlled scientific experiments. The results of such experiments will enable us to determine which, if any, of the proposed alternative policies will improve the current operations in a measurable way. Within the law enforcement environment, the ability to try new dispatch and patrol concepts has largely been limited to the direct approach of "let's try it out." This limitation has greatly hampered what should be a vital area of law enforcement research.

Direct field experimentation on patrol and dispatch operations is in most cases an inadequate research tool. Our present ability to know which policies stand a reasonable chance of improving operations is extremely limited. Field experiments tend, therefore, to exact high costs in terms of money, morale, and public confidence. The means of conducting controlled tests simply does not exist within the day-to-day patrol activity. The combined effect of uncertainty (e.g., the amount and location of crime), the dynamic interactions between decisions and subsequent events, and the extremely complex interdependencies among the many variables rule out definitive cause and effect conclusions. It is difficult if not impossible to hold "all other things constant" while varying, for example, the amount of preventive patrol in a beat.

As a solution to this limitation, the Metropolitan Police Department, under a grant from the Law Enforcement Assistance Administration (LEAA), entered into a contract with MATHEMATICA, Inc. in order to develop a computer simulation model of the police dispatch and patrol function.

HISTORY

The President's Commission on Law Enforcement and Administration of Justice of 1967 provided great impetus to research in this area. The establishment of the Law Enforcement Assistance Administration in 1968 has led to a small but growing body of valuable work aimed at providing procedures with which police administrators can, in an experimental sense, try out new ideas before actual field testing. This work can be divided into two groups: analytical mathematical procedures and computerized simulation models.

The analytical procedures have been directed towards particular, reasonably well defined problems. For example, a number of strong contributions have been made in the area of allocation of resources. In particular, the work of Larson[3] and Heller[2] may be cited. Heller, working with the St. Louis Police Department, has developed a number of "ready to implement" methods for assigning patrolmen to tours of duty. Larson's paper expands a section of his Master's Thesis at M.I.T., investigating the hourly allocation of dispatchers, complaint clerks, and patrol personnel. Larson was a staff member of the President's Commission, and currently is Associate Professor at M.I.T. as well as an advisor to MATHEMATICA.

Despite the progress which these papers exemplify, investigation of the total police patrol and dispatch system is too intricate and too complex to be handled by available analytic methods. Computer simulation models have attempted to fill this critical void between the "cost" of field experimentation and the limits of analytic methods. It is only by means of such computerized approaches that we can grasp the myriad interlocking activities which encompass the police dispatch and patrol functions. Simulation, in general, is a method of experimenting with complex models, and has been used for years, in particular by physicists and engineers. What is new is the development during the last decade of a set of techniques that provide a means of analyzing very intricate models using digital computers. The goal of a computer simula-

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tion is to understand and predict the behavior of complex systems. To prepare a model, the situation is abstracted and put into a form compatible with computer usage. Next, the simulation model is tested to gain confidence that it is a valid representation of the real world problem. Finally, various factors representing proposed changes to the actual situation are tested to gain understanding of the system's behavior, and to discover means whereby the real world system may be improved.

The drawback to simulation models is that they must be handled with great care. The first reason lies in the nature of simulation results. Whenever the model contains stochastic (chance) events, the outputs of simulation runs should be viewed as estimates subject to statistical error. In simulation of police dispatch and patrol, the chance elements, such as the times and location of calls for service, tend to exert a dominant influence. Hence, conclusions comparing alternative procedures must be drawn in a manner that recognizes the statistical errors inherent in the model.

Secondly, good simulation models tend to be rather sensitive to input data. Thus, great care must be taken during the testing phase of model development to ensure that simulation data, as well as the model structure, is as accurate as possible. Finally, it is important to reiterate that computerized simulation models are tools for experimentation. They do not provide specific solutions; the models do, however, allow comparison of possible solutions.

Despite these technical problems, successful, though limited work in this area has been done. Several large manufacturers have achieved excellent results from simulations of their "repairman" dispatch function. A simulation of emergency ambulance service for the City of New York[6] has led to revisions in that city's dispersal of ambulances with very promising results. Within the law enforcement field, the work of Larson[4] and Adams[1] is of particular note. The latter model, although somewhat general, was directed towards the simulation of an aspect of a particular city's dispatch and patrol problems (San Jose, California). Larson's outstanding and pioneering work has been used to investigate a generalized nine unit patrol command with excellent results. Using this simulation model, he has experimented with numerous dispatch strategies, reassignment policies, preemption capabilities, and car location estimators. Comparison of numerous different modes of operation were carried out and are summarized in his recently published book *Urban Police Patrol Analysis*[5]. His results, though limited by the small command being simulated, are a strong testimony to the role and promise of computer simulation for law enforcement agencies. Larson's model is designed about a logical simulation structure and can be applied to any geographic situation. It is this key feature which led us to use this model as the framework for our project.

THE CURRENT PROJECT – AN OVERVIEW

Under a grant from LEAA, the Metropolitan Police Department of Washington, D.C., and MATHEMATICA, Inc., are developing a computer simulation model of police dispatch and patrol functions that will be sufficiently general so that it can be used by other police departments and law enforcement researchers. We feel our work is significant in that it represents the first attempt to model the full-scale dispatch and patrol operations of a police department.

In a general sense, the simulation model will be of value to police administrators in the following ways:

- It will facilitate detailed investigations of operations throughout the city or in a part of the city.
- It will provide a consistent framework for estimating the value of new technologies and new approaches to the patrol and dispatch functions.
- It will provide the probable results of policy changes before such changes are put into effect. Thus we will be able to select the most promising approaches without resorting to the trial and error methods now necessary for evaluating decisions.
- In addition, it will serve as a training tool to
  - increase awareness of the system interactions and consequences resulting from everyday policy decisions and,
  - to develop new dispatchers and to improve the operations of veteran dispatchers.
- Finally, it will suggest new criteria for monitoring and evaluating actual operating systems.

More specifically, we plan to use the simulation to test and evaluate concepts such as the following:

1. What changes will result from dispatching rules based on the priority assigned to a call for service? For example, rules which prohibit the dispatch of patrol cars to low priority incidents at times when the system has a high load level will be investigated. Another example might be to divide the patrol force into two groups, where one group deals exclusively with low priority calls on an appointment basis.
2. What will be the effects of modified or completely new patrol beat structures? In other words, can system performance be improved by adjusting beat boundaries, by eliminating beats altogether and assigning territorial responsibility to small groups of cars, by overlapping beats so that any given area continues to receive preventive patrol even when many patrol cars are servicing calls?
3. What will be the impact of adding or subtracting patrol units? Using more sophisticated performance measures (e.g., requiring

that a given percentage of the highest priority incidents receive a response within a set time limit), the number of units required to patrol an area may not equal the number as indicated by present allocation schemes. For example, we have found that cars in one police district make an average of 3.2 radio runs per tour of duty, while cars in another district average 4.6 runs. This difference may or may not be to the best interest of an equal workload. When the simulation is in use, we will be better able to evaluate workload and how it ties in with the overall service to be rendered the city.

4. Which analytic procedures for allocating manpower are in fact "best" for our city? Recent analytic studies have advanced a number of promising techniques that should allow improved tour scheduling and deployment of patrol manpower. The simulation model will permit us to evaluate these schemes for possible adoption.
5. What impact will new technologies have on the patrol function? We will investigate the effect which various car locator systems may have on police operations. Such investigations will answer questions regarding the locator resolution desired, the impact on dispatch decisions, and the improvements in total operational performance which may be expected.
6. Are there viable techniques for dynamically repositioning patrol units before and after servicing a call? At times, a rash of calls will draw patrol units to a small area, leaving large gaps in geographic coverage. In general, we wish to determine if it is feasible to reposition the remaining units so that future service is maintained at a desired level, given the present conditions.

In addition to these basic questions, we also hope to investigate saturation patrol, the interactions between radio-cars, scooters and foot patrol, the effect of computerizing some aspects of the dispatch function, and the application of random preventive patrol strategies.

SOME DETAILS OF THE SIMULATION MODEL

The following Figure 1 depicts the overall flow chart of the simulation process. Inputs and initial conditions are classified into three groups: Geography, Parameters and Policies. Using this data, beats, patrol assignments, the simulation clock, dispatch queues, etc., are structured during initialization. Calls for Service (CFS) are generated to follow historical or hypothetical patterns. On the basis of dispatch policies, units are assigned to the CFS or are placed in queue. If a unit is assigned, travel, service and report/arrest times are generated using the input parameters. Upon completion of service, a unit may be assigned to a CFS waiting in queue or it may resume preventive patrol, considering the latter as a default assignment.

During processing, operating statistics are gathered and, at the user's option, may be printed out. In addition, provision has been made to display a snapshot of the entire state of the system or to trace a number of units during the simulation. At the conclusion of the model run, summaries of the simulation performance are printed. In the following paragraphs we present a more detailed discussion of two interesting aspects of the model:

1) Geography

The geographic aspects of the simulation model consist of two sets of data: the physical aspect of the city and the structure of police districts and beats.

System Geography
Physical – city blocks Police – districts beats

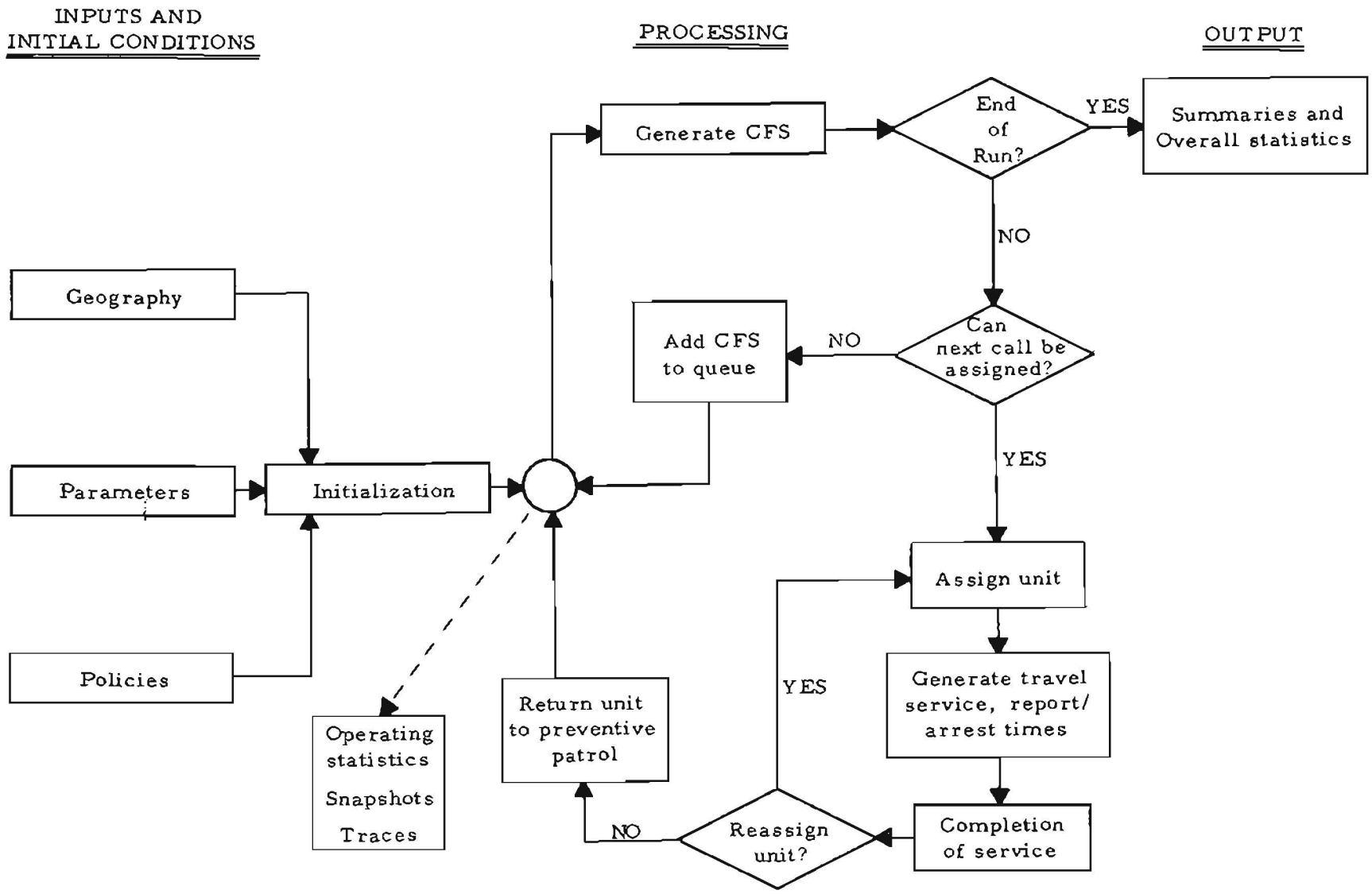
The city's geography is coded by individual city (surveyor) block. Each block has been given an x and y coordinate. These centroid coordinates were derived from census files (census tract and block) and converted to surveyor blocks using a translation tape which had previously been prepared by the District of Columbia government. Thus, the model views the city as a discrete collection of points, and all incidents which occur on a block are assumed to be located at the centroid. The maximum error using this method is a bit larger than 2 x half the length of a city block – a completely adequate level of resolution.*

The city blocks are grouped to form a set of beats. The grouping need not be static or exclusive. In other words, beats may be changed during the course of a simulation run to reflect a different structure for varying tours. In addition, non-exclusivity implies that beats may overlap. The beats in turn are grouped into districts and provisions will be made to allow the districts to be grouped into an additional administrative level.

2) Parameters

The input parameters can be divided into three groups: characteristics of the patrol units, the attributes of CFS, and the properties which delineate the police department's response.

*If such accurate geographical data had not been available, the view of Larson's models (the city as a continuous collection of reporting areas characterized by the coordinates of the vertices of these areas) would undoubtedly have proved adequate.



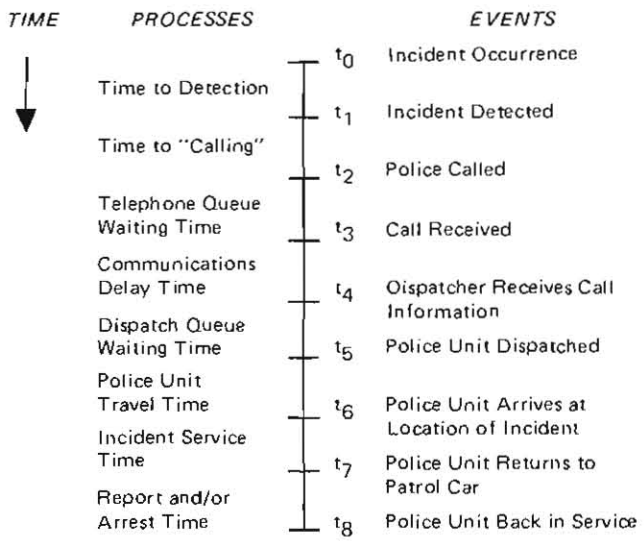
OVERALL FLOW CHART OF THE SIMULATION MODEL

Figure 1

System Parameters
Units – Number Types Responsibilities Calls – Times Locations Types Priorities Responses – Communication delay times Travel times Service times Arrest/Report times

For each simulation run, the number of patrol units must be specified. In addition, initialization requires entry of the type of unit and its responsibilities (e.g., its "home" beat(s) and district).

Reading "call" and "response" in a broad sense, Larson[5] traced a CFS in time as follows:



It should be noted that all events and processes may not be required for a given CFS (e.g., if a patrol unit initiates service of an incident, the time span $t_1 - t_6$ would be zero and the processes and events during this span would not occur).

As no reliable data is available, the time span $t_0 - t_3$ will not be simulated. This span represents the time which elapses while a citizen or automatic device detects the incident and attempts to dial the police and waits for the call to be answered. The simulation thus starts to model a CFS at time t_3, the arrival time of a call. It is this time that is generated by the (CFS) event generator. Before becoming dispatchable, the CFS is delayed for a time $t_3 - t_4$. This interval represents the time required for the telephone clerk to obtain CFS information, to record this information on a complaint form, and to transmit the form to the dispatcher. For a number of high priority complaint codes (e.g., officer in trouble) this time can be very short. Therefore, we had planned to model the communications delay time so that it is dependent on the seriousness priority attribute (see the next section) generated for the CFS at the time t_3 that the call arrives. Analysis of a large sample of delay times has demonstrated, however, that no statistical differences exist between these times for various priorities.

Other attributes of a CFS are also generated at time t_3. They include: location of the call, and whether or not the "call" represents a self-initiated action. The location is generated because the priority class of a CFS depends upon its location. The question of self-initiation must be settled at this time so that the simulation program can determine if the span $t_3 - t_6$ must be modeled. (This time delay in police response to the scene would not occur if the call were self-initiated.)

Once the CFS joins the set of dispatchable calls (time t_4), the simulation algorithm transfers programs control to the Dispatch Algorithm. This algorithm determines if a police unit can be assigned immediately. If the assignment can be made, the assigned unit is "transferred" to the location of the incident. After this, the appropriate statistical quantities are collected and filed. If no assignment can be made at time t_5 (i.e., immediately), the CFS is placed in a list representing a queue of its priority class. As units come back in service (when they complete service of another CFS), the queues are examined for calls to which the free unit can be reassigned. In this manner the dispatch queue waiting time is dynamically modeled, the time span $t_4 - t_5$ being dependent on the load level of the system.

Once a unit is dispatched, a travel time $t_5 - t_6$ is calculated. This time is a function of the location of the incident, the current position of the assigned unit, the priority class of the CFS, and the simulation time load level. The dependence of travel time on location of incident and unit is obvious. The

further these are apart, the longer the unit must travel. The priority class of the incident determines the speed at which the unit travels (e.g., a higher speed will be recorded for "robbery in progress" than for "larceny report"). The simulation time load level represents the factor which models "other" conditions (e.g., rush hour traffic, 4:00 A.M., etc.). The time which elapses between t_2 and t_6 is termed police response time and is one of the important measures of police effectiveness. During uncongested periods, travel time tends to be the largest component of police response time. Travel time is, of course, highly dependent upon the dispatcher's choice in assigning a police unit. Thus the simulation will model this aspect in particular detail.

Incident service time ($t_6 - t_7$) represents the time which a police unit spends at the scene of the incident. For the present, it is assumed that during this time the unit cannot be preempted. The final time span ($t_7 - t_8$) models time required (if any) to file a report or to process an arrest. In the next section we will discuss the means whereby estimates of these parameters will be obtained.

DATA COLLECTION AND ANALYSIS

In this section we present a review of the data requirements of the simulation model as well as the sources and methods to be used to satisfy these requirements.

The data may be classified as follows:

- The patterns of calls-for-service (CFS),
- The structure of police patrol, and
- The police response parameters.

The remainder of this section will present an overview of data handling for the first two of the above classifications. The collection of data on the structure of police patrol has been straightforward.

A. The Pattern of CFS

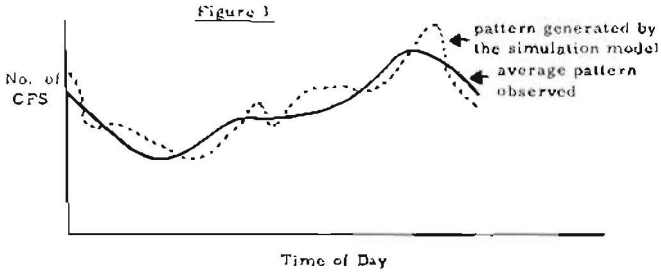
The major parameters of the pattern of CFS are:

(1) the time of arrival,
(2) the geographic location to which the police must respond,
(3) the seriousness of the CFS and hence, the type of response which the police must provide, and
(4) the originator of the CFS.

The number of CFS which arrive during a given hour of the day may be expected to vary due to numerous variables. Of these variables, the effect of some, such as the day of the week and the season of the year may be readily analyzed. The derivation of the CFS arrival pattern by the above temporal patterns has been completed. Using records of all radio runs representing the spring of 1972 data, the number of CFS by hour of day, for each day of the week, averaged over the season is shown in Figure 3 below.

We are thus able to determine the average number of CFS for, say, Mondays between 10:00 P.M. and 11:00 P.M. during the spring. There are numerous other factors which may influence the CFS arriving at the dispatch center during a given hour. The effect of these additional factors (for example, weather, public events, etc.) cannot be calculated within the scope of the present project. This does not mean, however, that these variables will be ignored. Instead of treating the effects of the weather, for example, as a deterministic factor, the simulation will use stochastic (random) arrivals of CFS, where the randomness is limited by the basic temporal pattern shown in the figure. The following Figure 3 serves to display this concept.

Figure 3

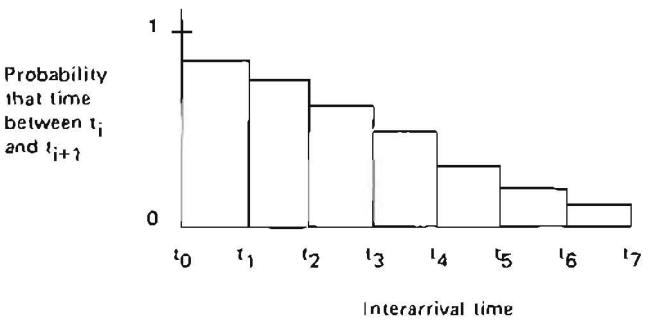


Thus the arrivals of CFS used by the simulation "varies about" the average pattern observed.

In generating the simulated CFS arrival times we make the following assumptions:

(1) CFS interarrival times are negative exponentially distributed, and
(2) CFS arrival times during a given day are properly simulated by randomizing about that day's average distribution.

By interarrival time we signify the time which elapses between successive arrivals of CFS. The assumption that these times are negative exponentially distributed means that we assume that the chance of a given time elapsing between successive CFS follows the pattern:



Thus the chance that interarrival times are relatively small is far greater than the chance that the

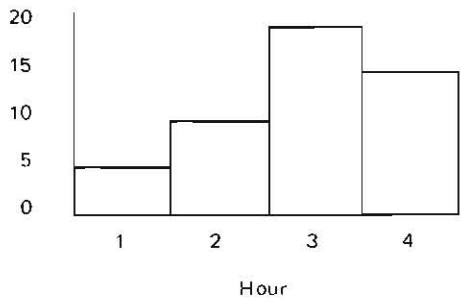
times are large. The importance of assuming this distribution is that it allows us to infer that the total number of CFS arriving during a given day is Poisson distributed.

The second assumption implies that, once the total number of simulated CFS during a given day has been calculated, we may distribute these calls by employing a uniform random number generator. The numbers so generated can then be translated to vary about the average distribution determined by historical records. The discussion below will serve to further clarify the meaning of these concepts.

The first step is to determine the number NCALLS, of CFS which will arrive during the "day." By assumption 1 above, the number is Poisson distributed with a mean equal to the seasonal average for that day. Using a Poisson sampling subroutine such a number is generated.

Having determined the number of calls, NCALLS, which the model will simulate, the arrival times are generated. The method used is best explained by means of an illustrative example.

Suppose we have a 4 hour "day" and that on the average 5 CFS arrive during the first hour, 10 the second hour, 20 the third, and 15 the fourth. A plot of this distribution appears as:



The total number of calls arriving during this average day is 50. Since 5 out of 50 CFS arrive during the first hour, 10% (5/50) of the CFS arrive during hour 1. Similarly 20% (10/50) arrive during hour 2, 40% during hour 3, and 30% during hour 4. A number, x, between 0 and 1 is chosen at random. The chance that x is between 0.0 and 0.1 is by definition 10%. Thus we assign a CFS to arrive during the first hour if x lies between 0.0 and 0.1. In like manner, if the random number, x, is between 0.1 and 0.3 (a 20% chance), a call is assigned to hour 2. If x is between 0.3 and 0.7 (a 40% chance) a CFS is assigned to hour 3, and finally if 0.7 x 1.0, a call is assigned to hour 4. Thus by choosing NCALLS random numbers and allocating times of day based on these numbers and the historical pattern, the random arrival of CFS is simulated.

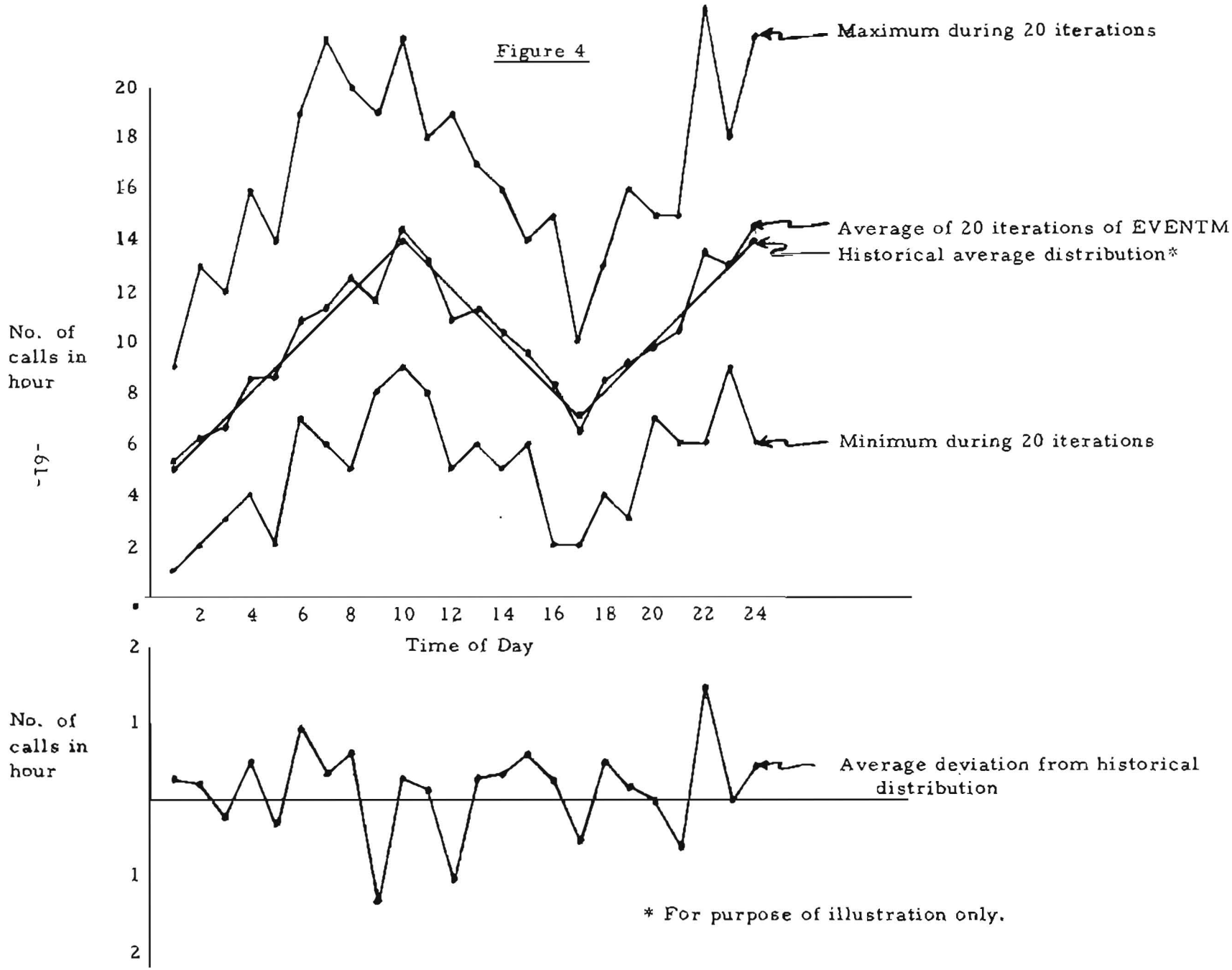
The following Figure 4 illustrates the output of testing the event generation subroutine. The test ran for 20 iterations to determine convergence to and variance about the historical pattern assumed.

The geographic location to which the police unit must respond will be aggregated by city (surveyor) block. All calls-for-service which require response to some part of a block will be assumed to be at the centroid of that block. The spatial distribution of CFS by block can be expected to vary considerably. For example, there is little chance that a CFS requires a police unit to respond to a large office building late at night; at that time however, responses to an entertainment area could be expected to be quite numerous. On the other hand, during morning hours when places of entertainment are closed, the response pattern would be reversed. Such shifts in the spatial distribution of police response will be modeled as follows: Ideally one would like to vary the simulated spatial distribution of CFS to capture each shift in the "real-world" distribution. Such a course is clearly impossible; the core storage requirements (or I/O demands) are outside the computer's capabilities. Thus a compromise must be made between the accuracy of simulation and the "cost" of running the simulation. The method selected to make the compromise is to stratify CFS arrivals into a limited number of "typical" groups, and to use one representative spatial distribution for each group.

The type of response which the police must provide to a CFS has as its main controlling variable the location (block) to which the response is to be made. In other words, response to a family argument is more likely in a residential area, while response to a robbery probably occurs more frequently in a commercial area. To simulate the type of response, data has been collected for each block to determine by groups of complaint codes the chance that a group occurs. As the response location depends on the simulation time load level (load level, for short), the response group also depends on the load level. These two load level dependent distributions were generated using as data all offense reports from June, 1971 to May, 1972.

As one of the major indicators of the quality of a patrol strategy is the response time to a CFS, it is important that self-initiated police actions (response time = 0) be incorporated into the simulation model. The chance that a given call is initiated by a patrolling unit depends heavily on

Figure 4



* For purpose of illustration only.

the load level of the police system as a whole. Thus, when most police units are busy servicing calls, there is little opportunity for preventive patrol. Hence, the chance of a unit spotting a police response situation before it is called into service by the dispatch center is slight. On the other hand, when the service load level is low, most cars will be on preventive patrol and are therefore more likely to initiate service before a CFS request is made through the dispatch center. Once again the load level serves as the mechanism whereby the pattern of self-initiated actions may be modeled. Using sample data, we are preparing a file which will contain the chance that a service action is self-initiated given the load level, the beat number, and the priority of the "call."

B. Response Parameters

As noted above, the major simulation input parameters of police response to a CFS are:

(1) Communications delay time,
(2) Patrol unit travel time,
(3) CFS service time,
(4) CFS report time, and
(5) CFS arrest time.

Since this data is not otherwise available, a number of field sampling studies were conducted. The most important of these was a field sample to determine with reasonable accuracy numbers (2) through (4) above. A select number of scout cars patroling a set of "typical" and representative beats has completed the following short form for CFS which they handled.

The completed forms, representing a sample of approximately 1200 CFS, are currently being coded for analysis. Some difficulty had been anticipated regarding the conduct of the field sample; expecting a police officer to fill in a form before he dashes from his car to answer an emergency call had appeared rather optimistic. However, it appears that a most satisfactory and reliable sample was obtained due to the Department assigning additional officers so that all sample cars were two-man units.

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METROPOLITAN POLICE DEPARTMENT
WASHINGTON, D. C.
DAILY ACTIVITY REPORT

Unit Car No.____Shop No. ____Tour of Duty_____

Day of Week ___ Date___ X Car Used ____ Shop No. ____

TIME OF CALL					
TIME ARRIVED					
NATURE OF RUN					
LOCATION OF CAR					
LOCATION OF CALL					
INITIAL ODOMETER READING					
TIME BACK IN CAR					
TIME BACK IN SERVICE					
LIGHTS AND/OR SIREN					
FINAL ODOMETER READING					
REPORT (YES/NO)					
ARRESTS (YES/NO)					

48292

A COMPUTER ORIENTED POLICE PLANNING SYSTEM

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A computerized long-range planning technique currently being used by the staff planning division of the Kansas City, Missouri, Police Department is described. Examples of recent applications are provided and results of the use of the system are shown.

The system, among other things, provides the planner with an overview model which characterizes the department in regard to organizational structure, personnel and equipment requirements, budgetary needs, population and areas served, crime statistics, and any number of other items relevant to departmental needs. The system is designed for use by police planners and requires little or no technical knowledge of computer operations. No programming experience is necessary. The system is generalized and can be applied to planning problems of any police department. The interactions of several hundred planning factors over a 10 period planning horizon which can be years, months, weeks, days, or any other desired increment, is depicted.

Capabilities and limitations of the system are described including the variety of computer installations which can accommodate the planning system. Projected applications of the system are described, in addition to planned improvements for the future.

PROBLEM SITUATIONS CONFRONTING POLICE PLANNERS

Planning is a decision-making process. It is a means whereby an organization or institution can meet expected change, produce desired change, and prevent undesired change. The need for planning, then, is due to the changing environment, the complexity of operations, the ever-increasing requirements for funds, the increasing number and complexity of regulations, and the inadequacy of the old informal planning methods. Computerized planning systems increase an organization's capability to take an "in-depth view" of the problems in the future; an organization may thereby develop effective courses of action to meet short-range, intermediate, and long-range goals and needs.

MICROFICHE

Quite often, however, planning attempts produce negative responses in those who should be involved. Some common responses from those who are approached about planning include: "We've survived without planning this long; who needs it?", "It's too blue sky," "It's just another job and I don't have the time," "It won't change anything," "It's inflexible," and "I know we're not doing as well as we can now, but if only they would . . ." To counteract criticisms and to provide a strong basis for planning, every effective plan must incorporate several elementary principles. First, the planning process must be simple enough to be understood by all those who should be involved with it. Second, the plan must be selective in placing proper emphasis on various elements, and it must be adaptable and flexible enough to accommodate change. Thirdly, the final benefit to be derived must be viable and worthwhile to all who are working with the plan. Finally, the planning process must not involve complicated, tedious paperwork to convert the desired goals into meaningful programs.

To assist in the development of a computerized planning system for police organizations, a program known as the "Computer Oriented Police Planning System" was developed by MRI and given the acronym of COPPS. This system involves the construction of computer simulation models which depict the functional and organizational aspects of the typical police department.

COPPS, as a computerized simulation system, represents a powerful and useful tool to address the characteristic "what if . . ." kinds of questions that frequently arises in formal police planning.

THE COPPS SYSTEM

To better understand the COPPS system several points of comparison should be made between it and the traditional Management Information System (MIS). First of all, COPPS does represent a management information system in the most fundamental sense; it provides police planners and administrators with timely information addressing an infinite variety of subject areas. To date, COPPS models have been structured focusing on such diversified law enforcement needs as:

- Budget Forecasting
- Retirement Benefit Studies
- Building Program Requirements
- Patrol Car Allocations
- Phase II Wage and Price Freeze Implications

A description of the budget forecasting model is presented later in this paper. The types of models developed are mentioned at this point to emphasize that COPPS is a planning *system* (as contrasted with a single model) which may be tailored to simulate any planning function in the department. The only requirement for the development of a COPPS model is the determination of relevant planning factors addressing the problem at hand and a definition of their functional relationship.

Typically, a COPPS model is developed around some pressing need facing the department. To use an example of a recently developed model, the impact of adding 50 additional patrolmen to the force was examined. The approach used here (as in the development of the typical COPPS model) was to identify first the planning factors to be addressed. In this case the most relevant factors include:

Personnel Requirements

- Number of additional sworn personnel in the detective and sergeants' ranks required to maintain force balance.
- Number of additional clerk-typists required for supportive function.

Equipment Requirements

- Number of patrol cars required on the force after addition of the 50 patrolmen (including fixed trade-in policy; cars demolished in accidents, etc.).

The next stage in the development of the COPPS model is to define the relationship between the planning factors. In the case of personnel requirements it was decided that five additional detectives and six sergeants should be added for each 30 patrolmen in order to keep line functions in balance. Further it was determined that due to the anticipated field assignments of the new patrolmen, one clerk-typist for each five patrolmen would be needed for support work (primarily typing and filing of report forms). The primary equipment needed to support the expanded force size is an increase in the fleet of patrol cars. The relationship developed here considered a three beat scheduling of the patrol division, a one-man per car staffing policy, and normal down time of a vehicle for routine maintenance. The ratio incorporated in the model assumed that one new patrol car would be added for every five new patrolmen. A similar relationship was developed for other support items of equipment such as weapons, radios, uniforms, etc., although these are not detailed here.

The final phase in the development of a COPPS model is to determine what information output is desired. In the example, it was decided that the following information was of primary importance for planning purposes:

Number of

- Detectives
- Sergeants
- Clerk-Typists

required over the planning horizon.

Number of

- Patrol cars

required on an annual basis.

Total Fiscal Requirements

– (Since the increase in total fiscal requirements includes more than the salaries paid to the new patrolmen, a comprehensive accounting of all associated costs are required. Items to be included: new patrolmen's, sergeants', and detectives' salaries and fringe benefit costs; salaries of new civilians [clerk-typists] to be hired, costs of new equipment purchases [patrol cars, radios, uniforms, etc.])

The details of the English-like instructional language used to formulate the model are given in the next section. The above example is included here to illustrate the planning processes as it relates to development of a COPPS model. The basic steps used in the process are reviewed in Figure 1.

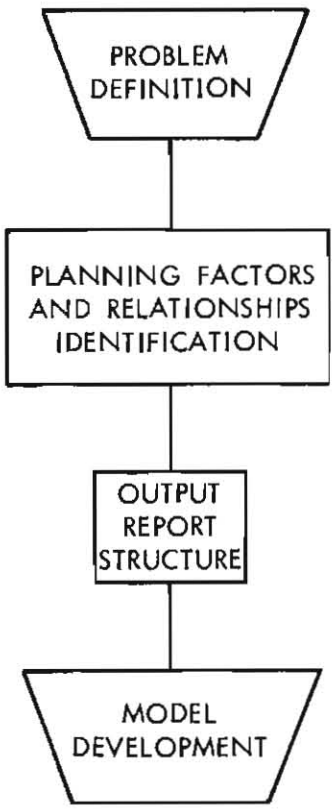


Figure 1 – The Planning Process in the Typical COPPS Model Development

HOW DOES COPPS WORK?

As noted above, in using COPPS the police planner selects the problem area to be addressed, identifies the relevant planning factors and their relationships and then proceeds to structure a model using an English-like computer language. Literally hundreds of interrelated planning factors can be considered in a single model. The computer does the tedious calculations thereby freeing the planner from the burden of repetitive calculations (and likelihood of errors) and enables him to explore many more alternatives, and to examine each alternative in greater depth. COPPS, then, in contrast to the conventional MIS, is very much a user-oriented system requiring no interface with technicians or computer specialists.

WHAT IS THE END PRODUCT OF A COPPS MODEL?

The output of a COPPS model provides a spectrum of practical, pragmatic, and useful information for police planners. The long range implications of current trends may be seen at a glance; many "alternative futures" may be examined; areas in need of additional research are clearly identified in structuring the model. Summary reports give answers to the questions posed by the planner. Documentation of the interrelationships of the planning factors and calculations performed are intrinsically provided.

BASIS OF THE COPPS SYSTEM

The knowledge and skills required to design and manipulate organizational models using the COPPS modeling language are extremely simple and straightforward to acquire.

Sample exercises are used to demonstrate the techniques used in structuring the model, the instructions to project planning item values, and the specification for reports.

The illustration shown in Figure 2 of the COPPS input format and instructions in the language shown below represent all of the technical skills required to structure a COPPS model.

The basic instructions used in developing a COPPS model include:

- Plan identification input
- Change by a percentage
- Change by an increment
- Achieve a goal
- Insert known planning item values
- Project and fill
- Summation of other planning items
- Formula/(Function) of other planning item
- Function of a previous period
- Minimum (Maximum) of other planning items
- Accumulation of a planning item
- Heading or section title
- Summary report

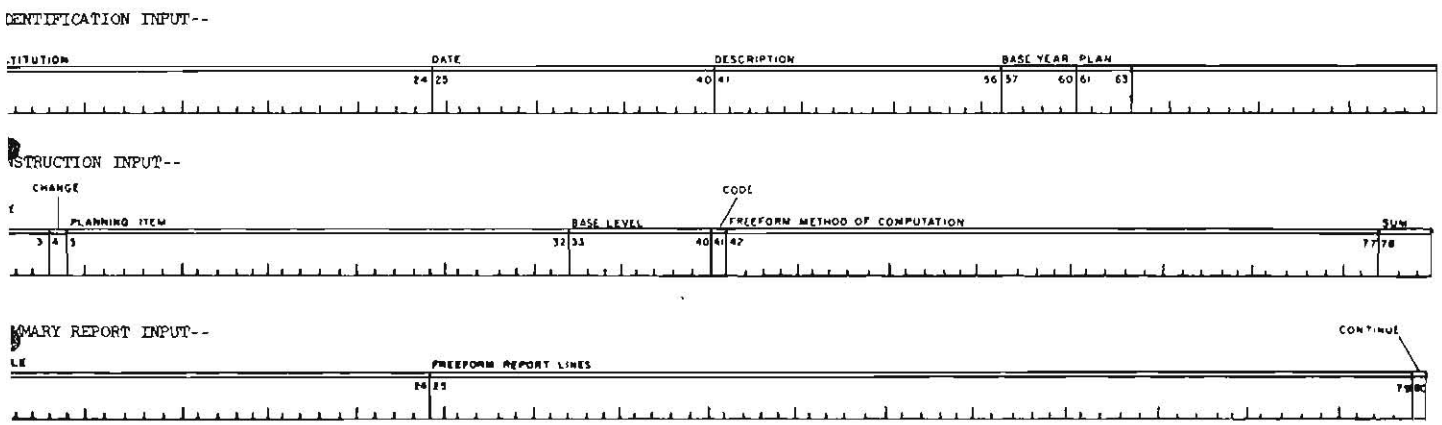


Figure 2--COPPS Language Input Formats

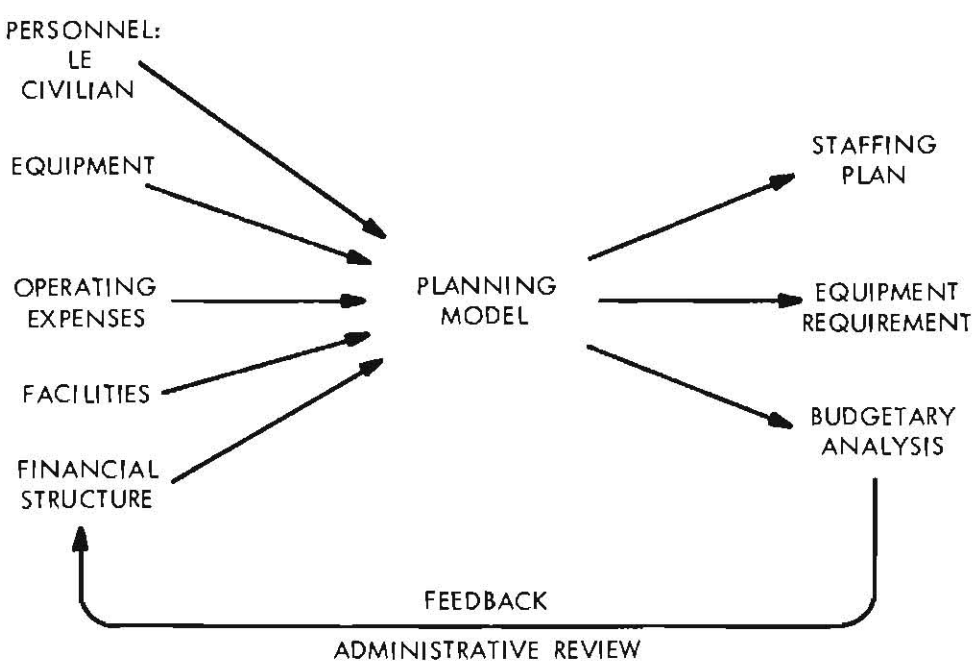


Figure 3--Police Planning Model

An understanding of these 13 basic instructions will enable the police planner to develop COPPS models to address a multitude of planning areas.

EXAMPLES OF MODELS DEVELOPED

Budget Overview

The following example of a COPPS model depicts ten year budget projections based on prescribed variations of over 200 planning items coupled with complex interrelationships between the items. The basic structure of the Overview Model is shown in Figure 3. As shown in the diagram the principal planning items incorporated into the model include personnel, equipment, operating expenses, facilities requirements and a financial structure. The model in turn takes the input data and develops a personnel staffing plan, equipment requirements list, and a detailed budgetary analysis according to the predefined relationships of the planning factors. The feedback from the model output back to the input parameters depicts the interaction of police administrators and planners in analyzing output from the model and in generating alternate plans. The planning items which comprise this model are listed in Figure 4. The following pages show reports which were produced from the model. Additional reports can be obtained after the model is structured by the addition of a single card.

It should be noted that this is only one *example* of the unlimited model variations possible with the COPPS system.

FIGURE 4 – BUDGET OVERVIEW MODEL PLANNING FACTORS

KANSAS CITY POLICE DEPT.
BUDGET OVERVIEW

APRIL 16, 1971

1 Patrolmen
2 Detective
3 Sergeant
4 Captain
5 Major
6 Major of Detectives
7 Lt Colonel
8 Senior Analyst Technician
9 Systems Analyst Technician
10 Program Research Technician
11 Program Technician I
12 Program Technician II
13 Helicopter Pilot Technician
14 Firearms–Evid Supv Tech
15 Public Info Supv Tech
16 Total LE Personnel
17 Total–Ptrl, Det, Sgt
18 Civilian Support Requirement
19 Chief of Police
20 Mean Detective Salary
21 Mean Sergeant Salary
22 Mean Captain Salary
23 Mean Major Salary
24 Mean Maj Det Salary
25 Mean Lt Col Salary
26 Sr Anal Tech Salary (Mean)
27 Sys Anal Tech Salary (Mean)
28 Prog Res Tech Salary (Mean)
29 Prog Tech I Salary (Mean)
30 (Prog Tech II Salary (Mean)
31 Hlcpt Pilot Tech Salary–Mean
32 Firearms–Evid Supv Salary
33 Public Info Supv Tech–Salary
34 Civ Salery Clerk-Typist
35 Patrolmen Salaries
36 Detective Salaries
37 Sergeant Salaries
38 Captain Salaries
39 Major Salaries
40 Major of Det Salaries
41 Lt Colonel Salaries
42 Sr Anal Tech Salary
43 Sys Anal Tech Salary
44 Prog Res Tech Salary
45 Prog Tech I Salary
46 Prog Tech II Salary
47 Hlcpt Pilot Tech Salary
48 Firearms–Evid Supv Salary
49 Public Info Supv Salary
50 Civilian Supp Salary
51 Shift of Detectives
52 Sum, Ptr, Sgt, Det Salaries
53 Total LE Salaries
54 Total Civ Salaries (Ft)
55 Total LE + Civ Salaries (Ft)
56 Total LE + Civ Personnel (Ft)
57 New Recruits Per Year
58 Personal Services Total
59 A-1 Salaries
60 A-4 Extra Compensation
61 A-9 Unclassified
62 Contractual Services Total
63 B1.1 Auditing + Accounting
64 B1.7 Medical Exp-Non Inj
65 B1.8 Veterinary Expenses
66 B1.10 Professional Services
67 B1.11 Educational Expense
68 B1.13 Medical Exp-Inj
69 B2.2 Local Transportation
70 B2.3 Postage
71 B2.4 Drayage, Frgt, Express
72 B2.6 Travel Expense
73 B3.1 Advertising
74 B3.4 Printing-Duplicating
75 B3.6 Promotional Expense
76 B4.1 Fire E/C Insurance
77 B4.2 Liability + Prop Ins
78 B4.5 Notary Bond
79 B4.8 Hospitalization Ins
80 B5.1 Gas
81 B5.2 Electricity
82 B5.3 Steam
83 B5.4 Telegraph
84 B5.5 Telephone
85 B5.5 Time Clocks
86 B5.5 Water
87 B6.1 Bldg-Structural Repair
88 B6.3 Repair Plant Equip.
89 B6.5 Repair Oper Equip
90 B6.6 Repair Office Equip
91 B7.1 Rent of Land
92 B7.2 Rent of Building
93 B7.4 Rent of Machinery
94 B7.5 Rent of Office Equip
97 Work Line
99 B8.6 Investigation Expense
101 B9.1 Cleaning + Printing
102 B9.2 Disinfect + Exterminate
103 B9.3 Dues + Memberships
104 B9.5 Laundry + Sanitation
105 B9.10 Contract Work
106 B9.12 Tow-In Charges
107 Commodities Total
108 C1.1 Office Supplies
110 C1.2 Magazines + Periodical
111 C2.3 Chemicals
112 C2.4 Cleaning + Sanitation
113 C2.6 Feed
114 C2.7 Food
115 C2.8 Fuel Oil
116 C2.9 Institutional Supplies
117 C2.10 Licenses + Badges
118 C2.12 Lumber + Materials
119 C2.13 Drugs + Medicines
120 C2.14 Minor Equipment
121 C2.15 Motor Vehicle Gas-Oil
123 C2.16 Motor Vehicle Parts
125 C2.17 Paint + Supplies
126 C2.21 Wearing Apparel
128 Wearing Apparel-Recruits
129 Wearing Apparel-Existing LE
130 Total LE Personnel (Shift)
132 C2.23 First Aid Supplies
133 C2.26 Reserve Equipment
134 Capital Outlay Total
135 E3.7 Motor Vehicles
137 Inflate Vehicle Cost
138 E3.8 Office Equipment
139 E3.9 Plant Equipment
140 E3.11 Communications
141 Calculate CST Port Radios
142 Required Radio Chargers CST
143 E3.16 Other Equipment
145 Police Service Allocation
146 LE Retirement
147 Civilian Retirement
148 Civilian F.I.C.A.
149 Total Fiscal Requirements
150 Patrol Car Requirement
151 Shift No. Patrolmen
152 Total Required Marked Cars
153 Total Unmarked Cars
154 Inflate Marked Car Costs
155 Inflate Unmarked Car Costs
156 Costs-Marked Car Replacement
157 Shift Line 16
158 Net Inc Total LE
159 Inc Civilians Ea Year
160 Cum Civilians
163 Mean Capt Salary Per Period
165 Shift Line 18
169 Total,Capt,Det,Sgts
170 Total Sgts and Higher
171 Net New Detectives
172 Inflate Drugs + Medicines
174 Stub Nose Revolver Cost
175 Shift Number Marked Cars
176 No. Unmarked Replacements
177 Costs-Unmarked Replacements
178 Shift Patrol Car
179 New Cars Required-Additions
180 Costs-Additional Cars
183 New Detectives Work Line 1
184 Accum Sum L183
185 Tot Det Work Line 2
186 New Sgts Work Line 1
187 Cum Sum L186
188 Tot Sgts Work Line 2
189 Communications Work Line
190 Total Fiscal Req
191 Police Service
192 Budget Capsule
193 Personel Services
194 Staffing Model
195 Fringe Benefits
196 Personel Services
197 Contractual Services
198 Commodities
199 Capital Outlay
200 A-1 Salaries
204 Mean Salary Patrol
205 Police Officers per 1000 Pop
207 KC Mo Population Projection
208 KC Pop (Thou)
209 Recruits Revolver
210 Board Members
211 School Guards
212 Hrly Employees
213 Board Members Salary
214 School Guard Salary
215 Hrly Employees Salary
216 Total Salary Board Members
217 Total Salary School Guards
218 Total Salary Hrly Employees
219 Number Clerk Typists
220 Number Other Civilians
221 Total Civ Hrly-Pt-Time
222 New Cars Req-Wrecks
223 Replacement Costs-Wrecks
224 Total Replacement Costs-Wrks
225 Tot All Remaining Cars
226 Additional Patrolmen
227 Add Percent Salary Increase
228 Patrolmen Base Number
229 Cum Ptrl Added
230 Total Patrolmen
231 Pct Increase Ptrl
232 Accum Pct Inc
233 Pct Mean Salary Increase
234 Cum Add Percent Increase
235 Cum Pct Mean Salary Increase
236 Net Pct Salary Increase
259 Tot Clerk-Typist Salary
264 Mean Other Civ Sal
265 Total Other Civilian Salary
269 Total Salary Chief of Police
270 Cum Sum of New Recruits
272 Tot LE Salaries
273 Net Inc Patrolmen
274 Sum Net Inc Ptrl
275 Cum New Cars Needed
290 New Recruits Work Line
297 (Dollars in Thousands)
298 (ACTUAL Dollars)
299 Manpower Changes

PERSONNEL REQUIREMENTS REPORT — KANSAS CITY POLICE DEPT. — BUDGET OVERVIEW – 100 — APRIL 16, 1971

PLANNING ITEM	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
						STAFFING MODEL					
16 Total LE Personnel	1300	1312	1324	1336	1348	1361	1373	1386	1399	1412	1425
1 Patrolmen	880	888	897	906	915	924	934	943	952	962	972
2 Detective	144	145	147	149	151	152	154	156	158	160	162
3 Sergeant	196	197	198	200	201	203	204	206	208	209	211
4 Captain	47	47	47	47	47	47	47	47	47	47	47
5 Major	13	13	13	13	13	13	13	13	13	13	13
6 Major of Detectives	1	1	1	1	1	1	1	1	1	1	1
7 Lt Colonel	5	5	5	5	5	5	5	5	5	5	5
8 Senior Analyst Technician	2	2	2	2	2	2	2	2	2	2	2
9 Systems Analyst Technician	3	3	3	3	3	3	3	3	3	3	3
10 Program Research Technician	1	1	1	1	1	1	1	1	1	1	1
11 Program Technician I	0	0	0	0	0	0	0	0	0	0	0
12 Program Technician II	1	1	1	1	1	1	1	1	1	1	1
13 Helicopter Pilot Technician	5	5	5	5	5	5	5	5	5	5	5
14 Firearms-Evid Supv Technician	1	1	1	1	1	1	1	1	1	1	1
15 Public Info Supv Technician	1	1	1	1	1	1	1	1	1	1	1
18 Civilian Support Requirement	364	371	374	376	378	380	382	384	386	388	390
56 Total LE + Civ Personnel (FT)	1664	1684	1698	1712	1726	1741	1756	1771	1786	1801	1816

BUDGET SUMMARY REPORT — KANSAS CITY POLICE DEPT — BUDGET OVERVIEW - 100 — APRIL 16, 1971

PLANNING ITEM	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
	BUDGET CAPSULE										
	(DOLLARS IN THOUSANDS)										
190 Total Fiscal Req	20508	23218	24211	25226	26414	27531	28703	30062	31352	32706	34263
191 Police Service	18751	21205	22118	23051	24140	25166	26243	27490	28677	29922	31352
193 Personal Services	16026	18560	19292	20057	20967	21804	22677	23707	24662	25661	26827
200 A-1 Salaries	15036	17165	17832	18530	19370	20132	20928	21877	22747	23657	24730
271 Tot LE Salaries	12554	14274	14924	15603	16313	17055	17831	18643	19493	20380	21309
	(ACTUAL DOLLARS)										
146 LE Retirement	1484952	1712973	1790889	1872366	1957568	2046666	2139838	2237272	2339163	2445716	2557145
147 Civilian Retirement	147134	152762	153394	154032	161207	161873	162545	170097	170798	171507	179449
148 Civilian F.I.C.A.	131207	147005	147940	148894	155483	156491	157521	164481	165569	166680	174029
54 Total Civ Salaries (Ft)	2482400	2589190	2599899	2610714	2732326	2743611	2755008	2883003	2894893	2906901	3041512
221 Total Civ Hrly-Pt-Time	289448	301277	308805	316606	324689	333065	341744	350738	360056	369713	379718
62 Contractual Services Total	1414059	1442638	1523327	1609654	1702045	1800961	1906899	2020397	2142037	2272448	2412311
107 Commodities Total	769163	773964	825315	880104	938565	1000944	1067505	1138531	1214322	1295201	1381510
134 Capital Outlay Total	531457	429013	477892	503993	531540	560616	591306	623700	657895	693992	732098

DETAILED BUDGET ACCOUNT REPORT KANSAS CITY POLICE DEPT BUDGET OVERVIEW -100 APRIL 16, 1972

PLANNING ITEM	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
	PERSONAL SERVICES										
	(DOLLARS IN THOUSANDS)										
193 Personal Services	16026	18560	19292	20057	20967	21804	22677	23707	24662	25661	26827
200 A-1 Salaries	15036	17165	17832	18530	19370	20132	20928	21877	22747	23657	24730
	(ACTUAL DOLLARS)										
60 A-4 Extra Compensation	935438	1304855	1365306	1428560	1494749	1564008	1636479	1712312	1791662	1874694	1961577
61 A-9 Unclassified	79351	90216	94320	98611	103098	107791	112698	117829	123195	128807	134676
	CONTRACTUAL SERVICES										
62 Contractual Services Total	1414059	1442638	1523327	1609654	1702045	1800961	1906899	2020397	2142037	2272448	2412311
63 B1.1 Auditing + Accounting	7800	8267	8764	9289	9847	10438	11064	11728	12432	13177	13968
64 B1.7 Medical Exp-Non Inj	2000	500	500	500	500	500	500	500	500	500	500
65 B1.8 Veterinary Expenses	2000	2119	2247	2382	2524	2676	2837	3007	3187	3378	3581
66 B1.10 Professional Services	16468	17456	18503	19613	20790	22037	23360	24761	26247	27822	29491
67 B1.11 Educational Expense	33023	34073	36451	38996	41719	44632	47749	51084	54652	58470	62555
68 B1.13 Medical Exp-Inj	8400	9234	9879	10568	11306	12096	12941	13844	14812	15846	16953
69 B2.2 Local Transportation	4730	5013	5314	5633	5971	6329	6709	7112	7538	7991	8470
70 B2.3 Postage	14514	19302	19302	19302	19302	19302	19302	19302	19302	19302	19302
71 B2.4 Drayage, Frgt, Express	11000	11659	12359	13101	13887	14720	15603	16539	17532	18584	19699
72 B2.6 Travel Expense	6749	8686	9284	9923	10606	11337	12118	12953	13846	14800	15820
73 B3.1 Advertising	66591	11733	11850	11969	12088	12209	12331	12455	12579	12705	12832
74 B3.4 Printing-Duplicating	2000	2119	2247	2382	2524	2676	2837	3007	3187	3378	3581
75 B3.6 Promotional Expense	3000	3179	3370	3573	3787	4014	4255	4510	4781	5068	5372
76 B4.1 Fire E/C Insurance	8900	9433	10000	10600	11236	11910	12624	13382	14185	15036	15938
77 B4.2 Liability + Prop Ins	100616	106652	113052	119835	127025	134646	142725	151289	160366	169988	180187
78 B4.5 Notary Bond	400	400	400	400	400	400	400	400	400	400	400
79 B4.8 Hospitalization Ins	263455	257654	259819	262007	264216	266447	268701	270977	273276	275598	277943
80 B5.1 Gas	7310	7748	8213	8706	9228	9782	10369	10991	11651	12350	13091
81 B5.2 Electricity	72341	76681	82182	86159	91328	96808	102617	108774	115300	122218	129551
82 B5.3 Steam	7770	8236	8730	9254	9809	10398	11021	11683	12384	13127	13914
83 B5.4 Telegraph	14425	15290	16207	17180	18211	19303	20462	21689	22991	24370	25832
84 B5.5 Telephone	95300	101017	107079	113503	120314	127532	135184	143295	151893	161007	170667
85 B5.5 Time Clocks	2111	2237	2371	2514	2665	2824	2994	3174	3364	3566	3780
86 B5.5 Water	5915	6269	6646	7044	7467	7915	8390	8893	9427	9993	10592
87 B6.1 Bldg-Structural Repair	53250	56444	59831	63421	67226	71260	75536	80068	84872	89964	95362
88 B6.3 Repair Plant Equip	650	688	730	774	820	869	922	977	1036	1098	1164
89 B6.5 Repair Oper Equip	96632	102429	108575	115090	121995	129315	137074	145298	154016	163257	173053
90 B6.6 Repair Office Equip	14893	15786	16733	17737	18802	19930	21126	22393	23737	25161	26671
91 B7.1 Rent of Land	7300	7737	8202	8694	9216	9769	10355	10976	11635	12333	13073
92 B7.2 Rent of Building	87906	93180	98771	104697	110979	117638	124696	132178	140108	148515	157426
93 B7.4 Rent of Mach.	128926	136661	144861	153552	162766	172532	182883	193857	205488	217817	230886
94 B7.5 Rent of Office Equip	48485	55085	58707	62568	66684	71074	75754	80744	86065	91739	97789
99 B8.6 Investigation Expense	17900	23840	25578	27443	29443	31588	33888	36355	39000	41837	44879
101 B9.1 Cleaning + Printing	4900	5193	5505	5835	6186	6557	6950	7367	7809	8278	8775
102 B9.2 Disinfect + Exterminate	500	529	561	595	631	669	709	751	796	844	895

DETAILED BUDGET ACCOUNT REPORT	KANSAS CITY POLICE DEPT	BUDGET OVERVIEW -100	APRIL 16, 1972

PLANNING ITEM	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
CONTRACTUAL SERVICES —(Cont.)											
103 B9.3 Dues + Memberships	2732	3286	3312	3338	3365	3392	3419	3446	3474	3502	3530
104 B9.5 Laundry + Sanitation	6925	7340	7780	8247	8742	9267	9823	10412	11037	11699	12401
105 B9.10 Contract Work	189356	208291	229120	252032	277236	304959	335455	369001	405901	446491	491140
106 B9.12 Tow-In Charges	1080	1169	1175	1181	1188	1195	1201	1208	1215	1222	1229
COMMODITIES											
107 Commodities Total	769163	773964	825315	880104	938565	1000944	1067505	1138531	1214322	1295201	1381510
108 C1.1 Office Supplies	66000	70741	75616	80828	86400	92357	98727	105537	112818	120604	128928
110 C1.2 Magazines + Periodical	5364	5685	6026	6388	6771	7178	7608	8065	8549	9062	9606
111 C2.3 Chemicals	1000	1059	1123	1191	1262	1338	1418	1503	1593	1689	1790
112 C2.4 Cleaning + Sanitation	8380	8882	9415	9980	10579	11214	11887	12600	13356	14157	15007
113 C2.6 Feed	3000	3179	3370	3573	3787	4014	4255	4510	4781	5068	5372
114 C2.7 Food	21320	22599	23955	25392	26916	28530	30242	32057	33980	36019	38180
115 C2.8 Fuel Oil	200	211	224	238	252	267	283	300	318	337	358
116 C2.9 Institutional Supplies	612	648	687	728	772	818	868	920	975	1033	1095
117 C2.10 Licenses + Badges	3000	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
118 C2.12 Lumber + Materials	3000	3179	3370	3573	3787	4014	4255	4510	4781	5068	5372
119 C2.13 Drugs + Medicines	1000	1167	1235	1308	1385	1466	1553	1644	1741	1844	1952
120 C2.14 Minor Equipment	123505	133879	143104	152968	163513	174787	186842	199730	213510	228243	243997
121 C2.15 Motor Vehicle Gas-Oil	218846	250955	267468	285075	303848	323866	345211	367971	392242	418124	445724
123 C2.16 Motor Vehicle Parts	146681	167991	179046	190832	203399	216799	231087	246324	262571	279896	298372
125 C2.17 Paint + Supplies	3050	3232	3426	3632	3850	4081	4326	4586	4861	5152	5462
126 C2.21 Wearing Apparel	132250	84802	90735	97082	103875	111143	118920	127243	136148	145678	155875
132 C2.23 First Aid Supplies	7000	7945	8388	8856	9350	9872	10423	11005	11621	12271	12957
133 C2.26 Reserve Equipment	5000	5299	5617	5955	6312	6691	7092	7518	7969	8447	8954
CAPITAL OUTLAY											
134 Capital Outlay Total	531457	429013	477892	503993	531540	560616	591306	623700	657895	693992	732098
135 E3.7 Motor Vehicles	415750	366298	412224	435226	459522	485187	512297	540936	571189	603149	636913
138 E3.8 Office Equipment	1305	1383	1466	1554	1647	1746	1851	1962	2079	2204	2337
139 E3.9 Plant Equipment	7000	7139	7282	7428	7577	7728	7883	8040	8201	8365	8532
140 E3.11 Communications	90840	54191	56919	59783	62792	65953	69273	72761	76424	80272	84314
143 E3.16 Other Equipment	23562	3700	3737	3774	3812	3850	3889	3928	3967	4007	4047

OVERVIEW MODEL APPLICATION

The following section depicts a practical application of a COPPS Budget Overview Model. The occasion to use the model arose when the Commanding Officer, Planning and Research, received a note from the Chief requesting an immediate response to the question, "What if we add 50 patrolmen in 1973? What will it cost in terms of additional salaries, supporting equipment, etc.? What are the long-term implications of such an expansion?" The Commander of Planning and Research was able to render a quick response to each of these questions by making effective use of his departmental Budget Overview Model. The following pages describe in detail the chain of events which transpired from the time the Chief's note was received to the analysis of summary reports generated by the Overview Model.

Figure 5 shows graphically the impact on salary related costs created by the addition of 50 patrolmen to the force in 1973. The plan which includes the force addition (Run No. 103) may be compared on an annual basis with the projection originally programmed (Run No. 100). Also shown as a point of comparison is Run No. 102 which shows the net effect on salary related costs of giving across-the-board salary increases of 5% in 1974, 1977, and 1980. (No additional staffing considered.) It should be emphasized that each of the alternate runs (Run Nos. 102 and 103) were made by a simple one card change in the original Budget Overview Model.

The previous examples illustrate a small sampling of the kinds of in-depth analyses which can be performed using just one COPPS model. In a typical department the need frequently arises to address planning areas not explicitly treated in the Budget Overview Model or treated only on a gross basis. Facility planning, details of staffing requirements, analysis of retirement and fringe benefits, patrol or helicopter operations are but a few of the possibilities for application of the COPPS system. The output from one of these other models may provide useful information by itself or it may serve to refine input data to the Overview Model or some other model. It is only after development of a network of both independent and interrelated models that the full benefits of applying the COPPS system to police planning can be realized.

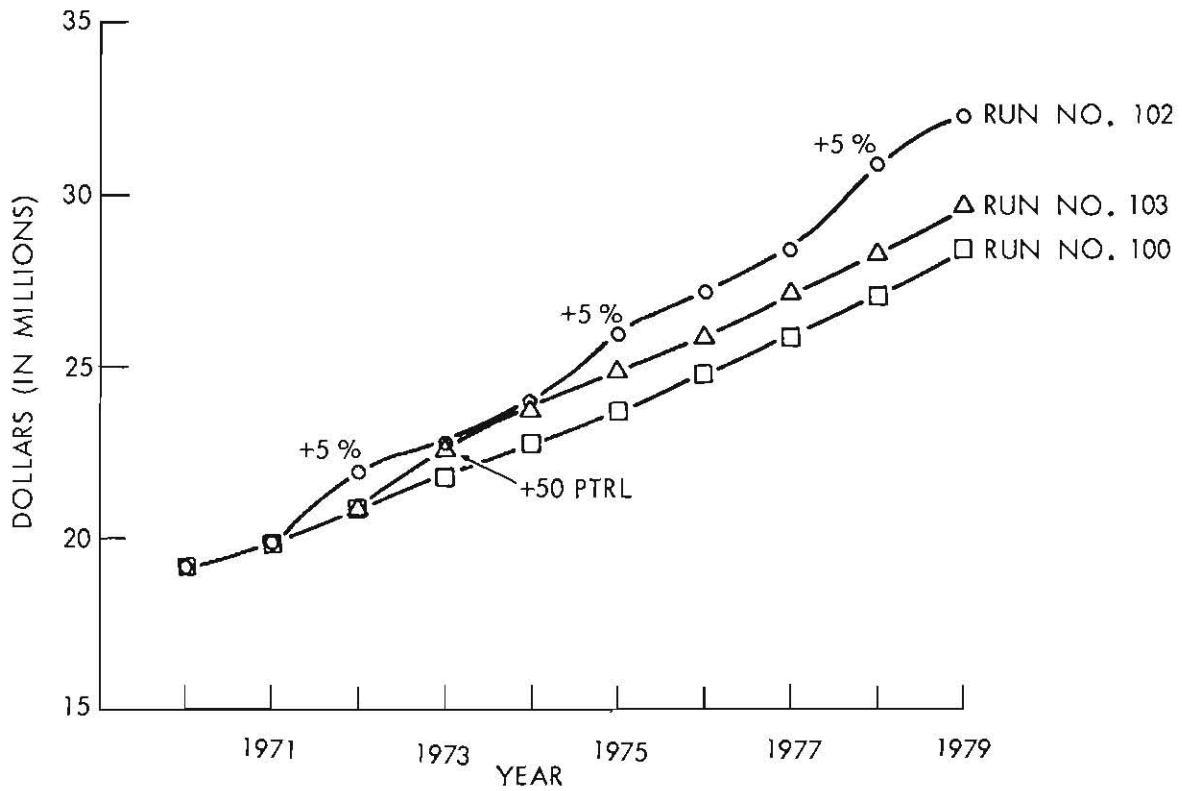


Figure 5--Projection of Salary Related (Personal Services) Costs

From the desk of . . .
THE CHIEF

9/30

To: Planning & Research
There is a possibility that we can get a one-time grant to pay for 50 additional patrolmen for one year in 1973. We would be responsible for needed equipment and other support.
What would this cost?

To: Chief of Police — September 30, 1971

From: Commanding Officer, Planning and Research

Subject: 1973 ADDITIONAL PATROLMEN GRANT REQUEST

The following tabulation represents a summary of the impact on our budget created by the expansion of the patrol force by 50 men in 1973. Using $9,000 per year as the starting salary in 1973, the amount of the grant would be $450,000 for 50 patrolmen. The department's fiscal requirements for that year will increase by $671,000, and in 1974, when outside funding is withdrawn, our total fiscal requirement will be nearly $1.1 million over that previously programmed. Included in this amount are additions of 10 detectives, 9 sergeants, and 11 civilian employees. Also included are 10 new patrol cars in addition to other equipment costs totaling $48,500.

We have the details through 1981, but the table below shows the major impact for the first few years.

	1973	*1974*	*1975*
TOTAL FISCAL REQUIREMENTS			
50 Additional Patrolmen	$25,332,000	$26,321,000	$27,573,000
Current Budget Overview	24,211,000	25,226,000	26,414,000
Net Difference	1,121,000	1,095,000	1,159,000
Applicable Grant Share	450,000	-0-	-0-
Net Budget Increase	$ 671,000	$ 1,095,000	$ 1,159,000

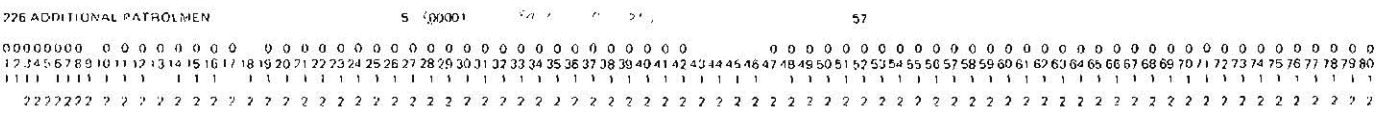
After receipt of the above note from the Chief, the Commander of Planning and Research was able to provide the information shown above in the memo, as well as have detailed back-up data, in approximately 2 hours. The elapsed time can be broken down as follows:

Study of the Chief's request:	15 min.	Wait for computer time:	60 min.
Review of the necessary changes in the Budget Overview Model:	30 min.	Computer processing time:	½ min.
Keypunch new program card:	5 min.	Extraction of information from summary reports:	10 min.
		Total elapsed time:	2 hrs. (approx.)

HOW IS COPPS RELATED TO THE CHIEF'S REQUEST?

A change in line 226 ADDITIONAL PATROLMEN of the Budget Overview Model just presented enabled the planner to add the required number of patrolmen to the force in the desired planning period. The addition of the 50 patrolmen did not disrupt the planned build-up of the department for any but the period specified. Thus, the 1 percent increase in total departmental growth, previously stipulated for each period, resumed after 1973 with the new patrolmen being included in the annual growth in subsequent years.

The card corresponding to line 226 in the original model with an annotation depicting the necessary change, is shown below.



The exact meaning of the coding instructions is discussed later and need not be of concern here. What is of significance, however, is that the net effect of the single card change above is to add 50 patrolmen to the force in the second planning period (1973) and that a multitude of other planning factors change as a result, within the model. By comparing the reports generated in this new model with those of the original model, the planner can see the across-the-board implications of a change in size in the patrol force. The material immediately following shows selected output from the two models. For ease of comparison, the line items from the current Budget Overview Model have been repeated and are shown immediately following the output from the +50 Patrolmen Model.

TOTAL LAW ENFORCEMENT SALARIES

Even though the required salaries for the 50 additional patrolmen can be easily hand calculated, the many other salary related planning items are not so readily determined without some structured mechanism for relating the factors and associated costs. The Overview Model provides the planner with just such a capability. By specifying line 271 of the model to be included in a summary report, the planner exercising the overview model generates the following data.

+50 Patrolmen Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
271	Tot LE Salaries (Dollars in Thousands)	12554	14274	15682	16396	17143	17924	18741	19596	20489	21423	22401

Current Budget Overview Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
271	Tot LE Salaries	12554	14274	14924	15603	16313	17055	17831	18643	19493	20380	21309

Comparing corresponding law enforcement salaries in the two models indicates that total law enforcement salary requirements would increase by some $758,000 in 1973 with the addition of 50 new patrolmen that year which represents considerably more than just the salaries paid the 50 new patrolmen. (See Additional Staffing Changes, below.)

ADDITIONAL STAFFING CHANGES

The difference in total law enforcement salaries includes salaries paid to additional detectives and sergeants required to support the expanded patrol force. The required number of patrolmen, detectives, and sergeants under the planned addition are included in the summary reports as lines 1, 2, and 3, respectively. To determine, for example, the number of additional sergeants required the planner compares line 3 SERGEANT in both models for 1973. The difference in the 207 and 198 shown below indicates the number of new sergeants needed to support the increased patrol force.

+ 50 Patrolmen Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1	Patrolmen	880	888	948	958	967	977	987	997	1007	1017	1027
2	Detective	144	145	157	159	161	163	165	167	169	171	173
3	Sergeant	196	197	207	208	210	212	213	215	217	218	220

Current Budget Overview Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1	Patrolmen	880	888	897	906	915	924	934	943	952	962	972
2	Detective	144	145	147	149	151	152	154	156	158	160	162
3	Sergeant	196	197	198	200	201	203	204	206	208	209	211

TOTAL FISCAL REQUIREMENTS

The difference in the total fiscal requirements for 1973 and the following years includes more than just the increase in total law enforcement salaries paid to new patrolmen, sergeants and detectives. The increase in total law enforcement salaries will be accompanied by corresponding increases in associated fringe benefits; new civilians (clerk-typists) will have to be hired; new equipment including patrol cars, radios, uniforms, etc., will have to be purchased. By comparing the line 190 TOTAL FISCAL REQ output in the two models the planner is able to see the net effect of all of these changes. As is shown below, the budget increase is over $1.1 million in 1973.

+50 Patrolmen Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
190	Total Fiscal Req (Dollars in Thousands)	20508	23218	25332	26321	27573	28742	29969	31387	32737	34154	35778

Current Budget Overview Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
190	Total Fiscal Req (Dollars in Thousands)	20508	23218	24211	25226	26414	27531	28703	30062	31352	32706	34263

CAPITAL OUTLAY TOTAL

If the planner is also interested in the total increase in some component of the total budget, say Capital Outlay, he would include line 134 in his summary report with the following data being generated.

+ 50 Patrolmen Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
134	Capital Outlay Total	531457	429013	526426	504607	546202	576165	607796	641188	676441	713660	752955

Current Budget Overview Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
134	Capital Outlay Total	531457	429013	477892	503993	531540	560616	591306	623700	657895	693992	732098

A comparison of total expenditures for Capital Outlay reveals that the addition of 50 more patrolmen in 1973 results in an increase of more than $48,500, representing costs to purchase additional patrol cars and other items of equipment.

PATROL CAR REQUIREMENT

If the planner wishes to examine in detail the associated build-up of any of the Capital Outlay accounts he merely specifies its line number in the planning model for inclusion in a summary report. If, however, he chooses to look at a planning item which was not included in the summary report from the current Budget Overview Model, direct comparisons can still be made between a report line from the +50 Patrolmen Model and the corresponding line in the planning matrix of the current Budget Overview Model. Such a comparison is made possible since, preceding the summary report section of each COPPS model, is shown the entire matrix of planning items included in that model. Any information not included in the summary report may still be obtained by the planner by an analysis of the planning matrix. A printout of line 150, PATROL CAR REQUIREMENT, from the +50 Patrolmen Model and of line 150 from the planning matrix of the current Budget Overview Model is shown below. While the format of the two lines differ, the necessary data for comparison of the patrol car requirement under the two plans are readily available. (Corresponding data depicting patrol car requirement in 1973 are circled below.)

+ 50 Patrolmen Model

	Planning Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
150	Patrol Car Requirement	323	324	(336)	338	340	342	344	346	348	350	352

Planning Matrix, Current Budget Overview Model

150 -0 Patrol Car Requirement 323.0 6 0.00L 275+ 323.00 0 0.00 0 0.00 0 000 INTO -0

Base	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
323.0	324.8	(326.5)	328.3	330.1	332.0	333 8	335.7	337 6	339.5	341.4

COPPS INTERFACE WITH EXISTING POLICE OPERATIONS

A police planning model that accurately reflects the complex and dynamic interrelationships of organizational elements has several significant advantages. The planning model can:

- Stimulate the imagination and improve perspectives.
- Assist in designing, manipulation, and examining various frames of reference.
- Facilitate communication among the people involved in planning the policy making by presenting a physical point of reference.
- Clarify and examine issues and focus effort on the major ones.
- Teach the planners and policy-makers improved planning techniques by permitting insight into patterns and trends.
- Develop contingency plans and anticipate crisis with planned action.
- Create methodologies, procedures, and frameworks for problem solving.

COPPS is designed to be an extension of existing planning operations found throughout the department. Since COPPS is a system for planning and not just a single model it can address the specific problems of a unit or bureau, or it can be applied to the department as a whole, as in the case of a budget overview model. COPPS is a tool whereby departmental planning, at whatever level, can be made more accurate, rapid, and extensive than ever before. Traditionally, many of the smaller departments have accomplished planning by an intuitive or "years of experience" approach. Planners in some larger departments depend upon computer specialists for planning analyses. Regardless of department size or the status to which the planning process has been relegated, the COPPS system successfully bridges the gap between departmental

planning needs on the one hand, and the powerful problem-solving aid, the electronic computer, on the other.

SYSTEM CHARACTERISTICS AND REQUIREMENTS

The system characteristics and requirements found in most departments are normally compatible with existing hardware configurations. Two basic modules are included in COPPS software package: (1) a language translator written in COBOL F and (2) a matrix manipulator written in FORTRAN IV. No absolute core requirements are specified. System has been installed on such diverse machines as: IBM 360/40, 360/50, and 1130; Burrough B5500; CDC 6400, 3200, and 3300; UNIVAC 1108, and SPECTRA 70/35. Usual card selector channel devices—card reader and printer are required. Though COPPS is not written for interactive operation it can be accessed via terminal installations. Program run time varies according to the hardware configuration and size of model. Average cp time for a 250 line model run on the CDC 6400 is on the order of 10 to 15 seconds. Elapsed time from card read-in to print out averages 5 to 7 minutes. No system maintenance is required—the user makes any desired model changes and data updating. Installation of the system would place an additional keypunch requirement of approximately 1,000 to 2,000 cards annually.

FUTURE PLANS FOR COPPS

The planning system described, herein, represents a significant development in enhancing the effectiveness of the police planner. Even though the reception of the original COPPS system has been enthusiastic, an improved version is under development. System user comments and suggestions have been incorporated into a soon-to-be-announced COPPS II system.

COPPS II will provide planners with greater capability than ever before to develop models of their departments and will accommodate up to 10,000 planning items. (The current system is limited to 300 planning items in a single model.) Some of the other new features designed are an expansion of the instruction set, optional 6- or 12-period planning horizons, optional heading term insertion (to accommodate month titles), and increased system error messages and diagnostics. Significantly, COPPS II has been designed to accommodate installation on smaller computer configurations. The system has been pretested on machines as small as 46,000 bytes and utilizes direct-access disk devices.

SESSION II B

COURTS INFORMATION AND STATISTICS

Larry P. Polansky, Session Chairman
Chief Deputy Court Administrator
Common Pleas Court of Philadelphia

Just two years ago at the first SEARCH Symposium, in November 1970, at Dallas, Ms. Jean White and I delivered a paper on the Philadelphia court system. That paper and Ms. Joan Jacoby's paper on the prosecutor's system were the only court papers submitted and heard at that time. This year there were some 20 excellent abstracts of papers submitted and we were hard pressed to narrow that to the seven papers for which we had time. I think this in itself is an indicator of the dynamic increase of court activity in the technology area.

The papers which follow feature a court information system on a "Minicomputer"; a modular transferable system for large federal district courts; a view of that system by one of its users; a paper on a statistical technique to measure problems in a prosecutor's office; a review of an information system for a prosecutor's office; an information system and its uses for a juvenile court and finally, a paper on what further uses can be made of our information systems to keep people out of our justice system. These papers do not cover the total problem area, but certainly they evidence great movement over these past two years in this area vital to all of us and, more importantly, vital to the improvement of our justice system.

Another interesting difference between 1970 and today is that although Ms. White and I were well received in 1970, we both felt that we were guests at a policeman's conference.

Not so in 1972. Project SEARCH has truly widened its perspective and now, in my opinion, does reflect a cross section of the justice agencies. Ample proof of this is the fact that concurrent with the presentation of these seven papers there were five other sessions on various criminal justice topics (presented in New Orleans and published in these proceedings) which attempted to cover the entire justice area.

The papers which follow are representative of the state of the art in courts. They show that where work has been done it has been done well. But most of all, they point to the need for so much more that has to be done. Court and court related information systems appear to be at the level of development of police systems of five years ago. We've not even reached that level of sophistication which allows us to even begin to look seriously at security and privacy issues and it is the very unusual court which has tackled the shared versus dedicated problem with anything but the economics issue in view. The surface has been scratched. Let us now build upon the base of those pioneers whose papers follow.

48293

A COUNTY CRIMINAL JUSTICE INFORMATION SYSTEM A CASE STUDY

Samuel D. Conti
Court Administrator
Hudson County

Ronald J. Parker
Ultimace Systems Inc.

Robert A. Weber
President
Ultimace Systems, Inc.
Maywood, N.J.

As we survey the nature of the criminal justice system as it exists on the county and municipal levels of government in New Jersey today, and as we observe, in particular, the volume and complexity of the responsibilities and duties of the judicial system, three mandates surface by which our actions in the administration of these systems must be guided.

As a criminal case is moved from arrest through final disposition by the courts, many agencies and departments are involved. The participation of each, historically, has been related to a limited portion of the activity of the criminal case process. The several levels of government and agencies responsible to each are often in a state of undeclared internecine warfare. Symposia such as this and efforts to discuss common problems and common solutions are rapidly obliterating dysfunctional activities. We must look forward to an integrated and harmoniously tuned network for the exchange of information and ideas. Continued failure to interact can only result in continued handicapping of necessary societal functions.

A second imperative inherent in the system deals with the necessity of developing and maintaining streamlined and efficient networks of communication. Agencies and departments must, at some schedule. Duplication of function, which is a form of delay, can be minimized by the intelligent planning of communications requirements. Communications systems require not only a means by which communications are accomplished but an evaluation of those data elements which ought to be captured, retained, studied, evaluated, and ultimately communicated. As more data is accumulated, attempts to synthesize and analyze become increasingly difficult. It is at this point that automation of the information becomes a reasonable step.

The last of these inherent necessities to which I make reference is the employment of human skills in such a fashion as to maximize the returns from energy expended and to maintain simultaneously the dignity and develop the talents of the human being within the bureaucratic process.

To fulfill these mandates is to permit and promote the development of creativity and innovation which are integral to the planning process.

From the perspective of the courts, it has become increasingly obvious that more and more personnel are needed to perform mechanical tasks. Tasks requiring the human critical faculties of analysis and evaluation are often neglected. The human use of human beings will permit further planning and innovative procedures, for example, projective calendaring and personnel allocation. Using electronic data processing devices as our tools, evaluations of rapidly updated facts and information may be made. Planning will be based on verifiable information rather than surmise and guesswork.

The only manner through which these several mandates might be simultaneously accommodated is through the introduction of automated court management systems.

In the development of a pre-automated, minimal information system and the implementation of the computerized system, major changes are to be expected. Whatever changes do occur should however appear to be gradual. This technique is not a sleight of hand. It is, rather, an attempt to gain the acceptance and confidence of the users. As an example, computer generated reports and listings should, insofar as is possible, be formulated as were previous listings. In essence, the outward manifestations of the system need not disclose the extent of underlying change.

The natural inertia existent in most human institutions must also be overcome in the court environment. The system is often permeated with traditions and reliance on precedents. Reluctance to change has been summarized in the quotation: "if you stand well – stand still" which I have seen inscribed on a nearby courthouse, albeit of another day. To work within a framework of a traditional system, a change oriented administrator must set practical resource guides keyed to that environment.

MICROFICHE

As an Administrator in Passaic County and again in Hudson County, I have had the opportunity for designing, developing and maintaining such systems. Within the first of these settings, we were able, through use of funds obtained from the State Law Enforcement Planning Agency of New Jersey, to complete a study of the court environment. The management study produced in this effort analyzed the systems used to record, communicate, store and retrieve information necessary to process criminal cases through the court system of Passaic County.

Again, through the assistance of federal funds and using as a basis the noted study, the Automated Criminal Court Management Information System of Passaic County was developed. The system employed in Passaic operates in a batch mode requiring the use of a computer center, which center is physically remote from the data collection source, with no teleprocessing hookup. With this system, key punch cards are hand carried to the computer center once weekly.

The advantages of this manner of processing are as follows:

1. This system affords greater control of cases
2. reduces clerical effort
3. facilitates scheduling of cases
4. helps control jail population through speedier trials and dispositions.
5. A requisite Court Information Center was perforce developed (which center has led to an overall increase in efficiency).

Some of the disadvantages considered to be present in the operation of the Passaic program are:

1. Long start-up time due to the limited experience of county personnel with data processing.
2. Limited ability to make modifications in the system due to insufficient funding and difficulty in hiring key system personnel.
3. Since this was the first Automated Court Information System in the state, certain conceptual problems related to data collection proved difficult of solution.
4. Lack of standardization in state-wide coding necessitates reorganization in certain areas as standards are developed

The automated criminal case processing system which is being developed in the County of Hudson has been described as a mini-computer. This system is a real-time system with 10,000,000 characters of storage on a disk, instantaneously accessible. While I will defer to Mr. Robert A. Weber, President of Ultimacc Systems, Inc., Maywood, New Jersey, to present all the technical aspects as to both the Hudson and Passaic County systems, I would like to outline some advantages, from an administrator's perspective, of the use of such a system in the Hudson County environment.

The computer size and minimal environmental control requirements of a mini-system are among its greatest benefits. The system to be installed in the County of Hudson will be operated in a space of approximately 150 square feet with virtually no special environmental controls.

As a by-product of the size and configuration, we will be able to locate the system within the court house in an area easily accessible to judicial and administrative personnel.

An analysis of the monthly operating cost of a mini-computer and a comparison to a large-scale computer system, comparable in terms of court processing requirements, is illuminating. My experience has shown that similar tasks can be accomplished on a mini-computer at approximately one-half the monthly operating cost.

The savings realized by the use of the mini-computer have enabled the County of Hudson to develop the initial environment as an on-line, interactive system.

The obvious benefits of the real-time system have enabled us to spread more rapidly the communication network to the early inclusion of the police and prosecutor information sources and requirements.

Having learned several lessons from the development in the County of Passaic, the system design and programming in the County of Hudson will, as we believe best, proceed in a modular fashion. The experience of Passaic County also taught us that the retention of a systems analyst/programmer on our own staff was not, and is not, a luxury but should be considered a prerequisite in the earliest stages of analysis.

The definition of requirements in the computerized effort is probably the largest single task to be confronted. With a systems analyst/programmer as a staff member, an investment is made into the future. The individual brings with him the discipline of his previous work and gradually becomes familiar with the language and requirements of the courts, as well as an "insider" in the particular court community. Few consultants can provide this type of total service.

In the development of the Passaic County system, it was recognizable that periodic meetings of what was called an "information systems" committee, consisting of all significant actors in the criminal justice system, were to be beneficial for the exchange of ideas and the construction of the system. This approach has been adopted in the County of Hudson with significant results.

During the feasibility stage of the project, the experience gained in Passaic County in the establishment of a Court Information Center was drawn

upon. This center, once established in the County of Hudson became the focus of calendaring responsibility. Without this perspective, efforts to have developed such a function within the county, perhaps, would have been long delayed and less well-conceived.

The system being developed in the County of Hudson is oriented toward the future. It is flexible and expandable. We anticipate in the near future the extension of operations in an automated environment to budget control, personnel files, resource allocation, and simulations. The availability of a staff systems analyst/programmer will in these projects minimize our reliance on outside resources.

In summary, I would wish to present the following suggestions regarding the design and initiation of court-dedicated automated systems:

Number One: Conceive the system *in toto* (insofar as is possible) and not as a patchwork job on an existing system.

Number Two: Develop a design schedule which will permit modular implementation.

Number Three: Gradually automate the system as it becomes economically feasible.

Number Four: Structure the system so as to permit its control by information center personnel.

This paper describes two information system implementations for two County-level Courts in the State of New Jersey. We will discuss some of the benefits achieved and the problems encountered in the hope that our experience will benefit other Courts.

Both Passaic and Hudson Counties, being large and highly urban, have a proportional number of cases and a growing backlog. The workload required for scheduling, calendaring, printing of dockets and warrants, administrative monitoring and recording, and record keeping for statistical and historical purposes has increased in an even greater proportion.

New Jersey, showing concern and insight into this monitoring and control problem, planned for a model system development effort in Passaid County beginning in 1970 to be operational in 1971. From this basic system has evolved additional innovative concepts designed to stop the increase in backlog of cases and to reverse eventually the trend or finally erase the backlog altogether.

SYSTEM CONCEPT

The judicial process is viewed as a series of milestones or events, leading from arrest to sentencing and post-conviction processing. These events are displayed in a highly simplified manner in Figure 1. The complexity is largely a result of plea changes, related cases, motions, and downgrade activities. The steps considered in the automated system are:

- Arrest
- Magistrate preliminary hearing
- Jail-bail action
- Probable cause hearing
- Grand Jury
- Warrants
- Arraignments
- Motions
- Trial
- Sentence
- Post-Sentence

These events in the processing of a case can be further reduced to the diagram in Figure 2. Reports of the results of a particular event, e.g. plea results at arraignment, are combined with all cases at this processing point to produce a worksheet for the next milestone. This worksheet is used by the Court staff to schedule specific cases at specific times. For example, Grand Jury "results" (i.e. indictments, dismissals, downgrades) are published. This information, combined with all other cases awaiting arraignment, is consolidated on the "awaiting arraignment worksheet". The schedule developed by the computer is verified by the Court administrative staff to produce an arraignment list. The results of arraignment (i.e. pleas) are posted to either the trial worksheet or the awaiting sentence worksheet.

There are a number of supplementary reports drawn from this primary information flow. These include jail lists organized by the time awaiting a particular milestone, or the time between milestones. Historical information is consolidated for a case and for all cases associated with an individual.

THE PASSAIC SYSTEM (LARGE SCALE COMPUTER)

This project was directed towards a batch-oriented, COBOL (Common Business Oriented Language) implementation on a large scale computer for the following reasons:

a. Budgetary limitations.
b. The desire to introduce data processing in an evolutionary manner.
c. The requirement that the programming language be compatible with any computer that the County might acquire in the future.
d. The "state-of-the-art" of minicomputers at that time, that is, the technology was still considered to be "shaky".

It was recognized by all involved that there was a requirement for inquiry-response and fast turnaround of reports, suggesting an on-line capability. The size of the file (and associated storage costs) precluded the use of time-sharing. A stand-alone on-site computer facility was not in the budget.

Hence a batch operation appeared to be the necessary alternative.

The system is currently implemented on a System/360 Model 40 operating under Disk Operating System. The programming language used is COBOL.

The computer configuration requires 128K bytes of core storage, 3 Type 2311 disc drives, and 6 tape drives. This configuration could be reduced to a 64K byte core memory and to four tape drives with minor changes.

One of the primary goals of the software design was to keep the programming logic as simple as possible. This recognized that the sytem would undoubtedly require many changes as experience was gained in its use. Surprisingly, the changes have been largely cosmetic, that is, in the form and content of the reports. More recently, the Court Administrator has directed additions to the logic to obtain new information.

Since input is by keypunched cards and there is a stringent requirement for accuracy of data, an elaborate editing program processes the data before it is added to the file. Further, certain "worksheet" type reports are designed so that minimum data need be added to use the report as a data entry form.

The reports available from the current system are tabulated in Table 1. A list of the data elements in a defendant-case record (Table 2) provides insights into the level of detail of the system and the types of information which can be extracted.

FILE STRUCTURE

It is necessary to relate a defendant to all cases in which he is currently (and perhaps historically) involved. The problem of identifying a particular defendant is not a trivial one; this is the major processing function in many law enforcement information systems. After several attempts to use combinations of name, date of birth and physical characteristics, it was decided to "render unto Caesar," that is to place the problem of identification in the agency best suited for this problem, namely, the County Identification Bureau. The automated system would then use the County "I.D." number.

Unfortunately this identification is not available immediately and a number of events may occur and be recorded before a specific reference to the defendant can be obtained. Hence the system allows use of a "temporary" I.D. number which, when changed, links all of the data to the "permanent" number. This method has proven effective and assured unique identification of defendants.

Each case associated with the defendant is linked to his "header" information. This linking represented a difficult information handling problem, given that the logic and file structure had to be simple and easily changed. At the time of arrest there may be a variety of charges organized on several forms. As the case proceeds through the judicial system, these charges may change, multiply, be dismissed, or be combined. There may be several counts on the same charge. Further, the prosecutor may assign a docket number to several charges and often several co-defendants. Several indictment numbers may arise out of one charge or at the other extreme, one indictment number may refer to several defendants with several charges each. An "audit trial" must be maintained to trace the origin of a particular defendant-charge combination.

The Passaic System has been operational for more than a year. It is still undergoing change and significant effort is being expended to design supporting manual procedures and standards.

By highlighting exceptions, the system provides the Assignment Judge and his staff with information to identify cases being delayed and unusual bail actions. By organizing and categorizing cases, cases can be handled more efficiently. By alerting and scheduling ancillary functions, e.g. pre-sentence investigation needs, cases are not delayed for this information.

COORDINATION OF PROJECT GOALS

The relationships between the judicial and administrative functions of the Court, its ancillary agencies (Sheriff, Prosecutor, Public Defender, Warden, Probation, Grand Jury) and the municipalities served are sensitive ones, particularly in the area of information transfer. At the outset of the project, a meeting was called by the Court Administrator to explain and coordinate the goals of the automation project. In addition to the above mentioned agencies, the Chiefs of municipal police departments were invited to attend. The results were well worth the effort. The meetings became a weekly institution.

The sense of participation by these agencies in a pioneering effort was crucial to the success of the project. At a procedural level the meetings highlighted problems in current information flow. "A always thought B did it." "A needed a particular piece of information before he could produce information required by C."

Further, this participation resulted in a depth of understanding of the actual process and constraints by the vendor's systems staff which could not have been achieved through typical systems "interviews." During the meetings, the Court personnel came to understand the capabilities and constraints of automation; the net result was cooperation.

We wish to emphasize the importance of early coordination with all agencies that will be involved in an automation effort.

INFORMATION CONTROLS – THE COURT INFORMATION CENTER

Information on cases, defendants' histories and personal data must of course be carefully controlled and privacy considerations maintained. There is always a tradeoff between file security and ease of use. On one hand the information must be readily accessible to those who require it; on the other hand, access must be limited. The solution in this system was the organization of an Information Systems Officer who served as the single point of contact to the automated files. All reports and requests for data flow through this office.

Although this approach has been successful in the "batch" operation currently in use, it will not be possible in the new on-line interactive system. In this latter system access devices are available to several functions. Here, advanced hardware and software privacy techniques must be employed to maintain control and privacy. Specific terminals will be limited to specific data elements. Use of passwords and access authorizations will be necessary.

Since the planned file structure will maintain an integrated record on an individual or on a case, control will be exercised at the data element level. That is, a particular function (e.g. Prosecutor) will have an *INFORMATION PROFILE* that defines the specific data elements that the function is allowed to access automatically. Requests for data outside of this profile will flow through the Court Administrator.

This concept of an information profile will be particularly important as remote terminal use becomes widespread.

FILE CONVERSION

This activity was one of the primary causes of delay in the systems implementation. During the systems analysis and programming phases of the project, samples of data were taken from the files as "live" test data. But it was not recognized at the time that many cases were (1) not fully described in the records and (2) that considerable research would be required to obtain this information. Since the value of the system depended to a large extent on the availability of a comprehensive data base, a major conversion effort was undertaken by the Court personnel.

Several observations are made which may be of interest to future automation efforts.

a. The conversion of data was excellent training for the operations personnel as it represented a bridge between the familiar and the new system.

b. Conversion was a useful introduction to the discipline required in an automated system, and to the meaning of each field.

c. The necessary "purification" of data for entry into the automated data base highlighted certain missing information and inconsistencies. The initial machine listings proved useful to various Court activities independent of the actual processing.

d. The extent of time and dollars required for conversion and associated research was not foreseen. The resulting delay impacted on the credibility of the system in its early stages.

e. In hindsight, it would have been valuable to convert files based on Court processing phases. That is, first convert all files associated with cases awaiting sentence. Then convert files for cases in and awaiting trial, and so forth, moving "backward" toward arrest records. Using this technique, useful results would be obtained from the system immediately.

f. A careful analysis of the form and content of existing data must be accomplished as part of the initial system design. System processing cannot be based on information that is not (and probably will not be) available. A detailed conversion plan should be developed, identifying the specific activities to be performed by Court personnel and by the vendor. A budget for additional personnel during this period should be considered.

g. An on-line data editing capability would have been very effective. The need to process punched cards and control records was a difficult administrative burden and increased the response time and control on error correction.

HUDSON MINICOMPUTER-BASED SYSTEM

This integrated system for the Hudson County Court is based on the proven hardware components used in ULTIMACC installations as well as in other applications.

Specifically, the system configuration proposed is:

NOVA 1200 with 16K words (32K bytes of core storage)

Automatic program load; power monitor and auto restart

2 CRT display and keyboard terminals

Disc controller and 2 drives, with 10 million characters (one fixed and one removable platter per drive)

300 line per minute, 132 column chain printer

Magnetic Tape Unit, 9 track, 800 bpi industry compatible

Card Reader, 200 cards per minute, 80 column.

This configuration is expandable to accommodate a variety of other peripherals and additional storage. Core memory is expandable to 65K bytes and disc storage is expandable to 20 million characters.

Low or high speed telecommunication lines can be accessed.

We have chosen a disc unit with removable platters so that files can be readily copied for safekeeping.

The primary advantage of this sytem is the availability of interactive displays and instantaneous access to files. The magnetic tape is used to store historical records, whereas the discs provide on-line storage. To the operator, the system is similar to working with a time-sharing terminal. However, the economies of on-site storage media and printing facilities enable large files to be maintained.

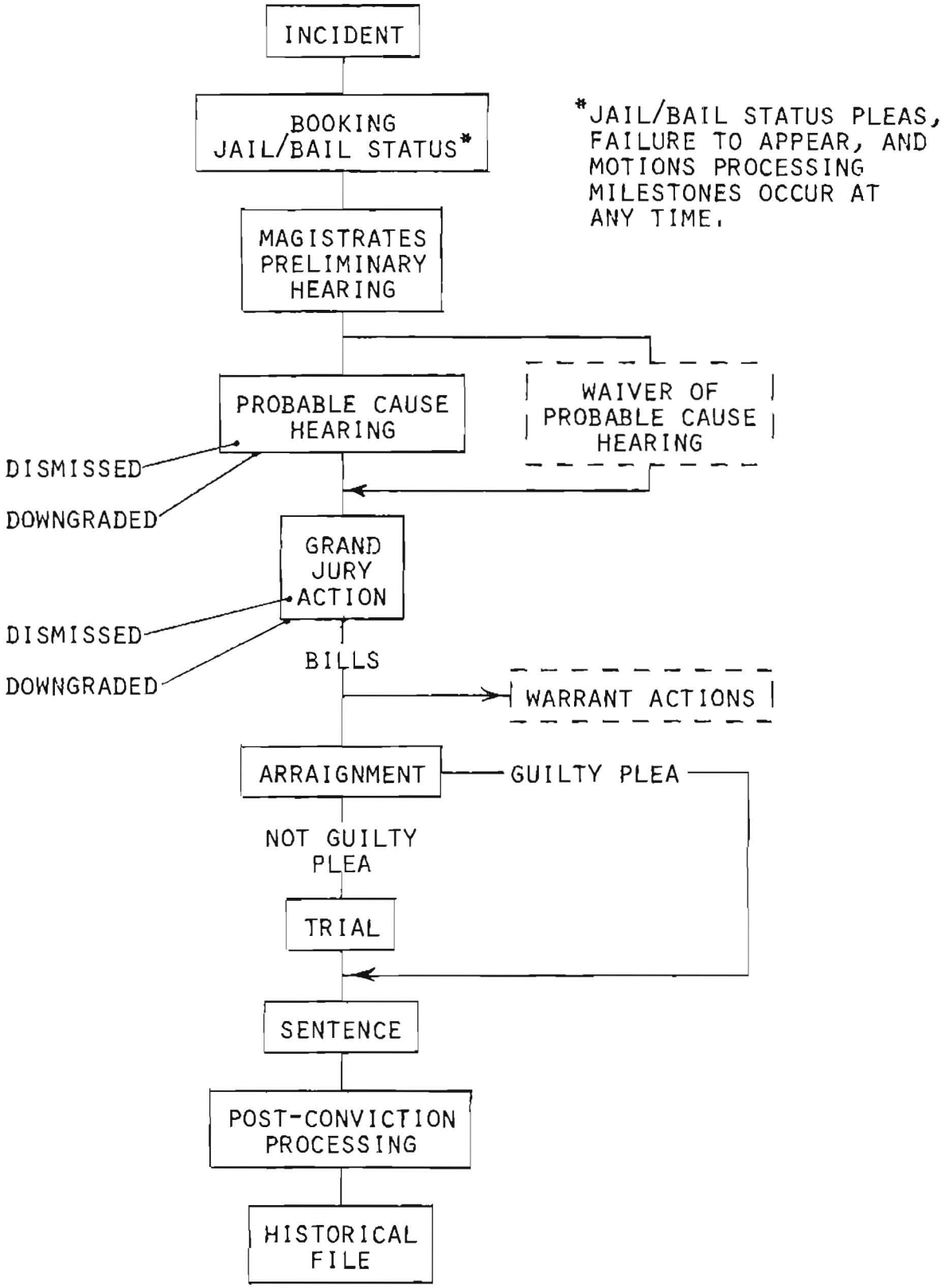
There are numerous ancillary agencies to be served by a Court System – Probation, Sheriff, Municipalities, etc. Consideration should be given to future installation of terminals at these locations. The minicomputer configuration herein proposed by Ultimacc Systems can be augmented with communications interfaces and software to work with a relatively large number of terminals. These terminals could be CRTs, Teletypes, Magnetic Card Selections or any of a wide range of low speed asynchronous terminals.

The technical constraints are several. It must be determined whether these remote terminals are to be (1) connected "full-time" to the computer or (2) can dial up a connection or (3) can wait for a few minutes to be "polled".

The minicomputer proposed can accept up to 31 terminals; however, if these were simultaneously operating there would be delays up to several seconds. Further, each terminal requires an interface or a portion of an interface, which becomes expensive.

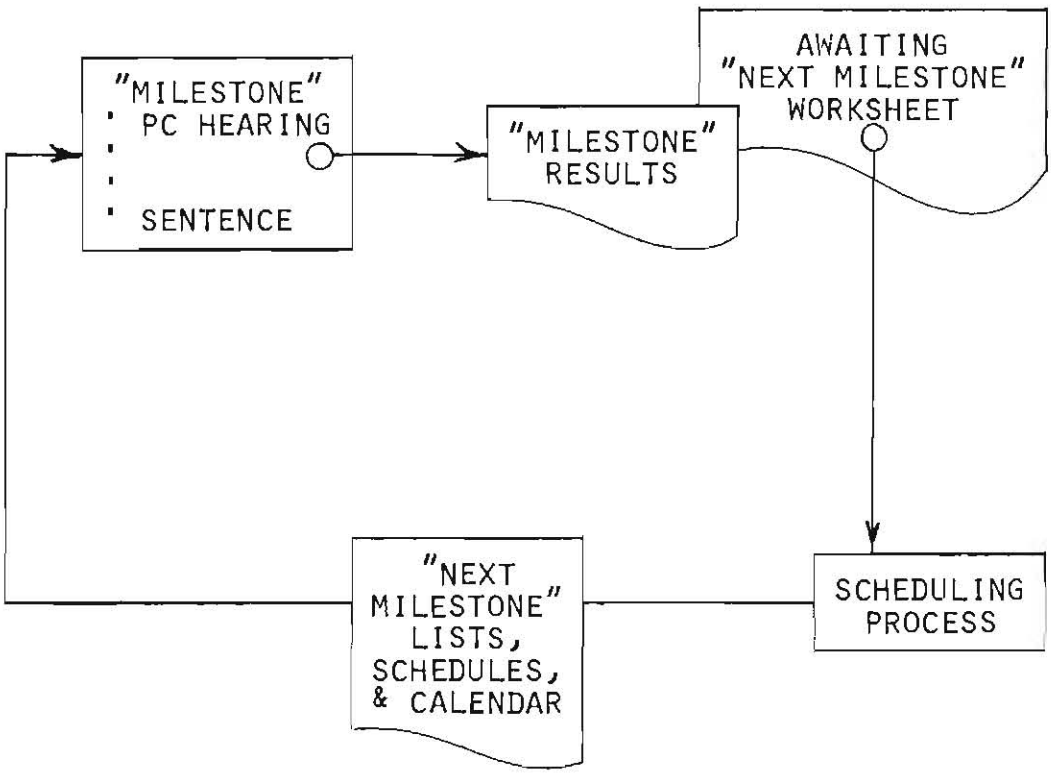
A more economic approach is to consider "ports" to the computer dialed by telephone line. Eight ports might adequately serve some 20 users with a low probability of blocking. In this type of operation, a user would dial the computer over the County telephone system and would then occupy a port for the duration of his inquiry-response or data entry. If more than eight users then requested service, the last users would be blocked until one of the eight released a port.

Use of certain existing or planned County terminals such as the Magnetic Card Selectric Typewriter are also economic when the total spectrum of applications is considered. Excellent hard copy for reports can be produced on these terminals. When not connected to the computer, these can be used for normal or power typing functions.



SIMPLIFIED MILESTONE CHART OF CRIMINAL CASE PROCESSING

FIGURE 1



CYCLE OF MILESTONE SCHEDULING AND REPORTING

FIGURE 2

TABLE 1

REPORTS AVAILABLE FROM SYSTEM

PROBABLE CAUSE WORKSHEET
PROBABLE CAUSE RESULTS
GRAND JURY WORKSHEET
GRAND JURY REPORT - BILLS
GRAND JURY REPORT - NO BILLS & D
GRAND JURY REPORT - ACTIVE
GRAND JURY REPORT - INACTIVE
ARRAIGNMENT WORKSHEET
ARRAIGNMENT LIST - PLEAS
ARRAIGNMENT LIST - DEFERRED
TRIAL SCHEDULE WORKSHEET
TRIAL LIST - JUDGE AND SEQ NO
TRIAL LIST - COURT RESULTS
MOTIONS - JUDGE AND SEQ
SENTENCE WORKSHEET
SENTENCE LIST - BY JUDGE
JAIL/BAIL STATUS LIST
RELATED DP CHARGES
MUNICIPAL JAIL LIST
TIME ELAPSED REPORT
INDICTMENT LABELS
DEFENDENTS IN FILE - ALPHA ORDER
DEFENDENTS IN FILE - CTY-ID ORDER
N.J. STATISTICS
RETRIEVAL FUNCTION
DEFENDENTS HISTORY REPORT

DEFENDANT'S INFORMATION

TABLE 2

DEFENDANT'S NAME
PERMANENT COUNTY-ID
AKA (MULTIPLE)
ADDRESS
SPOUSE
EMPLOYER
FATHER
MOTHER
DATE OF BIRTH
BIRTHPLACE
RACE
SEX
SOCIAL SECURITY NUMBER
MARITAL STATUS
STATE BUREAU ID NUMBER
FBI NUMBER
ATTORNEY
ATTORNEY'S ADDRESS
SURETY COMPANY
SURETY ADDRESS
CHARGES (MULTIPLE)
ARREST DATE
MUNICIPALITY ARRESTED
MUNICIPAL DOCKET NUMBER
COURT DISPOSITION REPORT NUMBER
COUNSEL TYPE (PUBLIC DEFENDER, PRO SE)
JAIL/BAIL STATUS
BAIL AMOUNT
PROBABLE CAUSE DATE
PROBABLE CAUSE RESULTS CODE
PROSECUTOR DOCKET NUMBER
ASSOC. INDICTMENTS & COMPLAINTS
DETECTIVE/INVESTIGATOR
GRAND JURY RESULTS CODE
INDICTMENT CHARGE
WARRANT/SUMMONS FLAG
INDICT DATE SUMMONS/WARRANT SERVE
INDICTMENT SERVICE CODE
ARRAIGNMENT DATE
PLEA CODE
RETRACTION INFORMATION
MOTION INFORMATION
COURT PERSONNEL FOR EACH MILESTON
TRIAL RESULT CODE
TRIAL DATE (BEGAN)
TRIAL DATE (TERMINATED)
SENTENCE DATE
SENTENCE TERM
INSTITUTION
SENTENCE FINE
SENTENCE PROBATION
POST SENTENCING INFORMATION

48294

COURTRAN: A MODULAR MANAGEMENT INFORMATION AND RESEARCH SYSTEM FOR COURTS

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INTRODUCTION

COURTRAN is the name given to a computer software system designed by the Federal Judicial Center to provide information support services for court management and for study and evaluation of court procedures and processes. Major features of the system are a language designed to handle court transactions, modular programming, an expandable file structure, and modifiable external dictionaries and tables for information elements. There are four versions of COURTRAN: criminal operational, criminal research, civil operational, and civil research. Each of these is a variation of the basic COURTRAN system using the techniques described herein.

The characteristics of the system were dictated by the special requirements for its operation and the research and development mission of the Center. It was designed to be operated in federal courts, by and under the control of local court personnel, to serve local case management information needs, and to provide local data required for input to the national statistics system. The criminal operational version has been implemented in two courts, the civil operational version is being implemented in one court this fall, and the civil research version will be used for a Center research project after implementation of the operational version.

Although our purpose here is to describe how the COURTRAN system operates and the functions it performs, we believe this description will be more meaningful if the design philosophy and the considerations which shaped the objectives of the system are first explicated.

Many existing computer systems required the user to conform to the demands of technology and thus make humans the servants. We were concerned with an approach which would make technology the servant of persons in the courts, and would allow parajudicial personnel to decide both the information products of the system and the way they would interact with the system. This posture affected both the nature of the software and the process used to define the specific objectives and functions of the system. For example, we oriented the design to reflect case processes and stages in the life of a case instead of orienting it to clerical or statistics gathering processes. Thus, the system is not tied to existing record keeping procedures, but to the events which occur as criminal and civil cases progress through the courts. As a consequence, system operation results in a progressive reexamination of procedures, new insights into the information functions of court supporting operations and changes in procedures as a result of these insights.

Court administration is an inchoate discipline which may some day gain the status now given to public administration or business administration. Since a computer system for court applications should be a tool to help improve court administration one should not design such a system to be rigid and inflexible as if the final answers about the best techniques were known. There is much yet to be learned and a system should be considered experimental and should be used as a learning device as well as an operational device. It should be designed for change since change is the only certainty both in our society and in our courts.

With this general philosophy as a starting point, a participative design process – involving a design group consisting of administrative personnel from district courts and Federal Judicial Center staff members – was used to determine the types of functions which should be performed by the system and the types of products which should be provided. This is not the most efficient way to design a software system. It has all the disadvantages of the democratic process, but it also has some of the advantages. It allows the user to decide what he wants, insures practicality, and precludes many of the problems that occur when a system is designed in a technological ivory tower or when systems analysts try to impose their concept of needs on the user.

Use of a participative rather than a prescriptive approach does not change the fact that the design process for a court system will be different from more typical computer applications, where needs are clearly perceived, can be easily articulated, and can be stated with the precision necessary for automatic data processing. Normally, a special study is conducted in order to determine "requirements."

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Defining requirements is relatively easy if one is developing a system to handle accounting or bookkeeping activities or other typical business processes for which a precise set of rules and practices already exist. The situation is quite different when one attempts to define requirements for a less routinized, more dynamic set of processes. Also, the fact that the judicial system is to some extent a nonsystem creates unique problems. Supposedly, people in an organization all work to further one general objective and although there are opposing forces in existence, these are normally not intended to operate at cross-purposes. Business organizations, for example, strive for efficiency and attempt to systematize as many activities as possible to further this goal. But the administration of justice is, in some respects, inherently inefficient. The due process model is a purposive obstacle course and its inefficiency and, what some might consider its irrationality, provide major protection to individuals. The system designer has to rethink his concept of systems when he confronts courts' requirements. However, the objectives of both justice and efficiency can be served by designing software which provides better information on court transactions and case events so as to help judges and court administrative persons manage cases more effectively while identifying situations where injustices may be occurring.

FACTORS AFFECTING SYSTEM OBJECTIVES

The objectives of the COURTRAN system were shaped by the environment. The design group had to confront the hard realities of the deferred maintenance syndrome and its heritage of limited court budgets for developing and testing innovations. An objective which emerged from this consideration was that the system should not require a separate large staff of technically trained ADP people in each court. It should be operable, and its products usable, by existing court personnel. In conformance with this objective, the system was designed to simplify to the extent possible both input preparation and processing operation. Ease of input and operation is described as "transparency" to the user. This transparency, this relative simplicity, requires substantial complexity in the software design. Software complexity and user complexity are inversely related. If one designs a system which is easy to program, it will be difficult to use. If the systems specialist ducks the hard problems this merely transfers them to the user for solution. Technology then becomes the master, not the servant, of the user.

Even the largest federal courts do not now have the volume of cases necessary to support an on-site computer. Therefore, the use of rental time for both development and pilot operation was mandated. This meant the system should be designed so it could be operable on computers located reasonably close to district courts. In effect, the objective was to design a software package which could be taken to various courts and "plugged-in" to a local computer.

Although there are basic similarities, each court's needs are to some extent unique, and a realistic approach to design and implementation requires the system designer to recognize the diversity which exists among district courts. Each reflects the culture and traditions of the locality and especially of the local Bar, and this affects the specific practices and procedures of a court and creates inarticulated norms. There are also differences in the case "mix" reflecting the commercial and population characteristics of the district, differences in physical facilities, and the geographic concentration of judges. Furthermore, there are a number of different organizational structures in court clerks' offices. Each of these features causes differences in the types of information products which are most useful for administrative functions.

This diversity indicates that a rigid, completely uniform system would not serve the needs of various district courts. This is not to say that some degree of standardization is not possible. In fact, many key elements of administration are already standardized. But local operating procedures vary and a system must be able to mesh with them. Thus another system objective was that flexibility and adaptability be incorporated into the design. Like simplicity for the user, flexibility and adaptability require greater complexity in the software, more development time, and more problems for the system designer.

Another factor with which we were concerned was the cost of court studies which involve measurement and evaluation of court procedures which relate to the characteristics of cases and case events. Courts typically have limited capabilities for determining the cause of problems which may exist or for evaluating the effect of changes in procedures. Most court studies have suffered from the high costs of obtaining information from court records, the paucity of information therein and the unreliability of such data as is obtained. In fact, research project directors have often found their funds nearly exhausted by the time the data collection effort is completed. Analysis, which is the

most important part of any project, then suffers from lack of funds and lack of time. Because research is one of the missions of the Center, we established the objective that the system be a tool for both management and research.

A research project normally involves collecting information on case characteristics and event history in totality at some point in time after a case is closed. In contrast, in a system for management purposes, information related to cases and case events is captured as it is generated. A more important difference between management and research information is the greater depth usually required for a research project. Therefore, the design includes a structure which enables the handling of several hierarchical levels of information density, *i.e.*, both general data and one or more degrees of successively more detailed data. For example, one level of information density might consist of the fact of occurrence of key events in the life of a case. A more detailed level might involve more information about the characteristics of each event. Another level could involve breaking down each event into a series of subevents.[1] The capability to process different degrees of information density makes it possible to use the soft ware for a special data collection effort or to add data about event characteristics to already existing computer files thus reducing the costs of special studies and allowing them to be conducted by use of a processing technique with which court personnel are already familiar. In more typical computer software systems, the collection of additional data elements requires the system to be redefined and reprogrammed, a task which sometimes doubles the cost of the programming work when a change is required in a project.

Although there are differences among courts, there must be some degree of standardization if national statistics are to be meaningful. A core of standardization already exists in the form of the JS (Judicial Statistics) reports which are prepared monthly by each federal court and forwarded to the Administrative Office of the U.S. Courts for compilation. The totality of information included by a local court in its version of COURTRAN can be viewed as a mathematical "set." A portion of this information is required for national purposes. As illustrated in Figure 1, the data for JS reports can be considered a "subset" of the local court's data "set." Therefore, all data elements in this "subset" were standardized to conform to the requirements of JS reports. It was also decided to design the system so it would be able to automatically produce – and punch – this input. In this sense, and for this "subset" of data, the local court system is a satellite of the national system

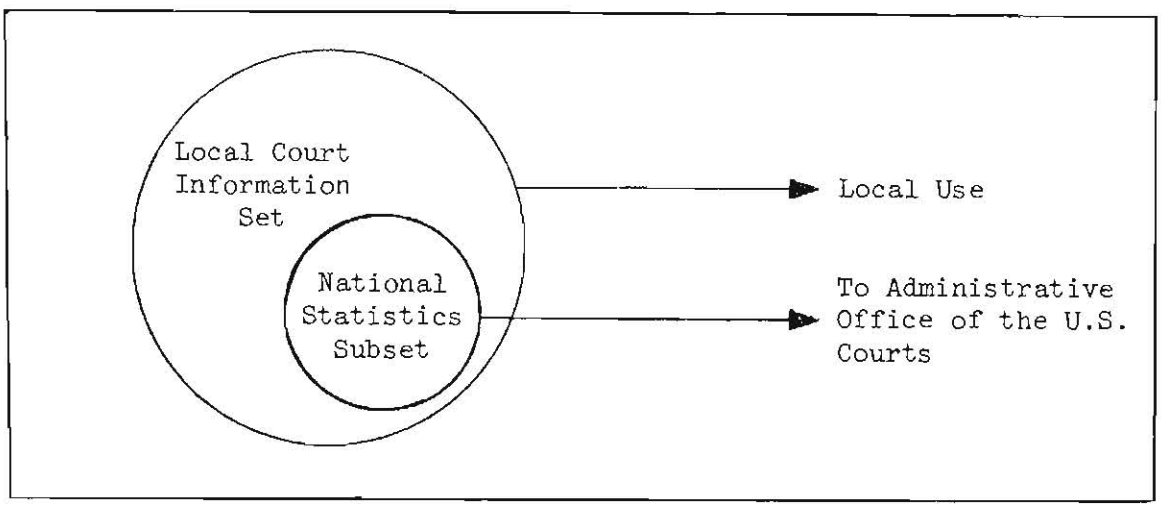


Figure 1. Local Information Set and National Subset

Because on-site equipment could not be justified, and because it was not possible to revolutionize paperwork and clerical procedures and replace the majority of manual tasks, initial priority was placed on the information and evaluation products of the system The design group did. however, establish the objective of replacing manual tasks wherever feasible or possible. Since the inception of system operation, a number of tasks previously performed manually have been replaced resulting in cost savings which exceed the cost of computer time. A given manual task was not eliminated until it was proven that the COURTRAN prepared reports were more accurate. This criterion was met in every instance where a manual task was a candidate for elimination.

One danger sometimes not recognized by either users or system designers is that the implementation of a computer system may freeze office procedures and preclude the possibility of further change and improvement. This has been the fate of many organizations which have implemented computer systems. Even though the development and implementation of a computer system usually involves significant improvement in office procedures, this change should never be designed to be a final "fix" or solution. Therefore, another objective was to design the system to be paperwork-independent so as to preclude rigidity in procedures which would limit or inhibit other administrative objectives.

The introduction of a computer system in most organizations results in the emergence of previously unperceived needs and an enhanced awareness of problems in present procedures. The anticipation of this phenomenon dictates an evolutionary approach to computer system development and implementation, and a design which enhances rather than constricts this evolutionary process. Thus, another objective was to design the system to facilitate change and evolutionary development.

There is a major trend today toward on-line systems. Although more costly, they provide more responsive and more timely services. Traditional systems are batch oriented, *i.e.*, both input and output processes are performed on a periodic basis (usually monthly, weekly or daily) by grouping all data for the period and processing it in one batch. During the interim period, many events occur and many data needs arise which must await the time of the periodic batch cycle. The period can be reduced to daily processing cycles, but even then unforeseen questions may arise. The ideal situation would involve the capability to obtain immediate response to information needs. An on-line system may provide the answer here. Therefore, another COURTRAN objective was to incorporate software design concepts which would make it possible to convert to on-line operation when a reasonable cost level is reached.

Another objective was to provide more refined court statistics. The courts have a public responsibility to achieve resolution of cases in the shortest amount of time consistent with a high quality of justice. Sometimes court statistics give a misleading impression of the effectiveness and efficiency of judges. In this sense, case statistics are often unfair to devoted, hardworking, overburdened judges. These statistics contain implicit inferences about the extent of, and the causes of, case delay. Therefore, two steps were taken to refine the present gross statistical measures. First, the system was designed to be able to account for all time periods during which the case is delayed by causes not under the control of the court. Second, the system was designed to provide statistics on a per-judge, not a per-judgeship, basis

The first objective is applicable to both civil and criminal cases. There are numerous situations in which a case is in an untriable or "limbo" status. Criminal cases are untriable, for example, when a defendant is a fugitive; when he is committed for evaluation to assist in determining competency; when a case is delayed pending disposition of another case (in which the same person may be a defendant or the disposition of which will be determinative of certain matters); or when a case is delayed pending an interlocutory appeal or an appellate decision in another case. There are other situations in both criminal and civil cases where delay may not be controllable by the court or where delay may produce a more just result. This does not refer to attorney preparation time or necessary periods for discovery (which vary according to the type of case), but to situations where court action may be deferred for a period of time when it appears this will lead to a more fair result. Where such periods can be defined by an objective standard they should be so identified and recorded by a computer system. This suggests that a more accurate measure of case processing time is the elapsed time between filing and disposition *minus* the elapsed time during which the case is in an untriable status or during which a deliberate extension of time has been provided according to a rule or standard. Thus, a generalized technique for accounting for such time periods was incorporated in the system software.

The second objective, that of maintaining case statistics on a per-judge basis, is an automatic fall-out of a localized system since the system works with actual case assignments and does not compute more active judges than are in being. Thus, the measure of output is based on the actual number of judges, not the number of judgeships.[2]

During the design period, meetings were held with members of the law and engineering faculty at the University of Notre Dame who were developing a simulation model for criminal court processes under a grant from LEAA. Their innovative study, which involved an integrated project team of lawyers and engineers, used techniques which meshed with characteristics of the COURTRAN design. Their experience confirmed the usefulness of the event-oriented approach to software design and led to the establishment of another objective, *viz.*, the ability to produce direct input for the Notre Dame LEADICS simulation model. With this capability, it will be possible to simulate changes in court processes without the extensive and expensive data collection and conversion efforts which have often plagued model simulation projects.

Our final objective was derived from developments in the Congress and the Judicial Conference Committee on Criminal Rules relative to speedy trials. Although there have been several Bills introduced in the Congress and several tentative versions of a proposed new Federal Criminal Rule, each contained some similar features. These were: preparation of a plan for prompt disposition of criminal cases; time limits during which specified events should take place; designated circumstances which could be the basis for extending these time limits; and, a means for reporting the status of cases. Several of the system objectives noted above fit in with the principles of the various speedy trial Bills and proposed rules; but in attempting to provide status reporting and monitoring information, another feature was added to the design. This consisted of a technique for establishing "suspense" periods for each stage of a case and a technique for computer generation of notices on cases which were exceeding or about to exceed these limits. As part of the adaptability features of COURTRAN, the software design provides for a method by which each court can set its own time limits based on its plan. In April 1972, Criminal Rule 50(b) was approved by the Supreme Court. Hopefully, the features designed into the system will be such as to support implementation of this new "speedy trial" rule.

COURTRAN CHARACTERISTICS

In order to achieve flexibility and adaptability COURTRAN was designed as a modular software system. Instead of writing a series of monolithic programs which are integrated into a fixed system, the modular concept involves development of many small programs (functional "modules"), each of which has a specific function. Control programs are then prepared which put together different combinations of modules to perform each major processing function. The advantage of modular programming is that one can put together different combinations of program modules and create different systems. Also, when a change is required, it is usually only necessary to reprogram one or two modules instead of reprogramming a total subsystem. This is one of the primary techniques used to achieve flexibility and adaptability. In addition, it results in greatly reduced costs when changes are required.

Another major design characteristic is the use of external dictionaries and tables. Judges' and lawyers' names are of course different in each court, names of bondsmen and correctional institutions are different, case events are often different or given different names, and the type of reports are sometimes different. In addition, civil case events and identifying features are different from criminal cases. The use of external dictionaries and tables allows a programmer to make changes easily to the system, to adapt it to each court, and to change the types of case data which it will handle. The implication of the adjective "external" here is that a programmer can effect these changes through revisions to the dictionaries and tables without making changes in the internal programming logic.

Possibly the most unique characteristic of the COURTRAN software is the use of a transition matrix structure for defining the events – and their effects – which occur in the life of a case. Transition matrices for Markoff Chains are well known to Operations Researchers. The COURTRAN transition matrix does not have all the characteristics of a mathematical transition matrix. For our purposes it is *inter alia*, a technique for symbolically representing case events and stages and can be viewed as a simplified flow charting technique. Figure 2 illustrates a sample portion of the flow of criminal cases in a court as this might be represented in a flow chart and then illustrates the same partial flow using the transition matrix structure. This illustration is not meant to be complete, but is used merely to describe the technique.

In the transition matrix, each cell represents a transition from one stage to another or a holding action. For example, the return of an indictment or information are two events which move a case from outside the court into the pretrial stage. The pretrial stage in Figure 2 is thus defined as the period between the filing of the case and the beginning of trial, the entry to a guilty plea, or the dismissal of the case. As another example the plea of guilty represents a transition from the pretrial to the presentencing stage which on the matrix is shown as a 1,3 transition.[3] Guilty pleas can also be entered during trial, and this event is shown by the mnemonic "PG" which appears in the 2,3 cell in Figure 2. Events which are shown in the cells along the diagonal do not move the case to another stage and events in cells below the diagonal move the case "backward," *i.e.*, a return to a previous stage. (See Appendix for examples.) Some examples of case dispositions are shown in column 4. For example, the "D" in cell 1,4 indicates a dismissal which occurred during the pretrial stage. The "D" in cell 2,4 indicates a case which is dismissed after the trial began.

In COURTRAN, a matrix can be broken into as many as 14 stages. Each court can define its own stages and the mnemonics which it wishes to use. The size and structure of the matrix depends upon the degree of detail desired by a given court and the nature of the information products which it wants from the system. Our experience has shown that this technique is easier than flow charting. Also, although it is sometimes difficult to develop a coded representation of a flow chart in a computer program, it is relatively easy to develop internal program codes using the matrix structure. For example, the "PG" and "G" mnemonics shown in transition cell 2,3 are coded internally in a computer as 2,3,1 and 2,3,2. (The last digit merely designates the first mnemonic in a cell, the second, etc.) The external dictionary then tells the system software that code 2,3,1 means a guilty plea entered after the trial has begun, and that code 2,3,2 means a defendant was convicted as a result of a trial.

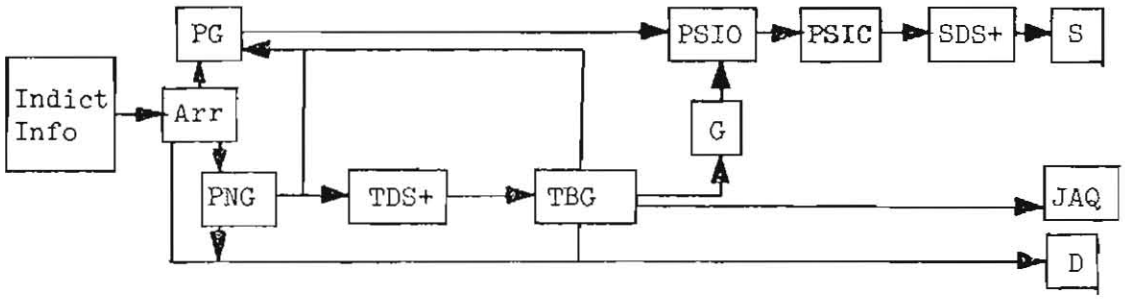
Prior to COURTRAN implementation the matrix technique is used by a court to describe and document its major procedural steps. As a result of going through this exercise, the pilot courts have found that their existing clerk's office procedures sometimes do not properly provide for all court events. Use of the matrix also shows where existing forms should be changed in order to provide more effective paperwork procedures.

Use of mnemonics is another key characteristic of the COURTRAN system. Their use greatly reduces the cost of key punching and the cost of computer processing, they are easy to learn since they are based on the word or phrase which describes the event, and they constitute the lexicon of the COURTRAN language.

Figure 3 shows a simplified system flow. The major steps of preprocessing, file updating and report generation are common to most computer systems. However, in the COURTRAN system each of the steps consists of combinations of program modules which vary from court to court and from civil to criminal applications. Every step in the flow uses one or more of the dictionaries and tables. For example, at the preprocessor stage, every event is checked to assure its validity and the type of case, name of judge and location are checked to be sure they are valid. The master file edit and update programs use the mnemonic dictionary for logical checks to assure conformance with the rules established when the matrix was designed by the court and to obtain various items of standardized data. The report generator uses the dictionaries and tables to obtain the narrative for each code, thus converting from computer-readable to human-readable symbols for printouts. Names and addresses of attorneys who practice in a given court are maintained in a separate subsystem. This requires more than a table since changes are frequently made as new attorneys appear, since that single subsystem interfaces directly with both the criminal and civil versions of COURTRAN, and since it is then available for use in systems designed to handle the engaged counsel problem. The names of assistant U.S. attorneys are maintained in a prosecutor table because addresses are not necessary, changes are less frequent, and the total number is much lower than the total number of private attorneys who may practice in a given district.

In addition to keeping track of events, COURTRAN also has provisions for scheduling information and for monitoring time periods which are established for case stages. Two scheduling mnemonics (for trial and sentencing dates) were shown in the matrix in Figure 1. As mentioned above, each court can set time limits for various stages. These limits create suspense dates and if another event has not occurred within the established time period, the case will appear on an exception report. Where a scheduling mnemonic is used, the date set for the event is punched immediately following the mnemonic. When a continuance occurs, the date to

Figure 2 Comparison between flowchart and transition matrix structure for a sample portion of a criminal case flow in a court.



	Out 0	Pretrial 1	Trial 2	Pre-Sentencing 3	Disposition 4
0		Indict Info			
1		Arr PNG TDS+	TBG	PG	D
2				PG G	D JAQ
3				PSIO PSIC SDS+	S
4					

INDICT - Commenced by Indictment
INFO - Commenced by Information
ARR - Arraigned
PNG - Not Guilty Plea Entered
TDS+ - Trial Date Set (Plus Date)
TBG - Trial Begun
PSIO - Pre-Sentence Investigation Ordered
PG - Guilty Plea Entered
G - Tried and Convicted
SDS+ - Sentencing Date Set (Plus Date)
D - Dismissed
S - Sentenced
JAQ - Judgment of Acquittal
PSIC - Pre-Sentence Investigation Completed

which the event was continued follows that mnemonic. If a hearing or trial is continued but no date is given in the order, the case will appear on an exception report after 30 days; otherwise, the case appears on an exception report only if the scheduled date has been passed and the event did not occur. In some instances, this will not be because a trial or hearing was postponed, but because there was a deficiency in clerical operations. Thus, the first check made by the clerk's office after receiving an exception report is to make sure there was no error in data capture. Therefore, this is also a method for assuring accuracy and completeness of court records.

The capability for handling several hierarchial levels of information is implemented via the use of mnemonics. For example, we originally used only one mnemonic ("D") for dismissals in criminal cases. In order to be able to distinguish dismissals because of superseding indictments from those occurring as a result of a motion by the prosecution or defense, or *sua sponte* by the court, four additional mnemonics were created: DC – dismissed by the court; DD – dismissed on motion of the defendant; DG – dismissed on motion of the government (but not because of a superseding indictment); and DS(+) – dismissed due to a superseding indictment. The plus sign following the last mnemonic indicates that the case number of the superseding case is entered with the mnemonic. This change to a more detailed level of information allows more refined statistics on dismissal rates which will show the composition of a statistic that is often available only as a gross percentage. The creation of four new elements of information is accomplished by adding the four mnemonics to the dictionary without any reprogramming or changes in the internal file structure.

Similar changes can easily be made for other data. For example, there are mnemonics which record the occurrence of a continuance. By adding the letters D and G, and thus creating two new mnemonics, data can be available which shows whether defendant's counsel or government counsel have asked for the continuance. Then, if the number of continuances is excessive, the COURTRAN output will indicate where efforts should be focussed to reduce the seriousness of the problem.

The COURTRAN preprocessor was designed for "free-form" keypunching. Initial case identification information must be entered in a fixed sequence, but the card location and the length of an item are variable. The keypuncher merely punches an item, skips two spaces, punches the next item, skips two spaces, etc. Keypunching for events occurring after a case is filed is even simpler since the system produces pre-punched cards containing the case number and defendant name and/or number. The keypuncher merely inserts the card in the machine, skips the pre-punched case identification information and punches in the mnemonic. Where several events occur for the same case, the keypuncher merely skips two spaces between each mnemonic representing these events. Experience to date has shown that training of a keypuncher requires at the most one day and this is for people who have never before seen a keypunch machine, but have had some experience with typing.

Accuracy of data has always been a problem in most court information systems and for most research projects. Therefore, the COURTRAN software contains a multitude of validation and self-checking functions to insure data accuracy. When information input does not meet a series of tests which use both the external tables and dictionaries and numerous logical routines, special messages are printed which explain the nature of the error. The system also contains complete audit trial capability so that any type of error can be traced to its origin.

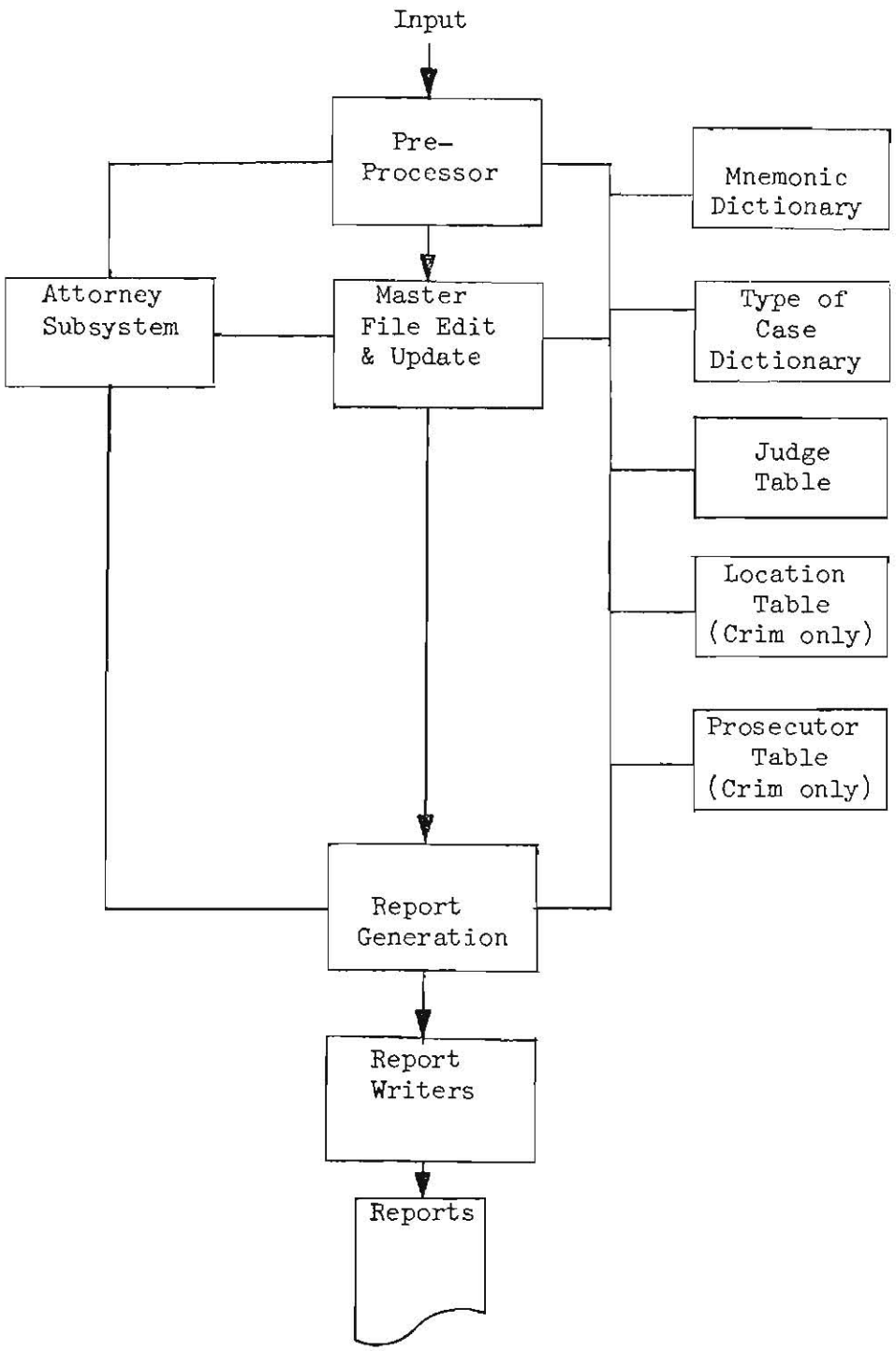
LINGUISTIC AND TECHNICAL CHARACTERISTICS

COURTRAN is, in effect, a high-level programming language which interprets and executes statements derived from source documents in the court. The linguistic structure consists of a *source* language, to be used by humans and a *target* language to be used by the computer. The COURTRAN translator converts statements in the source language into procedures defined in the target language. These procedures are then executed by the COURTRAN system.

COURTRAN source language consists of two kinds of statements: Control statements which identify for the system the input which is to follow, and source statements which provide the actual input. Control statements always begin with a dollar sign ($) followed by a keyword, and may contain one or more additional parameters.

Source statements are composed of three grammatical elements: *subjects*, which identify a unit of judicial effort; *predicates*, which state what happened to the unit; and *modifiers*, which provide differing degrees of information about a *subject* or *predicate*.

Figure 3. General Systems Flow, Civil and Criminal



The *subjects* in the COURTRAN criminal system are a case, which is identified by a docket number, and a defendant, identified by at least a name and a sequential number related to the docket number. The sequential number is "1" for the first or only defendant in the case, and "2" through "N" for subsequent defendants charged in a single indictment or information. The *predicates* consist of a series of mnemonics representing case events, or changes in bail status or defendant location. The *modifiers* provide related or additional information about a case, a defendant, or an event. Source statements must contain a subject and at least one predicate. They may contain multiple predicates and modifiers.

The COURTRAN translator parses control statements and source statements, calls into service the appropriate parts of the COURTRAN system, translates the subject into an access key and retrieves the case record, interprets predicates and modifiers, and posts events and related information to the record.

Syntax for control and source statements is defined by a table in the translator containing the minimum number of items required in the input statement, the maximum number of items permitted, a list of verification subroutines, one for each item, and a list of error messages, one for each item. Syntax for the target language is defined by the matrix of mnemonics, designed by the user, which is implemented in the system as the mnemonic dictionary of predicates and modifiers, and by modules which check the validity and consistency of interpreted statements and define housekeeping functions implicit in certain mnemonics.

Each "word" in the mnemonic dictionary is defined by a simple card input. Columns 1 through 22 of this card contain text which will appear on reports. This text may contain edit symbols which indicate to the report generator that some modifier may apply, and these symbols cause text associated with the modifier to be inserted. Columns 23 and 24 must be blank. Starting in column 25, the definition of the mnemonic appears in free form, each field separated by at least 2 blanks. The fields necessary to the definition are: (1) the mnemonic, which must be from 1 to 4 alphabetic characters, (2) a two-digit numeric field containing the matrix coordinates of the mnemonic, (3) a 1 or 2 digit hexadecimal field containing the path number associated with the mnemonic, and (4) a field defining the suspense parameter associated with the mnemonic. The suspense parameter may be an alphabetic "V", to indicate a variable suspense parameter obtained from a modifier (*e.g.*, a scheduled date), or a decimal value to indicate the maximum number of days after which a defendant will automatically appear on an exception report if no further action has occurred. A fifth definition field is optional, and identifies the kind of modifier which must or may be associated with the mnemonic (*e.g.*, a date, a related case number, or a time period). After the matrix and mnemonic dictionary have been defined, an entry may be deleted, or may be changed by entering a new definition with the same mnemonic field, or new entries may be added.

The mnemonic dictionary is used by the input preprocessor, master file editor, and the master file update program to verify that a predicate is defined, and that any required or optional modifiers are present. It is also used by the master file editor and the update program to post events, update the suspense field, and store related information. The update program also consults this dictionary in conjunction with the designated record to verify the consistency of a transaction to be posted. The report generator consults the dictionary to retrieve cases by current status, or by the occurrence of a specified event anywhere in the history of the case. The case history lister, which provides a complete event-by-event listing for all cases, uses the dictionary to retrieve mnemonics from their internal form.

MODULAR STRUCTURE:

The number of modules or basic "building blocks" is approximately 500. These can be classified, for purposes of analogy, as executives, supervisors, and clerks. Each is a separate control section with sometimes specific and sometimes very general functions. These can be combined in many different ways. One subset of these combinations is the COURTRAN criminal system, another is the COURTRAN civil system.

An example of an executive component is the control module for the input preprocessor and master file update. By inserting 2 or 3 new tables to be called into this structure, we can redefine syntax for control statements and source statements. This executive calls upon various supervisors to check grammar and syntax of control statements and source statements. After checking is completed, the executive determines whether the statement is acceptable or needs modification.

One of the supervisors called upon by the control executives for the preprocessor and the master file update is responsible for verification of all items in the statement. This supervisor has access to a series of clerk modules, each of which is responsible for detecting errors or irregularities in a specific item. The supervisor reports back to the executive the findings of the individual clerks.

An example of a simple specific clerical task is the examination of the docket number for validity. This specific clerk must be replaced if a different form of docket number is to be used. The D.C. District Court, for example, uses a number in the form 1234-72, while the Illinois Northern District Court uses 72CR1234. Obviously, the D.C. clerical routine would reject a Chicago docket number, but equally obvious, the substitution of a Chicago clerk-module at this point in the program remedies the difficulty.

REPORT GENERATION TECHNIQUES:

Report generation programs, which form an interface between the system and the independent report writer, greatly simplify the programming for additional reports. The report generator reads in, or determines from tables, criteria for selection of records from the files, extracts the required information, and explodes internal codes to text, which is then written on a file as input to an independent report writer.

The report writer itself consists of an executive program which can read in report headers from cards for one-time reports or from disk files for recurring reports, determine which report is to be written, load the appropriate formatting and printing program, and pass text records to it. The actual programming for a new report consists only of instructions to print column headers and detail lines. Subroutines are provided for printing of page headers and for page numbering.

STRUCTURE OF MASTER FILE:

The basic unit of the master file is an 88-byte record. In the criminal system bytes 1 through 5 contain a key which is used to retrieve records, bytes 6 through 8 contain control flags, and bytes 9 through 88 contain data, usually in compressed and encoded form. The record key is composed of a docket number, a sequential number called the record or defendant number which identifies defendants within the docket number, and a sequence number, which is used for control purposes, as will appear below. (See appendix for master file layout.)

Record number zero identifies the case control record which contains data pertaining to the case as a whole. Thus far, this data is confined to a single 88-byte record with sequence number zero. As the need arises, other 88-byte increments for case-related information may be inserted with sequence numbers from 1 through 255.

Records with defendant numbers 1 through 255 and sequence number 0 contain defendant names and other identification data, the current status of the defendant and a list of scheduled dates pertaining to that defendant. Following each of these records is a series of case history records with sequence numbers 1 through 255. Each record provides for the posting of 10 8-byte event blocks showing the event, date of the event, changes in defendant status or location, and the location of any pertinent related data, such as a scheduled date, or a related case number. When an 88-byte record is filled, and a new transaction is to be posted, a new increment of 88-bytes is added to the case history, and the next available sequence number is assigned.

Indexes to the master file are maintained by docket number and by case status. Other indexes can be implemented as required. When records must be added, they are first added to an overflow file, and an overflow index maintains linkage with the master file. As required, the overflow file can be merged with the master file, and the whole file reindexed.

MODIFYING THE SYSTEM:

To implement the COURTRAN processor in a new environment, the worst case involves the construction of 5 external tables and an attorney file, and possibly the writing of 3 or 4 subroutines to replace certain low-level clerical modules in the system. This worst case assumes a different case classification structure, and obviously and universally, a different list of judges and attorneys. In the best case, only the list of judges and attorneys need be constructed, but the lack of standardization from court to court makes the worst case most likely.

The mnemonic dictionary and the attorney lists can be implemented easily by card input to existing programs. At this writing, the judge list must be constructed manually, but it will soon be handled by card input.

Although the physical implementation of a new mnemonic structure is simple, it should be noted that the implementation depends on the careful definition of a matrix of events. On the surface, this appears almost trivial, but experience has shown that the User is not likely to be able to supply the necessary definition without considerable thought about the details of his procedures and the type of information he needs.

Implementation of the report generator and report writer for a new environment might well involve more programming effort than the implementation of the preprocessor. If existing report formats are acceptable, with changes only in page heading and text associated with mnemonics, practically no effort beyond that of implementing the preprocessor is required. However, if different criteria are to be used for selection of cases for reports, and the reports are to be formatted differently, some new subroutines will be needed, and a new formatting and printing program will be required for each report. Even these changes are confined to well-defined minor parts of the system, and the major part can continue unchanged.

EQUIPMENT:

The system is at present operating on a 64K IBM 360 Model 30. Required peripheral equipment is: three 2311 disk drives (or one 2314), one 9-track tape drive, one 1403 printer, and one 2540 card reader. One of the disk packs contains all object modules necessary to implement the system, while 360 assembly language is used for all programs.

COURTRAN CIVIL

Most of the examples cited in the previous sections have referred to the criminal case version of the system which was developed before detailed specifications were prepared for the civil case version. COURTRAN civil uses approximately 95% of the preprocessor, master file edit and update, and report generation software, but new report writers had to be prepared and several new modules were required for those characteristics of civil case information which are unique in comparison to criminal case information.

The same file structure is used but the contents are redefined via a revised internal control table. There is an expandable *case* record – just as in the criminal version – and there are up to 256 expandable *party* records for plaintiffs, defendants and third parties. In criminal cases, one party – the United States – is fixed, so the only party records are for defendants. Also, there are no subsidiary actions between various combinations of parties. In contrast, civil cases can involve multiple plaintiffs' filing an action against multiple defendants who, in turn, may join multiple third parties. Then, combinations of these parties may commence subactions in the form of cross-claims and counterclaims.

CIVIL CASE TRANSITION MATRIX:

The use of the transition matrix technique to define case flow and information needs is illustrated by the matrix established by the Illinois Northern District Court. The matrices for criminal cases usually reflect the exact event flow pattern. Illinois Northern uses what can be called a pragmatic structure. This structure follows the principles taught at the Federal Judicial Center seminars for newly appointed district judges. Emphasis is placed on the use of pretrial procedures and on the need to establish schedules for case management. The latter is sometimes paraphrased as "always have the case on calendar"; *i.e.,* always have a date for the completion of discovery, the preparation of a document, or for a status call, hearing or trial. In accordance with these principles, the first two columns of the civil matrix distinguish between the period initiated by the filing of the case and the time at which the case is set on a calendar.

In the first stage or column of the matrix (See appendix for the complete matrix.) the status of the case, as well as the status of all parties, may continue to be updated. The events which trigger a transition from column 1 to column 2 are all scheduling events which set a date certain for an identified step in the judicial process. The reports to be produced by the system (See appendix for samples.) reflect the columns in the transition matrix. For example, one report consists of all cases which are in the pretrial stage but do not yet have a scheduled event. This report also contains information relating to the date of filing, dates on which process was served, or unsuccessfully attempted to be served, dates on which answers to the original complaint were filed, etc. This report is used by courtroom deputies to determine the existing posture of a case so they can advise the judge when the case is at issue and ready for scheduling a positive court action.

After scheduling, the case moves to the second stage and a separate report is produced which

keeps track of all pretrial activity, scheduled pretrial events, and scheduling of the trial itself. The civil case matrix also has columns for the trial stage, dismissals, and judgments. In addition, there is a matrix column reserved for "limbo" time.

NEW MODULES:

We have already mentioned the multiplicity of parties and actions in civil cases. In civil cases, a single input transaction can affect multiple party records. New modules were required for these transactions. In the civil file structure a four-character party identifier is used. The first character identifies the generic class (plaintiff, defendant, third party). The second through fourth characters identify the specific party. It was recognized that in many cases events would occur which would require the updating of all the records of active parties of a particular generic classification, and that in such cases the data input task could easily become a burden. To resolve this difficulty, the sequence number zero input record is reserved for those transactions which are to be posted to the records of all active parties described by the generic party identifier. Thus, a transaction with a party identification of "Letter 'P' Number 'Zero' " would cause the event described by the subsequent mnemonic to be posted to the individual party record of every active plaintiff in the case. The civil system automatically keeps track of which parties are currently active, *i.e.*, not previously dismissed, so that subsequent analysis of the data on any one party will show only those transactions which occurred while he was an active participant in the case.

New modules were also developed to facilitate case monitoring and planning by courtroom deputies. This involved selecting sixteen key events for inclusion in a special case status report. This particular report tracks each next scheduled key event and the "last action" which occurred among these events. Each of the scheduled or "open" mnemonics is "closed" by designated mnemonics. For each scheduled key event, there is at least one and as many as five subsequent events which provide closure. The report then shows that the planned action has occurred or that another type of action which forecloses the need for action has occurred. Basically, the new modules required to track data for this report provide special handling which meets specific courtroom deputy needs and allows replacement of considerable manual activity on his part. The only difference between processing mnemonics for these key events and other mnemonics is the inclusion of a special flag in the master file record so the report will contain only the desired data. Some examples of key events are "DYS" for "discovery completion date set", or "PTS" for "pretrial date set", or "TA" for "trial taken under advisement", etc. Key events also appear on exception reports if their occurrence or rescheduling is not reported to the system by the predefined "closing" mnemonics.

Another aspect of the civil version which is helpful to courtroom deputies and clerk's office personnel and which also assists in effective report production is the capability to update two separate case records with a single input transaction. For example, when case B is identified as being related to case A which is already pending in the court, or as being involved in a multi-district litigation proceeding in which case A is the mother case, the entry of this fact via mnemonic in updating case B will also cause the docket number of case B to be automatically inserted in the case record of case A. When reports are produced all cases which are associated with case A are printed-out immediately below it. This can be seen by referring to civil report A in the appendix where case docket number 71C1111 has the docket numbers of all its related (daughter) cases printed immediately below.

INFORMATION PRODUCTS

Several years ago, enthusiasts were wont to claim the use of computers would revolutionize the administration of justice and make the courts models of efficiency. There was discussion about automatic calendaring systems and there were visions of the computer performing the administrative tasks now performed by judges and court administrators.

Needless to say, most of these expectations were unrealistic and were manifestations of the mythical and magical aura which often surrounds discussions about computers. A realistic appraisal reveals that both designers and users are still working in virgin territory in learning the ways in which computers can be most useful as a tool for court administration. But it is becoming clear that computers, used properly, can serve as a tool to make supporting operations more effective, can improve the types of information available for managing the business of the courts, and can provide a capability for evaluating the effects of procedures and identifying the composition – and sometimes the causes – of delay. Thus the product of this tool is usually

information in the form of printed notices, orders, subpoenas, etc. or in the form of reports. The following sections describe some of the information products which have been developed or are being developed for pilot operation of the COURTRAN system. (See appendix for samples.)

INDEXES AND INVENTORIES:

Each court maintains indexes which provide organized access to information about both pending and closed cases. COURTRAN replaces the manual effort required to produce these, adds several which it was not feasible to prepare manually, and includes additional information not previously provided. Some of these are:

1. *Party Name Indexes* – Alphabetical indexes are prepared for both civil and criminal cases. For criminal cases, this includes the type of offense, the judge, prosecutor and defense counsel and the age of the case in days. Indexes for civil cases include the type of case, the docket number, the judge and attorneys' names and the age of the case. Those indexes which include only pending cases can be considered as an inventory. Indexes which include all cases filed, both pending and terminated, can be used as permanent party name indexes.
2. *Docket Number Indexes* – These are usually produced for pending cases only. In the past, courts have prepared consolidated listings twice a year and have added monthly supplements. Now, a consolidated index can be produced monthly. This eliminates the manual effort and makes the index more usable since it is not necessary to refer to several supplements.
3. *Judge Indexes* – Since most federal courts use the individual assignment calendar system, each judge has a number of cases for which he is responsible. Indexes are prepared of each judge's cases in both party name and docket number sequence for inventory purposes. These also contain other items of information as noted above. The system also keeps track of transfers among judges and transfers to and from the Calendar or Executive Committee.
4. *Attorney Indexes* – These indexes are in alphabetical sequence by attorneys' names and list all the cases for which they are the attorney of record. In the criminal version of COURTRAN, a special prosecutor's report is prepared which lists all cases for which a given Assistant U.S. Attorney is responsible and groups these according to the judge to whom the case has been assigned. These reports have been produced for approximately one year. Indexes for defense counsel are currently being implemented.
5. *Special Indexes* – Other indexes include: an alphabetic list of all fugitives in criminal cases; all defendants currently committed; and all defendants awaiting sentence. Additional indexes can be provided according to any categorization required by the court. The user can specify the elements of information which he wants to appear on the index.

CASE STATUS REPORTS:

Case status reports are prepared for both civil and criminal cases for each judge, and for the total court. These reports are organized according to the stage and event categorization established by the transition matrix which is prepared by each court prior to implementation. Status reports include not only the last action which occurred on a case but the next scheduled dates for each case, whether this be a trial, a hearing or a due date for a report.

MONITORING REPORTS:

This type of report is used by clerk's office staff and courtroom deputies to monitor scheduled events and to assure that all necessary steps have been taken by supporting operations to provide for the occurrence of the event. Included in this type of report are "Exception Reports" which list cases for which some planned event has not occurred within the prescribed time period or on the scheduled date.

Appellate events are also included in monitoring reports. Reports on this stage start with the Notice of Appeal date, the date the record is due in an appellate court, the date a transcript is ordered from the court reporter, the date the finished transcript is filed with the district court clerk, and the date the record is transmitted to the appellate court. The appellate decision is another input which triggers notice on any district court action required.

STATISTICS:

The system also produces statistical reports showing filings and terminations (by type of disposition) for each judge and for the total court. These reports are automatic by-products of the system and replace the manual effort previously required for their preparation.

JS REPORTS:

A case opening card is automatically punched when a criminal case is filed and case opening and closing cards are automatically prepared for civil cases in the format required for the monthly JS (Judicial Statistics) reports required by the Administrative Office of the U.S. Courts for national statistics.

SPECIAL REPORTS:

The system not only produces periodic administrative reports but has an open-ended capability to prepare special reports to evaluate case processes or to test any of a wide variety of research hypotheses. The COURTRAN report generator makes it possible to retrieve any combination of event mnemonics and information on case characteristics

from the data which exists in the master file. For example, one might wish to know the difference between criminal cases in which omnibus hearings were held as compared to cases where this technique was not utilized. In this type of analysis, we look for the time between filing and trial for those cases going to trial, the time between filing and guilty plea for those cases following this route, the number and type of motion hearings, etc. The report is then in two parts, the first part consisting of data covering cases which did not involve omnibus hearings and the second part involving the same type of data for cases which involved omnibus hearings. The COURTRAN report generator produces means, medians and ranges for each time interval specified for any report. The same data can be produced in a separate part of a report with all of the non-triable and "limbo" times excluded in order to show the actual elapsed time during which the case was under the control of the court.

Using the report generator, a special report writer has been prepared which produces time profiles for cases following six different paths through the court system. These reports are modeled after those prepared for the speedy trial research project conducted by the Center last year. In courts where COURTRAN is operating, these reports can be produced as a system by-project. For these time profile reports, cases are separated into six categories, *vis.*, (1) those which resulted in trial, conviction and sentencing; (2) those which resulted in a guilty plea after a trial had begun and were subsequently sentenced; (3) those in which there was a guilty plea before trial followed by sentencing; (4) those which were tried and acquitted; (5) those which were dismissed before trial and (6) those dismissed during trial. Each of these is broken into stages which consist of the time between filing and the end of pretrial, the time between the beginning of trial and the verdict or judgment, and the time between a conviction or guilty plea and sentencing.

Time profile reports are an excellent example of the procedures used by the Center in converting research techniques into operating system capabilities. As a result of close coordination and planning, the COURTRAN system will be used by the Research Department for a similar analysis of civil cases using data collected during the summer of 1972. The COURTRAN Civil Research version will be used for this analysis. A somewhat similar report can be used for analyzing the pending caseload inventory of a court. This particular report segregates cases by type of offense and shows the age in days for each case in each category along with the mean, median and range for all cases in a given category.

Because of the flexibility of the COURTRAN software, it is possible to prepare almost any type of analysis which can be defined in terms of the case characteristics and events which exist in the file. In the civil speedy trial research project for example, we will be analyzing the nature of motion practice (types of motions, number of motions, number of hearings, etc.), the relationship between the time of setting a trial date and the total time for disposition of a case and differences between the paths followed by different types of cases.

FUTURE APPLICATIONS

Once the system versions described herein are all implemented we will be studying possible applications for magistrates' courts and appellate courts. The present criminal version starts with the filing of an indictment or information, which is the point at which a case is assigned a district court docket number. Although many federal criminal cases are "Grand Jury Originals," and therefore start at this stage, a complete information system should include events handled by U.S. Magistrates for cases where arrest, initial appearance and bail decisions occur prior to a preliminary examination and/or a binding over to the grand jury. This part of case flow will be handled by preparing a separate matrix and including it in the mnemonic dictionary. In addition, a docket number linkage will have to be included since a case is given one docket number by magistrates and is given a new docket number if and when an indictment is returned.

A version of COURTRAN for appellate courts will be relatively simple compared to the civil and criminal district court versions. An initial matrix, which includes only major events is shown in the appendix. Although initial design studies have been conducted in one appellate court, implementation of an appellate version of COURTRAN will not be seriously considered until sometime in 1973. In the meantime, the initial studies show that the present software will be directly applicable for an appellate court information system.

During the coming year, the report cycle period will be reduced to weekly and possibly daily processing. At this point in time reports are being produced once a month. Plans are also being made to link criminal and civil data for several report needs identified by the pilot courts.

During the experimental operation period, we are finding that a design which facilitates evolu-

tionary growth is paying off. Every time a new information product is introduced, it generates new insights into other system uses and the need for changes in existing procedures. Both court personnel and members of the Center staff are continuing to learn as a result of this process. Although the system was designed to be simple to operate, we were still concerned with the problems an operator in a local court might have when he was "on his own". However, we have found that software complexity has resulted in ease of operation and although there was a short debugging period, no major problems have arisen since operation began.

We can conclude at this time that the system is effective. We cannot claim any dramatic changes in the administration of justice as a result of its implementation, but there are numerous instances where the objectives of court management were facilitated by the use of the system and a significant amount of manual effort has been eliminated thus freeing-up time for more important parajudicial duties. The increasing trend of usage indicates the pilot courts are integrating the system more and more with their procedures. Our major worry at this point is that the demand will increase faster than we can provide the necessary technical services.

FOOTNOTES

1 One example which may be helpful to the reader is motion activity. A general level would consist of the fact that a motion hearing occurred. Another level would include information on the type of motion. A more detailed level would consist of the dates when each motion and reply was filed, the date of the hearing, if any, the date of the decision, and the decision by the court on the motion.

2 It should be emphasized that a national system has to use judgeships as a dividend in computing caseload per judge. Adjustments based on local situations would unduly complicate the statistical normalizing process. Also data for determination of the need for additional judgeships cannot be based on the actual number of active judges.

3 A transition is denoted with the row to column numbers. The row numbers represent the same stages listed above the columns.

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COURTRAN FROM THE USER'S POINT OF VIEW

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I would like to spend a few minutes describing the data preparation process for COURTRAN as the system exists in our court, and then I will turn to the uses of the reports.

Our court has a current criminal caseload of about 1300 criminal cases – that figure has been as high as 1600 during the time COURTRAN has been in existence. With the exception of about 250 cases in which the defendant is a fugitive or incompetent for trial, most of these cases are updated at least once per month, and many are updated several times in a given month. An update, in this framework, would be an action affecting the status of the case, the defendant's whereabouts, the identity of defense counsel, the assignment of a prosecutor, or a transfer of the case to another judge.

Thus, the data preparation involves the receipt, identification, coding and keypunching of no less than 1000 transactions, and generally about 3000 transactions per month. All of this, plus some tight control measures on input which I'll describe later on, is accomplished by a single person, whom we call a data processing assistant, and who was selected primarily on the following criteria:

1. She is knowledgeable and experienced in criminal case processing and had several years of experience in a variety of jobs in the court; so we knew she was flexible.
2. Because of her record with the court, we knew her to be a very accurate worker, with a conscientious concern for detail.
3. She is a good typist, an important consideration relating to keypunching.
4. Last, but perhaps most important, she asked to be considered for the job after observing operations from a distance for a month or so. A keen interest in this kind of work is a *sine qua non* for any system which depends for success on the efforts of a very small staff

Only limited supervision has been available to the data processing assistant once the training period was completed. In turn, she has been primarily responsible for the training of two other people who serve in a back-up capacity when she is on vacation or otherwise out of the office.

Input to the system comes from five sources:

1. Records of courtroom transactions;
2. Log of papers filed over the counter in the Clerk's Office, such as attorney appearances, return of bench warrants, orders filed but not in open court, etc.
3. Notices of transfers of cases between judges;
4. Notices of reassignments of prosecutors as well as indictment lists from the U. S. Attorney's office; and
5. Notices of completion of pre-sentence investigations from the probation office.

The only one of these five input devices that was created expressly for COURTRAN is the probation office notice – all the others pre-existed the system and the only adjustment necessary was the making of one extra quick copy of each for the data processing assistant.

I would like to digress for a moment to the subject of paperflow and computer systems. The ideal way to install a computerized information system is to first overhaul, streamline and modernize paperflow, and then computerize the contents. For policy reasons, we did not have the time to do anything with paperfow before the computer was upon us, so we designed the computer system to be paperwork-independent. We know our paperflow, which depends on blotter entries of courtroom activities, is archaic in many respects, and we will be changing it soon. The advantage of COURTRAN is that it does not freeze our present system – we can change it as necessary with the single proviso that we allow for information flow to the computer. We will, of course, move toward source data encoding in the future.

To continue with COURTRAN input: As the data processing assistant receives the data, she reads the entry, codes the transaction directly on the input document with a red pen, and keypunches the entry directly from the document. We do not use a verifier – all keypunching is sight verified and the computer program scans for errors as well. Then the data processing assistant places the punched cards in a holding file, and files the input documents for reference during the edit phases. Most input is held in an active status for three months, retired to an inactive file for nine months, then destroyed.

At the end of each reporting period (this can be monthly, weekly, or daily, depending on reporting needs), after the data processing assistant has made sure she has received and processed all input for that period, she turns the data over to an operator for entry to computer. I might add, at this point, that the system is simple enough to operate so that our data processing assistant can actually perform the computer operation herself.

As for the matter of input control, all indictments are checked against a sequential number list

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so that no indictment can be skipped and inadvertently left out of the system. In addition, the data processing assistant maintains a daily log of courtroom and office blotters, so that if a day is skipped, she can spot it immediately and check back with the courtroom clerk. Incidentally, courtroom clerks regularly submit a dated blank blotter if they had no criminal matters on a given day.

After the data has been taken by the computer operator, there are two edit phases; the first is the input-preprocessor edit, which verifies item count and identifies format errors. Since this edit consists of a listing of all input in the order in which it was placed in the holding file, with a flag on erroneous items, this listing provides an audit trail of each month's input. After errors found in the input edit have been corrected, the update program provides an error listing of inconsistent and invalid transactions. These are resolved, generally by telephone between the operator at the computer site and the data processing assistant at the court. Reports are then printed, transported to the court, and distributed to users. The turnaround period can be as short as 24 hours if there is a small number of errors, or at the outside, 72 hours.

Once the reports are in the hands of users, what happens to them? There are a wide variety of uses; while I can describe quite a few in the time allotted, I'm bound to skip some. Our court is on an individual calendar system; hence we provide to each judge a status report on his cases pending trial, a list of his cases awaiting sentence, both in docket number sequence, and an alphabetical listing of all defendants in his caseload. The same listings for the court as a whole are provided to the Chief Judge, the judge who is chairman of the Calendar Committee – the body responsible for policy and practice regarding the distribution of cases – and key Clerk's Office personnel. These are, on their face, simple directories and indices; but because they show data such as identity of defense counsel, prosecutor, case status, defendant whereabouts, and the date and nature of the most recent event in the case, they can be utilized to extract the facts necessary to formulate management decisions. For example, if a particular judge has a heavy caseload with a high proportion of inter-related and protracted narcotics conspiracy cases, will his murder, robbery and burglary caseload be held back and, if so, should there be a redistribution of such cases to other judges? Does the condition of some judges' caseloads indicate that they should be given specialized assistance in caseload management by provision of special training to their law clerks, courtroom clerks or other associated personnel?

While there is a legitimate question about the quality of justice rendered when arbitrary time limits are imposed on the judicial process, the much-quoted dictum that "Justice delayed is justice denied" is still a sound working principle. In an individual calendar system there are wide differences in the length of time that judges take to dispose of cases. One of the interesting questions that can be explored through the research capacities of COURTRAN is the identification of the judges who have the most events per case, what kind of events they are, and their comparative time lapses to disposition. Such an empirical analysis may lead to some new conclusions about the effectiveness of certain judicial practices for good utilization of judicial resources.

The reports on defendants awaiting sentence show which judge has the case, whether defendants were adjudged guilty by plea or verdict, whether or not they are undergoing some kind of specialized pre-sentence evaluation such as for Youth Corrections Act eligibility or a psychiatric evaluation, and how long they have been awaiting sentence. These data can be used by the court to project needs for additional probation officers, to detect regular peaks in sentencing caseloads if peaks do exist, and as a factual basis for the court's discussions with corrections officials on mutual problems. Incidentally, before COURTRAN, there was no such listing of defendants awaiting sentence available anywhere in the court.

There are other instances in which the court's relationship and communications with other elements of the criminal justice system are enhanced by the data available from the COURTRAN reports. For example, the U. S. Marshal's office, which in the Federal courts is responsible for apprehension of fugitive defendants, requested over a year ago a special report, which they receive monthly, listing all fugitive defendants in alphabetical order. A recent defendant-by-defendant check of their monthly fugitive list disclosed fifteen names on which the Marshal's warrant squad had no record. A docket check on those fifteen revealed that the Marshal's office had mislaid the records of thirteen bench warrants, and that in the two other cases, the defendants were actually fugitive but through a slip-up in the Clerk's Office no bench warrants had ever been issued. Score: fifteen fugitives from justice that nobody was looking for. In this as in other instances, the COURTRAN system proved more

reliable than other information available, and the ability to isolate particular classes of information made the checking process much faster and easier.

While the U.S. Attorney's office, the federal prosecutorial agency, receives a full set of almost all COURTRAN reports, we also produce a specialized set of reports designed expressly for their needs. From these prosecutor reports, they can determine which prosecutors are assigned to which pending cases, how many cases a given prosecutor has and before what judges, how old each prosecutor's caseload is, what it is made up of, and what status each case is in. Information that can be derived from the reports includes, among other data, each prosecutor's batting average by type of offense or by judge, data that can assist the U. S. Attorney in making effective personpower utilization decisions within his office.

There is a local felony court in the District of Columbia that shares with the Federal court a sizable defense bar. The Superior Court and the Federal Court are in the process of adopting the same identically numbered master file of active attorneys admitted to practice in D. C., the result of a cooperative effort by the two courts and the staff of the unified bar of the District of Columbia. While we do not at this writing have the capacity to look at our caseload in terms of each defense counsel's pending calendar, we will have that capacity very shortly. Since a single agency, the Public Defender Service, is responsible for coordinating the appointment of publicly reimbursed counsel in both courts, as well as providing its own lawyers for part of the caseload, the ability of the two court-based computer systems to interface on defense counsel and provide joint information to the Public Defender Service should prove highly useful to all three. The reports being planned can be used, like the U. S. Attorney's reports, to evaluate performance and guide the Public Defender Service in assessing training needs for appointed counsel.

The Police Department's ability to update arrest data with court dispositions is improved by the inclusion of an individual defendant's identification number and the criminal complaint report number, identifying the event, in the court's disposition report. This improvement in communication is obviously of interest to a much broader clientele than the components of the criminal justice system itself.

As time passes and more and more people become aware of the possibilities of COURTRAN, we acquire more users. Besides the Clerk's Office and the judges, we now distribute reports to seven other offices in the court, and two more have indicated interest in receiving one or more of the reports or in having a report custom programmed for them. While there is always a danger with computer-based systems of churning out reams of reports that nobody uses, this does not seem to be the case with COURTRAN so far – those persons who have come and asked for reports seem to make use of them, and if the reports are late in arriving, the users are hammering at the door immediately, demanding to know where they are.

At a more mundane level, a number of costly, time-consuming and irritating clerical tasks have been supplanted by COURTRAN. Several reporting requirements of the Administrative Office of the U. S. Courts are performed in one-fourth to one-tenth the formerly required time with the help of the reports. The system prepares monthly in-house statistical analyses of criminal caseloads – an aggravating and expensive chore when done manually. The system also prints a monthly master pending calendar, eliminating a time-consuming and error-prone manual operation. The alphabetical listing of defendants puts a portable index of all pending cases on no less than sixteen desks and countertops in key areas of our large building.

Not all conceivable questions about a criminal caseload can be answered directly from COURTRAN reports; we recently did a study of all defendants in jail solely because of cases pending in our court, requiring that we identify all defendants in jail, the cases on which they were committed, which court committed them, and the length of time they had been in custody. While two of those data elements were not yet available from COURTRAN, the ability to compare a COURTRAN-produced defendants-in-custody list with another listing produced by the Department of Corrections cut the time required to perform this study to one-tenth the time needed to do it manually.

While the system was not initially designed to take over clerical operations such as notice to counsel or preparation of judgments and commitments, it can be expanded into these areas in the future. Such expansion must await increased access by the court to computer facilities, implementation of on-line operation, and a decrease in the cost of such facilities.

My seven-year-old son always saves the frosting until after he has eaten the cake – in that respect, he's like his mother. To me, the best part of COURTRAN is what I have saved until last – the

management exception concept designed into the system.

Time parameters, chosen on the basis of realism as well as the court's judgment of ideal time lapses, have been built into the system at each stage of case processing. These time limits are tailored to the needs of our court – any other court that adopted COURTRAN could determine its own parameters based on local conditions. The parameters provide the basis for a separate follow-up list of cases that have "dropped between the cracks." If, for example, an indictment has been returned and no arraignment has occurred within 20 days, the case will appear on the next follow-up list. If a scheduled date – for status hearing, trial, sentence – has elapsed and no court appearance has occurred and no continuance has been recorded, the case appears on the followup list. There have been instances in the past in which fugitive defendants have been arrested and jailed, the court's manual record system malfunctioned, and the defendants remained in jail for long periods of time awaiting a summons to court that never materialized. COURTRAN prevents that from happening by placing such cases in the exception category immediately. There are other cases in which a defendant was to have all charges dismissed at the time of sentencing of a co-defendant, everyone forgot, and the defendant lived for months under the cloud of an undisposed criminal charge. With COURTRAN, this cannot happen any more – a 90-day period of inactivity with respect to such a defendant will produce an exception report.

The followup list, which groups cases by type of exception, is printed in two ways – by judge, and as a master listing. The individual judge report goes to the judge and his staff; the master goes to the Chief Judge, the Clerk, the U. S. Attorney, the probation office, and to me. Any one of these people can get all the exceptions tracked down and reactivated before the next reporting period.

My own method of handling an exception goes as follows:

1. Check the docket;
2. Pull the case jacket and read it;
3. Consult with the courtroom clerk;
4. Call somebody – prosecutor, defense counsel, or whoever can best get the engine started again;
5. Watch the next report to see that something constructive has happened to the case.

The first four of the preceding steps are an escalating series, and often it is not necessary to go through more than the first one to obtain the desired results. Step five, checking the next periodic report, is a must for effective utilization of the system.

Whenever I consult with a judge's immediate staff, or anyone else in the court for that matter, about a specific case, I always carry the computer report with me, and I always point out that (a) my question originally arose from the COURTRAN report, and (b) it may be an error in COURTRAN and, if so, I'm anxious to see it corrected. The first point re-emphasizes the possibilities of COURTRAN for effective case management and the second point takes the staff member off the defensive. Sometimes the reason for the delay is known to the staff, but is not the sort of information that gets into a case file – such as a key witness becoming ill and causing a continuance. Often, also, the information is known to chambers but has not been committed to the court's blotter system, such as a continuance granted by phone in chambers and not placed on a courtroom blotter. Thus, the followup report can be an inducement to more complete documenting of activity.

As is true in any situation, individuals vary greatly in their responses to such prodding; some judges' staffs have picked up the ball and run with it; direct consultation with them is rarely necessary. Some judges have low caseloads and/or excellent records systems in their own offices, and for them COURTRAN's chief utility is as a doublecheck. Other staffs are simply not oriented toward administration, and don't want to be, and we accept responsibility for the followup function for these chambers at the Clerk's Office level; this is not an onerous task because it's interesting and lends a sense of immediacy to our staff functions.

We have, by the way, run a series of show-and-tell type workshops for all users in the court, to identify for them the ways in which they themselves can use the system most effectively.

Finally, the court is in the final stages of developing its plan for the implementation of the new rule 50(b) of the Federal Rules of Criminal Procedure, requiring expedited dispostion of criminal cases. While the specific details of our plan are not yet final, it is clear that the court is going to adopt some time limits from indictment to trial. COURTRAN puts the court in the position of being readily able to monitor all cases in light of these time limits, thus fulfilling one of the specific requirements of rule 50(b) for a reporting system. More important, COURTRAN can get into the act by providing listings on a weekly basis of cases

nearing the end of the time limits, thus allowing the court to make informed decisions about caseload distribution so as to comply with its own rule.

I think the most important aspect of the system is that it provides the court the basis for making informed decisions about the management of its business. While the courts are always going to be at the mercy of events beyond their control – crime rates, police arrest and charging rates, prosecutors' decisions, grand jury decisions – we no longer need to feel that all we can do is struggle blindly. Now the court is able to define what we have, quickly and accurately, and classify it in any number of ways. Out of these definitions and classifications can come new ways of managing our caseload so that justice is far less frequently denied. Our greatest challenge, in utilizing COURTRAN, is to develop and implement those new management techniques.

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SNAPSHOT - SPIN AROUND: A TECHNIQUE TO MEASURE CAPACITY AND OVERLOAD IN A PROSECUTOR'S OFFICE

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INTRODUCTION AND BACKGROUND

With the advent of the Law Enforcement Assistance Administration in 1968 and with the increasing emphasis upon systems analysis as a technique for problem solving, the concept of criminal justice as a system was defined and accepted by not only the Federal Government but by the components of state and local criminal justice agencies. By now the systems concept of criminal justice has been utilized to describe almost every problem encountered within the criminal justice system.

For the past four years, the systems analysis approach has been used to portray and measure the flow of either persons or cases through the criminal justice system: from police and arrest, through the prosecution, courts and finally into the correctional areas. At this time in 1972, it is doubtful whether there is a single person working in the criminal justice system who has not seen such flow charts delineating the entry of cases into each functional area and the exits from each of the decision making areas. For example, the number of arrests are shown on the police level, followed by the number of cases actually charged on the prosecution level (those not being charged shown as an exit), followed by the number of cases handled by the courts with the resultant disposition noted, and so forth. Figure 1 is just one example of a systems description of a criminal process.

While this flow technique is valuable and essential to the understanding of the operation of the criminal justice system, it has a major weakness. It does not give an insight into the location of bottlenecks or breakdowns within the criminal justice system. In other words, it does not pinpoint those areas which cause delay within the system – either by the police, the prosecutor, courts or corrections. Basically, by describing only the flow of cases through the system, the ability to determine areas of delay is not present.

Indeed average or median times may be calculated between the functional areas or even within the areas themselves. However, this time calculation does not necessarily indicate where delays are occurring since it does not reflect whether it is waiting time or processing time. Also, time may vary according to the complexity of the processing step.

For example, from arrest to arraignment may consume less than 24 hours of processing time, while from preliminary hearing to indictment may consume up to weeks or even months. Hence, what is needed is a definition of delay which can be interpreted by the prosecutor or a court official in a meaningful fashion.

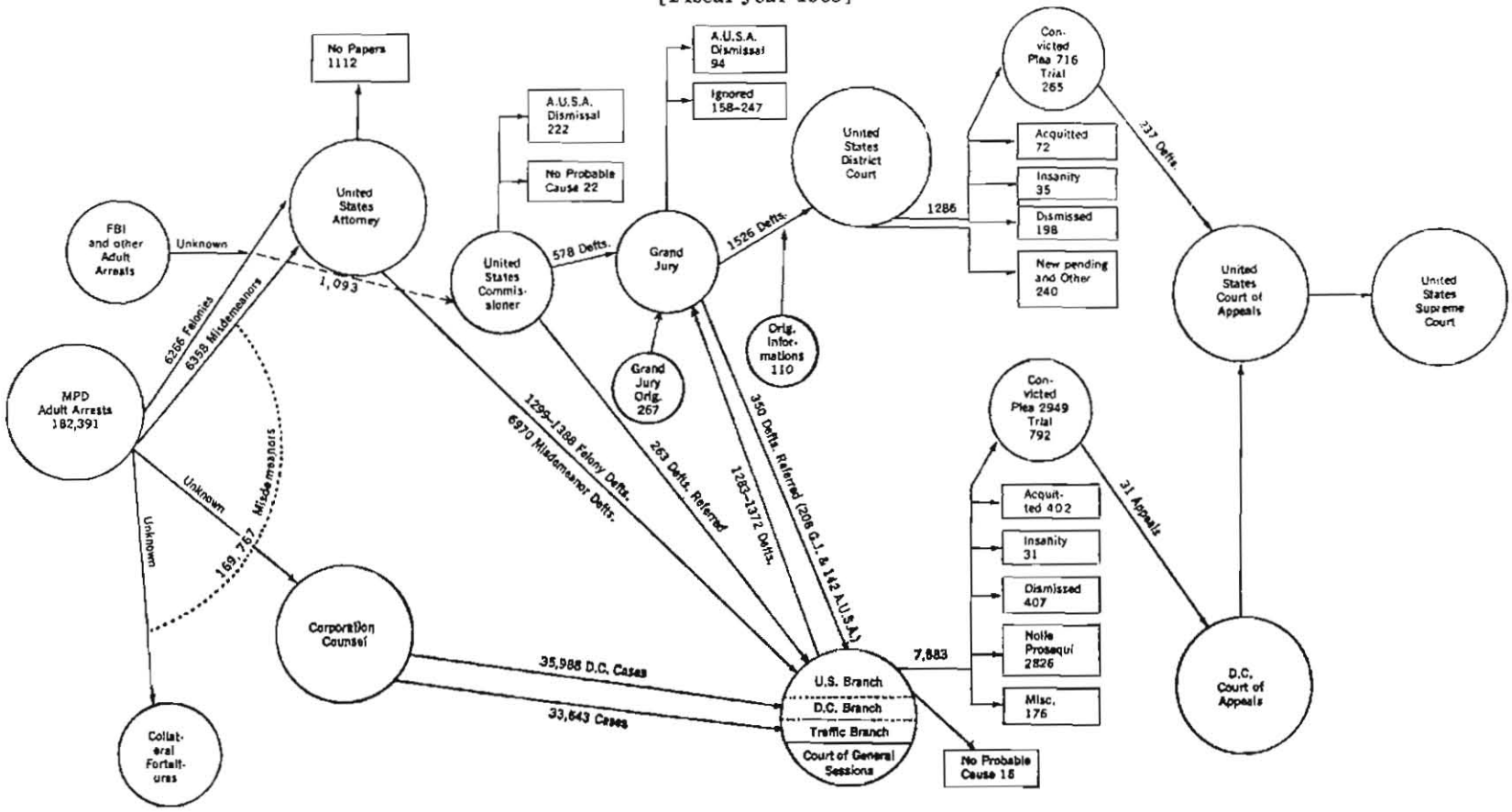
While this technique has been developed for the prosecutor, it also may be useful to the judiciary. The National Center for Prosecution Management's belief is that the prosecutor is the fulcrum of the criminal justice system and, hence, the most valuable source of information regarding prosecution or court delay. He has a vast amount of discretionary power which can be used wisely or not at all. He is the only person in the criminal justice system who knows, for example, why police arrests were reduced from a felony to a misdemeanor, why additional charges were added to a case, or why the case was disposed of prior to a court appearance.

The prosecutor's main value, therefore, lies in the fact that he is the sole source of knowledge about the processing and handling of all cases in the criminal justice system from the time after arrest through case disposition. In this regard, the technique developed and presented in this report is directed to the prosecutor, although its application to other areas of criminal justice is recognized as feasible.

The National Center for Prosecution Management is funded by LEAA through the National District Attorney's Association, National College of District Attorneys, and Institute for Court Management. Its primary purpose is to develop new techniques and principles for improving prosecution management. Hence, this technique is the result of the work performed by the National Center for Prosecution Management and is directly applicable to all prosecutors or court structures throughout the United States.

MICROFICHE

FIGURE 1.—The criminal process in the District of Columbia.
[Fiscal year 1965]



Source: Report of the President's Commission on Crime in the District of Columbia

SNAPSHOT AND SPIN-AROUND TECHNIQUE

The delay which this technique identifies is defined as those matters scheduled for action but not reached within each functional or processing area. Thus if 10 matters are scheduled for grand jury action for any given day and only 4 are acted upon, then the remaining 6 matters have been delayed.

With this definition, the concept of flow charting entries and exits was modified so that each functional area within the prosecutor's jurisdiction was identified. These areas include, for example: (1) initial screening – the point at which the police bring the arrest report and case to the prosecutor and the prosecutor determines what charges are to be filed; (2) arraignment – the point at which the defendant is brought before the court for the first time to be advised of his rights, his bail set and sometimes his plea taken; (3) preliminary hearing – the point at which the defendant appears with defense counsel before the judge and the judge determines whether there is probable cause that the defendant may have committed the crime; (4) the grand jury indictment – the point at which the grand jury hands down an indictment; (5) pre-trial conference – the point after indictment at which the defendant, defense counsel, prosecutor, and, sometimes judges, determine and identify the type of trial which will be conducted, including what motions will be made, whether a plea bargain will be obtained, etc.; and (6) the actual trial – the point at which the defendant is brought before the court for a trial either by jury or by the bench. This is only a simplified description of those functional areas within the prosecutor's jurisdiction.

Since delay has been defined as the difference between matters scheduled for action and those on which action has been taken, the measurement of the flow of cases through the system could not yield this information. Instead, what is needed is a snapshot of the prosecution/court system and its scheduled activities in each processing area over a period of time. This period of time could range from a week in high volume court systems or perhaps a month in low volume court systems.

The snapshot technique merely means that within the designated period of time all matters scheduled within the processing areas are counted and all dispositions within the processing areas are recorded. The identification of the number of cases spinning around within each processing area thereby causing system delay can be made quickly and simply. For example, if 100 matters were scheduled within a week's time for grand jury action and 45 of them were not disposed of within that week then a 45 percent spin around rate is occurring in the grand jury area. If in the next area of pre-trial conferences, 312 matters were scheduled for action during the week and 295 matters were not disposed of or received no action, then a 95 percent spin around rate can be computed. Thus, by computing just the simple proportion of the number of matters scheduled as compared to the number of matters not disposed of, problem areas can be identified quickly and simply.

The following 2 charts represent a felony processing system in a large metropolitan prosecutor's office. They have been simplified for ease of understanding so that all dispositions have been grouped together regardless of type.

The first chart shows the matters scheduled and handled from arrest through preliminary hearing. The second represents the process from grand jury to trials.

It is obvious that there is no delay problem in either the complaint room or at arraignment. However, post-arraignment procedures show the first spin-arounds. Of the 1341 matters scheduled for action in the adult post-arraignment procedure 729 or 54 percent were continued without any action being taken until a future date. Post-arraignment hearings for youth showed a similarly high percentage of cases being continued without action (58%).

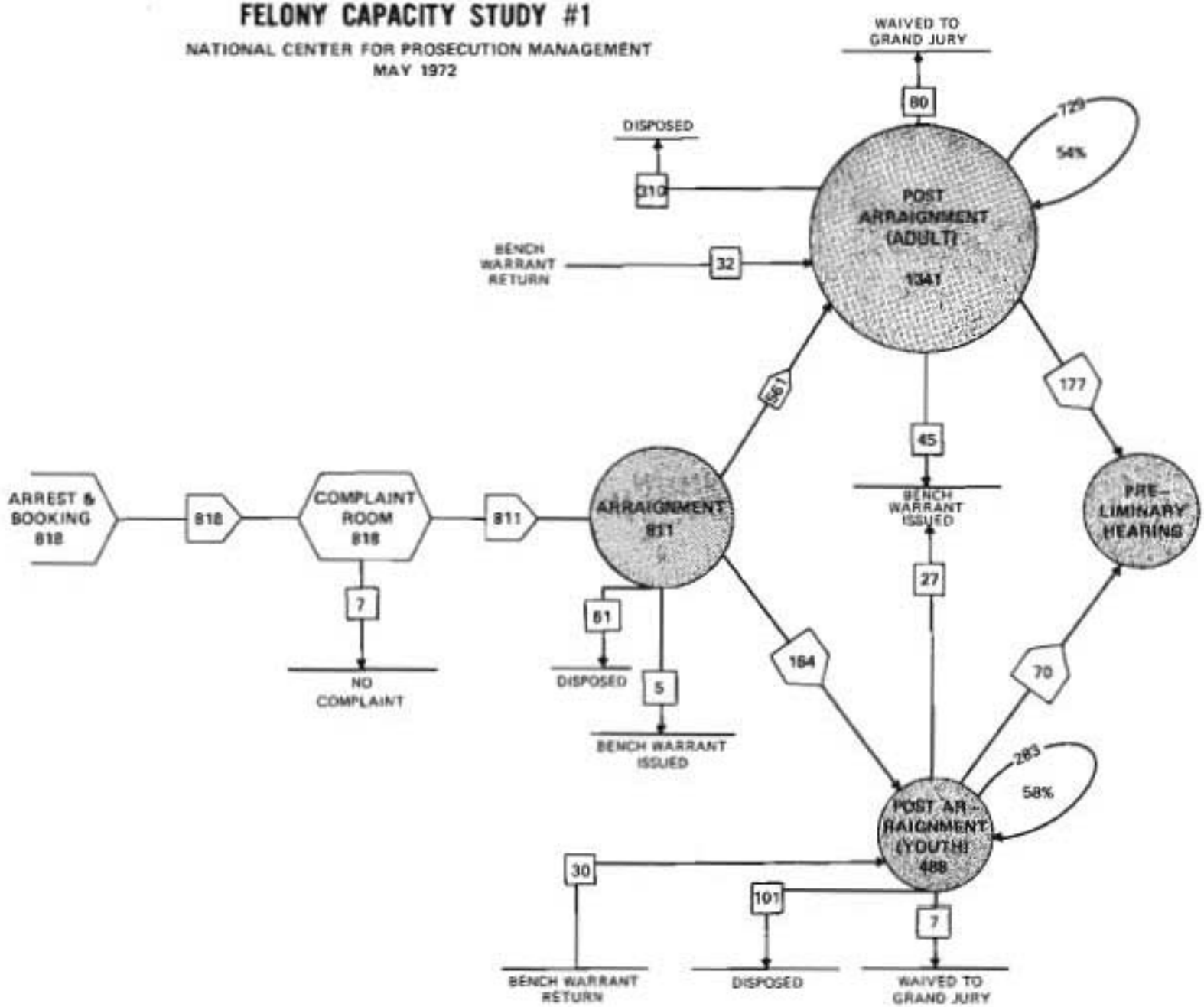
Chart two further illustrates the areas where delay is occurring. In this particular case, in one week, 522 matters were scheduled for grand jury action; 199 or 38% were not disposed of by any means but were continued into the next week's workload. Pretrial conference which should potentially speed up the court process showed a 69% spin-around rate. Finally, an 87% spin-around rate was occurring at the trials and hearings on motions level.

The implementation of this technique is simple and can be tailored to existing prosecutor and court structures throughout the United States. It merely requires collecting data for a pre-determined length of time in each one of the functional areas on the number of matters scheduled within that time period and the number of matters on which no action was taken. With this technique, the prosecutor or the court, for the first time, has a tool which identifies those areas causing him the most delay.

While the concept of the snapshot-spin around technique is basic to delay identification, additional elements need to be collected in order to

FELONY CAPACITY STUDY #1

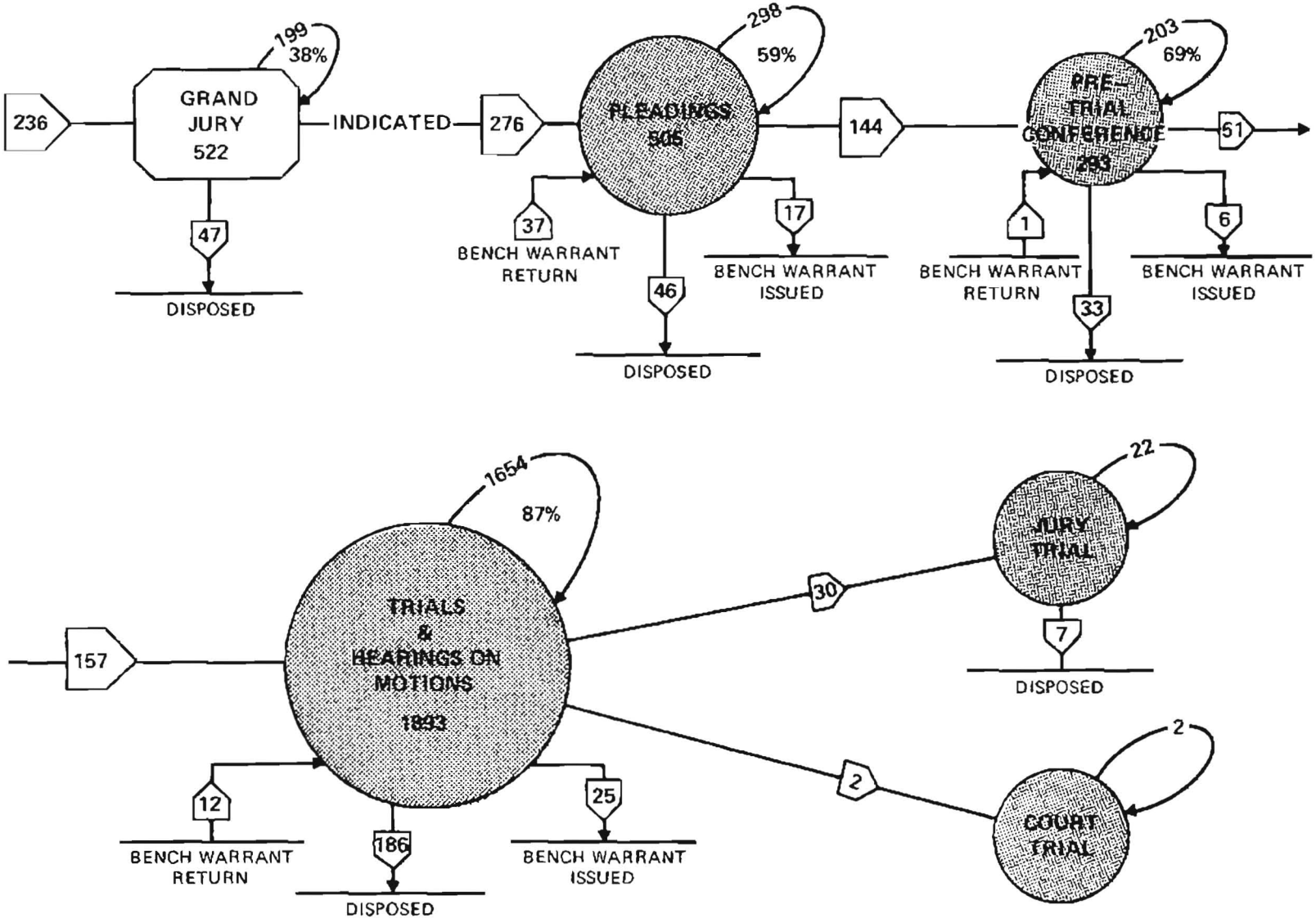
NATIONAL CENTER FOR PROSECUTION MANAGEMENT
MAY 1972



FELONY CAPACITY STUDY #2

NATIONAL CENTER FOR PROSECUTION MANAGEMENT

MAY 1972



determine the final significance of the actual delay. The first is the average length of time cases spend in the spin-around area. For example, if the average delay in the grand jury's 38% spin-around rate is two weeks, then this could be a potentially more serious problem than the 69% pre-trial conference spin-around rate with perhaps an average delay of only one day.

The second element which must be added in order to manage effectively a prosecutor's office is to overlay on the snapshot the staffing pattern of the prosecutor's office. It may well be that the staffing in certain areas could be modified and changed (perhaps only by the transfer of a clerk from one area to another) and result in reducing the delay time.

THE LIMITATIONS AND VALUE OF THE SNAPSHOT-SPIN AROUND TECHNIQUE

It should be clearly noted that this technique does not provide any answers as to why delays occur. It only identifies and proportionally distributes the spin-around areas. The next step for the prosecutor or the court personnel is to study those areas causing the most delay and to determine *why* the delay is occurring. The delay may be due to the police witnesses not showing, lack of defense counsel representation, notification procedures, understaffing, lack of trial capacity, etc. Identifying the reasons for the delay must then be the second step after the snapshot has been taken if program improvement is to be made.

The value of this technique lies in its simplicity; information is collected for only a short period of time; it is not bound by any prosecutor or court constraints; it can be done on a manual or an automated basis; and it quickly identifies areas of delay. Its most important value lies in its ability to monitor and evaluate management or program improvement. For example, a prosecutor identifies a significant delay area, the reason why the spin-around is occurring, and then develops and implements a program to reduce this delay time. At a later period in time, he can take another snapshot to determine whether his program improvement has worked or failed. If it failed, he first of all knows it and then can respond accordingly. If it has succeeded, he can measure the amount of success. This capability for monitoring and evaluating improvement programs by taking a snapshot at any given time, tremendously extends the power of monitoring and program evaluation.

Another value of this technique lies in its potential savings on management studies and the performance of relevant management improvement projects. All too often, today, consultant money and time is spent on studies of prosecutors' offices or court structures with the final product an unused report. This technique permits the rational expenditure of funds on problem areas with the specific measurable goal of reducing delay within certain areas. It moves away from a "study report" effort into a program development and implementation effort. Certainly, if the charts in this report were used for improvement by the prosecutor in this county, his major efforts would be focused on the reasons for delay in the trial area rather than the arraignment area and the subsequent development of improvement projects.

Finally, the technique provides a capability for fixing responsibility for delay on specific components within justice system. This eliminates the age old problem of "scapegoating" whereby one component blames another for delay which usually results in no action or improvment in the problem area. If nothing else, improvments can be made in communication and cooperative improvement programs.

CONCLUSION

In conclusion, this technique provides the prosecutor with an additional tool by which he can rationally manage and improve his office operations both on a professional legal level and on a clerical-support level. The ability to identify those functional areas causing delay and to fix responsibility for the causes of delay are clearly apparent. Not only can the technique be used for program and management improvement, but for budget justification, improved police and courts procedures, and improvement in all the interfaces between the various components of the criminal justice system. As a tool for reducing delay, it ultimately must assist in defining the steps necessary for improving the quality of criminal justice throughout the United States.

USING THE PROMIS TRACKING SYSTEM FOR CRIMINAL JUSTICE EVALUATION

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For many of us, the first introduction to the ideas and vocabulary of systems theory came during the early years of the space program. The mysteries of the subject quickly vanished as the excitement of countdowns and methodical checkouts of "life support systems" and "guidance and control systems" instilled an awareness of the analytical methods involved. We all became comfortable with the idea of dissecting activities into discreet components or subsystems, and, more importantly, developed an awareness of the fact that sub-systems must be intricately dovetailed in order to meet overall objectives. This initiation into systems theory was an exhilarating one because the incredibly complex space systems have worked beautifully.

Lately, we have all had an opportunity to update our knowledge of systems theory and to apply it to other areas of pressing national interest such as ecology and criminal justice. The new experience has been anything but exhilarating as the mass media daily bombards us with news of breakdowns in the "ecosystem" and in the "criminal justice system."

Unlike the space system, the criminal justice system was not conceived and built as part of a single, deliberate effort. Some components of the criminal justice system, such as trial by jury, are ancient, while other components, such as formal diversionary programs and professional police and prosecution forces, are comparatively recent additions established in response to changing needs. The significant point is that the criminal justice system components are under no less compulsion than the space system's components to operate in a synchronized fashion. This requirement is not mitigated by the fact that one system grew out of a single cohesive design and the other evolved in a somewhat less structured way.

How well, in fact, are the criminal justice components working together as a system? A subcommittee of the American Bar Association's Criminal Law Section described the situation this year in these words:

> "The American criminal justice system is racked by inefficiency, lack of coordination, and an obsessive adherence to outmoded practices and procedures. In many respects, the entire process might more aptly be termed a non-system, a feudalistic confederation of several independent components often working at cross purposes."[1]

The bleakness of this picture is aggravated by the realization that prospects for improvement are limited because the component agencies are independent of one another and not subject to the control of any overall systems manager as is the case of the space program. Even if this criminal justice system had been conceived and developed as part of one grand strategy with component agencies assigned totally compatible functions and perfectly consistent and complementary objectives, the desired system integration might soon deteriorate anyway without anyone to nurture it carefully.

The separation of powers and the procedural safeguards fundamental to our system of justice make any proposal for an authority to oversee and enforce system integration in the criminal justice field highly suspect. Anything that is done to promote system integration must be accomplished on the basis of the mutual cooperation of the constituent agencies.

Unfortunately, most of the constituent agencies in the criminal justice system today have enough to do just to survive. The blitzing pace of social change has combined with other factors such as limited resources to overtax the capabilities of police, prosecution, court, and correctional agencies. Rarely does an agency have an opportunity to step back from its own operational concerns to view itself in the perspective of the overall system.

One agency which has had an opportunity to begin to do this is the United States Attorney's Office for the District of Columbia, in its local prosecution unit, known as the Superior Court Division.

The Superior Court Division has prosecution jurisdiction for all common law serious misdemeanor and felony offenses committed in Washington, D.C.; and consequently, bears a close resemblance to a local district attorney's or state attorney's office.

In January 1971, the U.S. Attorney's Office's local prosecution unit acquired an unusually effective tool for self-evaluation: a computer-based management information system known as

PROMIS (Prosecutor's Management Information System).[2]

One of the key features of PROMIS is the ability to track the workload of the criminal court subsystem from three separate vantage points:[3]

- From the vantage point of the crime or criminal incident. This is accomplished by including in PROMIS the complaint number which the police department assigns to a reported crime. With this number, it is possible to follow the full history of the court actions arising from the crime even though those court actions may involve multiple defendants, multiple cases, and multiple trials and dispositions.
- From the vantage point of the accused person or defendant. This is accomplished by incorporating in PROMIS the finger-print-based number which the police department assigns to the individual following his arrest and which is used again by the department if the same individual is subsequently arrested. With this number, it is possible to accumulate criminal history files on offenders and to note incidents of recidivism.
- From the vantage point of the court proceedings. This is accomplished by including in PROMIS the number which the court assigns to the matter pending before it. With this number, it is possible to trace the history of any formal criminal action from arraignment through final disposition and sentencing, and to account for the separate fate of each count or charge.

The inclusion of these three numbers is very significant. The numbers provide a basis for communication among the various constituent agencies of the criminal justice system. Without them, there is no comparability of information among the agencies. This point is illustrated by a 1968 National Bureau of Standards criminal justice study[4] which pointed out the following problems in collecting data for evaluation purposes:

- Each element of the criminal justice system uses its own individual number for record-keeping.
- Alphabetical files are sometimes the only means to tie cases together among agencies. As a result, aliases, misspellings, and errors in middle initials cause search problems.
- One defendant's name appeared 124 different ways in the alphabetical files.
- No single dossier is available to tell the whole story of a defendant's passage through the criminal justice system. Different kinds of data reside in different buildings, generated and controlled by different administrations.

Indeed, attempting to make sense out of the workflow of the criminal justice system without numbers of this type is like watching a track and field relay race where the baton changes in shape and color each time it is handed over to the next runner and where all the runners are dressed identically.

The evaluative capability of PROMIS is further enhanced by the deliberate inclusion in PROMIS of explanatory data to indicate the reasons for each case event and outcome. This explanatory reason data is collected for PROMIS as a by-product of the collection of data for PROMIS's day-to-day operational support functions. For example, PROMIS not only records the dates and particulars of each case rejection, postponement, or dismissal, but also records the reason the case was rejected, postponed, or dismissed. The daily operational support functions of PROMIS, while very innovative, are not treated in this paper.

It is significant too that this tracking system is housed in a prosecution agency because the reach of the prosecutor extends from one end of the criminal justice system to the other: from the police end (reviewing the facts of the crime with the police in order to determine whether to press charges and what charges to press), to the corrections end (addressing the court at sentencing or moving to have probation or parole revoked). In between, the prosecutor directly interacts with virtually every other agency of the criminal justice system including the court, the bail agency, the diversionary program units, the official psychiatric elements, and the expert investigative authorities such as chemists.

The PROMIS data base currently consists of more than 21,000 misdemeanor and felony cases. There are 161 unique items of information stored on each case.

The 161 items of information on each case in PROMIS include the following types of data:

- Defendant data (e.g., name, alias, sex, race, date of birth, and current address. Also included are data about prior arrests, employment, and alcohol or drug abuse that are collected in conjunction with the Base Expectancy Scale developed by Professor D. M. Gottfredson).[5]
- Crime data (e.g., the time, date and place of the offense, the nature of the offense, and the number of persons involved in the offense. Also included are data about the degree of personal injury, property damage and intimidation involved in the offense. These data are collected in conjunction with the crime seriousness scale developed by Professors Thorsten Sellin and Marvin Wolfgang.)[6]
- Arrest data (e.g., the time, date, and place of arrest, the type of arrest, and the identity of the arresting police officers).
- Charge data (e.g., the original police charges, changes to the police charges by the prosecutor, and the reasons for the changes).
- Court processing data (e.g., the dates and outcomes for every court event in a case from arraignment, motion or continuance, to trial and final disposition, as well as the reasons for each court event or outcome).

The Superior Court Division has only recently had an opportunity to begin to tap the evaluative capabilities of the PROMIS data base. The three PROMIS studies briefly cited in this paper are referenced for the sole purpose of demonstrating some of the types of inquiries that are possible. The Superior Court Division has not yet had an opportunity to validate and interpret the results of these initial studies by using appropriate statistical and social research methodologies. It is important that the findings presented in these three studies be

regarded as tentative until the division is able to subject the findings to the required types of validation and interpretation.

The first study considered in this paper concerns the prosecution's relations with the police subsystem, and was designed to surface problems in the interaction between these two components. Using the PROMIS data base, a study was made of police arrest charges which failed to meet the Superior Court Division's prosecution criteria.

The sample size was approximately 10,000 cases considered for prosecution during the first eight months of calendar year 1972. The study disclosed that approximately 20-25% of all police arrest charges are totally rejected by the prosecutor, that is, not even filed with the court and that another 25% of the charges considered were modified by the prosecutor before filing with the court.

As for the reasons for the decision not to prosecute, the study revealed that in almost one-fourth of the totally rejected cases an essential element of the crime was missing. There are several possible explanations for this, including an imperfect understanding of the indicia of the crime, and failure to fully develop the facts of the event in the course of the investigation.

The study further disclosed that approximately 15% of the cases were rejected for prosecution because the complaining witness refused to prosecute. This often occurs in assault cases involving close relations or friends. Finally, the study demonstrated that approximately 5% of the cases were rejected because of a defective search or seizure.

This type of analysis can be performed on selected charges, too. For example, if gun violations become an acute local problem, the prosecutor can carefully scrutinize the intake and screening profile of gun charges and compare the results with any other group of charges.

The second study considered in this paper concerns the interaction of the prosecutor with the bail, probation and parole subsystems. This study was intended to examine the relative probability of rearrests for persons on various forms of conditional release, and to indicate the type of offense involved in the rearrest.

Using the PROMIS data base, a study was made of approximately 5,000 cases considered for prosecution during the first six months of 1972. Among the facts revealed in the study is that approximately 15% of all cases considered by the prosecutor involved arrestees who were currently on parole or probation, or free on bail.

Approximately 13% of the individuals charged with crimes against persons were on one of these three forms of conditional release when arrested. Looking specifically at arrests for crimes of assault, we find that probationers were arrested three times more often than parolees, and half again as often as persons free on bail.

As for crimes against property, we find that about 17% of the persons arrested were on some form of conditional release. Focusing on burglary, we discovered that almost 20% were on conditional release and that probationers and persons free on bail were arrested twice as often as parolees.

As for crimes against morals, the study reveals that approximately 17% of the persons arrested were on conditional release. Focusing on sexual solicitation crimes, we see that nearly 22% were on conditional release, and that probationers and persons free on bail were far more likely to be rearrested than parolees.

The third study considered in this paper concerns the prosecution of crimes in which there was a close relationship among the parties. This study was intended to examine differences in the processing of cases involving relationships between complainants and defendants, and stranger-to-stranger crimes.

Using the PROMIS data base, a study was made of approximately 6,000 cases disposed of during calendar year 1971. The study revealed that the court dismissed cases where close relationships were involved 50% more often than it dismissed cases involving stranger-to-stranger crimes. The study further revealed that of all cases tried on the merits, a finding of guilty was approximately 65% more likely for cases involving stranger-to-stranger crimes than for cases in which there was a close relationship amongst parties. These figures seem to support the movement toward decriminalization of intrafamily offenses.

These studies illustrate the relevance of research programs for operating agencies of the criminal justice system. The experience of the U.S. Attorney's Office suggests that prosecution offices, particularly those in large cities, can benefit significantly from an automated information system with a specially designed evaluative capability such as PROMIS.

Clearly, the task of nurturing system integration in the criminal justice field rests with the constituent agencies. PROMIS provides a powerful tool for detecting and diagnosing breakdowns in system coordination and integration. The United States Attorney's Office for the District of Columbia

believes that a conscious effort at improving the interaction of component agencies will materially benefit its own operations.

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THE PRACTICAL AND EFFECTIVE USE OF COMPUTERS IN SOCIAL SCIENCES AND SOCIAL SERVICES

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ACKNOWLEDGEMENTS

The Greater Metropolitan St. Louis region has been in the process of developing a regional criminal justice information system for approximately three to four years. During the past two to three years this system has definitely taken on a regional flavor. The over-all computer based information system serving criminal justice agencies is called REJIS, an acronym standing for Regional Justice Information System. REJIS has notable accomplishments in the law enforcement field. During the past two years with the planning and foresight of the judges who were assigned to the juvenile courts (Judges Noah Weinstein and Theodore McMillian) the juvenile courts of St. Louis City and St. Louis County in a joint effort, have been developing and implementing a juvenile information system called JURIS. This paper is a discussion of the JURIS System, its orientation, its objectives, its accomplishments to date and its expectations.

Juvenile courts have as a prime objective the treatment and correction of juvenile offenders. It is generally recognized in larger metropolitan areas of the country that a number of problems exist with our current juvenile system which could potentially be corrected with an effective information system that is sensitive, not only to the informational needs of the juvenile court and juvenile justice authorities, but also is sensitive to the need for developing and/or selecting more effective correctional or rehabilitative programs for juvenile delinquents. Some of the problems which have been experienced in juvenile courts are as follows:

A. Children who get in trouble are sometimes lost in the system.
B. When juvenile problems are recognized, juvenile authorities as well as social authorities do not always have the information that will advise them or assist them in determining that which should be done.
C. Unsuccessful services are often repeated and repeatedly used because the historical information relative to the success of the various treatment programs which have evolved has not been recorded and is not known.
D. Youth have been asked to provide the same information over and over again because information which has been previously given is not shared between agencies and/or different geographical localities.

The nature and scope of the JURIS Project in St. Louis is one in which the various agencies in the locality have been requested and are involved in a systematic effort to exploit the potential usefulness of computerized information systems technology in the areas of existing juvenile justice and youth service programs and agencies. It has taken into consideration the development of new services and scientific tools which can aid juvenile authorities through the use of more precise social science studies for more effective treatment and correction of juveniles.

INTRODUCTION

I believe at the outset we must recognize that the needs of juvenile courts fall into three distinct court function categories. They are:

1. Administrative activities
2. Judicial functions, and
3. Corrective functions and activities;

and that an information system that is developed must be responsive to the needs of all three of these functional activities in the juvenile court for it to be truly a management information system. Of these three, however, the most significant and important to society is the development of tools and aids which will improve the performance of the corrective function of juvenile delinquency treatment. This includes as one of the methods for improvement, the adoption of computer techniques to social sciences and social services. I think it should further be understood that although children are complex they are malleable and, therefore, a computer based system whose objective is the correction of offending juveniles must be able to measure precise changes in behavior and behavior patterns, which when analyzed and reviewed will aid in selecting action for rehabilitation. The system must also identify the "needs" of

the children so that responsible and responsive "highest probability" rehabilitation programs can be selected. These treatment programs that are selected must fulfill the needs of children and they must assist in the determination of "how to correct the child" rather than determine "why did the child go wrong." The system must capture the information necessary to evaluate the behavior characteristics of juveniles entering the system and be able to correlate these characteristics with historically successful treatment. The system must follow the child as well as a case throughout the entire system. It must follow his recidivism or his successful treatment. It must then use that information which it gathers for further sophistication and improved precision in selecting treatment programs for successful correction of juveniles.

COMPUTER CHARACTERISTICS

A. The characteristics of computers which permit effective use of these devices in social sciences and social services should be reviewed for a full appreciation of their potential and capability in this field. The significant characteristics which should be recognized are as follows:

1. *Information storage capability*—Computer systems have the ability to store significant, vast, and precise amounts of data. Inasmuch as behavior trends, behavior characteristics, and social behavior is a very, very, complex subject which has been studied for years and years by sociologists, psychologists, and social psychologists, we know that the measurement of those phenomena require extensive amounts of precise data maintained in organized form. These same scientists have concluded that human behavior is a very complex and highly unpredictable activity and that conventional and manual methods for collecting and measuring reaction and behavior have been extremely difficult.
2. *Information presentation capability*—computers can present information and data facts in printed form reports, cathode ray tube screen displays (television screen display) and voice response. The last two of these are on an immediate information retrieval and presentation basis.
3. *Computational capability*—computers have computing capability—to assist in the assimilation, analysis and presentation of social data. For example:
   a. Logic
   b. Arithmetic
   c. Objective computation and compilation
   d. Rapid handling of large volumes of data
   e. Correlation and trending
   f. Simulation
   g. Forecasting and predicting

B. Computers, although very fast and accurate, will only be beneficial to social workers if they can help in day to day activities. Some of the practical uses of computers in a social science environment are as follows:

1. *Administrative/social service information storage and retrieval.*
   a. Census of cases
   b. Indexes of registers of service capabilities
      (1) Available services register
      (2) Types of services indexes
      (3) Locations of services available
      (4) Scope of services available from various sources
2. *Social sciences*
   a. Relative ranking or grading of subjects
   b Identification of historical patterns
   c. Correction treatment selection
   d. Offense prevention

SOCIAL SCIENCE APPLICATIONS

A. The most valuable uses of computers in social sciences are in the field of social science applications because of their potential improvement effect on and for society. Those functional uses which have the greatest promise are as follows:

1. *Corrective Treatment Program selection*—the selection of a treatment program which has the highest probability of success for a given behavior profile subject. The selection of a treatment program should be the result of correlation studies made over a significant period of time and with a significant amount of data to make sure that the conclusions have been validated. This capability probably requires a form of multiple linear regression correlation analysis for assurance that all changes in pattern and trend have been taken into consideration.
2. *Program interrupt and change indicators*—the ability to recognize an ineffective treatment program that is being used on a subject and the ability to select an alternate treatment program which has a higher probability of success.
3. *Case loading*—selection of the worker or social service worker who has the best probability of correcting the offender because of his skills, experience and current case load.
4. *Research*—the ability to gain insight into the effectiveness of social correction programs and various worker approaches.
5. *Prevention*—that is
   a. Predicting where to expect offenses,
   b. Predicting how many offenses to expect in various localities, and
   c. Predicting who will be the offenders from the behavior profiles of various subjects in that locality.

   Therefore, preventive measures can be taken and, consequently, fewer correctional measures will be needed.

B. The use of computers for corrective treatment program selection and for predicting the success of treatment requires the following:

1. *Behavior profiling*—behavior profiling must be customized to demographic and geographic situations and conditions. It must also be multi-dimensional. It is our firm conviction that behavior profiling will only be effective if it is a relative measure.
2. *Correlation of subject behavior profile with:*
   a. Offender behavior profile
   b. Offender correction
   c. Treatment success or failure
   d. Counselor capability
3. *The use of correlation for treatment selection through correlated profiles and successful treatment*
4. *Measuring success*

C. Preventive Prediction--preventive prediction includes the determination through the identification of behavior profiles and environmental conditions which will permit prediction by social authorities of the following:

1. Where will offenses take place
2. How many offenders will there be in the various localities
3. What is the profile of the potential offenders and who are they
4. Pre-delinquent or pre-offense attention

D. Social impact--the social impact of the full implementation and utilization of this kind of program will be:

1. Successful rehabilitation
2. Successful correction
3. Identification of pre-offenders
4. The ability to take preventive or pre-delinquent action

ST. LOUIS REGION JUVENILE INFORMATION SYSTEM

With the concepts in mind as stated in the previous section and with recognition for the capabilities of computer systems, the St. Louis Regional Juvenile Referral Information System, JURIS, has been designed to serve the administrative, judicial and correctional activities and objectives of the court. The system objectives are coincident with and complementary to those of the court. The specific JURIS objectives, as established at the beginning of the system's design effort, are as follows:

A. To collect, store and present the activity status and performance information which will aid court management in its objectives of optimum effectiveness and efficiency.

B. To automate the repetitive clerical operations, so that:

1. The court can allocate more of its resources to correctional activity and less to paper handling and filing.
2. Employees of the court can utilize their time more constructively and effectively.
3. Procedural disciplines are established which insure complete and accurate information.

C. To provide files of information which are complete, accurate, and rapidly accessible to those who have a need to know.

D. To provide an aid or tool to the court which scientifically determines correlations between a child's characteristics, behavior, and correction history, and can thereby assist in the selection of correction programs which have the highest probability of success.

JURIS has been designed as a system composed of a series of integrated but independent subsystems or modules. Each module performs and serves a specific function, but all modules are interdependent parts of the total information system. The system is composed of seven functional modules using six information files. The seven subsystems are:

A. A file maintenance module
B. A data retrieval module
C. A referral and recommendation module
D. An administrative control module
E. A statistics reporting module
F. A counselor evaluation module
G. A correctional probability aid module

JURIS operates as a teleprocessing based system and provides each court with the on-line capability for data retrieval and for the update of dynamic information. Each court has been provided with remote batch capability for the input of volume and nondynamic data and for the production of volume output reports. The on-line terminals will produce both soft and hard copy output. The remote batch terminals produce printed hard copy output. The system is oriented to service the administrative, operational, counselor, and treatment selection and prevention activities of the court.

CORRECTIONAL PROBABILITY AID MODULE

The correctional probability aid module contains the correlation analysis programs which compute correlations between a child's characteristics and delinquent behavior, delinquent correction treatment program success and counselor type (skills, approach, etc.). The subsystem will be used for:

A. Treatment program selection--selection of the treatment program which has the highest probability of success with a child's specific history and characteristics and for which the best probability of correction can be predicted.
B. Correction program interrupt change.
C. Case loading selection of the DJO as the probability of correcting with the child because of skills and current case load.
D. Research.
E. Profile of the delinquent for:

1. Predicting where to expect offenses.
2. Predicting how much to expect.
3. Predicting who to expect, so that preventive measures can be taken and consequently fewer correctional measures will be needed.

Before getting into the behavior correlation analysis portion of the program, we should take a moment to relate a byproduct benefit that has been provided in the behavior correlation module to the juvenile courts in St. Louis for improved social service to juveniles. We have a capability which permits the booking agent or social worker on duty at the time that a juvenile is presented to the court for incarceration to determine whether

the child really should or should not be incarcerated. The technique works this way. The counselor enters a code calling up a hold/no hold mask onto the cathod ray tube screen. This mask contains a number of questions which can be answered either yes or no. As soon as all of the questions are answered, the scores are reviewed. Any positive score in any field means that the child should indeed be incarcerated and detained overnight pending an adjudication or incarceration hearing. If any difficulty is encountered the court administrator or social service worker is called. This is kind of a mundane capability, but it has proved to be extremely beneficial and fair for making detention decisions.

The treatment selection portion of the correctional probability aid module works as follows. Every child that is referred to the court has a behavior profile index rating calculated for him. This index rating is the compilation of weights and values resulting from his

1. Past offense record.
2. Personal history information.
3. Social history information.
4. Economic information, and
5. Psychological profile information.

All of the weights and characteristics for the child are carried in what we call the PESP (personal, economic, social, and psychological) file. His offense weights and history are carried in the base file of the system. All of the weights are added together to calculate a behavior profile. This behavior profile is recorded in his base record, such that all juveniles who constitute the data base for the juvenile court information system do have a behavior profile index, which is really a relative rating of social adjustment or maladjustment for the child. On a daily basis each one of these indices is arranged in matrix form and successful treatment or recidivism is calculated and measured against that matrix. The logic that we use for determining recidivism or successful treatment is as follows. If a child has stayed out of trouble, (has not had any repeat offenses) for a period of fourteen months, it is considered a successful treatment. If, however, in that period of time he has had a repeat offense, it is considered a recidivistic incident. The results of this correlation analysis which is run on a daily basis are stored in this matrix. This matrix has the treatment programs across the "X" axis and the behavior profile indices down the "Y" axis. At the intersection of each treatment program and behavior profile index, we have calculated the percent of successful correction and the percent of unsuccessful correction for those two factors. This permits inquiry into the system by a social worker who needs to make a decision relative to the best treatment program to:

1. Select for a given child,
2. Display that child's behavior profile rating, and
3. Display the twelve highest probability of success treatment programs which can be used for the child.

In the counselor evaluation file we carry all of the counselor characteristics and will in subsequent years develop the correlations which permit successful matching of counselors to behavior profile index type children.

CONCLUSION

The correctional probability aid module of the JURIS system is, in terms of scientific research, just an infant. It was developed after a significant amount of study, analysis, and determination of that which would be most beneficial for juvenile correction and juvenile rehabilitation. We cannot say with certainty that it is at this point a successful program. We can say with certainty that it is a step in the right direction—to determine through the use of the latest scientific technological capabilities along with the insight of human counseling an improved ability to correct juvenile offenders, remedy social situations and circumstances that breed and perpetuate social deviation and social maladjustment and to gain enough scientific insight and scientific fact which will allow us to predict where offenses are going to take place, how much will take place, and what the profile of the offender will be. Once we, as society, have gotten to that point (and hopefully the JURIS system will be one of the prime contributors to that universe of data) we will have developed a tremendously powerful and "social good" tool for the greater St. Louis area and for society as a whole.

What follows is a specific example of the way the CPA module operates.

TREATMENT SELECTION ASSISTANCE CAPABILITY

A. Behavior profile – weights (example)

1. Offense/record

The total of the weights of all offenses on the subject's record

Offense	*Weight*
Burglary	7
Assault	8
Runaway	2
Total	17

2. Personal, social, economic, and psychological characteristics (examples)

a. Has family had a neglect referral

	Category	*Weight*
	____ A No	0
	____ B Yes – Adjusted	2
Item	_X_ C Yes – Adjudicated	4
	____ D Yes – Multiple	8

b. Child's attitude toward current offense

	Category	*Weight*
	____ A Remorseful	1
	____ B. Frightened	2
	____ C. Neutral	3
Item	_X_ D. Indifferent	4
	____ E. Blameless	5

Behavior profile score – 17 + 4 + 4 = 25

B. Correlation Matrix

TREATMENT PROGRAMS

BEHAVIOR PROFILE		*A*	*B*	*C*	*D*	
	0 – 5	25	30	41	26	Successful
		20	25	28	52	Unsuccessful
		56	55	59	33	Percentage
	6 – 10	70	80	64	52	Successful
		35	20	48	58	Unsuccessful
		67	80	57	47	Percentage
	11 – 15	30	20	42	21	Successful
		76	80	65	47	Unsuccessful
		28	20	39	31	Percentage
	16 – 20	71	64	37	36	Successful
		11	23	59	34	Unsuccessful
		87	74	39	51	Percentage
	21 – 25	17	9	14	47	Successful
		42	28	53	29	Unsuccessful
		29	24	21	62	Percentage
	26 – 30	61	47	79	73	Successful
		12	32	9	27	Unsuccessful
		84	59	90	73	Percentage

C. Treatment Program Selection

1. Present to computer

A. Child's behavior profile

2. Computer

A. Scans matrix for the four treatment programs with the highest probability of success

Example

Behavior profile = 25

	Treatment Program	*Success Probability*
1	D	62%
2	A	29%
3	B	24%
4	C	21%

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HOW THE COMPUTER CAN AID IN KEEPING PEOPLE OUT OF THE "SYSTEM"

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ABSTRACT

A mental health administrator may typically reject institutional information systems for the following reasons: "What I need to know is how people are being *removed from*, and *kept out* of the system, as well as how they are being *put into*, and *kept within* the system." It is the conjecture of this paper that most existing Criminal Justice Information Systems measure only how people are entered into and tracked within the Criminal Justice System and that these information systems ignore the basic needs of society by not presenting the available governmental and societal alternatives aimed at keeping people out of the system. These alternatives may be appropriate at every stage of the criminal justice decision making process.

The authors of this paper contend that justice information systems can be developed to improve our society through the development of information systems that adequately present all available alternatives to criminal justice decision makers at each point in the complex process of decision making about individuals.

It can be seen that a new era for a more responsive approach to information systems design would include operational and statistical applications that:

- Demonstrate alternatives at each operational decision point in the system.
- Provide statistics that illustrate the degree to which alternatives to the usual criminal justice proceedings are utilized

We are now on the threshold of being able to trace an individual from his first arrest to final correction. An area of future interest in automation includes data systems that allow the Criminal Justice System to put into practice alternatives aimed at meeting the needs of government, society, and the individual. There is a need to avoid the automatic application of criminal justice machinery based on the naive approach of arrest-conviction-incarceration-and recidivism.

INTRODUCTION AND THEORY

Criminal Justice Information Systems (CJIS) are a subset of a system of justice, which in turn is a subset of the system of social order and society. An Administrator of the Justice System must ensure that information system designers consider the role of CJIS within the total system of society so that it does not drive the Justice System in the wrong direction.

One method for ensuring comprehensiveness of scope is the approach of applied mathematical logic aimed toward problem solving. The logic includes consideration of extremes so that boundaries are clearly understood and relevant within the context of larger systems. The applied mathematician may approach a problem according to the following procedure:

Consider the integral symbology:

$$\int_A^B$$

Where "A" implies understanding at one extreme.
"B" implies understanding at the other extreme.
"$\int$" implies the sum of understanding of all the infinitismal parts between each extreme.

When developing a Criminal Justice Information System the focus may be on two boundary problem areas:

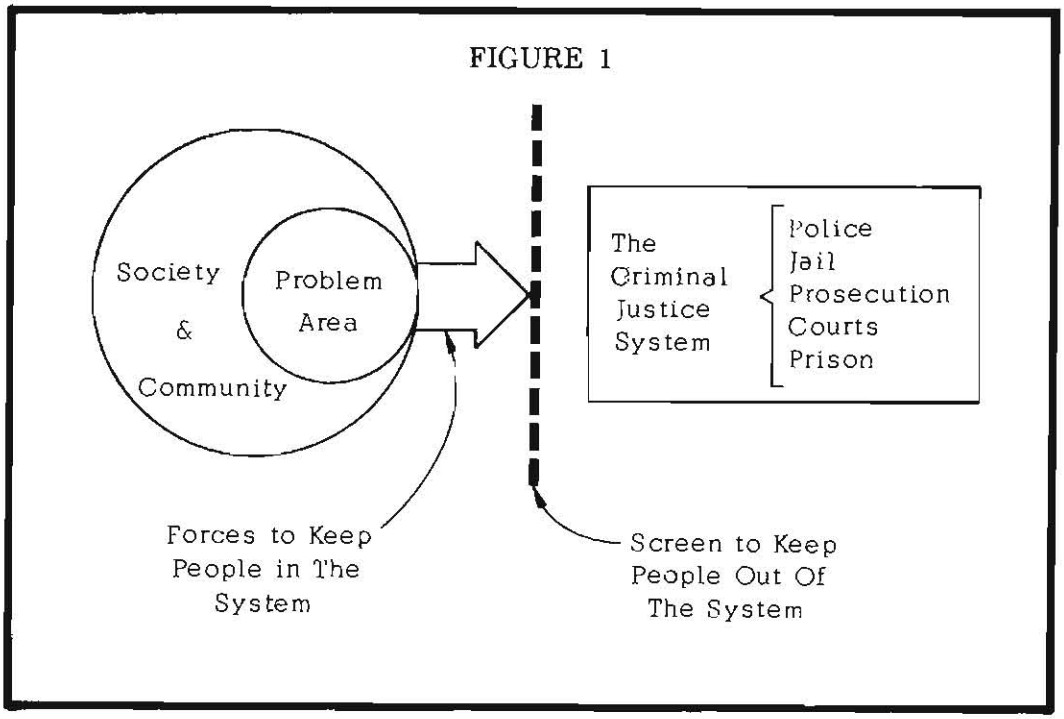
Problem "A" – information designed to keep people in the system of justice (to apprehend, prosecute, track, and remove individuals from society).

Problem "B" – information designed to keep people out of the Justice System (to prevent crimes or their recurrence, and to keep individuals free and within society).

Figure 1 is a model illustrating both viewpoints. The illustration indicates that the enlightened administrator of justice seeks to understand how the Justice System is operating to keep individuals out, as well as in the system.

MICROFICHE

FIGURE 1



MODEL TO PROVIDE TWO CLASSES OF INFORMATION

The Justice Administrator needs to know how the system is keeping people in society as well as it is keeping people in the system.

Once the boundary conditions are established, the systems analysts may approach the problem of understanding the sum of all the parts between the extremes (i.e., the $\int$), by conceptualizing and developing information systems that include the methods of feedback control. During conceptual information design stages, the analyst maintains objectivity regarding technology. The analyst does not make premature conclusions as to whether or not particular methods such as automation through the use of computers or other technologies should be used. The basic concern is toward improving *information content and flow* so that the system served by the information system can maintain its proper orientation toward higher goals.

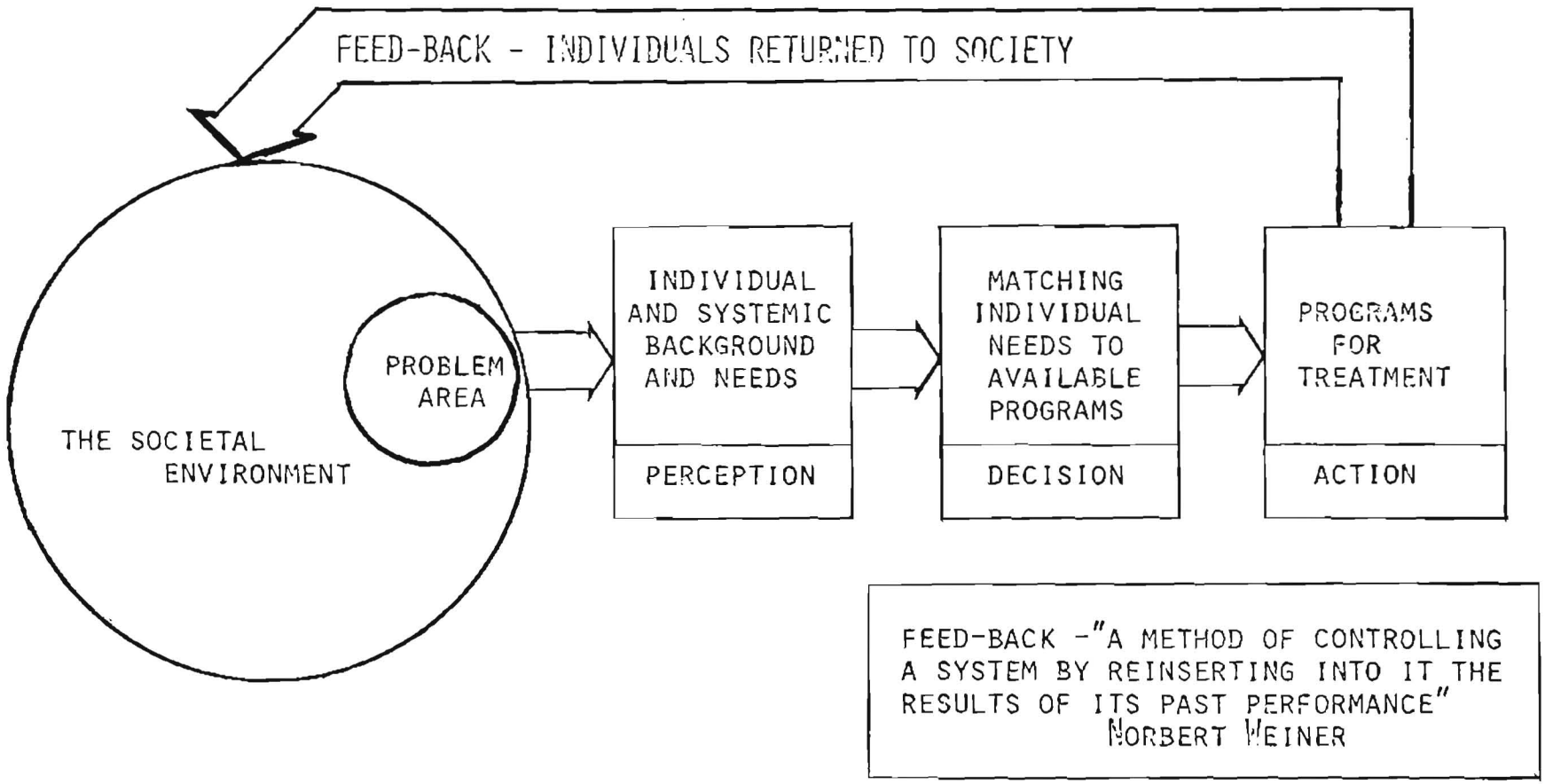
THE JUSTICE INFORMATION SYSTEM VIEWED AS A FEEDBACK MECHANISM

A Criminal Justice Information System (CJIS) can be viewed as an information system that provides for the feedback and the continuity of information flow to allow results of programs affecting individuals and society to be measured, and so that program adjustments can be based on facts rather than intuition. Figures 2 and 3 illustrate the feedback concept involving the societal environment with its problem areas, and the administration of Justice Systems need for PERCEPTION, DECISION, ACTION and FEEDBACK mechanisms.

PERCEPTION mechanisms provide informational inputs that allow the understanding of causes of crime and the gathering of facts for decision and action. In the development of facts regarding causes of crime, an objective administrator must not limit his focus to whether or not an individual adheres to regulations and laws. He must continuously look for deeper understanding of causes which may include the questioning of regulations and laws, and making recommendations for their change.

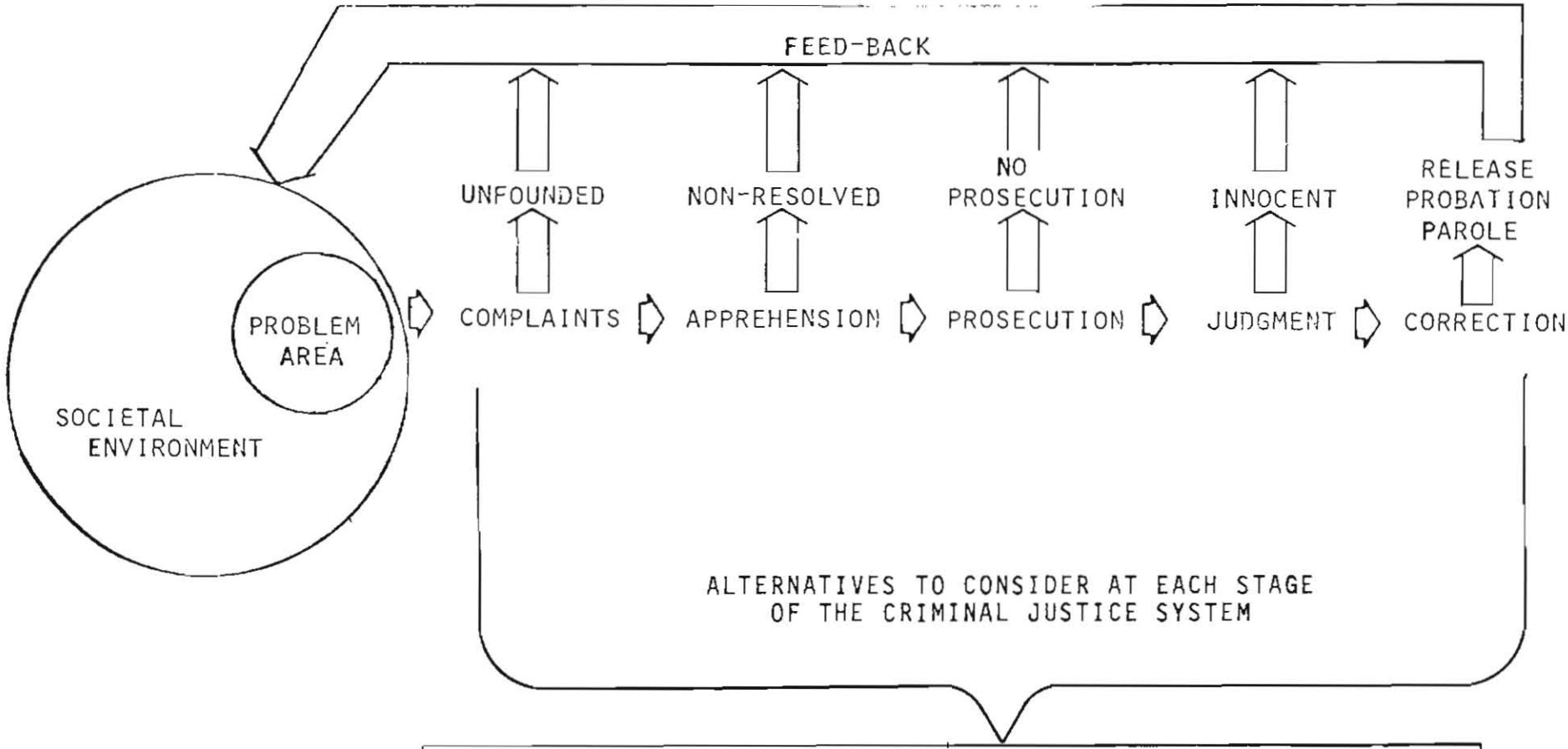
For DECISION making, several conflicting requirements must be faced in a society that cherishes individual freedom—for example, the desire to protect society from crime versus the desire to protect the freedom of individuals. In order to resolve conflicts, it is important that all rational alternatives consistent with higher goals of society and needs of the individual be presented to decision makers.

In the Justice System, there are ACTION mechanisms that operate to provide and apply resources to prevent crime and recidivism and allow individual improvements. Innovative administrators of justice will consider the application of *resources outside of the criminal justice system* as well as resources under his direct control.



THE JUSTICE INFORMATION SYSTEM AS A FEEDBACK PROCESS

FIGURE 2



ONE PURPOSE OF FEEDBACK IS TO MEASURE HOW THE SYSTEM KEEPS PEOPLE OUT OF INSTITUTIONS AS WELL AS IN INSTITUTIONS

TREATMENT MODES	
JUVENILES	ADULTS
DETENTION, PROBATION, PAROLE, PROGRAMS FOR YOUTH AND CHILDREN, FAMILY HELP, PSYCHOLOGICAL, PSYCHIATRIC, HALFWAY HOUSES, FOSTER HOMES, ...	INCARCERATION, PROBATION, PAROLE WITH RELEASE, HALFWAY HOUSES, PSYCHOLOGICAL, PSYCHIATRIC, FAMILY HELP, ...

RELATIONSHIP OF RESOURCES AND PROCEDURES TO THE CRIMINAL JUSTICE SYSTEM

In considering FEEDBACK, the entities that flow through the system are people and they eventually return to society for better or worse. Feedback is a continuous phenomenon and the performance of the *system* and its effects on individuals must be considered. As time goes on, the measure of the effect of feedback on reduction or increase of crime and crime-related problem areas in the environment can be perceived by alert perception mechanisms of the causes of crimes.

PRESENT SYSTEMS AND THE NEED FOR IMPROVEMENT

In many existing information systems (including Project SEARCH) the class of data regarding success or failure of how the system of justice had performed is almost completely lacking. This is especially true for data on institutional performance aimed at keeping people out of the system. Summarized information regarding individuals such as that illustrated in Project SEARCH demonstrations is basically pointer data which generally lacks the detail and comprehensiveness necessary for decision making about individuals and improvement of the system. This lack combined with the usual heavy work-load burdens on criminal justice decision makers may create a situation where there is a danger that this data may be used in a manner that is inappropriate.

In following paragraphs, the needs of major components of the Criminal Justice System are discussed with only hints as to how *accurate, timely and comprehensive information* can help alleviate basic problems. Candidate applications of information systems technology are suggested. The list is not to be considered complete.

Extensive research is required in order to develop a more comprehensive and fair approach to the usual "stick 'em all in jail" philosophy inherent in many Criminal Justice Information Systems.

AREAS FOR GENERAL IMPROVEMENT IN THE CRIMINAL JUSTICE SYSTEM

There are administrative similarities between the treatment of the mentally ill and the treatment of persons who may have committed crimes (offenders). This is important to administration of justice planners as history indicates that improvements in mental health treatment models often precede the treatment modes for offenders of social rules.

In the area of mental health, there has been a massive change of policy direction where the aim is toward treatment of the individual within his community rather than within an institutional setting. In many states, the old, architecturally massive and oppressive, rural institutional settings for mental health treatment are being closed or are being relegated to limited scope of utilization.

To a limited extent, this movement toward community treatment and services is happening in the area of criminal justice and the more modern methods of treatment of offenders encompass this approach. However, considerable resistance has been encountered possibly due to our present national focus on "law and order" and on the widely held notion that our society needs massive prisons and jails of archaic architecture to deter crime. This viewpoint remains in spite of the fact that most correctional administrators agree that for 80% to 95% of those incarcerated, the type of treatment that these institutions can provide is not relevant to the needs of individuals.

Although this paper is concerned with both aspects of the Justice System: Problem A – how people are kept in the system, and Problem B – how people are kept out of the system, the basic focus is toward Problem B where 80% to 95% of the individuals in institutions are *not being provided with proper treatment or services aimed toward improvement of the individual or society.*

Some of the general areas for improvement are well recognized by criminal justice administrators. They include:

- Avoidance of differential selection
- Treatment of the mentally ill
- Treatment of juveniles
- Alcoholism
- Victimless crimes
- Incarceration for family support

An important area for improvement includes the avoidance of the evils of selection for arrest and prosecution of individuals because of their social status. (See publication by Nathan Goldman, *"The Differential Selection of Juvenile Offenders for Court Appearance"*, NCCD-1963.) We suspect that the more recent programs for diverting youth (including those over the age of 18) from the criminal justice system did not evolve from reaction to differential selection. They probably evolved from the reaction to the volume of middle class youth involved with the smoking and distribution of "pot" which became so severe that the "mayor's son" was arrested. Diverting individuals from the criminal justice system now seems fair treatment, and it has the advantage of avoiding the stigmatizing of youth with labels of criminal records.

Information systems that point out differential selection may lead decision makers to greater understanding of cause of crime and allow them to improve their methods of dealing with specific cases.

The criminal justice system should include reporting systems that enhance referral to and transfer of responsibilities of treatment for mentally ill to mental health agencies. The obvious categories of mental health responsibilities that should be diverted from the criminal justice system include:

- Mentally ill – no crime involved
- Mentally ill – judged criminally insane
- Mentally ill in jails and prison population where an offense is not connected to the reason for incarceration.

The administration of justice must include recognition of special rules and laws specifically designed to provide the special services that are appropriate for juveniles and youth. This is especially true for offenses that would not be considered a crime if the individual were an adult. Development of methods for temporary care outside the law enforcement system may soon be mandatory on a nationwide basis (see Bill – S.2829 presented to the Senate committee on the Judiciary – November 9, 1971: The *"Runaway Youth Act"*).

Other areas that deserve special consideration for improvement include:

- Alcoholism and the recognition of alternatives to incarceration
- Victimless crimes. (The removal of a large portion of victimless crimes from the Criminal Justice System could relieve the system of a large burden.)
- Incarceration for family support payments. (Perhaps with more complete "women's liberation", this type of problem will be alleviated and "Family Courts" will be able to focus better as Civil Courts rather than quasi Criminal Courts.)

All of the above areas have information system needs to enhance the timely and effective performance of these general areas of improvements.

COMPONENTS OF THE CRIMINAL JUSTICE SYSTEM AND THEIR NEEDS FOR INFORMATION SYSTEM SERVICES

Information systems should always be subserviant to the system they serve. In the case of information systems for Criminal Justice, it is important to outline its components and then *in a comprehensive manner,* define needs and requirements for information.

The previous paragraphs discussed general areas of needs for information services. The following paragraphs examine possible information system use by functional components of the administration of justice such as:

- Police
- Prosecutors
- Defenders
- Sheriffs
- Courts including Juvenile Courts and pre-sentence investigation
- Corrections
- Parole and Probation

POLICE

There are several areas where police could use information systems during their decision making processes to display alternatives to the usual channels of reporting to prosecution and courts. These alternatives could allow police to avoid inappropriate reporting due to restrictive channels. Police should be allowed to dispose of cases by various means consistent with individual and societal needs. This flexibility would enhance the application of resources outside the criminal justice system. Another information system need of police is the capability to update files thus avoiding improper labeling of persons caused by unpurged or non-updated arrest records.

Police functions relating to crime (as opposed to traffic and other non-crime related functions) can be categorized according to the following:

- Crime prevention (including guard type duty and presence measures)
- Investigation
- Apprehension and arrest
- Court functions
- Youth aid.

In crime prevention, the optimal geographic allocation of police to possible crime locations is an important function. Presently existing automated information systems allow allocation of manpower to high crime areas so that police presence may inhibit further criminal activity, thus contributing to crime prevention. Associated with this are quick response capabilities that often involve extensive communications and computerized real-time information systems.

In performing investigatory functions, police use information systems that allow quick access to patterns of criminal offenses including past arrests, juvenile crime, warrants, stolen property, hot desk applications, and positive identification systems. Of importance to police in preventing crime could be reporting systems that allow investigation of such things as gang activities so that alternative methods that aim toward guiding and reorienting activities of youth may be utilized by police or

other agencies. Data regarding *exposure* of individuals (especially youth) to an environmental situation that leads to their criminal behavior, may be developed by police, so that methods could be developed to aid youth by reducing the effects of exposure factors.

In the area of apprehension and arrest, information that clearly displays alternatives to the usual criminal justice process could be of critical importance in keeping people out of the Criminal Justice System while improving society. Such alternatives include the concept of the policeman acting as a referral agent. Specific alternatives could include:

- Drug referral
- Alcohol referral
- Referrals of juveniles and youth to agencies outside the Criminal Justice System
- Referral to *Civil Courts* for "crimes against family" (i.e., family support payments).

The higher goal of police in assisting youth in keeping out of trouble deserves the attention of information system designers. All police should receive training with respect to special needs of juveniles and youth. This special knowledge should not reside only in youth bureaus. All members of Law Enforcement should have available to them the information necessary to allow utilization of alternatives that society has to offer juveniles and youth.

PROSECUTORS

In the area of prosecution, feedback on long-term results of prosecutors' decision making could improve short-term decision making. This feedback could aid prosecutors by allowing them to avoid the *win-lose* syndrome in favor of the philosophy of aiming toward understanding of *how justice is performed.*

A common complaint of prosecutors is that plea bargaining is performed according to dictates of impossible time schedules and difficult work loads. Automated information systems could improve the situation through optimized scheduling and automatic notification processes. Given the proper amount of time and the necessary information, the process of "plea bargaining" could be performed on a more rational basis and could allow greater focus on improving future performance of alleged offenders. Insofar as information systems ensure that cases are not misplaced for consideration due to paper mixups and schedule conflicts, they could tend to improve prosecutors' ability to perform with due consideration to each case.

As previously stated for prosecution, information regarding the success of previous uses of alternatives provides feedback to allow focus on more than win-lose and allows improvement of prosecutorial decision making. In cases where the individual did not respond to the alternate treatment mode, the prosecutor may then be able to suggest improvements in the alternative. For example, if individuals are not responding in a drug referral program, the prosecutor may be able to confer with program directors to find out why the program is not working and then may be able to suggest methods for improvements to, perhaps, funding authorities.

Automated systems that rank-order cases so that it is assured that most serious problems come to the attention of the prosecutors are an important contribution of the information systems community in that they tend to optimize scarce prosecutorial resources. One could, however, be concerned that subsequent increases in *efficiency* may increase conviction rates, thus creating burdens on other aspects of the system. This may be a *symptom of a lack of use of opportunities to use alternatives* that divert individuals from the Criminal Justice System due to the built in natural tendencies to give less than appropriate consideration to those cases at the bottom of the rank-ordered list.

Methods involving the rank-ordering of cases by *parameters of individuals' need for services* would be an appropriate application in a prosecutors' management information system.

DEFENDERS

The area for system improvement for the defender is similar to those of the prosecutor. They include access to more comprehensive individual histories so that the defense can suggest rational alternatives to each component of the Criminal Justice System and components of society that could be of aid to his client. We can imagine defenders reviewing successful treatment precedents to support his recommendations for avoiding sentence as well as reviewing of legal precedents that are developed to support his legal case. We now have legislative search services and perhaps treatment/search services that aid defenders in presenting positive alternatives will be an important candidate for automation.

SHERIFFS

Certain functions of sheriffs, such as jail keeping and knowledge of the whereabouts of individuals

and provision and coordination of services to the jailed to enhance their ability to remain in society thereby minimizing unnecessary time incarcerated, are also important candidates for improvements. There are many areas where jail operations can be improved if jail administrators are innovative and nurture proper community support. Of particular interest is the development of plans for new jails that include more than the usual advice of steel manufacturers.

Modern jail program administrators recognize that they should no longer operate in a passive jail keeping role and that their responsibilities lie beyond steel bars and stone walls. They recognize that funds must be carefully spent and that costs of new secure type jails (ranging from $30,000 to $50,000 per cell) must be weighed against positive programs for rehabilitation and crime prevention.

In jail administration, the discipline of Program Planning budgeting and *evaluation* systems, (PPB&ES) and associated information systems could improve the sad state of affairs in the jails in the United States.

COURTS

In court administrative areas, the natural consideration of fair treatment must include avoiding *undue* respect for the comprehensiveness and accuracy of automated criminal history records. In a recent conversation with a court administrator regarding automated systems, the observation was made that "it seems that these automated systems are designed to automatically put us all in jail".

However, with this caveat in mind, there are areas of courts and court administration where computers serve important functions of ensuring efficiency in the use of court resources. Automatic methods for scheduling and notifying many agencies and individuals can allow the judiciary branch of government to utilize its time and effort in its most important decision making functions.

Persons and agencies involved in court operations include clerks, state witnesses, bailiffs, defense council, grant juries, trial juries, state attorneys, county or state probation officers and jailers. The actions of these agencies and/or persons for courts include:

- State attorney investigations
- Probation office reports
- Prisoner movement reports
- Judicial preview of indictments
- Bail setting and release on recognizance
- Docketing
- Scheduling of defense and state attorneys
- Arraignment and pleading
- Court trial
- Court sentencing
- Mental health disposition
- State institution reception reports
- Bail accounting.

It is accepted as a basic precept that courts are the protectors of individual rights and freedoms. Care must be exercised in the planning and coordination of information systems so as not to preempt judicial decision making functions and advocacy procedures.

Information systems for judges should include feedback on results of treatment prescribed for individuals, and should present alternatives that are available in sentencing procedures. Sterile presentencing reports that display only easily formulated data will usually work to the detriment of defendants. In order to balance the situation, it is important to formalize reports that display positive aspects of the applicability of alternatives to incarceration for the individual along with objective narrative information.

JUVENILE COURTS

In the Juvenile Courts, great care must be exercised with the development of automated systems so that labeling of juveniles and youth is avoided. The reluctance of Juvenile Courts to take advantage of the capabilities of automated systems is due to the fear that ease of transmission could lead to improper use of confidential data. Use of automated systems, developed from the viewpoint of aiding judges in keeping juveniles out of the system, could prove to be a positive tool for improving juvenile justice. In the area of Juvenile Courts, the automatic presentation of the variety of assistance that may be available to juveniles is of prime importance. In all cases, special information systems technology for security protection and purging records is a requirement.

This consideration is due to the several problems inherent in labeling of youth and juveniles. Procedural and representation safeguards for juveniles should be adhered to even though they may not be required in local jurisdiction. Information systems such as those that schedule legal representation may be of assistance.

New reporting requirements regarding juvenile delinquency program effectiveness will be a significant area for designers of information systems.

PRE-SENTENCE INVESTIGATION

In pre-sentence investigations, it is important that more than the usual criminal history background data be developed. The successes and lack

of successes of an individual must be reviewed in the light of past decision making of the justice system. In the investigation process, items regarding the individual and how the justice system has dealt with him are of importance. Questions that should be answered are:

- Were expected treatment modes actually used?
- If they were imposed, were they effective?
- If they were not effective, will more treatment of the same kind be appropriate under present circumstances?
- What were the unknowns in previous reports that may show promise for effecting improvements in the individual?
- What was the level of *exposure* of the individual to experiences in the *system* and in *society* that tend to enhance his further offensive behavior?

Information systems to optimize the efforts of pre-sentence investigators could prove to be very useful in that they could allow the time for development of rational alternatives and recommendations for use by decision makers. Information could include job bank data, resources that may be made available from self-help groups, religious, family, and community assistance and assistance that may be available from a variety of government agencies.

Information retrieval system designed to extract lucid, narrative, and possibly voluminous data regarding individuals, and their environment could be useful, along with systems to aid in the scheduling of the time of investigators. It can be assured that excessive case loads of these investigators will only perpetuate the present inadequacies in classification and proper treatment of individual offenders.

CORRECTIONS

Correctional operations could be improved in several areas through the development of information systems that provide relevant information regarding their effectiveness. One of the classic problems of correctional institutions is their self-protective institutional outlook. In the development of alternatives to incarceration, correctional agencies are placing greater focus on community treatment, such as halfway houses, and other forms, and methods of integrating individuals into society.

In general, the correctional community needs to develop a *knowledge base* which can be used to demonstrate the effectiveness of alternatives to incarceration. Although well-structured institutional information systems exist to define the inmate population, institutional resources (such as cost of meals), and to some extent, criminal records of incarcerated persons, there is a need to develop systems to allow understanding of the effectiveness of correctional programs, and their later influences on individual clientele and society.

Due to the introverted character of classic correctional programs aimed at the secure and controlled warehousing of individuals, information systems that aim to measure effectiveness have been neglected. Research performed on a national basis indicates that "most prisons operate like businesses that do no bookkeeping, and remain in blissful ignorance of their gains and losses."

While there are a number of reporting systems that develop crime and offender statistics in the aggregate, they are, nevertheless, inadequate for relating correctional treatment to later activities of the individual. In this regard, the National Prisoner Statistics, the Uniform Crime Reports, and the more recent Uniform Parole Reports, as well as the Uniform Probation Reports, have not proved adequate to the task.

At present, corrections management cannot rely on programs such as Project SEARCH. Even though this project hypothesizes a computer accessible, nationwide data base, extended to include prior offenses, holding records available to be converted to active status when and if the individual once more enters the system after release, the basic thrust of Project SEARCH is oriented toward quick response requirements of law enforcement. Project SEARCH is of limited value in measuring the effectiveness of particular correctional programs.

A modern correctional administrator recognizes that he resides in a Field of Forces beyond his control that to a great extent limits his flexibility of action. These Fields include:

- Societal influences – political, economic and religious
- External policy determinants – judges, legislators and governor
- Requirements for institution internal control and maintenance.

Recognizing these influences, correctional management, in its evolution from prison boss through institutional manager and system administrator, must have a base of knowledge and research data to ensure that correctional practice is relevant to the world to which offenders are returned.

PROBATION AND PAROLE

The information system needs of probation and parole are characterized by the need to optimize their resources so that they do not need to rely on "technical violations" to reduce caseloads. Technical violations of probation and parole conditions

are a major source of pressure for incarceration. Special needs for information include data concerning social services and employment for their clientele. It is a sad commentary on the effectiveness of the system to hear of reports of incarceration due to lack of a gainful employment or provision of social services for individual clients.

Contrary to popular opinion regarding the ease by which parole for individuals can be obtained, studies have indicated that parole decision making agencies are a most conservative force that tend to keep individuals in institutions. Open hearings utilizing true advocacy procedures to help individuals to be released from institutional care are the exception in most jurisdictions.

Information and reporting needs of probation and parole decision makers are similar to the needs of police. These officers should be allowed to continually utilize all means for disposition of clientele problems and should not be restricted to incarceration as the only course of action when problems arise.

CONCLUSIONS

Areas for improvement of Criminal Justice Information Systems have been briefly discussed in the context of methods by which alternatives available to society and the Criminal Justice System can be better utilized. Information system theory relative to the way in which more comprehensive information systems can evolve has been explained in terms of how policy aimed at the intelligent phasing out of the massive and oppressive institutional care philosophy can effectively be performed.

One of the first research problems that should be undertaken is to develop measures of expected performance of alternatives so that decision makers can be more secure in their recommendations. The problem of measurement is therefore to define the levels of success/failure of various programs in terms of:

- The performance of the clientele
- The performance of the organization that serves the clientele.

Once these measures are defined, the problem can be resolved into one of development of the mechanisms by which relevant data are displayed to decision makers so that the principles of adaptive management may be applied.

SESSION II C

CORRECTIONS INFORMATION AND STATISTICS

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In introducing this series of papers it appears appropriate to emphasize some of the points raised in earlier presentations at this conference and show how the concepts of management information systems interrelate with those crucial points.

First there has been a heavy emphasis upon Offender Based Transaction Statistics. While a large part of activities in that framework relates to arrests, detentions, and other activities related to law enforcement, it should be clear to all that the offender also is exposed to a number of "transactions" during that period covered by corrections. On probation, he may undergo a variety of kinds and levels of supervision; within institutional settings, he may participate in a number of different kinds of programs of varying length and intensity; and, on parole, he may again be handled under a wide array of procedures. The capturing of data about these many actions or events is essential if comprehensive knowledge is to be accumulated about what is happening to individuals in the correctional segment of the criminal justice system.

Second, a number of speakers have stated the need for goals and objectives in overall operations, in programs and in individual projects. Often the goals are translated into objectives so general in nature that it is difficult to determine whether they have been achieved or not. But what is equally unfortunate, even in those cases where objectives have been clearly delineated in specific, practical and measureable terms, the available data sources are so undeveloped that again progress toward objectives cannot be assessed.

Drawing on these two major emphases, the importance of Corrections' information and statistics system can be seen. When administrators, supervisors and project planners reach the stage where objectives are clearly stated in observable and measureable terms, the information and statistics systems must be ready to supply data for evaluation. The papers that follow suggest that the capability is being developed, the job can be done, that answers about progress and effectiveness can be provided.

48298

PHILADELPHIA PRISONER INVENTORY SYSTEM

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INTRODUCTION

The COJINT (*CO*mbined *J*ustice *I*nformation *N*etwork over *T*erminals) Committee is a subgroup of the Philadelphia Regional Planning Council under the Pennsylvania Governor's Justice Commission.

Based on the recommendation of a consultants' study, and with the aid of a $250,000 LEAA Discretionary Grant, the COJINT Committee formed an implementation unit of the COJINT Project, and funded the expansion of the Police Department and Courts' computer installations. These actions were the first steps toward the goal of the COJINT Project, namely the establishing in Philadelphia of a combined, coordinated, comprehensive criminal justice information system. This system will provide immediate availability of stored information and rapid entry of new information for every agency of the City involved in the criminal justice process.

PRINS (Prisoner Inventory System) has been designed and implemented to provide accurate and current information on all prisoners in the Philadelphia County Prisons (the Detention Center, Holmesburg, and the House of Correction). This information is in the form of a computerized data base resident on the Courts' S/360 Model 40 Computer. It is accessed through remote terminals by all agencies of the criminal justice system. PRINS was selected as the first COJINT project because of its value to all of the criminal justice agencies as well as its feasibility within the hardware and personnel resources available to the COJINT Project. PRINS caused very few procedural changes and no organizational changes.

THE SYSTEM OVERVIEW

The three prison reception centers batch the information that they receive on individuals and periodically forward this information to the Chief Registrar's Office. This information consists of the Commitment Form, the Extract of Police Information Form, and the Bail Certificate. As the information is received at the Registrar's area several computerized records are created or updated by keying the appropriate information into the on-line terminal. The operator who is keying in the data must first identify himself to the system as part of a security procedure designed to protect the information stored in the system. He is then instructed by the computer as to the data required and the format with which the data must be entered. The fact that several different data files, both shared by the Courts and Prisons, as well as unique Prison files will be created or updated does not matter to the operator. The operator is concerned with entering data. Editing features are incorporated in the system to notify the operator of keying mistakes. Such editing indicates omitted critical data, or data fields that should be all numeric and are not, etc.

Each of the Criminal Justice Agencies may make general (no security) inquiries into the PRINS Data Base. The type of prisoner information that can be retrieved on-line includes: location, bail, charges, and reception data. In addition to general information, the prisons have the capability of making sign-on type inquiries (SECURITY PROCEDURE REQUIRED) to obtain confidential information on prisoners like physical description data, psychological data, and gang affiliations.

PRINS is designed to be used on an IBM 360 DOS system with the IBM macro language, FASTER Multi-Thread. All terminals are under control of the FASTER Monitor.

PRINS consists of several data bases residing on DISK, direct access storage devices. They are as follows:

1. A *Phonetic file* which consists of the imprisoned individual's name, police photo identification number, charge, and holding commitment number
2. A *Master file* which consists of elements relevent to an individual's physical description, personal information, activity status, location, special indicators (relative to physical and psychological characteristics for handling purposes in penal institutions) and other classification information.
3. A *Case (Commitment) file* which consists of information relevent to each unique commitment of an individual.
4. A *Logging file* which contains a history of each day's activity. This serves as an audit trail of daily activities and a source of statistical information.
5. A *Statistics file* which contains current inmate population statistics.
6. A *Security file* which contains a list of valid terminal operators who can access security information.
7. *Translation files* which are used in the conversion of input data to system codes and vice versa.

MICROFICHE

NON-SIGN ON TRANSACTION DESCRIPTIONS:

There are various levels of general information which can be accessed without signing on.

PRINS provides the terminal user with three general inquiry facilities. The screen formats are:

Name Search Inquiry. Using the incarcerated person's name, this transaction will provide the operator with a list of the individual's Police Photo Number, commitment number, charge, location, and full name.

Master Inquiry. Using the incarcerated individual's Police Photo Number, this transaction provides the individual's full name, commitment number, reception date, reception time, charge, location, race, sex, and prison institution number.

Commitment Inquiry. Using the incarcerated person's photo number this transaction will provide the terminal operator with the following information:

Full name
Photo number
Commitment number
Prison number
Charge
Reception Date
Reception time
Source of commitment
Class Code
Method of release
Release date
Release time
Time Served
Sentence effective date
Sentence class
Minimum and maximum Sentence
Minimum and maximum Discharge date
Date eligible for parole
Comments

Prison Statistics. Using the desired day month and year a terminal operator can find the present population of any of the Philadelphia Prisons. The Statistics are broken down into detentioner and sentence groups according to sex. Statistics will be displayed showing the number of prisoners received, transferred, and discharged.

SIGN-ON TRANSACTION DESCRIPTIONS

PRINS is a highly versatile on-line Inventory System. All data entry for data input is completely edited for correctness before any actual processing takes place. If errors occur, the operator is given an error correction screen to allow him to correct false data and retry the transaction. PRINS is fully conversational. Upon completion of any transaction the operator is notified of the success of the operation, status of the record and file he was working on, and instructed how to correct minor errors. For instance, women are allowed only in the House of Correction. If the operator attempts to admit a female to any other prison, he is notified of the error. Another example is when an operator tries to release an individual from one detainer to another detainer. If the new detainer does not exist, the operator is notified that the old holding detainer is released but a create (CAT) must be issued for the new detainer to correct the status of the individual.

All record creation and updating is done on the security protected prison terminals. All operators must sign-on and be identified to PRINS before they can alter any PRINS files. The operator must sign-on using his name and social security number. PRINS will check for the operator's name and social security number on the security file. If his security level matches the transaction he is attempting, he is allowed to continue. If not, he is denied access.

Further security is maintained by only defining the transactions valid for file manipulation on the security protected prison terminals. The Sign-on transactions are not usable on any other terminal within PRINS. For this reason, the prison operators are only allowed to access the PRINS files through the Prison terminals. The Security file contains the terminal-IDs for all valid operators. This protects the theft of sign-on names that may be tried on other terminals.

Once the operator has initially signed on he does not have to do so again. The operator's name and social security number are automatically passed from one transaction to another by PRINS. The Security Check is done for each transaction but the operator only keys it once. If the operator reaches the end of a chain of transactions he is presented with a modified sign-on screen which has his name and social security number already placed on the screen. All he needs to do is key in the desired transaction he wishes to use next.

Flows for this and the following transactions will be found at the end of the text.

TRANSACTION = CAT

This transaction will cause the creation of a master file, a *holding* case (commitment) record and a Phonetic (name) record. These are skeleton records upon completion of "CAT". "CAT" will update a master record with the new holding commitment if the master record already exists. However, if the existing master record reflects that there is an indisposed holding record currently existing, the record will not be updated with the new information. The current holding record must either be released first or changed to a supplementary status. Then the "CAT" can cause the new holding record

to be created. The logic is based on the rule that only one holding record exists for each individual.

"CAT" will also cause proper updating of prison population statistics.

If the operator keys in incorrect data he is presented with an error correction screen to correct the bad data and retry.

Upon completion of "CAT" the operator is notified of the success of the operation and the status of the file. (i.e., "RECORDS CREATED" or "RECORDS UPDATED").

TRANSACTION = SCOM

This transaction will cause the creation of Supplementary Commitments. Often an incarcerated individual will have several commitments or court cases against him. PRINS allows for just one (1) Holding Commitment. All other cases must be entered as Supplementary to the Holding Commitment. "CAT" will create the Holding Commitment and update the population statistics. "SCOM" will only create a Supplementary Record. No updating of the population statistics is done because it is only another case, not another individual.

Upon completion of "SCOM" the operator is notified of the success of the operation, status of the record, and given another screen to continue work.

TRANSACTION = RELS

This transaction will cause the release of a holding or a supplementary commitment.

If the commitment being released is a holding commitment it can either be a physical release (individual physically leaves) or a nonphysical release (i.e., individual is released to another detainer or sentenced).

For a physical release of a holding commitment; the record is deleted, the Phonetic (Name) record is deleted and the commitment and Location fields on the master are cleared. Various other forms of updating may take place depending on the method of release.

For a nonphysical release of a holding commitment, the case and master records are updated with the release information and any new data.

A supplementary record is always physically deleted and no change is made to the master (the master will only reflect holding information).

Various errors can occur. If the operator tries to release a holding record that does not have a commitment number corresponding to the number on the Master file, the operator is notified of the error. If any of the case, master of phonetic, records for this individual do not exist, the operator is notified.

All population statistics are updated depending upon the method of release and status of the incarcerated individual.

If the operator keys in incorrect data he is presented with an error correction screen to retry the transaction.

After a successful "RELS" the operator is notified of the success and what type of record he released (i.e., holding or supplementary).

TRANSACTION = MNT

This transaction will allow the terminal operator to change the status of an incarcerated person's commitment records. A record is either "Holding" or "Supplementary".

For instance, suppose the prison wishes to change an individual's holding commitment to supplementary status, and change one of his existing supplementary records to holding status. This transaction will change the two commitment records, update the master file with new holding data, create a proper phonetic record for the new holding commitment and delete the old phonetic record.

This transaction can also be used for correcting any error within PRINS such as the existance of two (2) holding records. The improper (H) record can be changed to a supplementary (S) status.

TRANSACTION = UPD2

This transaction will allow the terminal operator to update an incarcerated individual's master record. This transaction is entered immediately after the "CAT" completes the creation of the basic master record. The UPD2 input screen is chained to the "CAT" transaction.

Update information: age, birthdate, education, social security no., birthplace, citizenship, naturalization date, height, weight, complexion, hair color, eye color, and visible marks.

TRANSACTION = UPD3

This transaction will allow the terminal operator to update specific information on the master and case files. The UPD3 input screen is chained to the UPD2 transaction.

Update information: class, source of commitment, sentence class, sentence effective date, maximum and minimum discharge dates, date eligible for parole and emergency information.

TRANSACTION = UPD4

This transaction will allow the terminal operator to update an individual's master record.

Update information: business and resident phone numbers, medical alert information, work specialty, FBI number, type of bail, parole and probation information.

TRANSACTION = UPD5

UPD5 will allow the terminal operator to set or turn off the special indicators in the PRINS files. These indicators are displayed under a security checked inquiry. A set of bit switches are used to indicate whether a prisoner is dangerous, escape prone, psycopathic, a gang member, a parole violator, suicidal, homosexual, a medical alert and so on.

TRANSACTION = MINQ

This transaction will retrieve and display the security protected information on the master file. The operator enters the imprisoned individual's police photo number. The response is four (4) screen pages of all the information on the master file. (See: Master file description) This inquiry is only valid on the prison terminals and the sign-on procedures must be used by all operators. The last page in the response to the terminal is the modified Sign-On screen. This allows the operator to continue processing without physically signing on again.

TRANSACTION = TRAN

This transaction will: (a) transfer one incarcerated individual from one Philadelphia prison to another, (b) transfer the individual from one cell to another within a Philadelphia prison.

"TRAN" may be used by the security checked prison personnel to correct erroneous data or actually update the location on the master file.

All data is edited on input. If errors occur, the operator is presented with an error correction screen to retry the operation.

Upon completion of "TRAN" the operator is given a modified sign-on screen to continue processing.

TRANSACTION = CHANGE

This transaction will change any of the Key data on the PRINS files. "CHANGE" allows the operator to change the mandatory data on the master, case and phonetic file. This is the same data the "CAT" transaction creates. For instance, if a record on the file has a dummy police photo number, "CHANGE" will: (a) delete the old master record, (b) create a new master record with the correct photo number, (c) delete the old case record, (d) create a new case record with the proper photo number, (e) update the phonetic record with the proper photo number. This same process takes place for changes to all KEY data on the PRINS files. For all changes to mandatory data that is not KEY data, an update is done to the proper file.

"CHANGE" will notify the operator of the success of the operation and the status of the file. For instance, if the operator changes a Holding Commitment number and one of the PRINS records is missing, the operator is told which file has missing records and how to remedy the error.

Upon completion of "CHANGE" the operator is presented with a Modified Sign-On Screen to continue processing.

SIGN-ON TRANSACTION FORMAT

Each terminal operator must sign-on to PRINS. To initiate the sign-on the operator keys in PR01. He is presented with the following screen.

```
PR02
,NAME:
,SSAN:
,TRAN:
```

The operator then keys in his name and social security number and enters the desired transaction. After the operator enters PR02 into PRINS, he receives the preformatted screen he will use to complete the desired transaction. All screens are preformatted with standard PRINS keywords. The keywords are followed by a colon (:). The colon (:) is the TAB character. To pass from one keyword to the next the operator hits the TAB key on the non destructive cursor terminals.

A list of all transaction codes and PRINS keywords is included.

The operator only needs to sign-on when he begins work. After the original sign-on, PRINS will

carry his name and social security number to each succeeding transaction for him. Therefore each transaction is security checked, and the operator avoids the tedious sign-on procedure.

FORMAT FOR SIGN-ON TRANSACTIONS

The terminal operator, after signing-on, must enter the type of transaction he desires to use (these transactions are included). The operator is presented with a screen preformatted with keyword operands. The following is a list of PRINS keywords.

KEYWORD	*DESCRIPTION*	*LENGTH*
AGE	AGE	2
AGRS	HOMOSEXUAL AGGRESSOR INDICATOR	1
BAIL	BAIL	5
BDTE	BIRTH DATE	6
BPLC	BIRTH PLACE CITY	10
BPLS	BIRTH PLACE STATE	2
CELL	CELL	4
CHRG	CHARGE	5
CLAS	DETAINER CLASS	2
COMP	COMPLEXION NCIC ABBREV.	3
COMS	SOURCE OF COMMITMENT	2
CTZ	CITIZENSHIP	1
DATE	RECEPTION DATE	6
DELP	DATE ELIGIBLE FOR PAROLE	6
DMAX	MAXIMUM DISCHARGE DATE	6
DMIN	MINIMUM DISCHARGE DATE	6
DNGR	DANGER INDICATOR	1
DROW	DEATH ROW INDICATOR	1
EADR	EMERGENCY ADDRESS	35
EDLV	EDUCATION LEVEL	2
EMP	EMERGENCY PHONE	10
EMR	EMERGENCY RELATION	1
ENAM	EMERGENCY NAME	26
ESCP	ESCAPE INDICATOR	1
EYES	EYES NCIC ABBREV.	3
FBI	FBI NUMBER	9
FNAM	FIRST NAME	10
FRSN	FORENSIC HOUSING INDICATOR	1
GANG	GANG MEMBER INDICATOR	1
HAIR	HAIR NCIC ABBREV.	3
HOMO	HOMOSEXUAL INDICATOR	1
HT	HEIGHT	3
INSD	DETENTIONER INSTITUTION NO.	7
INSS	SENTENCE INSTITUTION NO.	5
JUV	JUVENILE INDICATOR	1
LNAM	LAST NAME	15
LOC	LOCATION	1
MCCP	COMMITMENT NUMBER	9
MCH	HOLDING NO. TO BE	9
MCS	SUPPLEMENTARY NO. TO BE	9
MEDA	MEDICAL ALERT INFO OR CODE	25 OR 1
MI	MIDDLE INITIAL	1
MISC	MISCELLANEOUS COMMENTS	50
MREL	METHOD OF RELEASE	2
NAME	SIGN ON NAME	26
NAT	NATURALIZATION DATE	6
NFNM	NEW FIRST NAME	10
NLNM	NEW LAST NAME	15
NMCP	NEW COMMITMENT NO.	9
NMI	NEW MIDDLE INITIAL	1
NPP NO.	NEW PHOTO NUMBER	7
NRLC	NOT RELOCATABLE INDICATOR	1
PAAN	PAROLE AGENCY INFORMATION	10
PADT	PAROLE DATE	6
PBAN	PROBATION AGENCY INFORMATION	10
PBDT	PROBATION DATE	6
PBUS	BUSINESS PHONE	10
PP NO.	POLICE PHOTO NUMBER	7
PRBV	PROBATION VIOLATOR INDICATOR	1
PRES	RESIDENT PHONE	10
PSYC	PSYCHOPATHIC INDICATOR	1
RDTE	RELEASE DATE	6
RSEX	RACE/SEX CODE	1
RTME	RELEASE TIME	4
SEC	SENTENCE CLASS	1
SED	SENTENCE EFFECTIVE DATE	6
SLOC	SENTENCED LOCATION	1
SMAX	MAXIMUM SENTENCE	6
SMIN	MINIMUM SENTENCE	6
SSAN	SIGN ON SOCIAL SECURITY NO.	9
SSN	SOCIAL SECURITY NUMBER	9
SUIC	SUICIDE INDICATOR	1
TBAL	TYPE OF BAIL	2
TIME	RECEPTION TIME	4
TLOC	TRANSFER LOCATION	1
TRAN	TRANSACTION	UP TO 6
TSER	TIME SERVED	4
TYPC	D FOR DETENTION S FOR SENT.	1
WORK	WORK SPECIALTY	15
VSM	VISIBLE SCARS AND MARKS	5X11
VSM6	VSM CONTINUED	5X11
WT	WEIGHT NCIC ABBREV.	3

SIGN-ON TRANSACTION CODES TO BE USED WITH KEYWORD "TRAN=" ON SCREEN PR02:

Transaction	*Explanation*
CAT	Creates a *holding* commitment, master and phonetic record
SCOM	Creates a supplementary commitment record
RELS	Releases a specified commitment record
MNT	Performs case file maintenance
UPD2	Updates
UPD3	Updates
UPD4	Updates
UPD5	Updates
MINQ	Master file INQUIRY—displays the Master Record
TRAN	Transfers Inmates from one location or cell to another
CHANGE	Changes Key Data on the PRINS files

ON-LINE STORAGE REQUIREMENTS

1. PRINS Master File – 90 cylinders of IBM 2314 disk storage for prime data. 9 cylinders for independent overflow. (5 records/block for 2,250 bytes), and 2 cylinders for indexing.
2. PRINS Case File – 60 cylinders of 2314 disk storage for prime data. 4 cylinders for independent

overflow. (10 records/block for 2,000 bytes), and 2 cylinders for indexing.

3. PRINS Phonetic File – 9 cylinders of 2314 disk storage for prime data. 4 cylinders for independent overflow. (5 records/block for 310 bytes), and 1 cylinder for indexing.
4. Statistics File – 5 cylinders of 2314 disk storage for prime data. (8 records/block for 1,984 bytes), and 1 cylinder for indexing.
5. Security File – 1 cylinder of 2314 disk storage for prime data. (32 records/block for 1,920 bytes), and 1 cylinder for indexing.
6. NCIC Visible Marks Files – 2 cylinders of 2314 disk storage for prime data. (20 records/block for 240 bytes), and 2 cylinders for indexing.

MACHINE AND CORE REQUIREMENTS

1. PRINS is designed to run in the present FASTER partition of 136 thousand bytes on the Philadelphia Court computer configuration, IBM S/360 Model 40.
2. Any FASTER supported terminal configuration with the non destructive cursor and TAB feature will operate with the current design of PRINS.

PRINS FILE MAINTENANCE

The PRINS on line files are transferred to tape each night using standard utility programs. A revolving history of three days backup is kept at all times.

The PRINS files are all reorganized at least once a week using COJJNT programs. The reorganization restructures the file to use the PRIME data area and physically delete certain records. The Reorganization program will allow all terminal deleted commitment records to stay on the file for approximately 7 weeks.

When the records are physically deleted from the on-line files, they are saved on tape for future use in statistical reporting.

There also exists a series of batch load, add, delete and update programs which were used to initially bring PRINS on line. These programs serve as a creation backup and as utilities whenever batch updates are required.

PRISONER INVENTORY SYSTEM

FILE DESCRIPTIONS

MASTER File
CASE File
PHONETIC File
STATISTICE File
SECURITY File
OPERATIONAL Files:
NCIC to PRINS
PRINS to NCIC

KEY: X – Hexadecimal Number
C – A/N Character

PRINS MASTER FILE – PRMAST (ISAM)

Field Name	*Description*	*Comments*	*Size*	*Type*	*Position*
	Delete Code	X'FF' for Delete	1	X	1– 1
PP No.	Police Photo No.	Key	7	C	2– 8
	(Key Expansion)	X'00's	10	C	9– 18
MCCP	Holding Commitment No.		9	C	19– 27
LOC	Location	Numeric 1,2,3	1	C	28– 28
OLOC	Location (Other)		15	C	29– 43
CELL	Location (Cell)		4	C	44– 47
RSEX	Race/Sex Code		1	C	48– 48
	Previous Cell Link	(I.G.) Internally Generated	4	X	49– 52
SSAN	Social Security No.		9	C	53– 61
FBI	FBI No.		9	C	62– 70
BAIL	Bail		5	C	71– 75
RDTE	Date-Made-Bail	MMDDYY	6	C	76– 81
TBAL	Bail Type		2	C	82– 83
HT	Height	FII	3	C	84– 86
WT	Weight	lbs.	3	C	87– 89
COMP	Complexion	NCIC Abbreviation	1	X	90– 90
HR	Hair	NCIC Abbreviation	1	X	91– 91
EYES	Eyes	NCIC Abbreviation	1	X	92– 92
VSM VSMG	Visible Scars and Marks	NCIC Abbreviation	10	X	93–102
MEDA	Medical Alert Information		25	C	103–127
PRES	Phone No. (Residence)		10	C	128–137
PBUS	Phone No. (Business)		10	C	138–147
BDTE	Birth Date	MMDDYY	7	C	148–153
BPLC	Birth Place City		10	C	154–163
BPLS	Birth Place State		2	C	164–165
AGE	Age		2	C	166–167
ENAM	Emergency Information Name	Free Form	26	C	168–193
EADR	Emergency Information Address	Free Form	35	C	194–228
EMP	Emergency Phone		10	C	229–238
	Emergency Relation		1	C	239–239
EDLV	Education Level		2	C	240–241
WORK	Work Specialty		15	C	242–256
	Activity Indicator	(I.G.) Internally Generated	1	X	257–257
	Bit Positions 1	Inactive			
	2	Detentioner			
	3	Temp/Stopover			
	4	Out on Bail			
	5	On Probation			
	6	On Parole			
	7	Sentenced			
	8	Reserved (Expansion)			
	Reserved Expansion		1	X	258–258
	Special Indicator (1)		1	X	259–259
DNGR	Bit Positions 1	Dangerous			
ESCP	2	Escape Tendency			
SUIC	3	Suicide Tendency			
NRLC	4	Not Relocatable			
DROW	5	Death Row			
HOMO	6	Homosexual			
ARGS	7	Aggressor/Homosexual			
MEDA	8	Medical Alert			
	Special Indicator (2)		1	X	260–260
FRSN	Bit Position 1	Forensic Unit			
PRBV	2	Probation Violator			
PARV	3	Parole Violator			
JUV	4	Juvenile			
PSYC	5	Psychopathic			
GANG	6	Gang Member			
	7	Reserved			
	Other Indicator	(I.G.) Internally Generated	1	X	261–261
	Bit Position 1	Parole Application			
	2	Temp. Record			
	3	Previous Temp. Record			
	4	Incomplete Record			

Field Name	Description	Comments	Size	Type	Position
	5	Reserved			
	6	Reserved			
	7	Reserved			
	8	Reserved			
	Previous Dummy Photo No.		7	C	262–268
	Previous Dummy Key Expansion		10	C	269–278
	Previous Dummy MCCP	Holding	9	C	279–287
	Primary Gang Affiliation		3	C	288–290
	Secondary Gang Affiliation		3	C	291–293
CTZ	Citizenship		1	C	294–294

KEY: X – Hexadecimal Number
C – A/N Character
P – Packed Decimal Digits

Field Name	Description	Comments	Size	Type	Position
NAT	Naturalization Date		6	C	295–300
PBDT	Probation Information Date		6	C	311–316
PBAN	Probation Information Agency		10	C	317–326
PADT	Parole Information Date		6	C	327–332
PAAN	Parole Information Agency		10	C	333–342
	Previous Incarceration Date	(I.G.) Internally Generated	6	C	343–348
	Date-Last Detention	(I.G.) Internally Generated	6	C	349–354
	No. of times Detentioner	(I.G.) Internally Generated	2	P	355–356
	Date-Last Sentence	(I.G.) Internally Generated	6	C	357–362
	No. of times Sentenced	(I.G.) Internally Generated	2	P	363–364
	Last Charge = Sentence	(I.G.) Internally Generated	5	C	365–369
MISC	Miscellaneous		50	C	370–419
LNAM	Last Name		15	C	420–434
FNAM	First Name		10	C	435–444
MI	Middle Initial		1	C	445–445
	Expansion		5	X	446–450

KEY: X – Hexadecimal Number
C – A/N Character

PRINS CASE FILE – PRCASE (ISAM)

Field Name	*Description*	*Comments*	*Size*	*Type*	*Position*
	Delete Code	X'FF' for Delete	1	X	1– 1
	Record Type	H=Holding – S=Supplementary	1	C	2– 2
PP No.	Police Photo No.	Key	7	C	3– 9
MCCP	Commitment Number	Key	9	C	1– 18
	Key Expansion	Key	4	C	19– 22
	Other Indicator		1	X	23– 23
	Bit Position 1	Record Incomplete			
	2	Temporary Record			
	3	Previous Temporary Record			
	4	Reserved			
	5	Reserved			
	6	Reserved			
	7	Reserved			
	8	Reserved			
	Previous Key		16	C	24– 39
	Previous Key Expansion		4	C	40– 43
INSD	Institution No. (Detention)	YY-XXXXX	7	C	44– 50
INSS	Institution No. (Sentenced)	D-XXXX	5	C	51– 55
DATE	Reception Date	MMDDYY	6	C	56– 61
TIME	Reception Time	HHMM	4	C	62– 66
CHRG	Charge		5	C	67– 71
CLAS	Class Code		1	C	72– 72
MREL	Release Method		2	C	73– 74
RDTE	Release Date	MMDDYY	6	C	75– 80
RTME	Release Time	HHMM	4	C	81– 84
TSER	Time Served	MMDD	4	C	85– 88
SED	Sentence Effective Date	MMDDYY	6	C	89– 94
SEC	Sentence Class Code		6	C	95– 95
SMIN	Minimum Sentence		6	C	96–101
SMAX	Maximum Sentence		6	C	102–107
DMIN	Minimum Discharge Date	MMDDYY	6	C	108–113
SMAX	Maximum Discharge Date	MMDDYY	6	C	114–119
DEP	Date-Eligible Parole	MMDDYY	6	C	120–125
MISC	Misc. Comments		32	C	126–157
	Expansion		43	X	158–200

KEY: X – Hexadecimal Number
C – A/N Character
P – Packed Decimal Digits

PRINS PHOETIC FILE – PRPHN (ISAM)

Field Name	*Description*	*Comments*	*Size*	*Type*	*Position*
	Delete Code	X'FF' Delete	1	X	1– 1
	Phonetic Last Name	Key	4	C	2– 5
	Phonetic First Name	Key	4	C	6– 9
	Middle Initial	Key	1	C	10– 10
MCCP	Commitment Code	(M or C) Key	1	C	11– 11
MCCP	Commitment Number	(9 digits) Key	6	P	12– 17
	Micro Film Number	(X'00') Key	5	X	18– 22
LNAM	Last Name		15	C	23– 38
FNAM	First Name		10	C	39– 47
MI	Middle Initial		1	C	48– 48
PP No.	Photo No.		4	P	49– 52
CHRG	Charge		3	P	53– 55
LOC	Location		3	P	56– 56
RSEX	Race/Sex		1	C	57– 57
	Special Indicator	(I.G.) Internally Generated	1	X	58– 58
	Bit Position 1	Inactive			
	2	Detentioner			
	3	Temp/Stopover			
	4	Out on Bail			
	5	On Probation			
	6	On Parole			
	7	Sentenced			
	8	Reserved			
	Expansion		4	X	59– 62

KEY: X – Hexadecimal Number
C – A/N Character
P – Packed Decimal Digits
L – Length

PRINS STATISTICS FILE-PRSTAT (ISAM)

Field Name	*Description*	*Comments*	*Size*	*Type*	*Position*
	Indicator	X'OF' or X'00'	1	X	1– 1
	Key	YYMMDD	6	C	2– 7
	Receive Counters	R	48	16P(L3)	8– 55
	Discharge Counters	D	48	16P(L3)	56–103
	Transfer-out counters	O	48	16P(L3)	104–151
	Transfer-in-counters	I	48	16P(L3)	152–199
	Totals	T	48	16P(L3)	199–247
	Miscellaneous Indicator		1	X	248–248
		COUNTER FORMAT			
	X=R, D,O,I,T,	See Comments above			
	XS1M	Sentenced Male, LOC=1	3	P	
	SX1F	Sentenced Female, LOC=1	3	P	
	XS2M	Sentenced Male, LOC=2	3	P	
	XS2F	Sentenced Female, LOC=2	3	P	
	XS3M	Sentenced Male, LOC=3	3	P	
	XS3F	Sentenced Female, LOC=3	3	P	
	XS4M	Sentenced Male, LOC=4	3	P	
	XS4F	Sentenced Female, LOC=4	3	P	
	XD1M	Detentioner Male, LOC=1	3	P	
	XD1F	Detentioner Female, LOC=1	3	P	
	XD2M	Detentioner Male, LOC=2	3	P	
	XD2F	Detentioner Female, LOC=2	3	P	
	XD3M	Detentioner Male, LOC=3	3	P	
	XD3F	Detentioner Female, LOC=3	3	P	
	XD4M	Detentioner Male, LOC=4	3	P	
	XD4F	Detentioner Female, LOC=4	3	P	

KEY: X – Hexadecimal Number
C – A/N Character

PRINS SECURITY FILE – PRSEC (ISAM)

Field Name	*Description*	*Comments*	*Size*	*Type*	*Position*
	Delete Code	X'FF' for Delete	1	X	1– 1
	Terminal I.D.	Key	4	C	2– 5
	Last Name	Key	15	C	6– 20
	First Name	Key	10	C	21– 30
	Middle Initial	Key	1	C	31– 31
	Social Security No.	Key	9	C	32– 40
	Security Level		1	X	41– 41
	Expansion expansion		19	X	42– 60

KEY: X – Hexadecimal Number
C – A/N Character

NCIC CONVERSION TO PRINS – PRNCIC (ISAM)

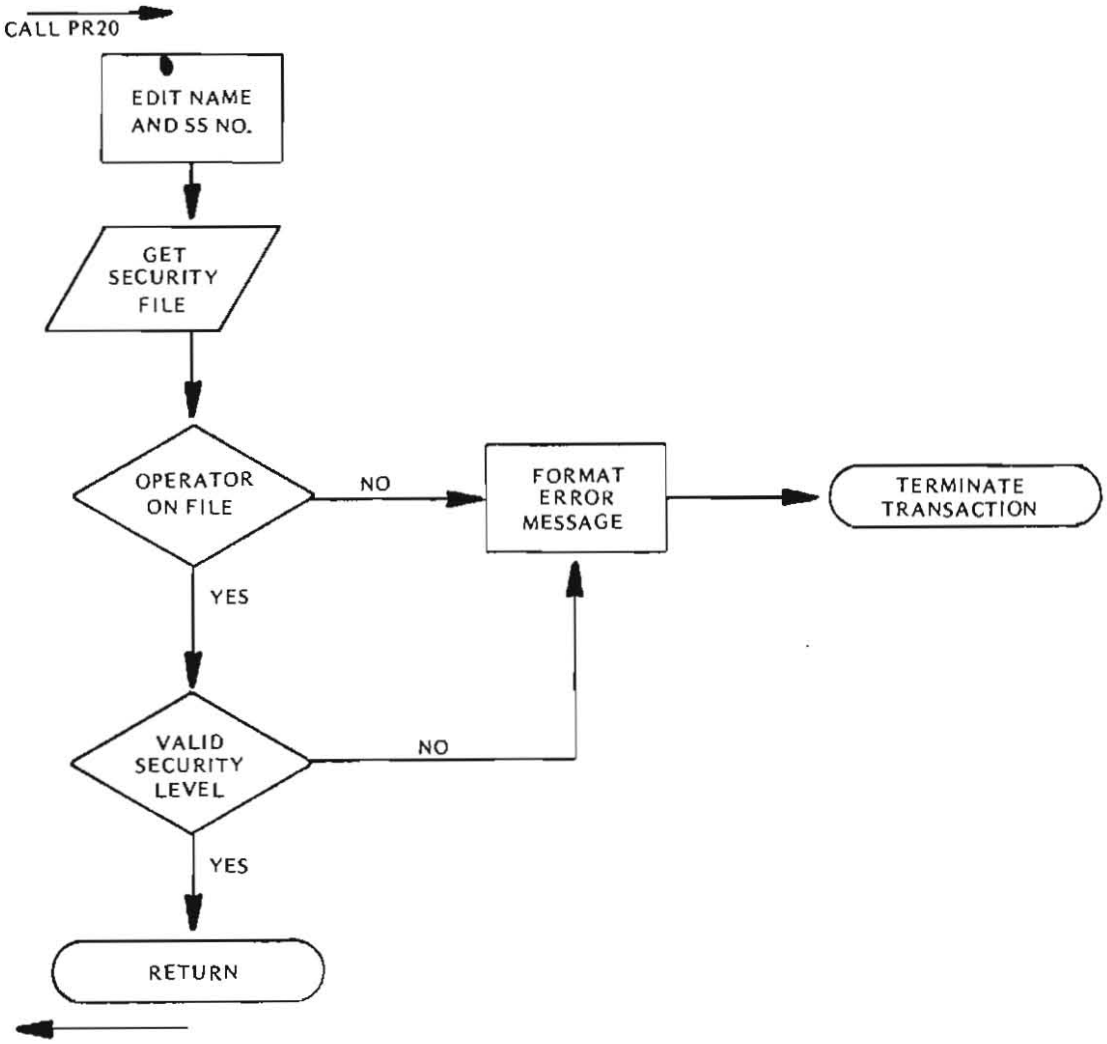
Field Name	*Description*	*Comments*	*Size*	*Type*	*Position*
	NCIC Code	Key	1	X	1– 1
	NCIC Abbreviation		11	C	2–12

KEY: X – Hexadecimal Number
C – A/N Character

PRINS CONVERSION TO NCIC – NCICPR (ISAM)

Field Name	*Description*	*Comments*	*Size*	*Type*	*Position*
	NCIC Abbreviation	Key	11	C	1–11
	NCIC Code		1	X	12–12

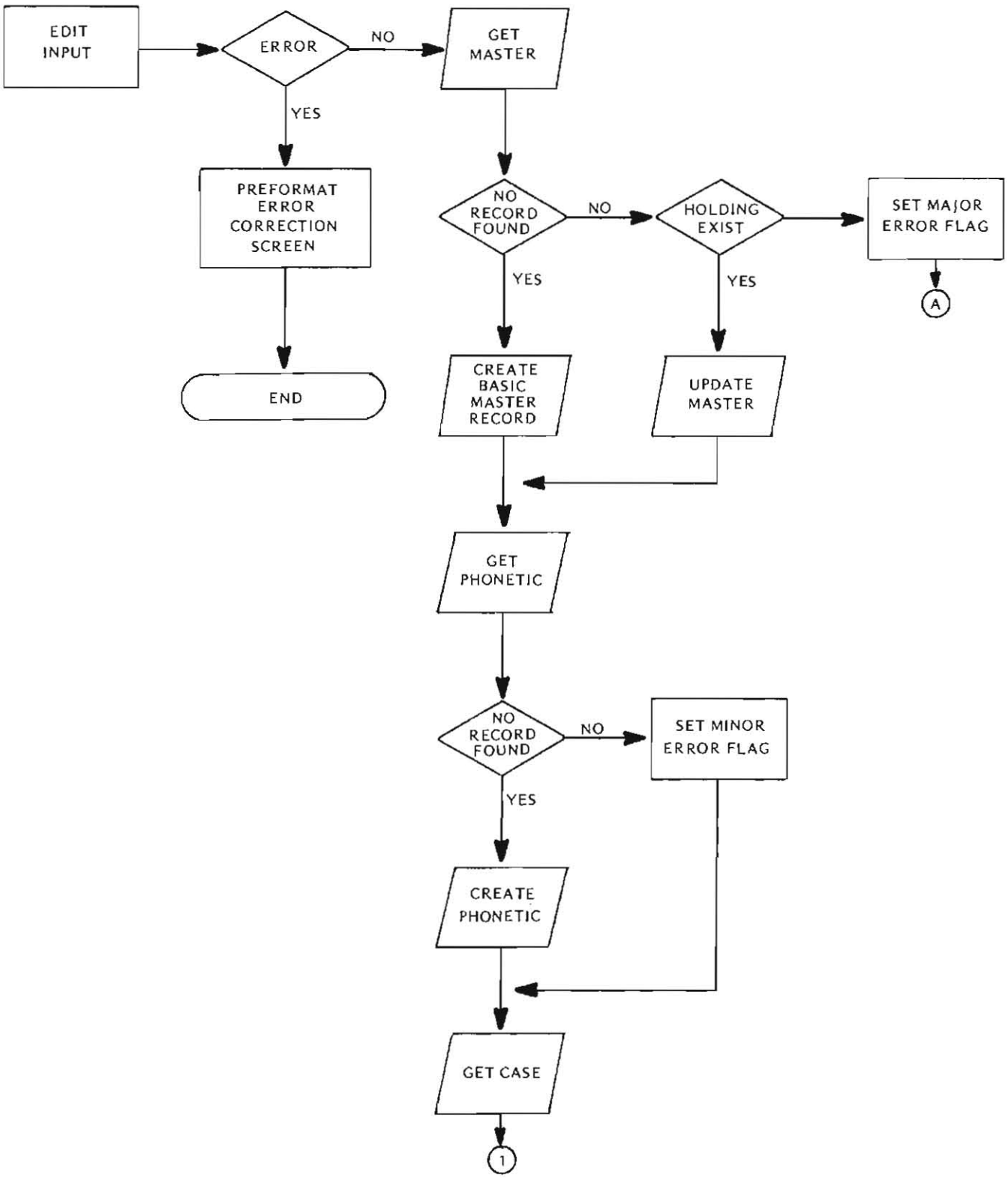
SIGN–ON TRANS

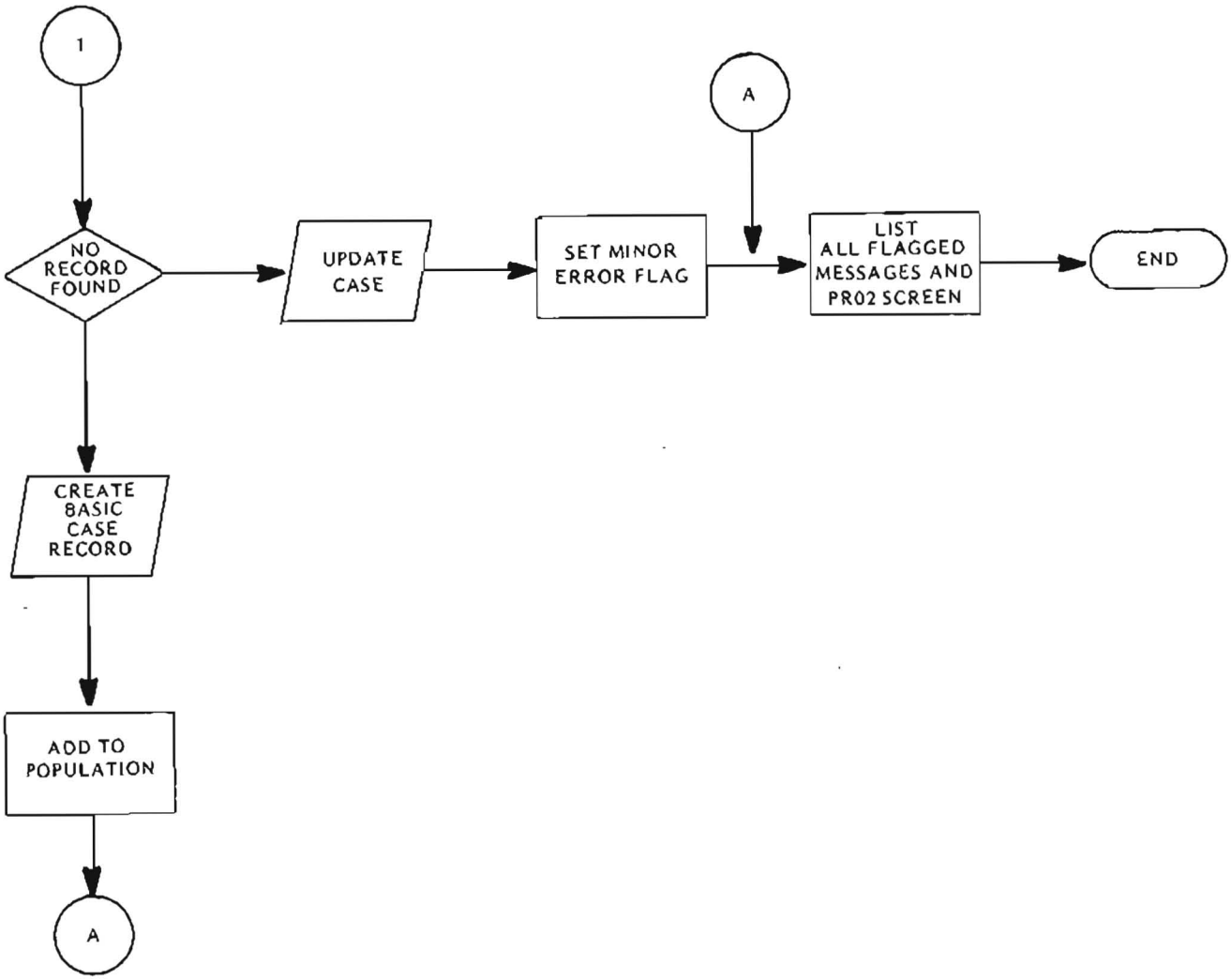


Note:

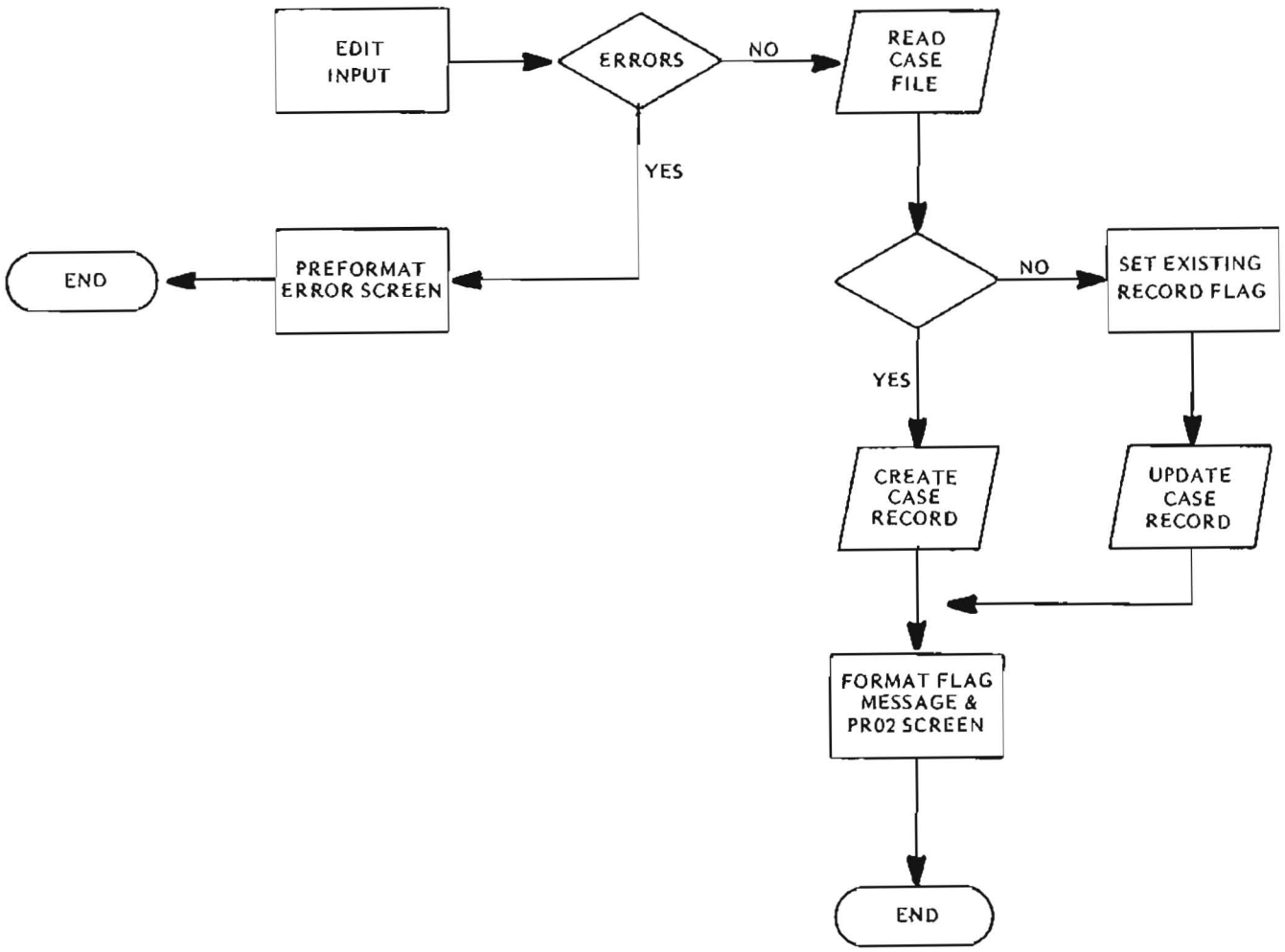
The screen layouts for all transactions are defined in the section "FORMATS FOR SIGN-ON TRANSACTIONS". (Section 5.5)

CAT FLOW

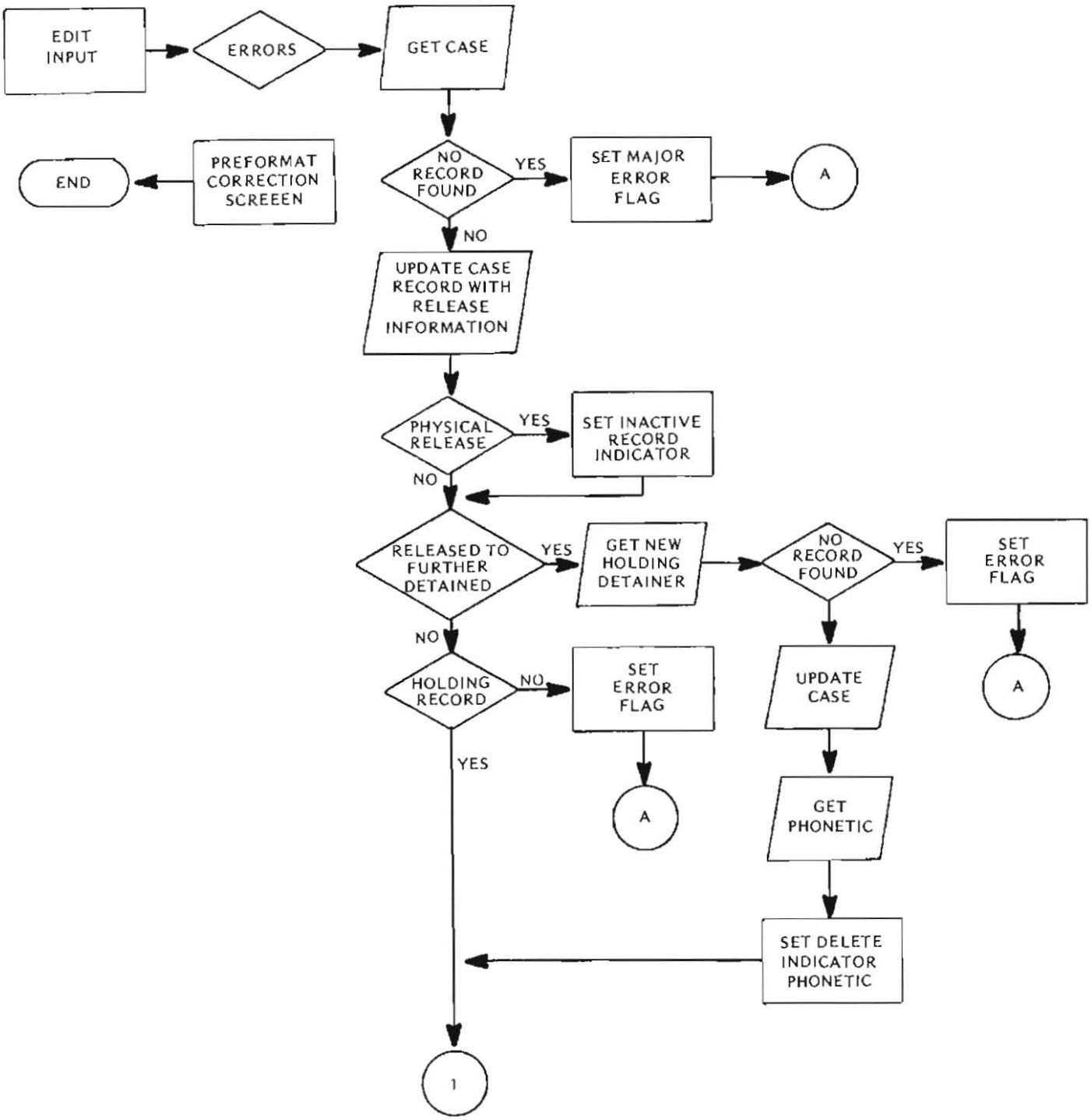

EDIT INPUT
ERROR
NO
YES
GET MASTER
PREFORMAT ERROR CORRECTION SCREEN
END
NO RECORD FOUND
NO
HOLDING EXIST
SET MAJOR ERROR FLAG
A
YES
YES
CREATE BASIC MASTER RECORD
UPDATE MASTER
GET PHONETIC
NO RECORD FOUND
NO
SET MINOR ERROR FLAG
YES
CREATE PHONETIC
GET CASE
1

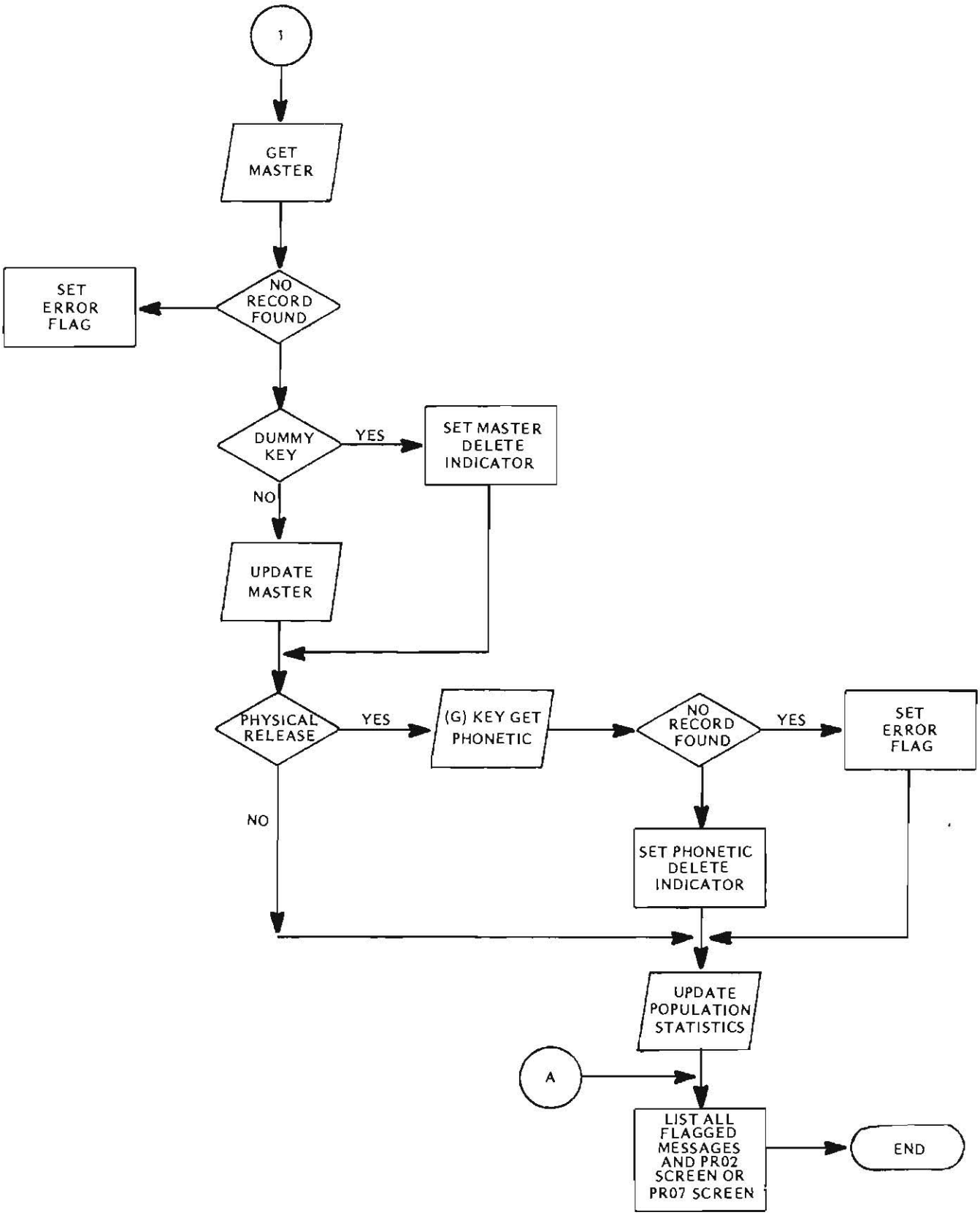

1
NO RECORD FOUND
UPDATE CASE
SET MINOR ERROR FLAG
A
LIST ALL FLAGGED MESSAGES AND PR02 SCREEN
END
CREATE BASIC CASE RECORD
ADD TO POPULATION
A

SCOM FLOW

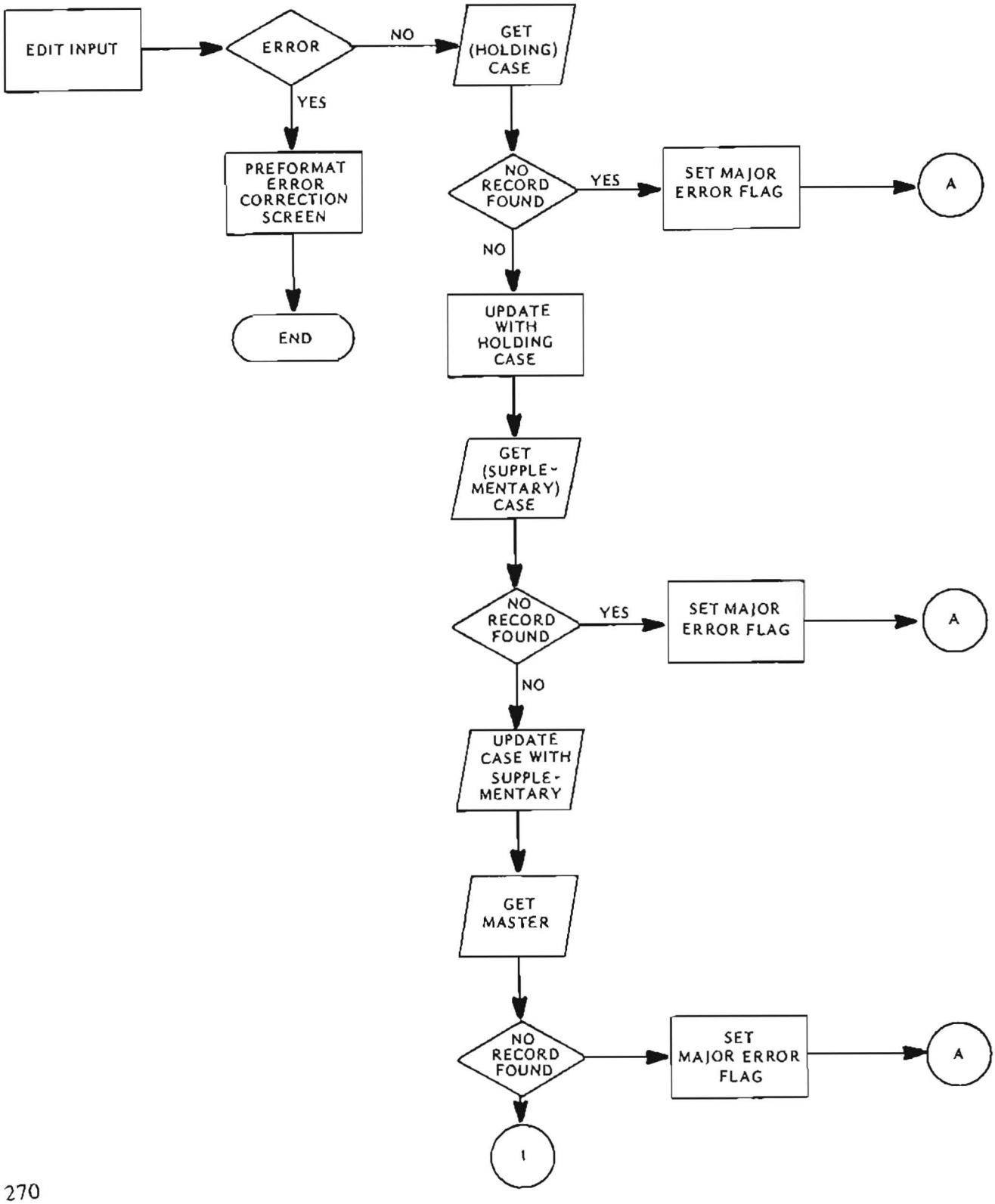

EDIT INPUT
ERRORS
NO
READ CASE FILE
YES
END
PREFORMAT ERROR SCREEN
NO
SET EXISTING RECORD FLAG
YES
CREATE CASE RECORD
UPDATE CASE RECORD
FORMAT FLAG MESSAGE & PR02 SCREEN
END

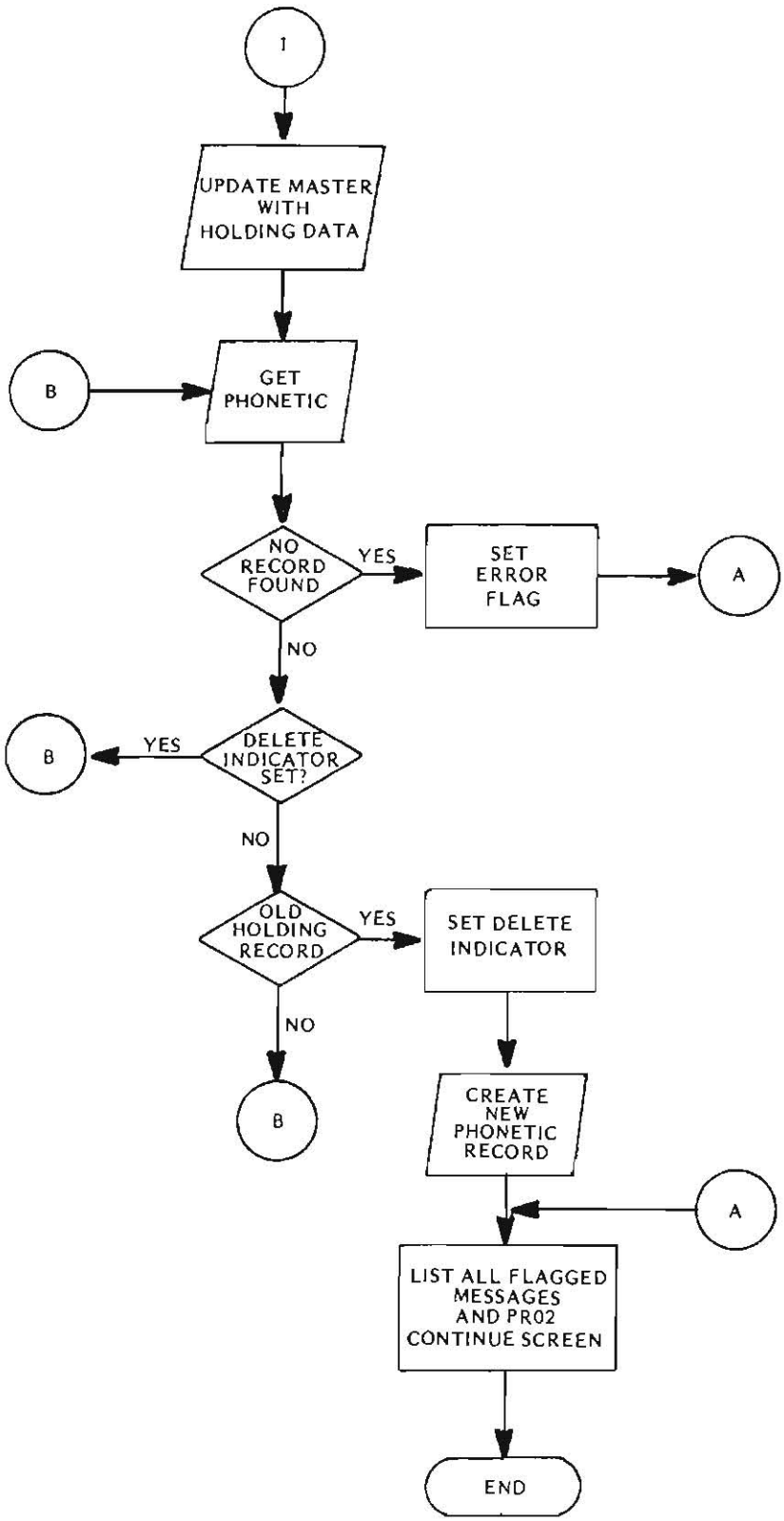
RELS FLOW


EDIT INPUT
ERRORS
GET CASE
NO RECORD FOUND
YES
SET MAJOR ERROR FLAG
A
NO
PREFORMAT CORRECTION SCREEEN
END
UPDATE CASE RECORD WITH RELEASE INFORMATION
PHYSICAL RELEASE
YES
SET INACTIVE RECORD INDICATOR
NO
RELEASED TO FURTHER DETAINED
YES
GET NEW HOLDING DETAINER
NO RECORD FOUND
YES
SET ERROR FLAG
A
NO
HOLDING RECORD
NO
SET ERROR FLAG
A
YES
UPDATE CASE
GET PHONETIC
SET DELETE INDICATOR PHONETIC
1

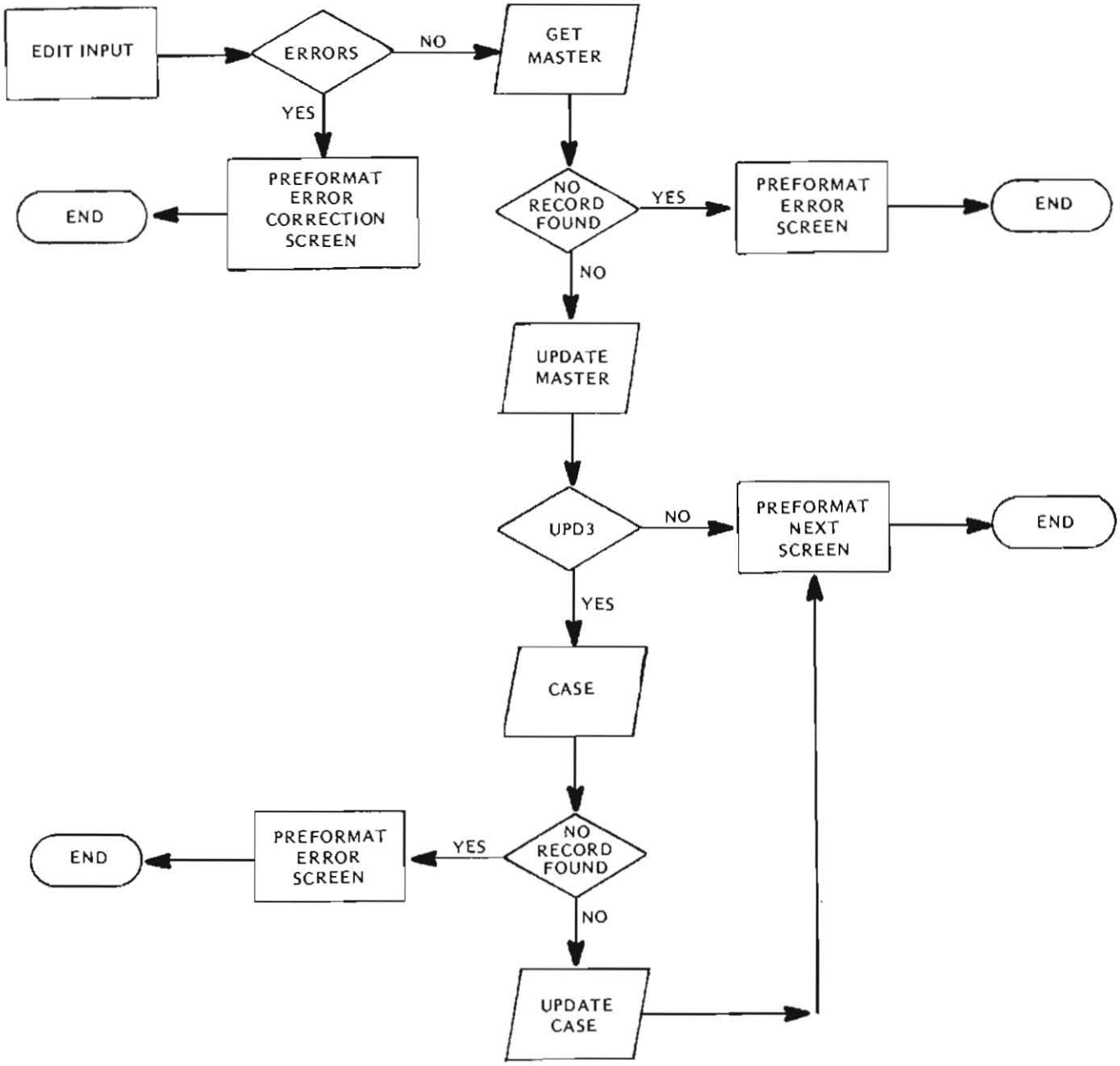

1
GET MASTER
NO RECORD FOUND
SET ERROR FLAG
DUMMY KEY
YES
SET MASTER DELETE INDICATOR
NO
UPDATE MASTER
PHYSICAL RELEASE
YES
(G) KEY GET PHONETIC
NO RECORD FOUND
YES
SET ERROR FLAG
NO
SET PHONETIC DELETE INDICATOR
UPDATE POPULATION STATISTICS
A
LIST ALL FLAGGED MESSAGES AND PR02 SCREEN OR PR07 SCREEN
END

MNT FLOW

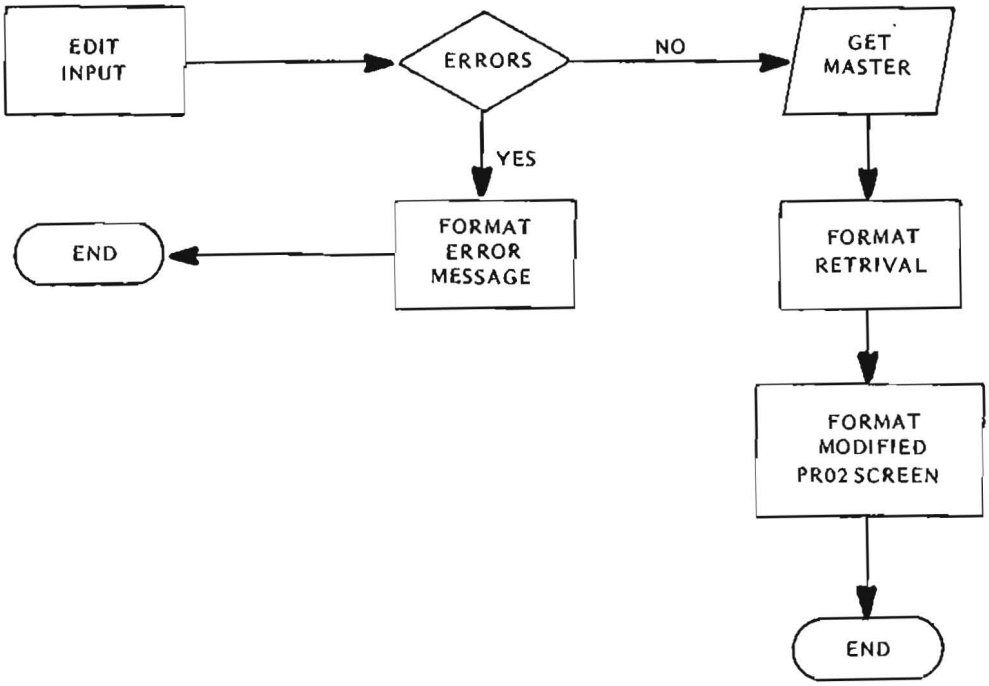

EDIT INPUT
ERROR
NO
YES
GET (HOLDING) CASE
PREFORMAT ERROR CORRECTION SCREEN
END
NO RECORD FOUND
YES
SET MAJOR ERROR FLAG
A
NO
UPDATE WITH HOLDING CASE
GET (SUPPLE-MENTARY) CASE
NO RECORD FOUND
YES
SET MAJOR ERROR FLAG
A
NO
UPDATE CASE WITH SUPPLE-MENTARY
GET MASTER
NO RECORD FOUND
SET MAJOR ERROR FLAG
A
1


1
UPDATE MASTER WITH HOLDING DATA
B
GET PHONETIC
NO RECORD FOUND
YES
SET ERROR FLAG
A
NO
B
YES
DELETE INDICATOR SET?
NO
OLD HOLDING RECORD
YES
SET DELETE INDICATOR
NO
B
CREATE NEW PHONETIC RECORD
A
LIST ALL FLAGGED MESSAGES AND PR02 CONTINUE SCREEN
END

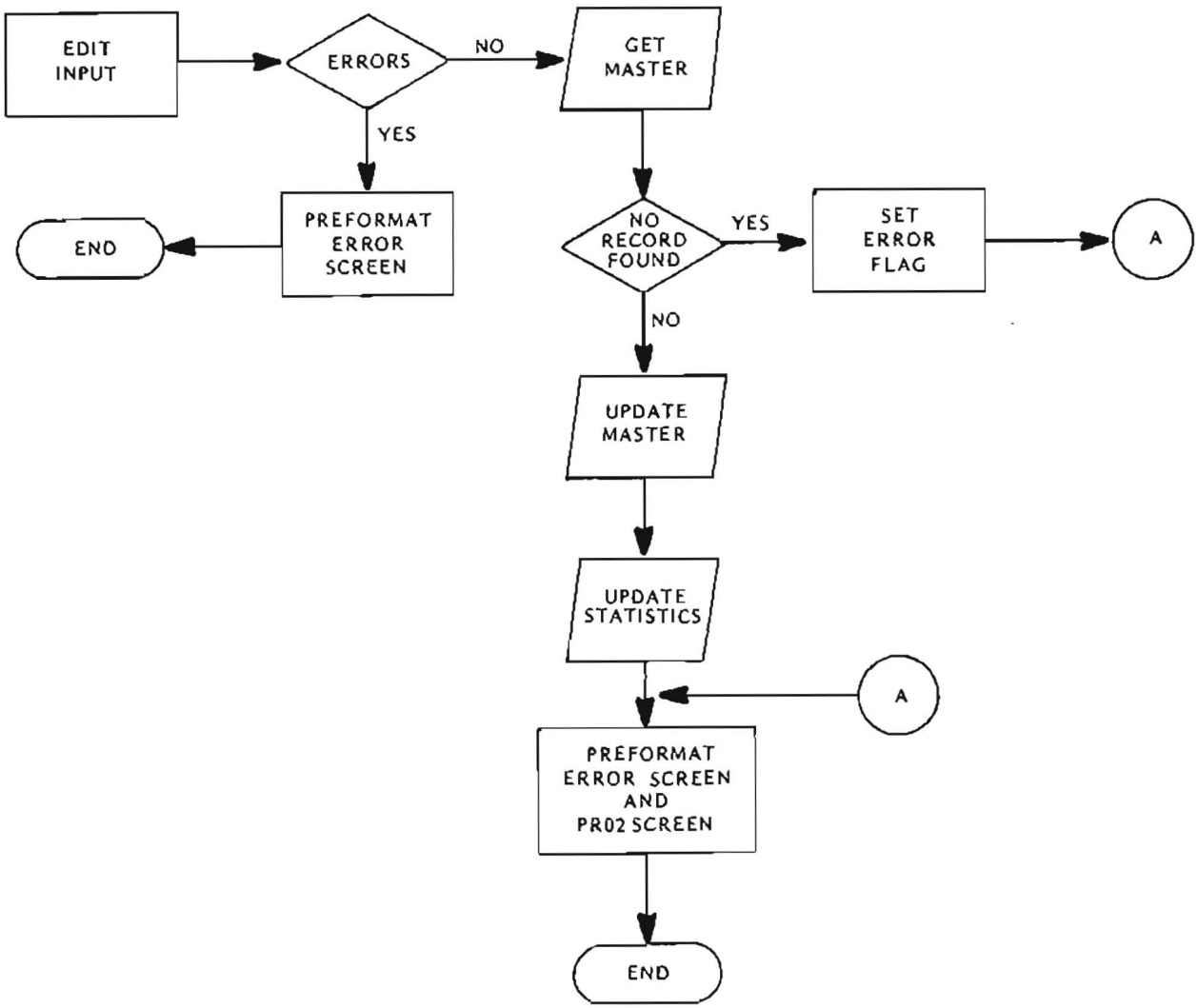
UPD FLOW


EDIT INPUT
ERRORS
NO
GET MASTER
YES
PREFORMAT ERROR CORRECTION SCREEN
END
NO RECORD FOUND
YES
PREFORMAT ERROR SCREEN
END
NO
UPDATE MASTER
UPD3
NO
PREFORMAT NEXT SCREEN
END
YES
CASE
NO RECORD FOUND
YES
PREFORMAT ERROR SCREEN
END
NO
UPDATE CASE

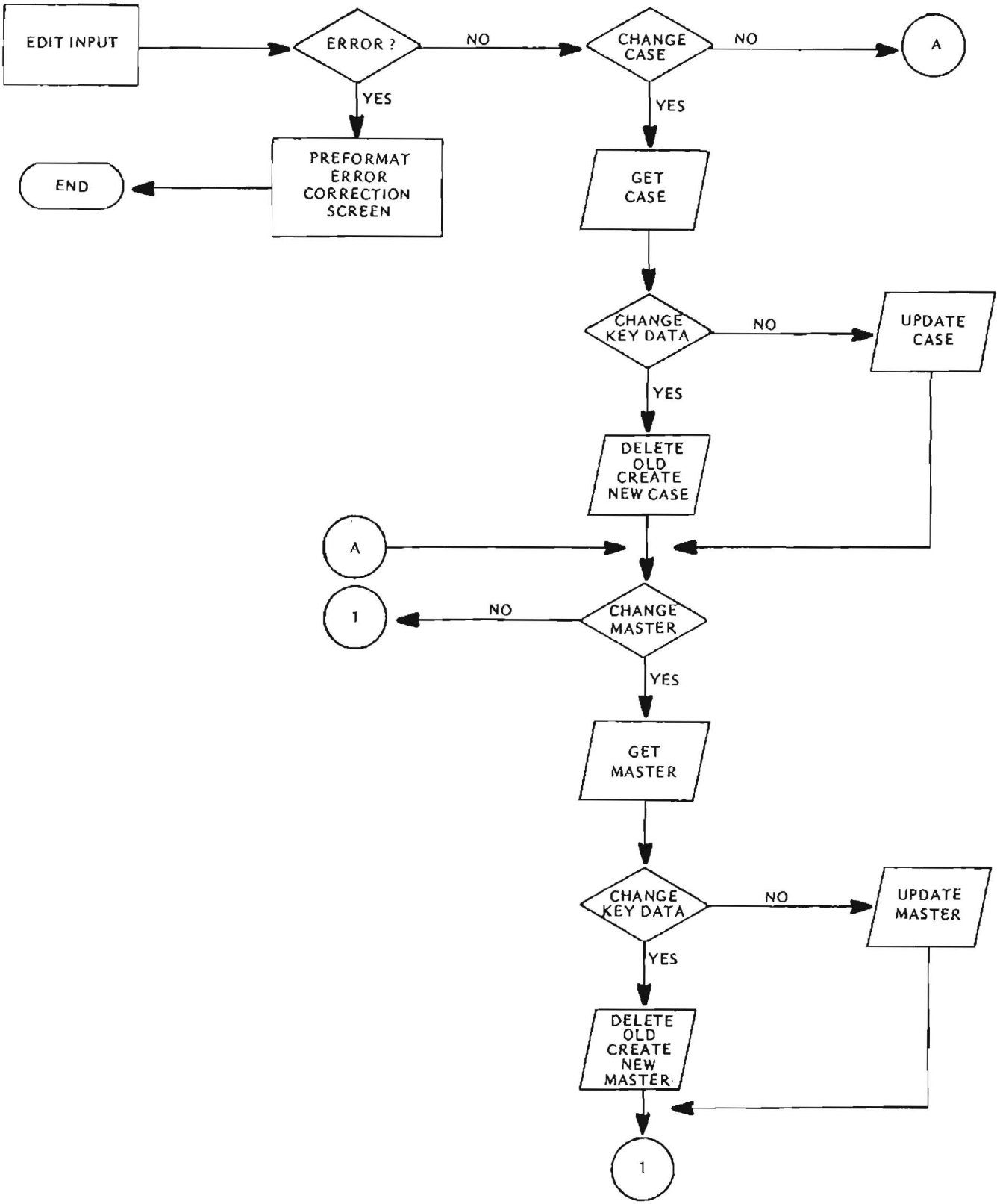
MINQ FLOW

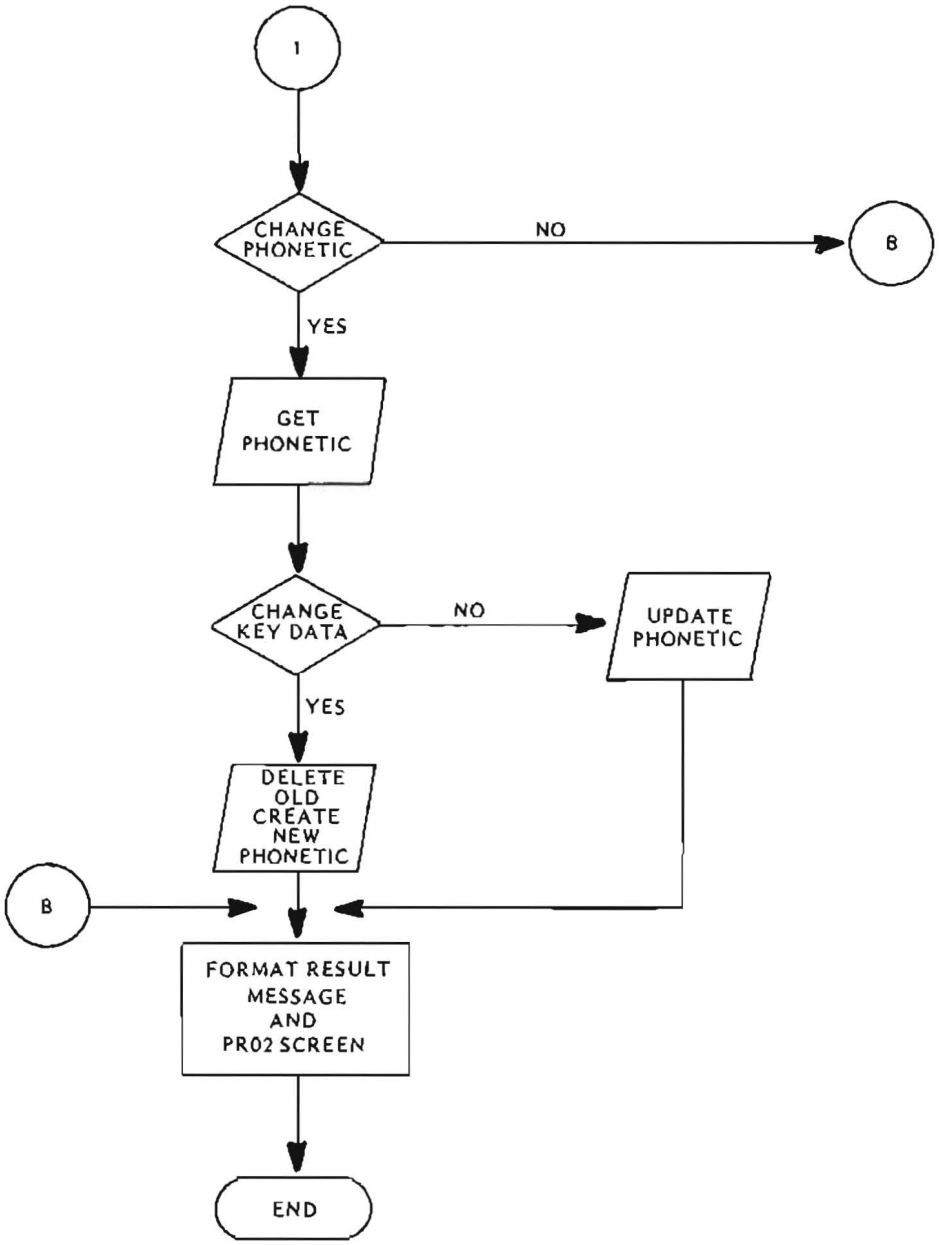

EDIT INPUT
ERRORS
NO
GET MASTER
YES
FORMAT ERROR MESSAGE
END
FORMAT RETRIVAL
FORMAT MODIFIED PR02 SCREEN
END

TRAN FLOW

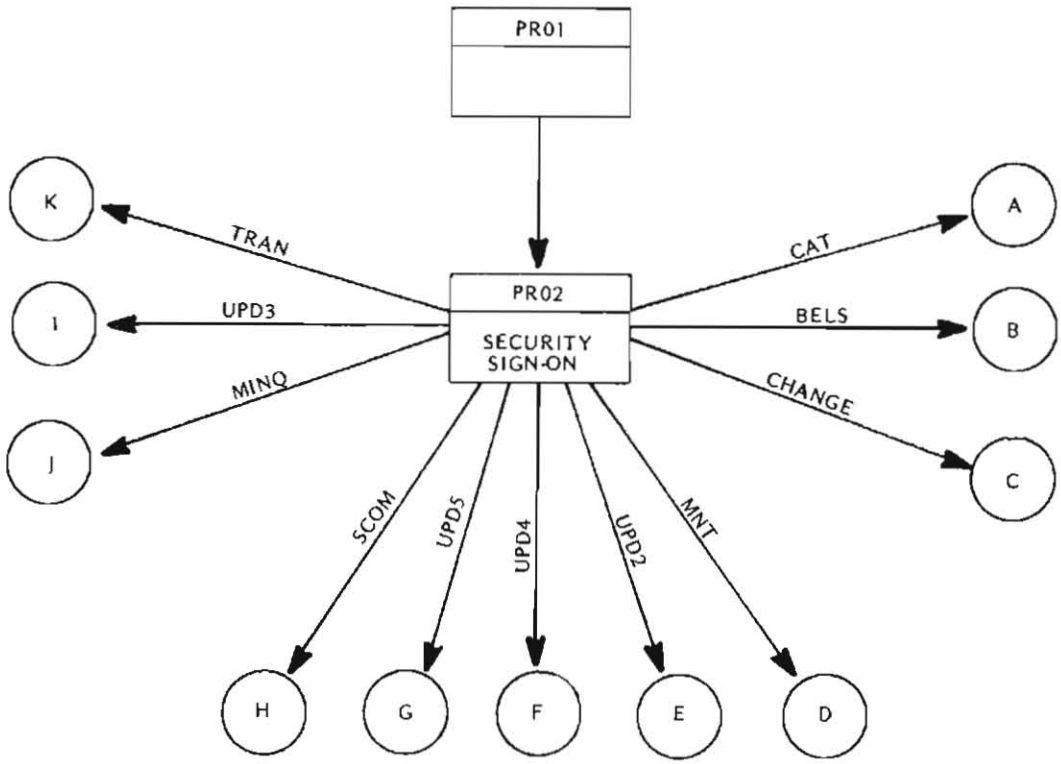

EDIT INPUT
ERRORS
NO
GET MASTER
YES
PREFORMAT ERROR SCREEN
END
NO RECORD FOUND
YES
SET ERROR FLAG
A
NO
UPDATE MASTER
UPDATE STATISTICS
A
PREFORMAT ERROR SCREEN AND PR02 SCREEN
END

CHANGE FLOW

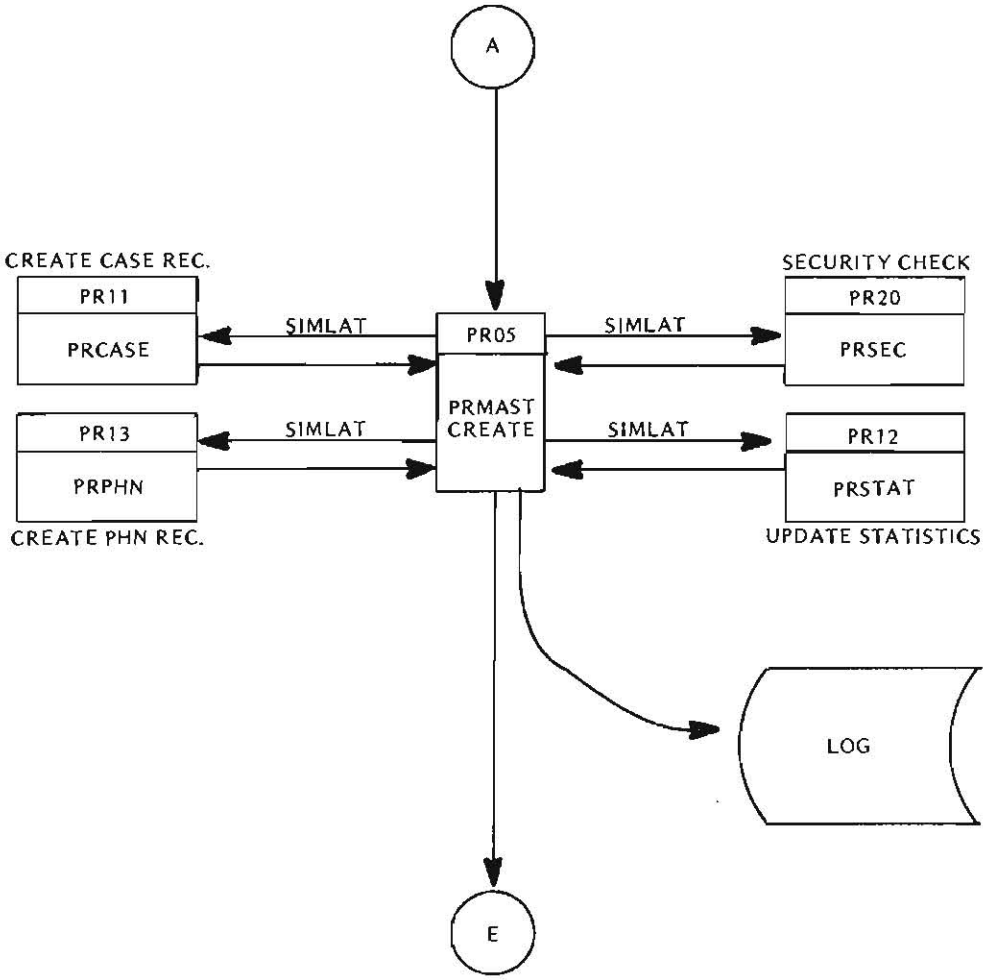

EDIT INPUT
ERROR ?
NO
CHANGE CASE
NO
A
YES
YES
PREFORMAT ERROR CORRECTION SCREEN
END
GET CASE
CHANGE KEY DATA
NO
UPDATE CASE
YES
DELETE OLD CREATE NEW CASE
A
1
NO
CHANGE MASTER
YES
GET MASTER
CHANGE KEY DATA
NO
UPDATE MASTER
YES
DELETE OLD CREATE NEW MASTER
1


1
CHANGE PHONETIC
NO
B
YES
GET PHONETIC
CHANGE KEY DATA
NO
UPDATE PHONETIC
YES
DELETE OLD CREATE NEW PHONETIC
B
FORMAT RESULT MESSAGE AND PR02 SCREEN
END

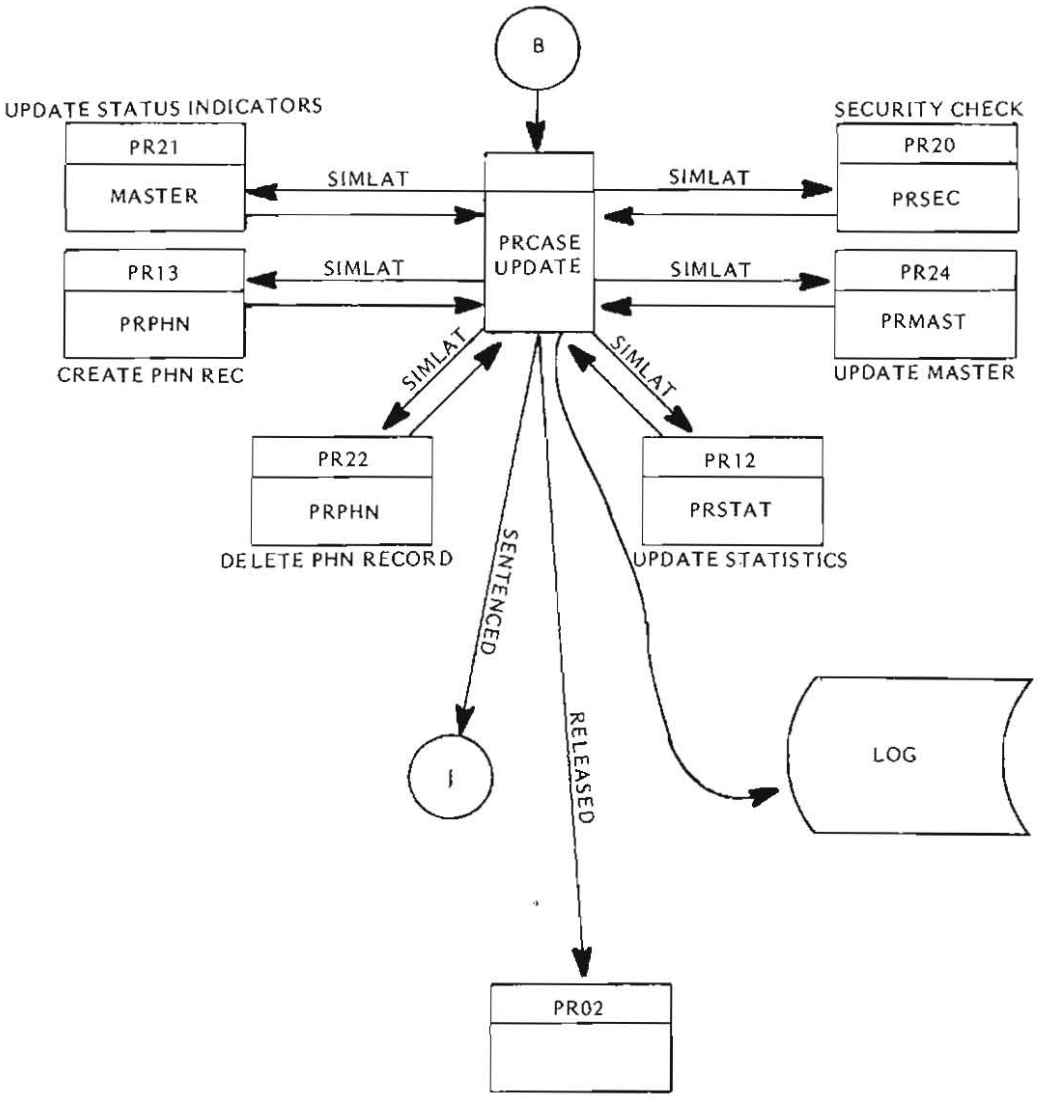
I. INITIATE ACTION PROGRAM



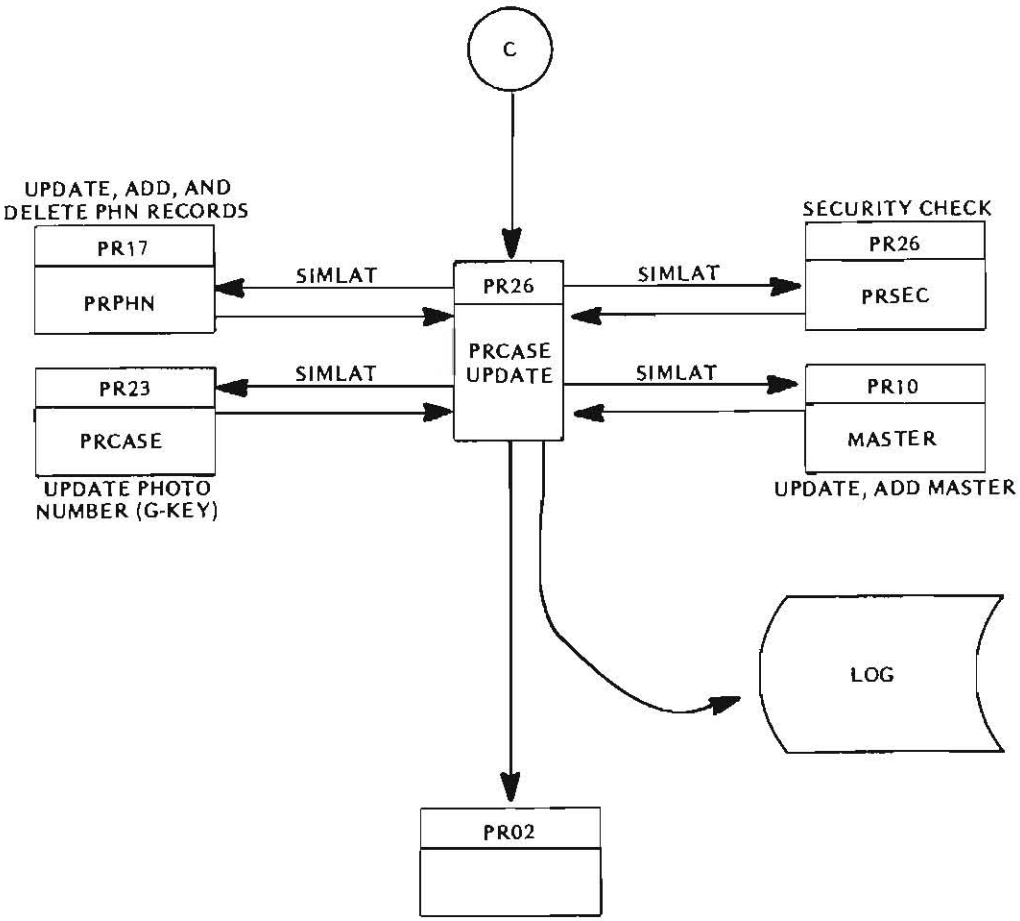
II. CREATE (CAT) PROGRAM



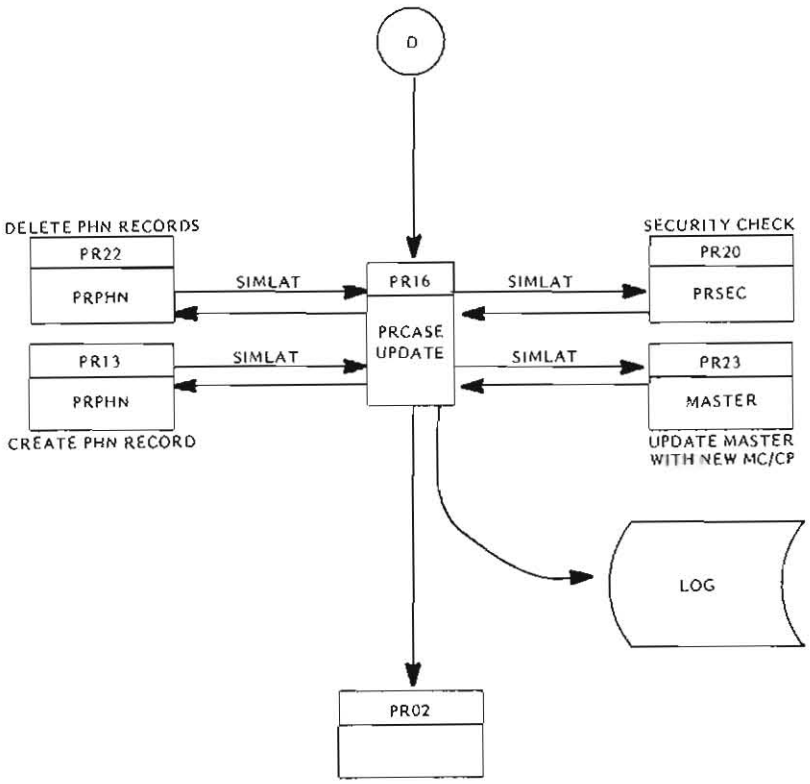
III. RELEASE (RELS) PROGRAM



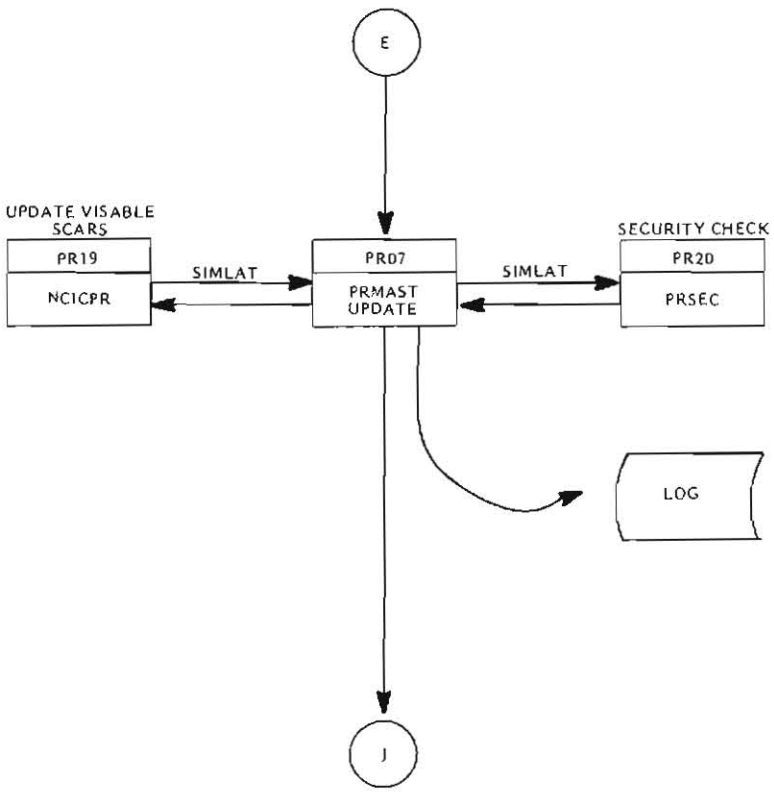
IV. KEY DATA MAINTENANCE (CHANGE) PROGRAM



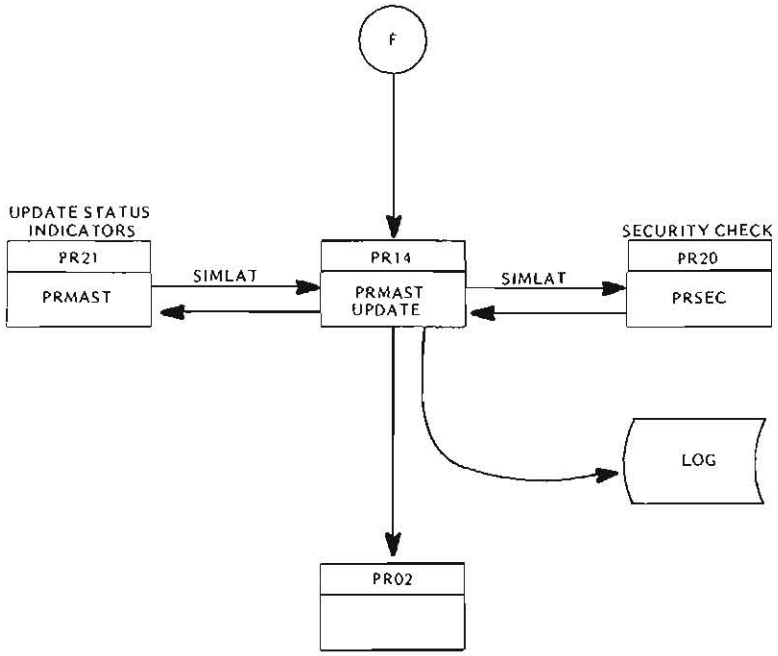
V. FILE MAINTENANCE (MNT) PROGRAM



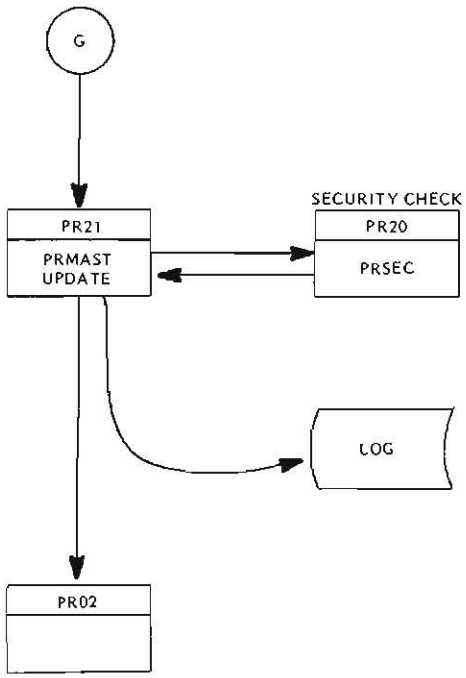
VI. UPDATE (UPD2) PROGRAM



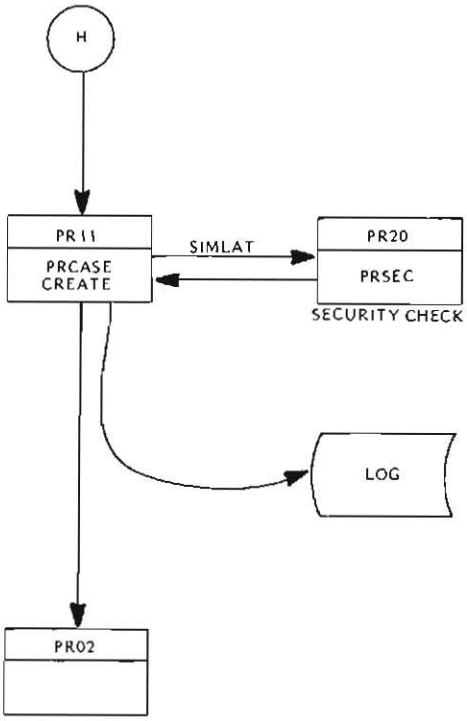
VII. UPDATE (UPD3) PROGRAM



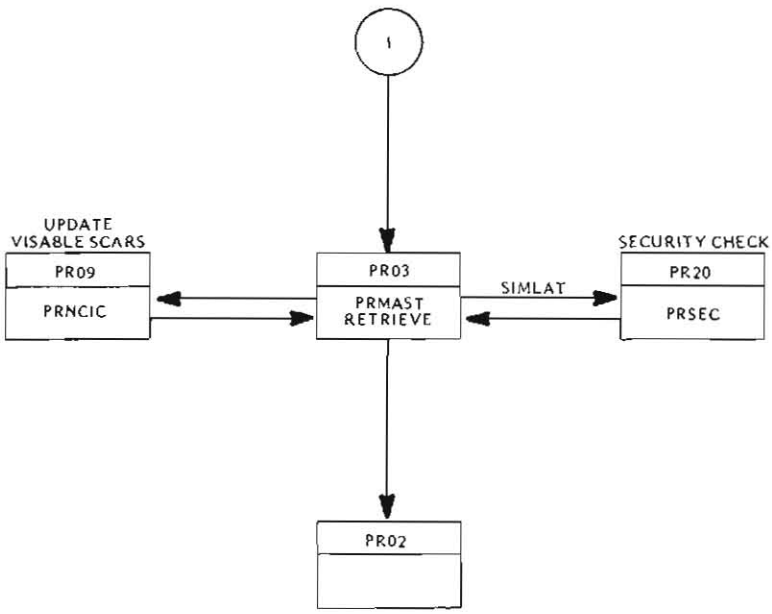
VIII. UPDATE (UPD4) PROGRAM



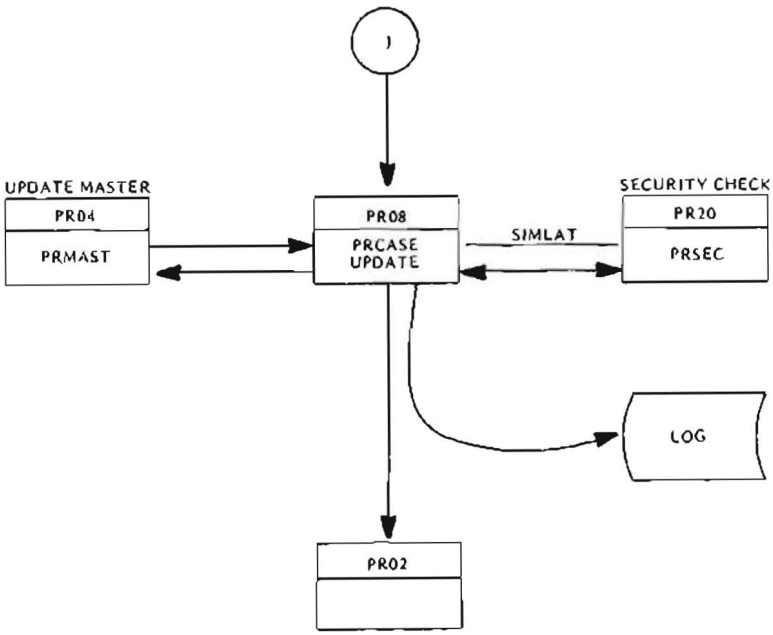
IX. UPDATE (UPD5) PROGRAM



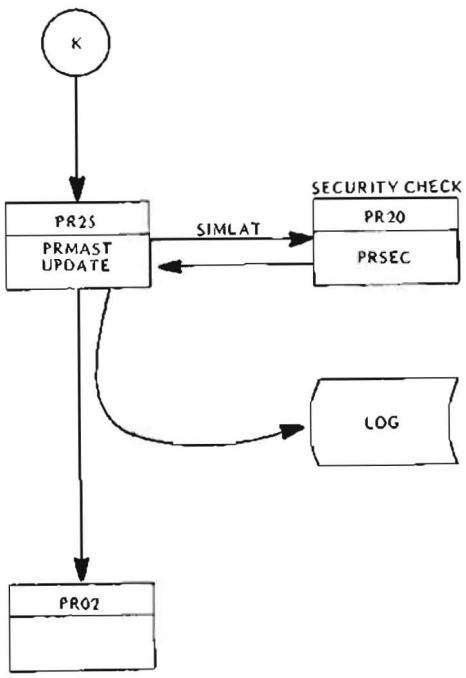
X. CREATE SUPPLEMENTARY COMMITMENT (SCOM) PROGRAM



XI. SIGN-ON MASTER INQUIRY (MINQ) PROGRAM



XII. TRANSFER INMATE (TRAN) PROGRAM



NON SIGN-ON GENERAL ACCESS PROGRAMS

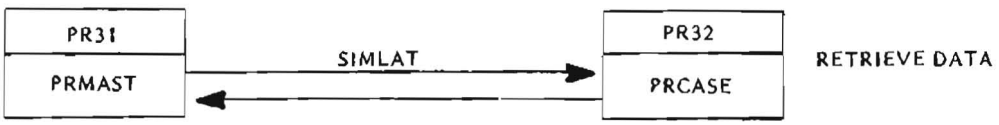
XIII: GENERAL NAME INQUIRY



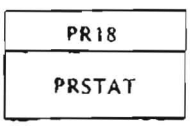
XIV: GENERAL CASE FILE INQUIRY



XV: GENERAL MASTER FILE INQUIRY



XVI: PRISON POPULATION INQUIRY



48299

DESIGN AND IMPLIMENTATION OF A CORRECTION INFORMATION SYSTEM

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INTRODUCTION AND BACKGROUND

Correction systems have been largely ignored in the past. Recent interest has caused examination of such systems in New York City. Since September 1970, the New York City Department of Correction has progressed to the point of implementing the Inmate Information System which was designed and developed through a joint effort by the Correction Department and the Management Services Staff of the Bureau of the Budget. It is geared to a large detention and sentence population encompassing areas of inmate status and location, inquiry responses, movement monitoring and control, automated reporting and operations control. The Inmate Information System (IIS) is a major first step in an overall plan for information systems within the Department of Correction (DOC). The first-step served to introduce computers to the Department, and to aid operations and planning. and planning.

The size of DOC and its characteristics affects the design of an information system. Approximately 400,000 cases are handled by the court system in New York City each year. About 100,000 of these cases produce over 400,000 movements (412,000 in 1971) of which 95% or 380,000 movements are between the courts and the institutions or are institutional transfers. There are at present nine different institutions in New York City. Their combined daily census is about 12,000 inmates. Approximately 60% of the population are detention cases and 40% are short sentence cases. All long sentence cases, an additional 1,500 cases, serve the major portion of their sentences in New York State facilities located outside of New York City while still officially in the custody of New York City Department of Correction. About 15% of the City-housed inmates are moved each day. Thus, there are around 1,800 movements each day most of which take place between the nine facilities and the 15 most used courts. In addition, nearly 2,000 inquiries about inmates are received each day from lawyers, relatives, judges, friends, and DOC personnel. In addition, the Department was staggering under a huge paperwork load, a shortage of personnel and a lack of information.

The design philosophy was to introduce systems in a modular fashion. Priorities were placed on various projects, recognizing that many projects were related and would be tied together in the future. The Inmate Information System was selected as the first module to design and implement mainly because it would provide an operational tool to resolve some crucial problems and serve to introduce the ideas of computerization to the whole Department at once. Since then, other systems work has taken place. Studies are continuing in the areas of food services, transportation scheduling, centralized personnel record-keeping, and maintenance.

OPERATING PROBLEMS

Once the Inmate Information System was chosen as the first step, a major study was undertaken to determine what difficulties existed and what would be done to alleviate them. The key problems encountered were:

1. There was a lack of centralized information. Every one of the nine institutions had its own inmate information hand written on cards which were filed, searched, updated and created manually. This meant that the 100,000 inmates who passed through each year generated several million record transactions including record creation, record updating and record discharging. Every inmate movement, 400,000 each year, required many updates, some to record a future appearance and some to record the movement to and from that appearance. Every time a bail was changed, or a charge was reduced, or an appearance was postponed updates were needed. Each inmate required fourteen forms containing similar information. Thus, updating could result in fourteen changes to these forms. Since each facility had its own independent system, every time an institutional transfer took place, most of the forms had to be newly created again, further increasing the volume of work. Furthermore, when any inquiry arose, it had to be directed at the institution where that inmate was housed. Redirecting inquiries to the proper facility resulted in many needless telephone calls and required increased staff to handle them. This problem brought much frustration to the Department, the public, the lawyers and the courts.
2. There was a duplication of effort. In every facility there were many forms that were nearly identical. Forms had to be filed two or three ways in some cases; by alphabetic order, by prison number order and by location. This system required

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handwritten duplication at best in order to cut down on manual file searches or, at worst, since not everything was duplicated, secondary searching was required.

3. A third difficulty was the legibility of the forms. With so many forms and so many people writing, reading them was difficult.
4. Another difficulty was the timeliness of the information. With such volumes, it was a struggle to complete reports on time. This struggle led to yet other sets of records, the various "journals" which held skeleton information in order to retrieve the most used information more quickly without accessing the major card files.
5. Also, there was the inability to produce any comprehensive reporting. Any special request for reports produced disruptions of normal activity. Information was merely collected and left in raw form, filed away.
6. A major procedure within the department is to account for inmates. Head counts during the day accomplish this accounting. Counts must allow for work gangs, movement outside to the courts, etc. Should a count have been short, recounting had to be done. Many times, this led to investigating individual whereabouts through the record system. An inmate's housing area assignment and his current location were facts that needed to be known both individually and in the aggregate. Obviously, getting this information was cumbersome and time consuming, leading to unnecessary overtime at shift changes since shifts are not released until the count is correct.
7. There was a shortage of personnel to perform all of the tasks originally envisioned in such a record-keeping function. The reduction of performance of basic tasks and file maintenance was necessary to keep up with the workload and, in fact, even this reduced workload was hardly maintained. This shortage further increased legibility problems, accuracy, errors, misfiling and work being not completed.
8. File accessing was barely adequate. In addition to those problems caused by misfiling, legibility and so forth, not all inquiries were requested in the same manner. If an alias or another criminal justice agency number (e.g. court docket number) was used, retrieval was impossible.
9. Last, history retrieval was medieval. The forms were stored in basement record rooms or City archives, depending on age, in random order broken out only by the year of discharge. Retrieving records meant that a time consuming search was necessary and successful retrieval was not always achieved.

The list of key problems above are not exhaustive. It can easily be seen, however, that some automation of the inmate records could be of major significance in resolving the difficulties.

DESIGN OF THE INMATE INFORMATION SYSTEM

In order to resolve the situation, a centralized information system was designed with access to the nine facilities in a real-time, interactive mode. The design was performed inhouse. The system, as originally conceived, required a CRT terminal, a low speed printer and a badgereader (plastic card reader) at each of the nine institutions. Also, the badgereader would be needed at the hospital prison wards and the court detention pens. This equipment together with a centralized data base allowed access by all of the required users, gave a hard copy option and took advantage of faster data entry. The software to tie this system together needed to have editing features, name search routines, search by various inmate identifiers, multiple repeat of data fields, and message switching as well as usual telecommunications front end, file management and transaction and backup procedures. This system is illustrated in Exhibit 1.

The centralized system solved many problems. Inquiries could be handled at any point in the system regardless of where an inmate was housed. Upon an institutional transfer, only the assigned location data field needed to be updated alleviating paperwork, recreating records, etc. Approximately 24 forms were made obsolete since their function was performed by the computer. The volume of transactions was thereby greatly reduced. File searching was also greatly reduced since each inmate record could be accessed faster via the computer and by a number of methods including name, alias, NYSIIS number, docket number or indictment number. We were also able to go to a centralized number, the NYSIIS number. Previously the DOC number system reflected the independence of each facility and did not allow access by the law enforcement agencies other than by a proper name. Legibility was no longer a factor except with the source document which was also redesigned to cut down on writing by using as many "check-off" item selections as possible. Accuracy was also improved through this form as well as by the visual editing done on the CRT at data entry.

In addition information was now more timely due to on-line creation, updating and discharging of records. Reports were to be on time; some produced on-line and some off-line and the running "journals" of skeleton information were to be eliminated. Special reports could now be done by programming, reducing disruptions. Information could now be processed rather than being left in raw form and many more reports were added as a matter of routine. Accounting for inmates was aided by a "running count" to which the head counts could be matched. When the counts disagreed, the computer "occupancy file" could immediately give the aggregate housing assignments by each area so that the search time for the difference in the count could be isolated and any individual record search time reduced. Since the system operates faster and reduces some of the workload, the problems associated with the personnel shortage were also to be reduced. Finally, a

NETWORK

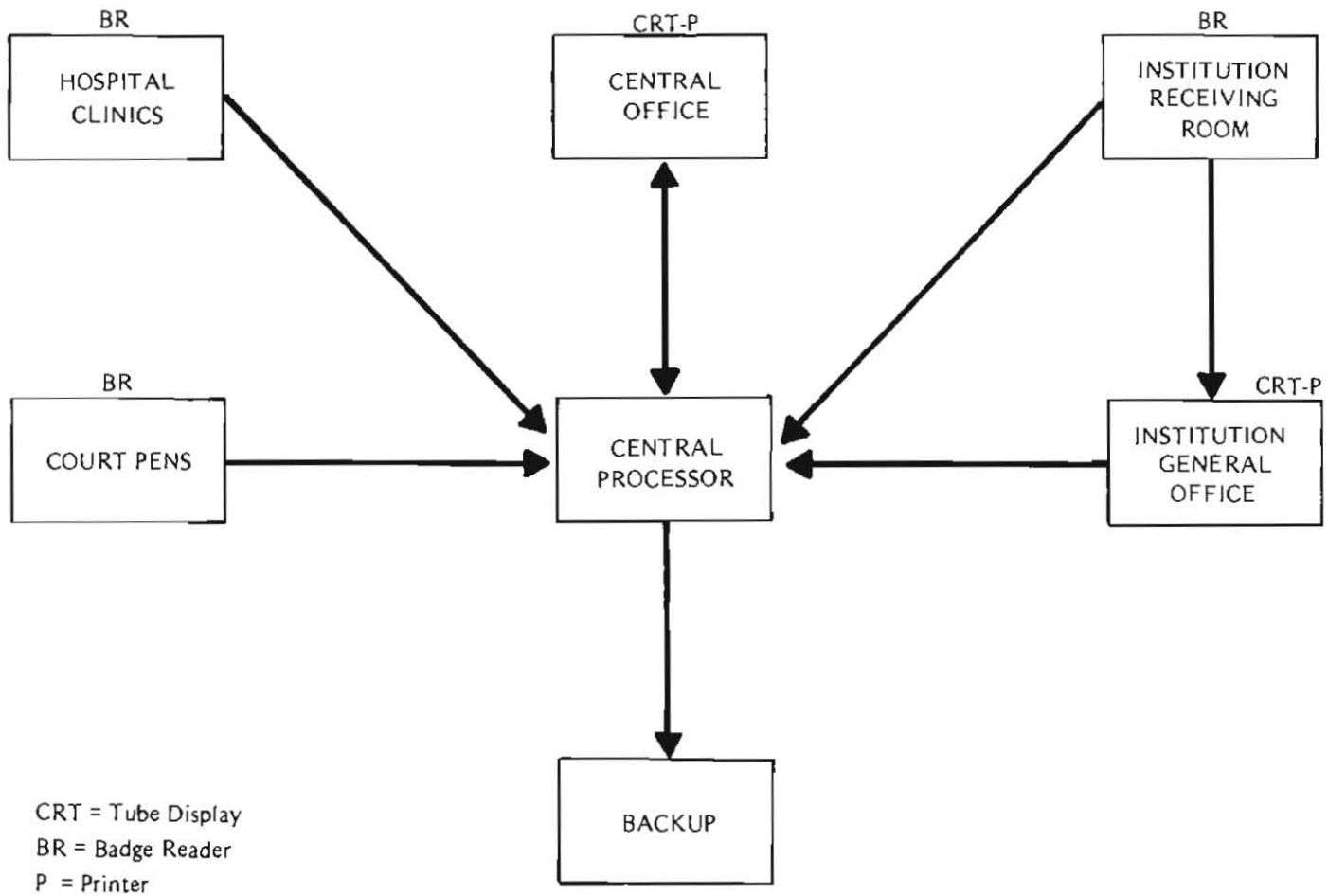

EXHIBIT 1

history file was to be maintained on tape so that the information could be much more readily available.

Inmate movement presented difficulty under the manual system. The computer system was designed to keep track of inmate movement via the badge-readers. Whenever an inmate was to leave the institution, his plastic identification card with machine readable code was inserted into the badgereader, a destination code was to be entered and an automatic update was to occur. Just as the inmate was logged out, he was also to be logged in. This procedure keeps constant track of an inmate, and it gives point to point movement volumes by time of day. It is easy to see how this data could be used for planning – perhaps, forecasting inmate movements in advance for the purposes of transportation scheduling.

Regarding automated reporting, three types of operational reports are produced. The appointment reports list those inmates who are to appear at hospitals, courts, etc. These lists are produced both by destination and by housing area location so that gathering the inmates and sending them in groups to the proper destination is facilitated. The occupancy reports are produced in alphabetic order, floor layout format and floor summary formats. These aid in assigning housing, returning inmates to previously assigned housing and as manual backup in case of computer failure. The last type of reports are the management reports. These include simple census reports, reimbursement reports, movement reports, analyses (profiles) of inmate population, length of stay analyses, bail distributions, etc.

The data on each inmate can be categorized into four main areas: inmate data, location data, court data and miscellaneous. The following is a list of the major items of each category:

1. *Inmate Data*
   Name Address
   Number Relative Data
   Aliases Descriptors
2. *Location Data*
   Assigned location
   Current location
   Future appointments
   Past appearances
3. *Court Data*
   Docket number (or indictment number)
   Arrest number
   Arraignment date(s)
   Jurisdiction
   Charge data
   Bail data
   Record of court appearances
4. *Miscellaneous Data*
   Reimbursement status
   Legal status
   Conviction data
   Warrants
   Court orders
   Property number
   Other numbers (FBI, etc.)

Implementation plans were also part of the design process. Careful plans were laid out because one of the prime goals was to succeed with the first attempt at systems and automation. Implementation did not turn out to be straightforward. There were many problems which caused design changes and schedule slippage.

IMPLEMENTATION PLANS

A great deal of planning for the implementation of this system was done in order to insure a greater chance of success. This section covers those parts of the plans for vendor selection, personnel, training, and some key decisions affecting the implementation.

A. Vendor Selection

In order to implement this system, the Department of Correction was forced to seek outside help since it had no computer system of its own and no programming staff. It was decided, since many different services were needed, to issue a facilities management contract to a single vendor. The vendor had to recommend hardware, software, backup methods, any design changes, and an estimate of programming development and site implementation time. It was requested that vendor responses be submitted in two parts; a technical and management part and a pricing part. The following procedure was used to evaluate the vendor bids:

1. Creating a team of five people to evaluate the bids representing three New York City agencies: the Department of Correction, the Management Services Staff of the Bureau of the Budget, and the Criminal Justice Coordinating Council.
2. Individually rating the Technical and Management part by each team member.
3. Dividing of vendors into "acceptable" and "unacceptable" categories based only upon the aggregate ratings of the Technical and Management part
4. Evaluating of pricing in conjunction with the Technical and Management part ratings for the "acceptable" group.
5. Selecting a small group of the "acceptable" vendors to make oral presentations for further evaluation and checking the vendor references.
6. Final selecting of a single vendor.

Certain specifics were desired for the system and were considered in the final selection of a vendor:

1. Software
   a. What front end communications packages were offered by the vendor?
   b. What language was proposed for the programming?
   c. Would the software be compatible with other computers?
2. Mainframe
   a. What computer would be used for this project?
   b. How restricted to this computer system would we be?
   c. What backup would be permitted in the event of computer failure?
3. Terminals
   a. How fast did the terminal transmit (baud rate)?
   b. How compatible was the proposed terminal with other terminals?
   c. What printer attachments were available?
   d. What special features were available?
   3. What communications environment did the terminals need?

The vendor finally selected offered the following:

1. Highest technical competence within a competitive price range.
2. Prior experience in the Criminal Justice area.
3. Previous experience with the City of New York.
4. Availability of two proprietary software packages; one, a frontend communications monitor and the second, a report writer.
5. Understanding of the needs of the Department of Correction.

B. Some Key Implementation Decisions

It was necessary to decide whether to put all facilities on-line simultaneously or one-at-a-time. The simultaneous procedure would be far quicker at least in theory since all sites could operate and relate at once. However, the Department could not supply enough persons who could direct this effort or assist in the conversion process. The only practical way to proceed was sequentially, as shown on Exhibit 2. Personnel from each institution would be brought to an operating facility prior to installation at their own site. Thus, "hands-on" experience was to be obtained in addition to the formal classroom training. Also, each person's problems could be handled individually and all key personnel could devote their full attention to that location. This insured that at each new site there would be at least some experienced staff in addition to the conversion team.

The number of CRT's required at each facility had to be determined both for determining the number of operators needed to run the system and for the purposes of ordering the equipment. The number of CRT units depended upon the time needed to perform all of the intended functions. Time estimates were based on the following:

a. New inmate records	10 minutes
b. Update court returns	3 minutes
c. Movement	1 minute
d. Cell location changes	1 minute
e. Inquiries	5 minutes

Exhibit 3, which follows, summarizes the analysis that led to determining the number of CRT terminals.

The transaction volumes over the time of day were analyzed indicating that the majority of court returns and new admissions arrived at the institutions between 3 p.m. and 10 p.m., thereby requiring greater terminal access during this period. This fact was significant for planning purposes both for personnel shift assignments and for computer scheduling.

EXHIBIT 2
TRAINING SCHEDULE

LOCATION	*DATE OPERATIONAL*	*6/5**	*6/12*	*6/19*	*6/26*	*7/3*	*7/10*	*7/17*	*7/24*	*7/31*	*8/7*
CIFW	6/19	2	4	2	2	2					
Queens	7/17	2	3	2	2	2	2				
Manhattan	7/24	2	3	3	3	3	3	3			
Bronx	7/31	2		1	2	2	2	2	2		
Adult	8/7	2			1	2	2	2	2	2	
Adolescent	8/14	2			1	2	2	2	3	4	4
CIFM	8/21	2		1	1	1	2	2	3	4	4
Brooklyn	8/28	2					2	2	3	3	3
Branch Queens	9/14	2						1	1	1	1
Headquarters		2	2	2	2						
Academy		1	2	2							
Rikers Island Hospital	8/14			1							2
Kings County		1						1	1	1	1
Bellevue		1	1	1	1	1					
Court Pens		2									
Central Office		2									

* The week of June 5 was used for Executive Training Sessions

EXHIBIT 3
ESTIMATED TERMINAL USAGE

	Volumes (9/1/71)		Hours					
	New Inmates	Court Returnees	New Inmates	Court Updates	Cell Transfers	Inquiry	Total (Hours)	Est. No. of Terminals
Brooklyn	43	102	7	5	3	23	38	3
Bronx	32	72	5	3	2	17	27	2
Manhattan	49	77	8	4	2	30	44	4
Br. Queens	0	14	0	1	1	5	7	1
NYCCIFM	87	20	14	1	1	37	53	4
Queens	19	90	3	4	3	14	24	2
NYCARD	99	164	17	8	5	41	71	5
Reformatory*	0	57	0	3	2	25	30	2
NYCCIFW	23	29	4	2	1	10	17	2

* Prior to use as a detention institution.

Another key consideration was the conversion of the data base. Current inmate records from all nine institutions had to be converted from the existing manual files onto the computer system via (a) the CRT terminals, or (b) transcribing all inmate records onto IBM coding sheets, punching the data onto cards and reading the cards into the computer off-line. In making the choice between (a) and (b), the effort needed to convert an entire prison was considered. Entering 1,000 inmates on-line would require 10,000 minutes or 165 terminal hours based on the ten minutes' record creation estimate. To complete this conversion in 24 hours, seven terminals would be required plus the system availability of 24 consecutive hours. Also, it would be spatially difficult to put seven terminals in any institution. Some terminals would have to be temporary since no institution required seven. The records could not be removed from the facilities for outside services. For these reasons data conversion via the CRT terminals was eliminated.

As for the punched card method, any number of people could be involved at any one time. Each record creation would also require ten minutes, but twenty people working eight hours could transcribe 960 records. Key punching could be performed by an outside firm and the cards could be read off-line in batch, all of which required no extra time from the conversion team.

C. Personnel

Personnel requirements were reviewed for two phases, the transition phase during which the computer system would run in parallel to the existing manual system and the on-going operations' phase of the system.

A study was made of the time required to perform the main functions in order to estimate the number of people required for the two phases. An approximate increase of 10%, or 16 persons, was necessary to insure successful transition and on-going operation. By implementing each site sequentially, these added persons could be used during the transition phase for data base conversion and for initial help while the regular staff developed their skills and became more confident in the system. Then this team of additional persons could move on to the next site to begin the initializing process again.

D. Training

Training was oriented to both the management of the Department of Correction and the operating personnel. Briefings were held with the commissioners, the wardens and department heads. They were made aware of the latest developments in the system, especially of any problems. It was essential to get their feedback on all critical aspects of the system. Prior to operator training and implementation, a final meeting was held to insure that they had a full understanding of all plans and procedures.

With an anticipated thirty terminals, seventy-two operators on a full-time basis over two shifts were necessary. A first group of approximately 135 persons would be taught to use the terminals. This would provide the seventy-two operators plus a backup pool.

Key aspects in setting up training classes for these people were the number of people per class, the duration of the class, and the number of people that could attend from any institution at one time. It was decided that one week would give each person sufficient time to understand the basic concepts of the Inmate Information System and enough practice sessions on the terminal. Five terminals were made available for the classroom. These terminals would subsequently be used at one

Fifteen people were in a class with three persons sharing each terminal. This schedule is detailed on Exhibit 2.

Personnel selected to be operators were primarily those staff members already performing the functions manually in each institution's general office. These people were correction officers and civilians. The sixteen additional persons hired by the Department of Correction for this project were all civilians.

To aid the training, an operator's manual, a code book, and self-testing question and answer sheets were prepared. The operator's manual contained thorough descriptions of all phases of the system. It also described in detail the procedures of each operator transaction and an example of its use. The code book contained that information to be entered in an abbreviated or coded form. The question and answer sheets related to all phases of the system and gave the students a chance to evaluate their level of understanding throughout the training course.

It was intended that members of the Department of Correction Training Academy would attend the class for two weeks, giving them a solid grasp of the system. Academy instructors would then continue all of the subsequent training. After the nine week period, the Training Academy would thereafter train new operators as the need arose and acquaint every new correction officer with the general concepts and the importance of the system.

PROBLEMS AND CHANGES

As previously indicated, the actual implementation differed from its plans. This section will list some of the major problems encountered.

1. To get approval for most grant related items requires agreement of the Department of Correction, the Bureau of the Budget, Criminal Justice Coordinating Council, and the New York State Office of Planning Services. Time delays occurred while waiting for approvals. This red tape created a rigidity of ideas and left the flexibility of decisions a very difficult concept to achieve.
2. Upon selecting the CRT terminal, the manufacturer claimed that no additional electrical power was required. Immediately prior to the planned installation, a site survey was conducted at which time it was determined that extensive electrical work was needed. It turned out to be a very costly and time consuming effort. Electrical requirements at court detention pens and hospital prison wards have all but eliminated their function from the system at present. These facilities are not in Department of Correction buildings, causing red tape delays in the changes needed.
3. Badgereaders – it was intended to use a badge somewhat like a plastic credit card, as an inmate identifier. These would be machine readable and allow the logging of inmates very quickly and accurately with no keying of information required. Well into the development phase it was determined that the selected company could not produce the desired terminal. It was necessary to alter our plans and use CRT's in many sites. A cutback on the total number of locations was made, since the higher price of the CRT's made installation at low traffic sites a luxury.
4. The implementation of each site, after the first one, was expected to be done in one week. It turned out to be unrealistic to convert all the records accurately and insure accurate maintenance of the system within one week. Two weeks, however, was sufficient for most installations.
5. Software – the program development ran longer than expected. Once the system was put in, a great many bugs existed, creating great difficulty during the training phase and first site operations. The reliability was poor, many transactions operated incorrectly, and others did not work at all.
6. Telephone Lines – telephone line installation was lengthy and the lines turned out to be defective for some time. In addition, the telephone company required use of the lines occasionally to modify the network, disrupting the system of course.
7. The Training Academy never became fully accustomed to the system and constantly sent new people to "learn" the system rather than to help instruct. Thus, the training could not be assumed by the Training Academy for the nine week period. Delays in site implementation and software debugging were occurring simultaneously so that this training interference affected the development only slightly.
8. A detailed contract was written so that the vendor would know exactly what was expected of him. This somewhat more rigid contract turned out to be both a help and a hindrance. On the hindrances, there were times when the main purpose seemed to be adherence to the contract rather than to install a useful system. Also, major changes had to undergo the bureaucratic approval cycle. The main help that the contract provided was that it held the vendor to his promises as was originally intended.
9. The main computer site was closed down just before implementation was to begin. The site had been located at an exceptionally convenient location close to the major prison complex at Riker's Island as well as centrally to the rest of the facilities. The main site had to be switched to what had been the backup computer site in New Jersey. This switch caused delays, raised costs, and necessitated operational modifications. It also took time to decide on a new backup site and new backup procedures.
10. Although much time was spent in training and involving Department personnel, a full understanding of the difficulties of implementation was never achieved. No major crises resulted from this situation but it did tend to make things more difficult.

CONCLUSION

At this stage, about half of the institutions have been put on the system and are running well. Most of the problems that have caused delays have largely been first site experiences. The remaining institutions are expected to have the system installed according to plan.

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CORRECTIONETICS: A MODULAR APPROACH TO AN ADVANCED CORRECTIONAL INFORMATION SYSTEM

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INTRODUCTION

Since the last SEARCH Symposium, the NIMH funded Correctional Decisions Information Project (CDIP)[2] of the American Justice Institute has completed the modular conceptual design of an information system to assist correctional managers and case decision makers to achieve their operational objectives. The design provides information for decisive actions and feedback of the consequences of those actions. This feedback relates to the variance between planned and actual correctional achievements over successive periods of time. It also relates to the management functions depicted in Figure 1 which sets forth an overview of correctional operations to be supported by an information system. This feedback is dependent upon:

1. Operational definition of correctional goals and objectives,
2. Precise specification of the nature of the requirements imposed on correctional entities by new offenders and their environments.

It involves four major management functions.

1. Managerial planning to meet these changing requirements,
2. Measuring the quality and quantity of operational thrusts toward change and controlling operations to be sure they agree with plans, policies, etc.,
3. Assessing intermediate correctional achievements, and
4. Evaluating the effectiveness of the various correctional processes in achieving correctional goals.

Feedback from each of the latter three functions results in replanning, restatement of goals, or both. The Correctional Information System must not only support the four management functions, it also must support the decisions which take place within the six case event programs and the four management support programs shown in Figure 1.

THE CORRECTIONAL INFORMATION SYSTEM OVERVIEW

A total Correctional Information System was conceived, shown here in Figure 2. It was recognized that a total correctional information system to meet all these needs could not be implemented in a single thrust due to the constraints of resources and the limited ability of a correctional system to change. A step by step or modular approach was deemed necessary. A series of models, which together approach a total system, were organized into four subsystems as depicted in Figure 3.

The four basic subsystems are (1) Offender Control and Reintegration, (2) Management Support, (3) Offender Care, and (4) Correctional Industries. These subsystems have been selected with an eye toward the major goals of the system and the supporting activities required to achieve those goals. The major differences among the subsystems are in the purposes each serves and, thereby, the capabilities provided. Since each subsystem also will be implemented in stages, a number of implementation *models* have been identified for most subsystems. A total of fourteen such models appear in Figure 3.

Figure 3 also reflects the unevenness of the system development. Highest priority was directed to the six models of the Offender Control and Reintegration subsystem.

These six models are ordered according to the designer's expectations of their chronological development. In fact, most are dependent upon previous models. Each successive model increases in complexity and capability by the addition of additional data elements and events. Within a subsystem, the models are conceived to provide different capabilities to accomplish the subsystem purpose. The assignment of capabilities to a model within a subsystem often has been an arbitrary design decision, based on the perceived needs and priorities of managers.

Many combinations of events are possible for each of the models. Crucial to the success of the eventual total system, however, is the ability to fit the modular pieces into an integrated whole after a lengthy period of development. This ability to integrate the various models is dependent on linking them across the subsystems via the use of codes for key data elements; e.g., offender number, organization code, event codes, activity codes, and dates. So doing permits such linkages as costs in the fiscal model (model 7) to the performance measures in the effectiveness evaluation model (model 5) to provide cost effectiveness infor-

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CORRECTIONAL OPERATIONS OVERVIEW

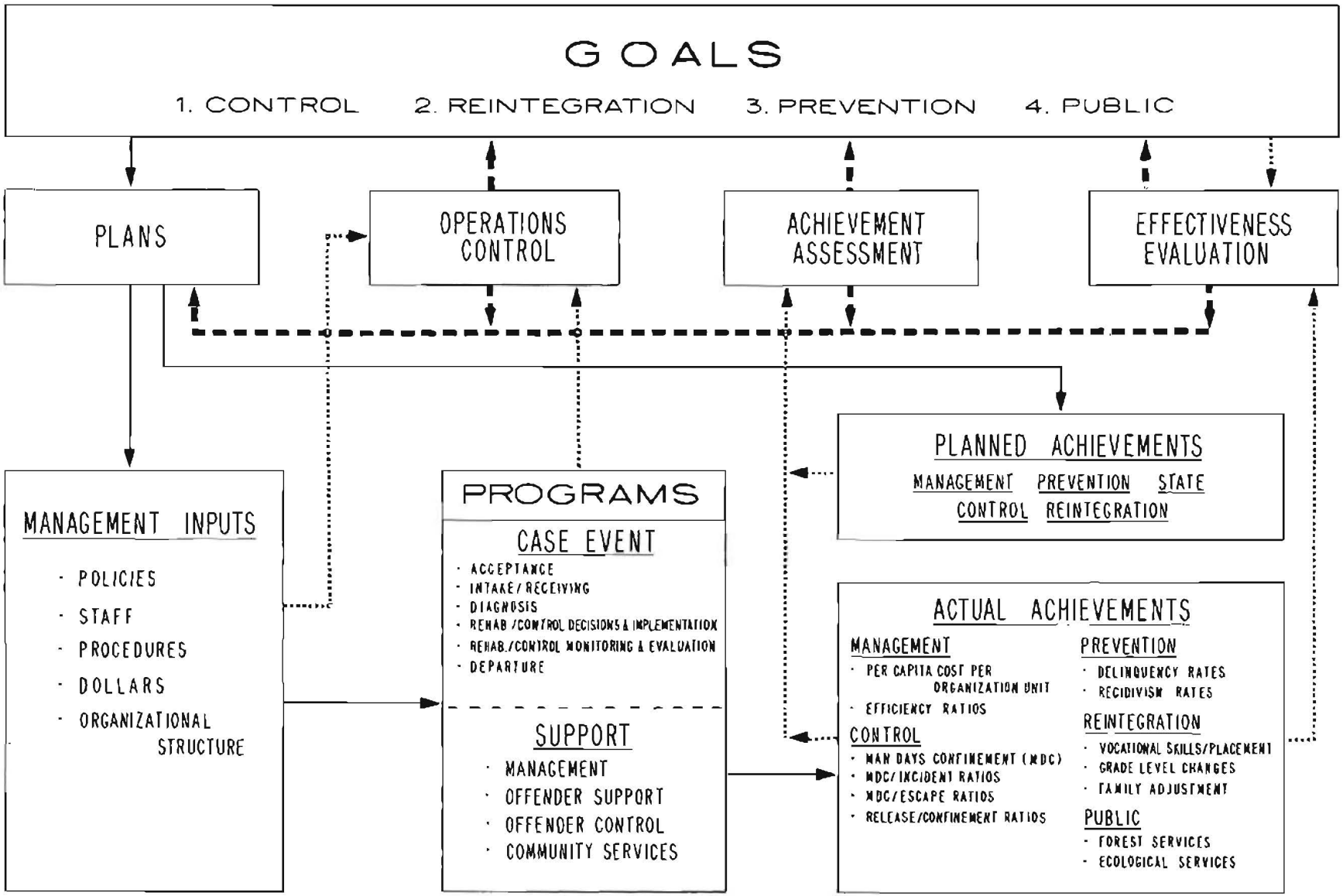


FIG. 1

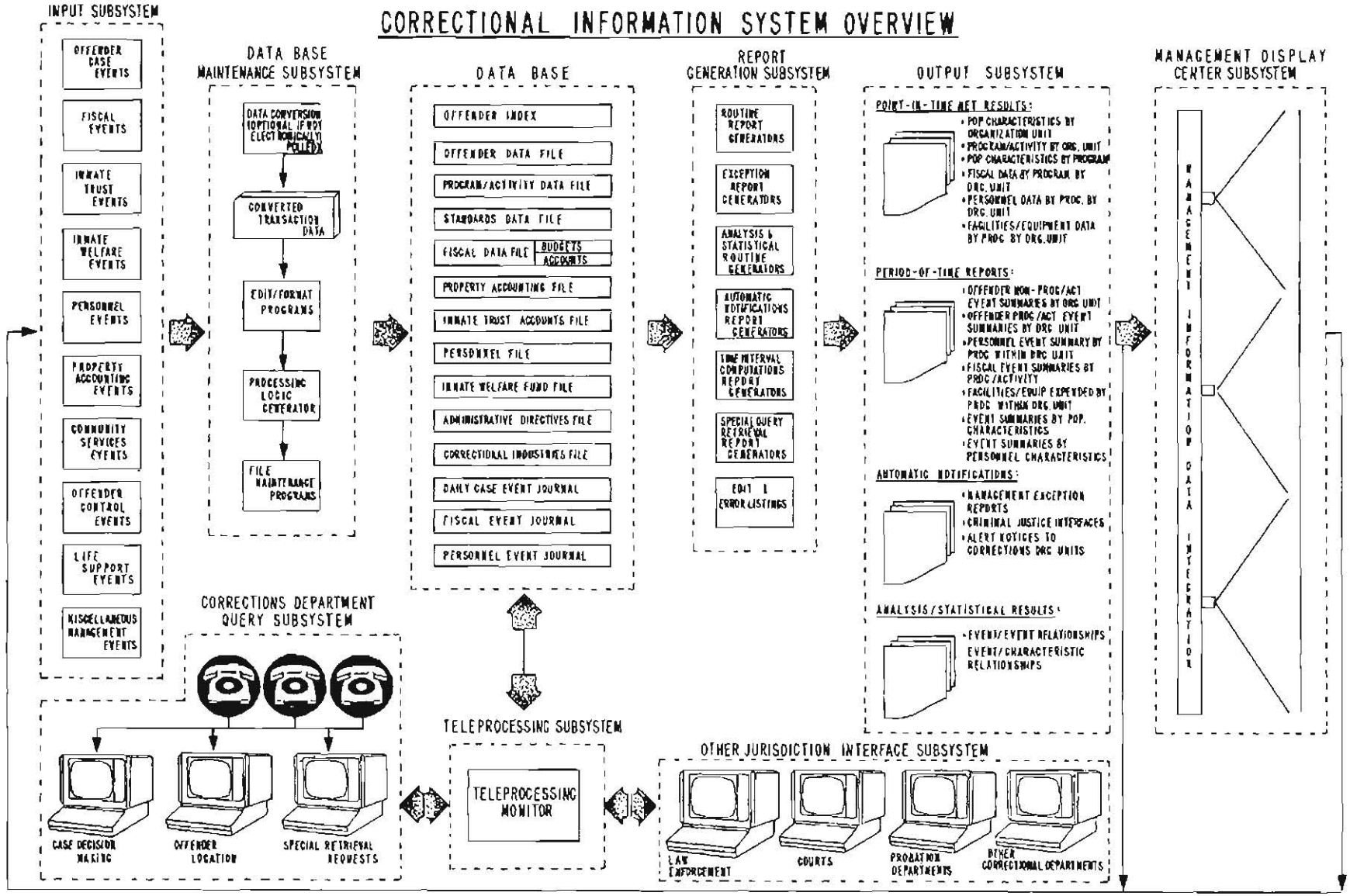

CORRECTIONAL INFORMATION SYSTEM OVERVIEW
INPUT SUBSYSTEM
OFFENDER CASE EVENTS
FISCAL EVENTS
INMATE TRUST EVENTS
INMATE WELFARE EVENTS
PERSONNEL EVENTS
PROPERTY ACCOUNTING EVENTS
COMMUNITY SERVICES EVENTS
OFFENDER CONTROL EVENTS
LIFE SUPPORT EVENTS
MISCELLANEOUS MANAGEMENT EVENTS
DATA BASE MAINTENANCE SUBSYSTEM
DATA CONVERSION (OPTIONAL IF NOT ELECTRONICALLY POLLED)
CONVERTED TRANSACTION DATA
EDIT/FORMAT PROGRAMS
PROCESSING LOGIC GENERATOR
FILE MAINTENANCE PROGRAMS
DATA BASE
OFFENDER INDEX
OFFENDER DATA FILE
PROGRAM/ACTIVITY DATA FILE
STANDARDS DATA FILE
FISCAL DATA FILE
BUDGETS
ACCOUNTS
PROPERTY ACCOUNTING FILE
INMATE TRUST ACCOUNTS FILE
PERSONNEL FILE
INMATE WELFARE FUND FILE
ADMINISTRATIVE DIRECTIVES FILE
CORRECTIONAL INDUSTRIES FILE
DAILY CASE EVENT JOURNAL
FISCAL EVENT JOURNAL
PERSONNEL EVENT JOURNAL
REPORT GENERATION SUBSYSTEM
ROUTINE REPORT GENERATORS
EXCEPTION REPORT GENERATORS
ANALYSIS & STATISTICAL ROUTINE GENERATORS
AUTOMATIC NOTIFICATIONS REPORT GENERATORS
TIME INTERVAL COMPUTATIONS REPORT GENERATORS
SPECIAL QUERY RETRIEVAL REPORT GENERATORS
EDIT & ERROR LISTINGS
OUTPUT SUBSYSTEM
POINT-IN-TIME NET RESULTS:
• POP CHARACTERISTICS BY ORGANIZATION UNIT
• PROGRAM/ACTIVITY BY ORG. UNIT
• POP CHARACTERISTICS BY PROGRAM
• FISCAL DATA BY PROGRAM BY ORG. UNIT
• PERSONNEL DATA BY PROG. BY ORG. UNIT
• FACILITIES/EQUIPMENT DATA BY PROG BY ORG. UNIT
PERIOD-OF-TIME REPORTS:
• OFFENDER NON-PROG/ACT EVENT SUMMARIES BY ORG UNIT
• OFFENDER PROG/ACT EVENT SUMMARIES BY ORG UNIT
• PERSONNEL EVENT SUMMARY BY PROG WITHIN ORG UNIT
• FISCAL EVENT SUMMARIES BY PROG/ACTIVITY
• FACILITIES/EQUIP EXPENDED BY PROG WITHIN ORG. UNIT
• EVENT SUMMARIES BY POP. CHARACTERISTICS
• EVENT SUMMARIES BY PERSONNEL CHARACTERISTICS
AUTOMATIC NOTIFICATIONS:
• MANAGEMENT EXCEPTION REPORTS
• CRIMINAL JUSTICE INTERFACES
• ALERT NOTICES TO CORRECTIONS ORG UNITS
ANALYSIS/STATISTICAL RESULTS:
• EVENT/EVENT RELATIONSHIPS
EVENT/CHARACTERISTIC RELATIONSHIPS
MANAGEMENT DISPLAY CENTER SUBSYSTEM
MANAGEMENT INFORMATION DATA INTEGRATOR
CORRECTIONS DEPARTMENT QUERY SUBSYSTEM
CASE DECISION MAKING
OFFENDER LOCATION
SPECIAL RETRIEVAL REQUESTS
TELEPROCESSING SUBSYSTEM
TELEPROCESSING MONITOR
OTHER JURISDICTION INTERFACE SUBSYSTEM
LAW ENFORCEMENT
COURTS
PROBATION DEPARTMENTS
OTHER CORRECTIONAL DEPARTMENTS

FIG. 2

SUBSYSTEM IMPLEMENTATION MODELS
CORRECTIONAL INFORMATION SYSTEM

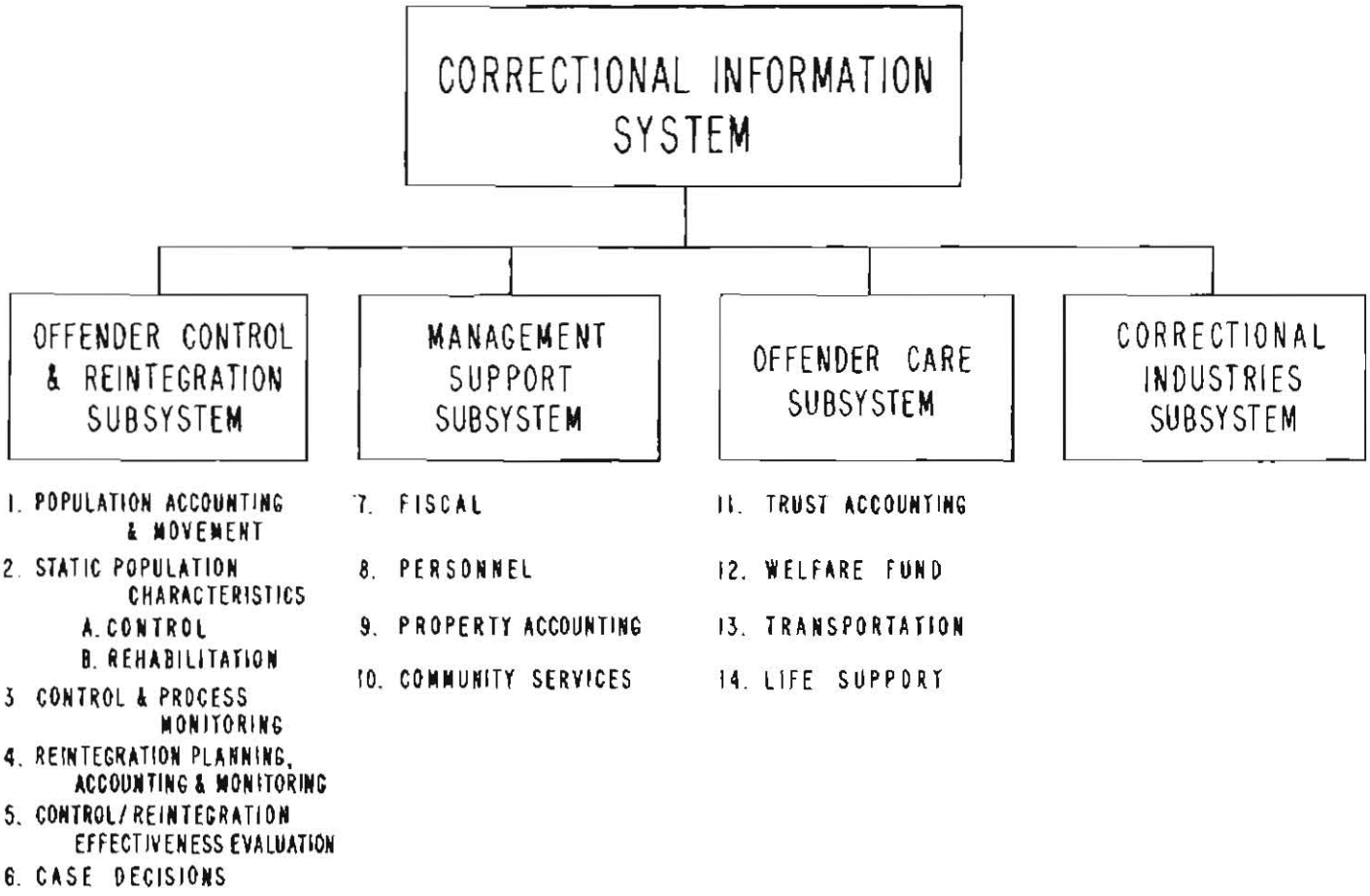


FIG. 3

mation. These codes also enable linkages across different models in the same subsystem.

First let me describe each model briefly and then come back to a discussion of the capabilities of the models as time permits.

Model 1. Population Accounting & Movement

This is a simple start up model to enable:

1. Location of the individual via an index.
2. Account organizationally for all offenders.
3. Provide movement data in terms of event summaries or days in movement status for each offender or all offenders.

This model only has 30 data elements to provide the bare essentials for management planning and feedback with respect to movement and the impact of population on planning alterations.

Model 2. Static Population Characteristics

This second model, which augments model 1, is primarily concerned with better planning of offender reintegration and control programs by capturing and reporting static offender population characteristics. This simplified capture of static characteristics occur at reception centers, or other places of first admission. It provides a great deal of planning information with a minimum increase in system resources. A static population characteristic is defined as data not subject to change, e.g., birthdate. Model 2 adds 112 such static items to model 1, including such data as treatment recommendations, which will be captured only once, at reception, and not updated. Thus, there is no requirement to track the offender to keep the model 2 static data items updated.

Model 3. Control & Process Monitoring

Model 3 addresses all decisions regarding the control of the offender population (level of custody or constraint). It also provides for the tracking of the control processes related to each offender in the system. Considerably larger than models 1 and 2, it adds 65 data elements and 218 control oriented subevents which capture those elements. Process status refers to each stage the offender is in in the system, e.g., accepted but not received, received undergoing diagnoses, diagnosed awaiting assignment, etc. There are 42 total process statuses. This concept provides a powerful mechanism for effective management control of the correctional process.

Model 4. Reintegration Planning, Accounting & Monitoring

As the name implies, this model provides information support for activities related to offender reintegration. Thus, model 4 will facilitate:

1. Monitoring individual offender program activity by capturing the program recommendations at the time of diagnosis and tracking all related decisions and program participation and progress therein.
2. Managing the delivery of rehabilitation program activities in accordance with the needs of offenders by aiding managers as they plan, control and assess the achievements of rehabilitation programs by setting forth (1) summary data about the number and types of programs/activities underway, (2) program achievements, and (3) unmet program prescriptions.

Model 4 provides 154 new data elements and 65 new events (291 subevents). As expected, these are related to program/activities and performance data.

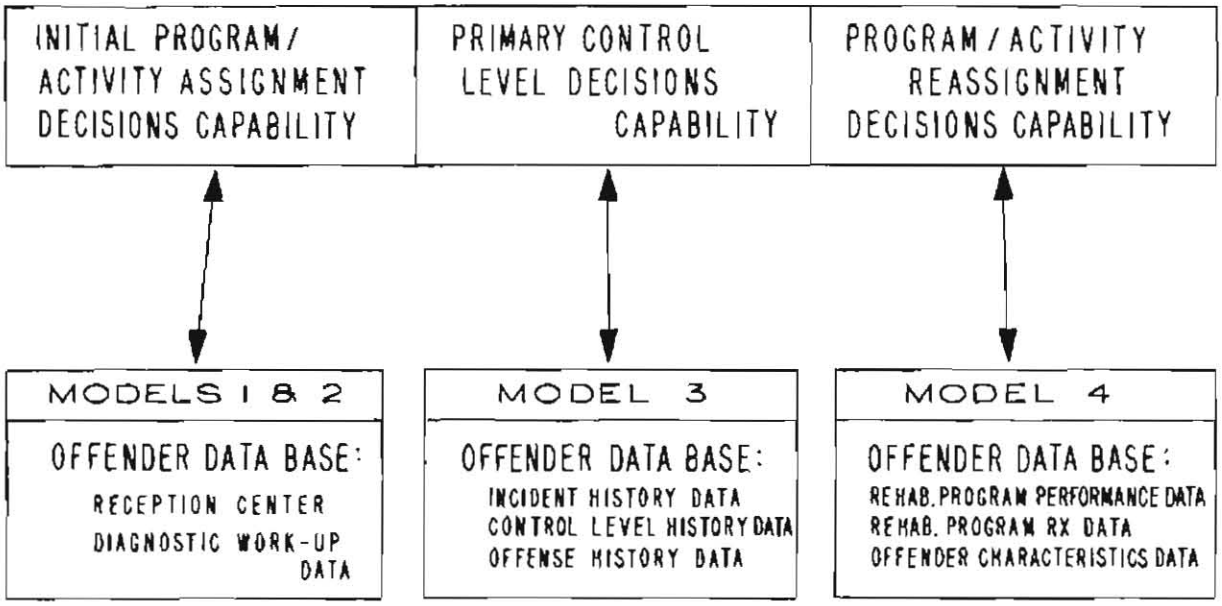
Model 5. Control/Reintegration Effectiveness Evaluation

This model strives to relate correctional operational results with correctional goals – effectiveness evaluation. It requires the marriage of the one major capability in model 4 – the capture of each offender's program/activity performance – with new model 5 capabilties. The latter include the capture of data not previously gathered concerning each offender's performance on goal related behavior criteria and establishing the degree of relationship which exists between that performance and program/activity achievement via statistical analysis. The latter, statistical analysis, is the major characteristic of this model. If desired, it can be added on to previous models.

Model 6. Case Event Decisions

This model's purpose is to provide the information support for the decisions made with respect to the individual offender as he passes through the six system programs. It is quite possible to provide limited case decision data as early as model 2. Each additional model provides additional data for decision making as indicated in Figure 4. Therein you note model 2 data enables initial program assignment decisions, model 3 data supports control type decisions, and model 4 data supports reintegration decisions.

The case event decision model has been placed sixth largely for two reasons. First, exploratory decision studies have indicated a wide variance in the perceived importance of different data elements to correctional case decision makers; model



MODEL 6 MODULAR IMPLEMENTATION

FIG. 4

5 should facilitate empirical determination of the value of data to be presented. Second, the cost of providing the equipment to enable other than manual display of information in a large organization dictated the postponement of this capability other than in manual form.

CAPABILITIES OF SUBSYSTEM MODELS

Keeping in mind the overall correctional process as displayed in Figure 1, let us now touch on the capabilities of these models as time permits. Only a few illustrative capabilities can be set forth.

INTERFACE

First, since there has been a large amount of discussion of OBTS at this conference, one feature of model 1 will be automatic notices to other criminal justice units when an offender is admitted, transferred, or released.

PLANNING

Each model will provide event summaries and time interval computations with respect to the events covered therein, to facilitate management allocation of resources.

Model 1 will provide sample counts relative to: population, number of movements -- admissions, transfers, release.

Model 2 informs managers on the distribution of static population characteristics across all organizations and preliminary reintegration programs data; it also aids the planning of diagnostic efforts since it sets forth the number of diagnoses to be performed and provides feedback on those completed or overdue.

Model 4 assists in planning resources to meet dynamically changing needs for reintegration programs.

OPERATIONS CONTROL

The outstanding feature of all models is the ability to set standards and monitor operations against those standards with management exception reports emitting when preset standards are not met within certain tolerances. Standards may pertain to organization population counts or time in particular movement statuses in model 1; the number of diagnostic events exceeding presently planned upper or lower limits in model 2; time in any process or control status exceeding limits in model 3; excessive time intervals between program prescription and entering program/activities or time in specific program in model 4.

Another important capability is that of setting certain criteria in terms of population characteristics, such as age or criminal history, for any

decision, be it control or reintegration, and receiving notice when a decision violates those criteria.

ACHIEVEMENT ASSESSMENT

Every model will provide summaries of the events that take place within that model so the manager can ascertain if he planned properly.

The results of those events, e.g., incidents or program/activity achievements, will provide precise data in terms of control or program achievements. The latter will include the number achieving or failing to achieve each program objective.

CASE EVENT DECISIONS

The initial decision models will simply provide data with which to make decisions. In more advanced, on line, case decision models, the decision maker will be able to obtain immediate feedback on whether his decision is contraindicated by such conditions as program availability, population characteristic standards, or incompatible inmates.

IMPLICATIONS FOR MANAGEMENT

Before closing, it appears in order to touch on the implications of such a CIS for correctional managers. Such a system is dependent on managers who have the ability and courage to set goals, assess requirements, plan for change, precisely assess the quality and quantity of operational thrusts, and willingly expose themselves to measurement of achievement and evaluation of their effectiveness in goal achievement. In other words, they must be of the new breed willing to change, with the courage to face the fact they may be found wrong.

In order to implement a CIS, the manager must provide firm, wholehearted support to its development and implementation. He must participate in the requirement definition and design stages. Once operational, he must make the tough priority decisions, often in the face of the demands of old time stalwarts. He must be willing to insist on uniform data element definitions and centralized collection of standard data. He must accept staff disruptions and train displaced personnel for new jobs. He must face the fact that adequate information is costly. He must place a higher priority on the establishing of the capability to assess the effectiveness of his organization, which may cause criticism, rather than using those resources to establish a new operational program that may create a good image but be of no real value to the offender. This, truly, is a rare breed of manager, but in him lies the hope of corrections. A correctional information system will provide the sharp tool with which he can carve such a future.

1. This paper, presented October 4, 1972 at the Second SEARCH Symposium, New Orleans, La., is drawn from a document by Hill, Harland L. and Woodell, Marshall J., *CORRECTIONETICS: MODULAR APPROACH TO AN ADVANCED CORRECTIONAL INFORMATION SYSTEM*, Vol. 1, American Justice Institute, Sacramento, Calif., 1972, passim.
2. Funded by National Institute Mental Health Grant 5 R11 MH 02092

48301

A PROBATION MEASUREMENT INFORMATION SYSTEM

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BACKGROUND

The information system which is the subject of this paper is being developed by the Los Angeles County Probation Department as part of the Probation Performance Measures Project.

The project's goal is to develop and validate measures of recidivism and the casework process by which to evaluate the quality of probation supervision. Instruments for measuring recidivism during and after supervision, client characteristics, and the probation officers' casework, will be defined and tested for reliability and validity. The system is being designed to support the validation phase of the project, during which recidivism and casework measurement data will be collected and statistically analyzed.

This paper is concerned with the application of systems design principles to the unique problems of validating instruments measuring the casework process. This is a working paper, in the sense that some details of the project's research design, on which completion of the system's design depends, have not yet been decided.

DEVELOPMENT OF CASEWORK PROCESS MEASURES

Before proceeding with the description of the system's data base and data collection and analysis components, some comments on development of casework process measures will clarify the system's functions.

The first phase of the casework process is investigation and diagnosis, including collection of information on an offender, assessment of his probability of success on probation, and making a recommendation to the court. During this phase, information on an offender's characteristics facilitating or hindering probation casework will be collected for the project. The data fall roughly into three categories, indices of social functioning, internal controls, and personal effectiveness. Some of the data included under each category are

social functioning:
- quality of and satisfaction from relations with family and friends
- stability in family relations and school and work histories

internal controls:
- definition of offense situations
- relations with victims
- sense of being under effective surveillance

personal effectiveness:
- self-esteem
- sense of responsibility for acts

Data on probation officers' casework effort will be collected for an offender placed on probation. The data to be collected include contacts with social workers, school principals, employers, and other agents influencing a probationer's environment, measures of effective counseling relations, and the scheduling of surveillance contacts with a probationer.

The effect of casework on a probationer will be measured by changes in social functioning, internal control, and personal effectiveness indices. Some data will be collected at each contact with the probationer, but certain items will be collected only monthly or when special incidents, such as violation or termination, occur.

Some of the data on probationers' characteristics or probation officers' effort may be collected for already validated instruments. The psychopathy scale of the Minnesota Multiphasic Inventory[1] and the counseling effectiveness scale of Truax and Carkhuff[2] appear applicable to casework elements. However, most of the data will be items in scales to be developed during the first twelve to eighteen months of the project. The scales will be summated item type, such as Likert's summated ratings.

THE DATA BASE

Specific elements for the data base will not be known until at least some casework measures have been defined. However, certain kinds of data are anticipated by the project's design and, from these, the data base's structure can be projected.

The unit record will be at the level of the probation case. The variable length record will include a subrecord for probationer identifiers, such as name, probation case number, or state criminal identification number, and descriptors, such as date of birth, ethnicity, and sex.

Other subrecords will represent data schedules completed on the probationer and will include item scores used in scales. These records will be keyed on date of completion and schedule type and have varying formats. Certain data in item

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subrecords, such as probation officer's number and time sequence indicators, will be used as record selection criteria for data analysis. Time sequence indicators, which include months on probation and probationer's age, in months, will be used to specify individual scorings of a probationer on an item, for scale construction.

DATA COLLECTION

Human factors are usually not an important consideration in data collection for criminal justice information systems. This system is different, because the data collection setting can introduce errors into the casework effort and affect data to be collected for the project.

The major portion of the data is to be collected by a probation officer during casework sessions, such as probationers' reporting or home calls. A public opinion poll interviewer collects behavioral and attitudinal data in similar face-to-face interactions with respondents. The similarity suggests that studies of the sources of data errors in opinion polls will help to identify potential sources of error in the project's data.

Herbert H. Hyman, in *Interviewing in Social Research*[3], has reviewed many studies of opinion poll error and developed a model of the error processes, which suggests additional similarities between data collection in opinion poll and casework settings. The model has been adopted, on the basis of its plausibility,[4] to indicate possible solutions to human factors problems for data collection in the casework setting. I will briefly outline the model, applied to that setting, before discussing the solutions which have been developed.

In the outline, references to "error" should be understood to mean both random and biasing error, although for the project more concern is being given to reduction of biasing errors.

INTERVIEWER-CAUSED ERROR

According to Hyman's model, an interviewer introduces errors by failure to recognize and follow up on incomplete answers to questions or by editing responses in a way that distorts their meaning.

A good interviewer adopts an orientation to the task of probing answers and recording them accurately and a degree of social distance which limit errors. A poor interviewer, on the other hand, is too socially interactive with a respondent and introduces errors through his attitude structure, role, and probability expectations about a respondent's answers.

As Hyman uses the term, attitude structure expectations refer to the perception by an interviewer of a consistent pattern of attitudes in a respondent's answers. Experimental results show that an interviewer can introduce error into data when he relies on his attitude structure expectations in deciding whether to probe and how to record answers. He is more credulous of incomplete answers which agree with anticipated responses, and in recording he edits answers to be consistent with his perceptions of a respondent's attitudes and beliefs.

Role expectations, which lead an interviewer to anticipate certain answers because of a respondent's social position as housewife, Negro, or blue-collar worker, operate like attitude structure expectations to produce errors. Probability expectations due to an interviewer's anticipation of a certain distribution of responses over all respondents creates errors in distributions of survey results.

Because it is important to casework, a good probation officer maintains the detachment necessary for data collection in the casework setting. However, the error model suggests some situations in which an officer's expectations can affect data.

Interviews for which procedures are not completely given and which use free-answer questions are subject to errors resulting from lack of structure, which increases the number of decisions an interviewer must make about the completeness and interpretation of responses and, therefore, the opportunities for expectation effects to occur. The possibility of the counseling sessions in which probation officers will be collecting data are undirected and open-ended.

Collecting data in the casework setting is difficult for a probation officer, because time spent recording data is a distraction from the counseling process. His mechanical problems with recording can be serious enough that he loses interest in accuracy and uses his expectations about responses to help him decide when to probe or how to record answers.

The construction of an opinion questionnaire or respondent selection procedures can increase opportunities for expectation effects. Role expectations are likely to occur in the presence of physical or verbal cues which type a respondent, with questions which concern role-related attitudes or behavior. Attitude structure expectations are fostered by interlocking attitude questions and certain

question sequences. If interviewers have knowledge of distributions of answers in previous surveys, probability expectations are encouraged.

Because a probation officer works closely with a case for several months and has information on a probationer's personal relations, feelings, and beliefs, opportunities for role and attitude structure expectations are more frequent in the casework setting than in an opinion poll interview. In addition, a probation officer is prone to probability expectations based on experience with all his clients.

It is suggested that expectations affect data when psychological stress in the interview situation makes it difficult to decide how to record answers. Casework presents many problems for a probation officer, such as whether to reprimand a probationer or return him to court for modification of probation, and, in these situations, a probation officer uses expectations he has developed over the period of supervision about a probationer's attitude toward probation and the law and about his role in his family and community to aid him in making casework decisions. In these circumstances, data collected in the casework setting will be affected by an officer's expectations.

RESPONDENT-CAUSED ERROR

Like interviewers' expectation effects, effects of the interview situation on a respondent can cause errors.

Under normal circumstances, an opinion poll respondent has a task orientation and social distance similar to an interviewer which controls error. A probationer in the casework setting will also have the necessary task orientation, to the degree that he sees a connection between accurate information given to the probation officer and early release from probation, lack of arrests, and future financial security. It is to be expected, however, that in most counseling sessions a probationer will either regard probation as irrelevent to his life or attempt to manipulate the probation officer through concealment of information, distortion of facts, and censorship of attitudes and belief seen as disapproved by the officer.

The situational factor contributing to a probationer's deliberate and unconscious errors in the casework setting is a difference in group membership, which increases the likelihood of an interview affecting a respondent. The difference between probation officer and probationer is significant for a probationer, because questions about his attitudes and beliefs are seen by him as being related to the uses the officer will make of his authority. Therefore, the probationer is influenced to edit his answers in order to manipulate the officer.

CONTROL OF ERROR

The solutions which have been developed for the project to control errors are standardizing elements of probation casework sessions, simplifying data collection, collecting redundant data and performing analyses to identify problems, training probation officers for data collection, providing useful data to probation officers, and creation of a special team of interviewers.

Presently probation officers use many kinds of forms for recording casework information, with a range of specificity in the data to be entered from partially formated adult and juvenile investigation worksheets to unformated chrono cards. To avoid the previously discussed problems of unstructured interviews, the schedules developed to collect data on casework sessions for the project will replace all forms, such as chrono cards, which are used to record notes on office or home visits. The revised forms will be constructed to avoid questions which facilitate attitude structure expectations or which will encourage a probationer to distort answers. Criteria for complete answers and standard definitions of pre-coded response categories will be developed. The interview procedures to be followed and the use of schedules within a counseling session will be specified.

Pre-coding of response categories on the data schedules will also simplify the mechanical problems of recording data for a probation officer. Another technique which may be used to simplify data recording is tape recording casework sessions. Tape recording would make the least demands on the officer of any data recording technique and, by eliminating the need to write during a session, allow the officer to intrude less into the probationer's awareness. Taping would also permit checking completed data schedules for errors against a transcription of the session. The problems are that the method is expensive and difficult to use out of the office.

The collection of data which are redundant, in the sense that several items are selected to represent one casework variable, makes it feasible to identify possible sources of errors statistically. If one item in a scale is particularly subject to error it may be possible to identify the item by its lack of correlation with other items, with which past experience suggests it should correlate.[5] Another procedure, requiring random assignment of a sam-

ple of cases to probation officers, would permit comparisons of casework data among probation officers or data collection situations. Significant differences in average scores or variability of data indicate possible errors attributable to particular officers or collection situations.

Training of probation officers as data collectors will be primarily directed toward following standardized procedures for completing the project's data schedules. Part of the instruction will cover awareness of behavior which can influence probationers' answers and of the officers' own attitude or role expectations.

Instruction will be reinforced by feed-back to a probation officer of his mistakes. To detect the mistakes, casework sessions will be observed and data schedules checked for accuracy against a tape recording if one is available.

Data collected for the project will be provided to probation officers to help them monitor their own performance and their cases' progress. The data are expected to motivate immediate benefits from the data, tools which support them in carrying out their professional functions.

Creation of a special team of interviewers without case supervision responsibility would reduce errors by taking data collection out of the casework setting. A data collection specialist would have relatively limited contact with any one probationer and would be less likely to develop attitude structure expectations. He would also have no responsibility for casework decisions, which encourage use of attitude structure and role expectations. To the extent that a probationer saw a specialist as non-authoritative, he would probably adopt a somewhat better orientation to the task of answering a specialist's questions in order to improve his situation on probation.

Another advantage of creating a team of interviewers is that persons with better potential data collection ability could be selected. Specialists would be selected for probing and recording skills and an introversive personality, which indicates ability to remain detached and resist expectation effects during an interview.

Creation of a special data collection staff is problematical, however. It would involve hiring special personnel and require either additional staff or reorganization of supervision units and reassignment of probation officers to larger caseloads.

DATA ANALYSIS[6]

The function of the system's data analysis component is to perform computations of estimates of reliability for summated scores and their validity with respect to recidivism criteria, with little programming effort required of a research analyst to extract data from the case record file, construct scales, and carry out analyses.

To perform the basic analytical operation of scale definitions and scoring, the analyst will list names of items to be included and time sequence selection criteria and weights for each item. The subrecord type and field location of an item will be pre-defined in the data analysis system, and, with the above data entered, a matrix of item scores by probationer, item score averages and variances, and a Kuder-Richardson reliability coefficient will be generated. The analyst will have available item intercorrelation estimates of parallel forms or retest reliability for related scales, constructed by selection of equivalent items or identical items at different points in time.

For item analysis, the system will generate the point-biserial correlation of each item with total scale score. If item analysis suggests it, the analyst may also request computation of the matrix of tetrachoric correlations between pairs of items and a factor analysis according to criteria specified by him.

Once used, scale definitions will be included in the system's data description. The analyst will be able to recall the definitions and scores for scales proved reliable. The scales can then be analyzed for validity by multiple regression against or factor analysis with recidivism measures selected as criterion variables.

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3. (Chicago: The University of Chicago Press, 1954).
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6. References for the statistical techniques in this section are Edwin E. Ghiselli, *Theory of Psychological Measurement* (New York: McGraw-Hill, 1964); J. P. Guilford, *Psychometric Methods* (New York: McGraw-Hill Book Co., 1954); Dean K. Whitla, *Handbook of Measurement and Assessment in Behavioral Sciences* (Reading, Mass.: Addison-Wesley Publishing Co., 1968).

48302

A COMPREHENSIVE INFORMATION SYSTEM FOR A CORRECTIONAL AGENCY

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The two primary functions for any Department of Corrections are: (1) To isolate the inmates assigned to it for the protection of the general public, and (2) To rehabilitate these offenders so that when they are released, they will be better prepared to become productive, useful members of society. Like most correctional organizations, the South Carolina Department of Corrections originally addressed the majority of its efforts to the first of these two functions. In the late 1950's however, the Department began to emphasize its responsibilities in the second category and prepared itself to carry out a complete program of rehabilitation. To the surprise of those involved, it soon became evident that there was not enough information available to enable the Department to establish or pursue truly effective rehabilitation programs. Although the Department kept modern records as far as corrections' requirements were concerned, there was not enough information available on background, relative capabilities, and needs of the inmates. The Department of Corrections then began to gather additional data, but the requirements soon flooded the manual records system then in use. It was not until the advent of automated data processing that there was an opportunity to get a workable rehabilitation program based on facts rather than surmise or intuition.

In order to place our talk in perspective, I would like to provide a few facts and figures concerning the size and responsibilities of the South Carolina Department of Corrections: (1) The Department handles only adult offenders so we deal only with people over 17 years of age; (2) Certain offenders ranging in age from 17 to 24 years are sentenced under a Youthful Offender Act, which requires special accounting and treatment; (3) We have 17 institutions of various sizes and security requirements throughout the state; (4) In 1971 the Department averaged approximately 3,200 inmates and 800 staff personnel; (5) We average about 210 receptions and about 170 releases per month; (6) The South Carolina Corrections' System does not distinguish between felons and misdemeanants; (7) In South Carolina we have a dual corrections' system. Our Department has the responsibility of inspecting and approving county facilities, but has no other responsibility at the county level.

In July, 1967, the Department started an MDTA Project, which had the dual function of training prospective programmers, computer operators, and keypunch operators, and of establishing an inmate records system. This combination effort was continued for approximately three years, by which time it had become evident that it was impractical to meet MDTA requirements with inmates of correctional institutions and also, that it was impractical to attempt to maintain both a training program and an operational program on the same equipment. Accordingly, the Department decided to pursue a different route in establishing an inmate records system.

In mid 1970 an IBM 1440 system was acquired, and in late 1970 a grant request was submitted to LEAA to conduct a study for the development and implementation of a comprehensive information system in a correctional agency. In the spring of 1971 this grant was approved, and the Department took steps to acquire and assign a staff to conduct this study. The study officially started on July 1, 1971. The first few months were used to establish an Information System Advisory Committee, to increase the knowledge of the system study staff in the overall operation of the Department, and to select a consulting firm to assist in the study. The principal reasons for asking for consulting help were to compress the time span required and to get an objective external view of the Department's operations.

The system study project was undertaken as a three-phase program of study, analysis, and preparation for total implementation. It followed closely major recommendations of the Joint Commission on Correctional Manpower and Training which stated that correctional agencies should adopt a multi faceted research strategy which would include (a) in-house evaluation projects; (b) collaborative research ventures with institutions of higher education, private industry, and non-profit research organizations. and (c) cooperation with national, regional, and state efforts to disseminate research results.

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Phase I of the study was the System Definition Phase. This involved collecting and analyzing all the reports and report forms that were used by the Department of Corrections. An effort was made to chart the flow of information into and out of every division and operating section of the Department. We attempted to take into account, not only the published or organization chart flow of information, but also the actual – sometimes informal – staff information requirements. Liaison was effected with outside agencies with whom the Department of Corrections routinely exchanges information. This included such agencies as the State Law Enforcement Division; the Probation, Parole, and Pardon Board; the Vocational Rehabilitation Agency; the Alston Wilkes Society, among others.

Phase II of the study was the System Design Phase. It was during this phase that we synthesized the system to meet the information flow requirements we had investigated in Phase I.

1. An information collection, processing and utilization flow schedule was developed. This schedule establishes when and where appropriate data and information concerning management resources and inmate background and behavior, by transaction, will be captured, stored, processed, and utilized.
2. An operations manual relating to the management and administration of the System was outlined. This manual included detailed direct input data forms and data collection procedures.
3. A detailed definition and processing description of each major programming application in the system was prepared.
4. A program outline was developed to delineate the interagency coordination and input of data necessary to ensure optimum performance of the system as designed.

The system we developed will, when implemented, accomplish all of the objectives we set out for it in Phase I.

Phase III was the System Demonstration Phase. Because of the programming load, we were not able to conduct a complete, dynamic demonstration as had been envisioned; but we established and prepared on the computer, using dummy data in some instances, several of the reports that had been developed during Phases I and II. During this phase an implementation master schedule, based on PERT/CPM project control techniques, was developed to serve as a guide for the orderly long-range establishment of the system. Finally, an estimated cost breakdown for all future staffing, equipment and software expenses was developed. This included an assessment of the potential capability of the present hardware, and a determination of how we can interface with the state criminal justice information system to enhance this capability.

The System Design Study for this system was completed in April of this year and approved in early May. Implementation has begun and it is anticipated that full implementation will be accomplished by the end of 1973, approximately 15 months from now. In the meantime, the system is being evaluated, and when necessary, modified in order to accommodate new or revised requests.

Relatively early in the design effort we began to consider the Management Records System and the Inmate Records System separately. These two problems were similar in concept, but were quite different in detail. While there is a great deal of information crossfeed and a number of programs which bridge the two systems, we have found it best to maintain a clear separation between them.

The function of the Management Records System is to provide management information in such form that it will facilitate planning and operational decision making. The South Carolina Department of Corrections operates in the mode of management by exception. This means that the Management Records System must provide two levels of information. For top management levels it must prepare summary reports that will call attention to problems, aid in planning, and assist in establishing policy. For operating level personnel the Management Records System must provide various amounts of detail so they can focus on problems, imperfections, inefficiencies and opportunities for improvement. Both groups must receive information promptly enough to permit effective management through analysis, investigation, and astute supervision.

The Management Records System accomplishes four major tasks. The first of these tasks might be regarded as a record-keeping function. These records are used in cost analysis, budget preparation, and for audit purposes. They are also used to provide justification for appropriation and grant requests.

The second of these tasks comes under the heading of fund accounting. As you are all well aware, in today's world the money to fund a project may be coming from three or more sources. At the same time, individuals working on the projects may be dividing their time among five, six, or more separate efforts. It is extremely difficult to keep track of the allocation of costs to the various fund sources. Our Management Records System makes this allocation and prepares both detail and summary reports.

The third major function of the Management Records System is that of planning and control. This effort encompasses such items as maintenance records; equipment and supplies inventory; food

service, canteen, and commissary breakdown; Prison Industries' records; and will be extended to include agricultural management. By this last, I mean that we will be assisting in such matters as the planning and rotation of crops, and the acquisition and handling of cattle and swine. Incidentally, our dairy production records are already being handled by computer through our State Agricultural Extension Service and this function will not become a part of the Management Records System.

The fourth major task will be to simplify the accomplishment of routine administrative and fiscal functions. In this category come such items as personnel records, staff and inmate payrolls, accounts receivable and accounts payable, purchasing files, jail inspection reports, and similar reports that will make life in a paper-work world a little easier and more responsive.

The other portion of the Comprehensive Management Information System is the Inmate Records System. The overall function of the Inmate Records System is to provide us with a transaction-based accounting system suitable for monitoring inmate behavior and rehabilitative progress and to note and record the inmate's status in such fields as health, education, attitude adjustment, and other factors. Many theories concerning inmate behavior have been advanced and many rehabilitative programs based on these theories have been tried. It appears that a common fault of all of these systems was that they tended to be too simplistic. They made broad assumptions and generalizations and attempted to apply these broad features to individuals in specific cases. It appears that a requirement of any successful rehabilitation program is going to be sufficient knowledge of the individual to modify the theories to fit more precisely the individual's problem. This is one reason why we have attempted to go into such detail in the Inmate Records System.

Another area where we anticipate major assistance from the Inmate Record System is that of behavorial reinforcement. Any corrections system offers a wide range of living conditions – from punishment in solitary, on restricted diets, to work study release programs – with only the loosest of controls. Previously, it has not been feasible, with manual systems, to ensure that correct behavior was rewarded and misbehavior was punished. With the Inmate Record System we intend to insure that the inmate is kept completely informed of the behavioral standards required to attain any specific level of freedom, including eventually, parole or probation. We intend, also, to insure that if these standards are met, the promised reward will surely follow; and if the standards are ignored, that loss of privileges is the inevitable result.

Our Inmate Record System is divided into five major sections: (1) Section one is the basic identification section; (2) Section two is the criminal history; (3) Section three is the family and background data; (4) Section four is the rehabilitation records, and (5) Section five is specialized services information. It should be noted that the first three sections can be considered as static information. The other two sections, rehabilitation records and specialized services information, can be expected to be updated at periodic intervals.

In our system the basic identification information is acquired from the commitment papers and by interviews at the Reception and Evaluation Center. The second section, criminal history, is obtained from the records of the Department, if there has been a previous commitment, and by contacting the State Law Enforcement Division and through them, the FBI, and NCIC. The family and background data is determined by a series of interviews conducted at the Reception and Evaluation Center, or if necessary, at other institutions in the Department. Wherever possible, this family and background data is verified by contacting the employers, schools, and agencies in the individual's home territory. The rehabilitation record is a complete, detailed, history of those incidents and assignments affecting the individual. It includes such information as custody status, and a record of changes to this status; disciplinary actions involving this individual; educational opportunities available and accepted; work assignments and level of performance; and routine periodic evaluations of the inmate's attitude and overall performance.

Section five, the specialized services information, includes information concerning the medical and dental record of the individual, psychological tests administered and their evaluation, psychiatric examinations and evaluations, data on social services assistance required and/or requested, and a record of special skills and accomplishments in the hobby, recreational and athletic areas.

The development of an information system for a correctional agency presents some interesting challenges in information system design and operation. These challenges are due to the type of information collected, processed, and disseminated. Much of this information is considered to be highly confidential and represents a potential hazard to

the privacy of the inmate if disclosure is made to unauthorized personnel or agencies. These factors of confidentiality and privacy of information were two of the key points that had to be investigated during the course of the Comprehensive Information System Study.

There are two types of data and information to be dealt with in the overall systems design. The first type is the management data that concerns the operational aspects of the Department and its various institutions. This data deals with personnel, budgets, fund accounts, and other administrative and management matters, and is to be made available on a "need to know" basis only. This information will be collected and processed under carefully controlled conditions of physical security. The processed information will then be handled and disseminated as determined by the Distribution List. This list provides that information should be given only to those who need it for the effective discharge of their duties. Such structuring of information needs by levels of responsibility is, of course, a function of management, not data processing.

The other major area of data and information to be treated in the system is that concerning the inmate, his criminal record, his progress in rehabilitation, and other personal information. Distribution of this information is limited to those officials professionally engaged in the rehabilitative processes of the Department.

Although subject to change during the implementation period, it is currently planned for information about inmates to be divided into four categories. Final determination of the information to be included in each category is not simple and generally requires thorough study.

The first category, the information most readily available, will consist of identification information. The data will consist of name, including aliases, physical characteristics, identifying marks, any assigned identification numbers, and similar information. This will be available to all authorized law enforcement agencies.

Category two, criminal history, will consist of those items concerning the criminal offenses for which the inmate is, or has been, charged. Category two information will be available to law enforcement and correctional agencies when appropriate need has been established.

Category three, institutional information, will consist of a transaction-based record of the inmate's status, including such items as medical and dental history, location assignments, work assignments, IQ tests, attitude, and disciplinary actions taken. This level of information will be available to appropriate correctional authorities.

Category four, voluntary information, will consist of information volunteered by the inmate in response to confidential questionnaires, psychiatric evaluations, etc. This information will be available in summary or statistical form only and will be supplied only to persons authorized to engage in research and rehabilitation projects.

It was considered necessary for the protection of confidential data to develop internal physical security that would provide safety in both the transmittal and storage of information. Our program includes restricted access to the Department's computer system and records storage facilities, and the special handling of output reports. Records containing this type of information, whether management or inmate data, will be stored on separate disks or tapes and will be maintained under lock and key with the key available only to the supervisor of Data Processing. Information from these records will be run only under the direct control of the supervisor.

Use of random identification codes and similar means are also being considered to aid in preserving confidentiality of inmate data. We plan an experiment to code this inmate record information in a fashion known only to senior Department of Corrections personnel. We believe we can arrange the code so that even if the information were printed out, the individual concerned would not be identified. The volume of work involved has required postponing extensive experimentation until the latter phases of implementation.

A requirement of any program is an on-going evaluation of its objectives, procedures, and accomplishments. We have already begun this evaluation phase. In time we expect to re-examine every aspect of the system, but our initial evaluation will concentrate on three areas.

The first item we would like to effect is overall reduction in paper work such as record keeping, report preparation, and similar administrative functions. We feel we are already beginning to help this by handling both staff and inmate payroll, Food Service inventory, Federal Grant allocations, and similar program data.

The second area of evaluation will be that of more effective management. This is, of course, a very subjective type of evaluation and considerable time must pass before any significant results can be pointed to; however, already we have provided meaningful reports to assist in next year's budget

preparation, and have provided projections to assist with the capital budget planning function.

Finally, the most important and longest range effort will be probably the establishment and testing of new and innovative research programs. This phase of the evaluation will require several years of study, and will, like most corrections programs, use recidivism rates as a yardstick.

One of the aspects of this system study, which I feel is worthy of special mention, was the establishment and use of an Information System Advisory Committee. I must admit that my initial reaction at hearing that such a committee would be established, was a rather large "ho-hum". However, as it turned out, this committee played a significant role in the system study and is continuing this role during the implementation. Our Information System Advisory Committee consists of twenty-five people, representing all segments of the user population. In order to facilitate working with this large a group, a steering sub-committee of five particularly interested individuals was selected. This steering sub-committee worked very closely with the staff and consultants during the System Design Phase and were a key to the acceptance of the system by the full committee. The influence of the full committee was a significant factor in the acceptance of the system by the staff of the Department.

The development of a system such as we are working on has been compared to the weaving of cloth in preparing a suit. From a technical viewpoint we feel we have prepared excellent material, but there is still a lot of work to be done before we have a suit that fits the prospective user. And unless the suit fits, we have not succeeded in reaching our goal. Our task for the next 15 months is to make sure all our measurements are correct so the cloth we have woven can be turned into a well-fitting suit that will keep the user happy and comfortable.

SESSION II D

CRIMINAL JUSTICE INFORMATION SYSTEMS DESIGN AND IMPLEMENTATION

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The papers presented in this portion of the Symposium were selected to provide a cross-sectional description of Criminal Justice Information Systems describing their component parts and various features of design. It is interesting to note that, at this stage of development, CJIS systems are rapidly becoming a reality in many locations. Generally, such systems begin with implementation of computer applications in the police areas followed by courts and corrections. The exact sequence varies in accordance with economic, political, organizational, and other factors. In some cases, systems design is heavily dependent upon available computer hardware and software. In others, hardware/software is secondary to basic systems design.

Design and implementation of CJIS systems is being performed by a variety of organizations. These include consultants, police departments, courts, correctional agencies, independent criminal justice information system organizations, crime commissions, etc. While there is a steadily growing trend to centralize files of state-wide utility in state criminal justice data centers, there is likewise a trend toward proliferation of criminal justice computers at the local level. The only constraints against excessive duplication of files and efforts by state and local jurisdictions appear to be funding controls and common sense. Although such constraints are becoming gradually more evident and effective, criminal justice and computer officials are concerned that the proliferation of computers and duplication of effort could go further than is appropriate.

Hopefully, the papers in this section will assist all concerned in gaining greater insight into the nature of CJIS systems, their component or modular parts, relative roles of state and local uses of both unique and common (or linked) files, and the implications of the current level of the state-of-the-art.

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CIRCLE – A COMPREHENSIVE REGIONAL CRIMINAL JUSTICE INFORMATION SYSTEM

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BACKGROUND:

Project CIRCLE is unusual in at least two respects: first, in that it occurred at all, and second, in its unusual design approach. CIRCLE began as a concept – a "Concept of Information Retrieval for Crime and Law Enforcement" – that had uneven support in the Criminal Justice Community in Montgomery County, Ohio. However, by the time that the Westinghouse Justice Institute (WJI) began work on the design of CIRCLE last October, it found both total community interest and total community commitment to participate in the CIRCLE design effort. It is, in our experience, quite extraordinary to see police departments, prosecutor's offices, courts, and corrections agencies in a large geographic area like Montgomery County, Ohio, form a working consortium to create a true Regional Criminal Justice Information System.*

The reasons for the widespread support among CJ agencies, both at the start of the project and throughout the design effort, were many and related to the purposes of the CJ community and the Miami Valley Council of Governments (MVCOG), the contracting authority in developing a CJIS. They were:

1. MVCOG recognized that CJ agencies did not have an effective information system to meet their information needs.
2. Each agency recognized deficiencies in the availability, accessibility, accuracy, and completeness of its own information and of other agencies' information useful to each agency.
3. Each agency recognized that its current information system impaired the making of sound management decisions and of long-range planning decisions.
4. MVCOG and each agency recognized that a CJIS would provide an effective tool to reduce crime, to apprehend offenders, to introduce speed and efficiency in law enforcement and adjudication, and to improve rehabilitation programs.

MVCOG commissioned WJI to analyze the needs of all CJ agencies and to design a CJIS that would satisfy, at the minimum, all priority needs to all Montgomery County CJ agencies. It was not to be a law enforcement information system parading as a CJIS, but a true CJIS meeting the information requirements of law enforcement, prosecutive, judicial, correctional, and related agencies. Moreover, the emphasis was placed on community determined information priorities (focusing on common-need information), but avoiding duplication of data which would be effectively provided by other systems, such as NCIC, SEARCH, LEADS, LEIN. This balance of purpose promoted widespread agency participation and enthusiasm in the design of CIRCLE.

The design approach was unusual because of the methodology imposed by the Miami Valley Council of Governments on WJI. The project was to proceed over 9 months in 3 phases: I Conceptual Design of an Ideal System; II Definition of Optional Systems, and III System Design, Specifications, and Implementation Plans. MVCOG knew at the outset that the CJ Agencies of Montgomery County could not afford to invest immediately in the best (ideal), technologically feasible CJIS satisfying all needs of law enforcement, prosecution, defense, courts, corrections, and related agencies. It knew it would have to settle, because of financial constraints, for a CJIS advanced over its existing system but not as advanced as the ideal system. However, MVCOG wanted WJI first to undertake, in Phase I, to design the ideal system for the region so that later, in choosing the financially feasible CJIS for implementation, MVCOG would know not only how much better was the system selected for implementation than its existing information system, but also how inferior it was (in terms of information needs satisfied) to the ideal system. This methodology afforded the community an unusual two-dimensional basis for two key decisions:

1. the selection of the feasible CJIS option, cognizant of what the community gained (more than its current information system) and gave-up (less than the ideal information system), and
2. the development of a long term information system plan, in

* Agencies participating in Project CIRCLE are listed as Appendix 1 to this paper.

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terms of a plan to achieve interim information systems, logically and cost-effectively building toward the ultimate system.

THE FUNCTIONAL OBJECTIVES OF PROJECT CIRCLE

The CIRCLE design approach had three phases, each with a unique objective. In the first phase (to design conceptually the ideal system) the objective was to design an ideal CJIS which (1) satisfied all information needs of the specific CJ community (e.g., tailored the needs to be satisfied by the CJIS according to the Montgomery County decision of kind of needs to be satisfied, number of needs, and the priority of needs), (2) was designed as if money were no object, and (3) was an attainable system within the state-of-the-art out to the year 1975. In the second phase, (to design optional systems), the objective was to define optional designs of progressively less cost and consequently less effectiveness than the ideal system, with the community selecting the highest option that it could afford. In the final phase involving system design, specification, and implementation plan, for the particular optional system chosen by MVCOG as financially feasible), the objective was expansion of the phase II prior work on the chosen optional system in sufficient design, implementation plan, and cost detail for direct implementation.

In phase II, four optional systems (designated A, B, C, and D) were developed. Of the 53 information needs defined by the community to be satisfied by the ideal system, optional system D satisfied 43 of them or 81% of the total needs defined.* Optional systems C, B, and A satisfied fewer needs in descending order. At the conclusion of phase II, the community decided that optional system D would ultimately satisfy the needs of the CJ community in Montgomery County. MVCOG instructed WJI that system D would not be implemented all at once; rather WJI should prepare a phased implementation plan, commencing with optional system A and progressing successively in capability and number of users serviced until the optional system D level is reached. This implementation plan was followed by WJI in phase III, which was concluded in July of this year.

THE CIRCLE SYSTEM

Figure 1, from the phase III final report, is a schematic of the CIRCLE system selected for implementation, showing the system files and other system interfaces.

The system will have eight subsystems:

- COMMAND AND CONTROL
- PERSONS OF INTEREST
- OFFENSE REPORTING
- PROPERTY*
- FINGERPRINT IDENTIFICATION
- MODUS OPERANDI
- SUBJECT-IN-PROCESS – ACTIVE CASES
- SUBJECT-IN-PROCESS – INACTIVE CASES

The operations processes of each subsystem follow, with the processes described in terse but self-explanatory terms.

COMMAND AND CONTROL PROCESSES:
- Incident Entry
- Location Verification
- Unit Identification/Status Change
- Evaluation of Potentially Dangerous Situations
- Incident Alert Timing
- Incident Logging
- Incident Inquiry

PERSONS OF INTEREST PROCESSES:
- Name and Case Information Entry
- Case Summary Response on Name Inquiry
- Field Interview Entry from Street Investigations by Police
- Originating Agency Notification of Contact or Field Interview
- Correlation of Field Interview Descriptions with Descriptions of Perpetrators of Crime Occurring in Immediate Area

OFFENSE REPORTING PROCESSES:
- Offense Entry
- Crime Pattern Analysis
- Crime Density Analysis
- Uniform Crime Reporting/FBI
- Special Crime Reports
- Crime/Socio-Economic Factors Analysis

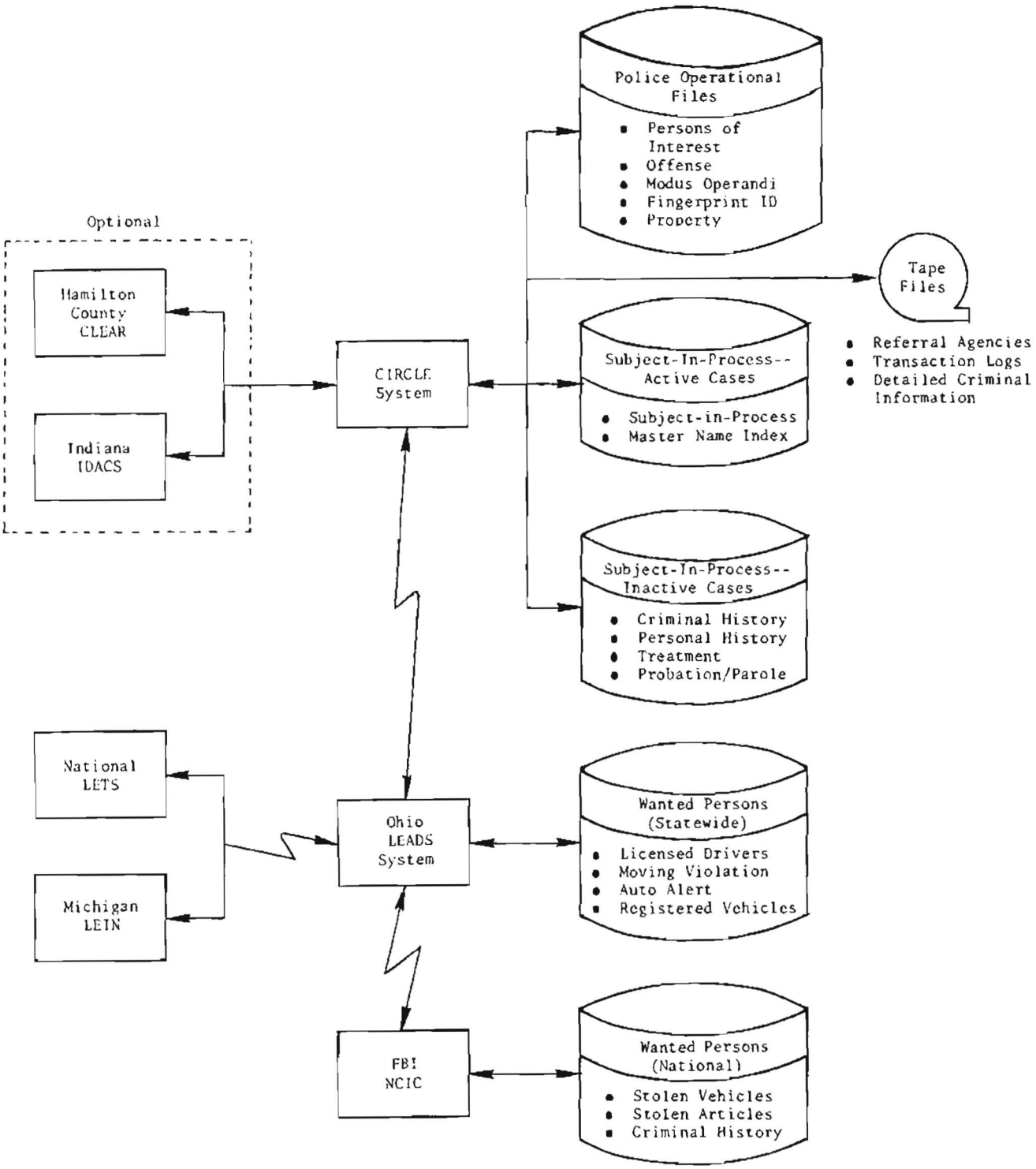
FINGERPRINT IDENTIFICATION PROCESSES:
- Coded Fingerprint Entry
- Identification Verification for Arrested Persons
- Suspect Identification from Latent Fingerprint Impressions Left at Crime Scene

MODUS OPERANDI PROCESSES:
- Modus Operandi Information Entered From Crime Reports
- Physical Description Information Entered From Arrest Reports
- New Crime Reports Checked Against File For Pattern Definition or Suspect Description Matching
- All unsolved Crimes Apparently Committed By Same Unknown Suspect Identified and Presented to Police for Deterrent Actions

SUBJECT-IN-PROCESS ACTIVE CASES PROCESSES:
- Arrest Entry
- Jail Inventory
- Case Review
- Case Priority Ranking
- Case Scheduling
- Case Tracking
- Case Manpower/Evaluation
- Assignment Management
- Process Alert Timing
- Strategy Analysis

* A list of the 53 information needs defined in the ideal system appears as Appendix 2.

* The Property Subsystem is not planned to be implemented until the Ohio State information system plan is known, and then it will only augment, not duplicate the State plan.



CIRCLE System Files and Interfaces

Figure 1.

SUBJECT-IN-PROCESS INACTIVE CASES PROCESSES:

- Court Disposition Entry
- Record Transmitted to State For Entry Into State Criminal History Files
- Previous Dispositions and Treatment Information Identified to Probation or Correction Agency Currently Involved
- Treatment Agency Activity and Statistics Reports Generated
- Offender Personal and Environment History Analyzed and Training or Treatment Needs Identified to Agency Currently Involved
- Success of Treatment Programs Evaluated on Mean-Time Recidivism Rates
- Juvenile and Adult Probation Caseload Projections Made From Monitoring All Changes in Total System Activity

THE BENEFITS OF THE CIRCLE SYSTEM

Both the community and its contractor, WJI, had foremost in mind during the CIRCLE project the goal of maximizing the benefits from a CIRCLE Regional Criminal Justice Information System. In this section, some of the most significant benefits of the system are outlined along with how the CIRCLE CJIS will achieve those benefits:

BENEFITS	HOW ACHIEVED
Improved Crime Prevention Efforts	• Multi-Jurisdictional Crime Pattern Analyses • Computerized Projection of Developing Crime Trends and Hazards • Analyses to Determine First-Offender Profiles • Interaction with Social Service and Social Planning Agencies to Identify and Reduce Causative Factors of Crime
Increased Officer Safety	• Immediate Access to Vital Information • Identification of Potentially Dangerous Situations and Locations Prior to Dispatch
Improved Allocation of Resources	• Variable Police Field Force Deployment in Response to Current Conditions • Analyses of Work Load Requirements versus Resources Allocated in all Agencies
Increased Efficiency In Criminal Investigations	• Additional Aids to Investigations Through Modus Operandi, Personal Appearance and Fingerprint Identification Functions • Area-wide System Entries on Contacts or Interrogations of Crime Suspects • Timely Notification From Prosecutor's Office to Police Agencies When Continuing Investigation is No Longer Required
Improved Efficiency of Case Handling in County Prosecutor's Office	• Case Prioritizing Procedures • Assistant Prosecutor Effectiveness Evaluations • Improved Scheduling Through Notification of Possible Attorney or Witness Schedule Conflicts • Ability for Rapid Notifications Of All Principals and Witnesses For Trial Date Assignments or Changes • Immediate Notification of Changes in Case Status • Optimum Use of Time of Assistant Prosecutors Through Work Load Balancing and Priority Assignments
Protection of Rights of Accused	• Selective Screening of Criminal History and Other Personal Information Obtained from Local, State and/or Federal Systems so that only Data Pertinent to Current Case is Released to Police and Investigative Officers • Restrictions Against Release of Information on Non conviction Arrests • Time-Triggered Alert Notifications to Assure Court Processing Within Established Guidelines • Local Guidelines Established For Purging of Arrest-Related Information
Information Security	• Interagency Agreements on Information Security and "Need-to-know" Limitations on Sensitive Information • Multi-level Safeguards Against Release of Unauthorized Information • "Cut-Off" Procedures for Use Against Those Agencies Found To Be Violating Security Regulations
Reduction in Redundancy of Information Collection	• Centralized Repository for Critical and Summary Information; and Index for Location of Previously Collected Detail Information • Cooperative Procedures for Information Sharing
Coordination of Multi-Level Agency Efforts	• Better Understanding of Area-wide and System-Wide Problems • Timely Information on How Changes in One Level of System Will Affect Other Levels • Better Problem Definitions Through System-wide Information Sharing • Time-savings for Investigative and Analysis Personnel Through Changes in Case Status
Improved Rehabilitation Potential for Convicted Offenders	• Indices to all Public and Social Agencies that have had Prior Contact With Individual - For Purposes of Determing Prior Assistance or Treatment Given • Ability for Correctional Agencies to Better Evaluate Needs of Individual in Education, Job Training, etc. • Recidivism Documentation for Evaluation of Prior Rehabilitative Methods

CONCLUSION

The Westinghouse Justice Institute concluded its contract activities with MVCOG on Project CIRCLE in July, 1972. Since that time it has been working with MVCOG, Captain Tobias, Project Officer for MVCOG, and community representatives to help facilitate an implementation program for CIRCLE. There are several obstacles to the implementation of CIRCLE, being addressed at the present time.

The planned subsystem implementation calls for, in Phase A, the implementation of Offense Reporting, Subject-in-Process – Active Cases, and Command and Control, taking 12 months. The second phase, Phase B, calls for implementation of the remaining subsystems: Persons of Interest, Fingerprint Identification, Modus Operandi, and Subject-in-Process – Inactive Cases taking an additional 6 months. The local Regional Planning Unit has placed CIRCLE implementation high on its priority list and has requested LEAA block grant funds from the Ohio State Planning Agency. The city of Dayton has asked for Pilot Cities' funding for CIRCLE implementation. However, the LEAA

Regional Office appears to have reservations about the appropriateness of using Pilot Cities' demonstration funds for such implementation. Both the community and its contractor, WJI, feel that implementation of a Regional CJIS, supported by the Region, would be an excellent demonstration project befitting Pilot Cities' funding.

Other significant problems being addressed are: who should operate the CIRCLE system, and how will its operating costs be supported over time? MVCOG is confronting the basic issues of implementing a Regional system. Should it be operated by the largest city in the Region (Dayton), or by the county, or by the city and county jointly? MVCOG is also exploring economic options to determine a feasible mechanism for absorbing operating costs in a way that is proportionately fair to the many and variously-sized communities who would participate in the CIRCLE system. These problems illustrate a typical set of serious obstacles to implementing advanced and innovative information systems on a regional basis.

CIRCLE – A COMPREHENSIVE REGIONAL CRIMINAL JUSTICE INFORMATION SYSTEM

APPENDIX 1

Some of the agencies participating in Project CIRCLE include:

- Police:
  - Montgomery County Sheriff
  - Dayton Police Department
  - Some 20 Municipal Police Departments
- Prosecutorial Units In:
  - Dayton
  - Oakwood
  - Miamisburg
  - Kettering
  - Vandalia
  - Montgomery County
- Courts:
  - Montgomery County Common Pleas
  - Kettering Municipal
  - Dayton Municipal
  - Montgomery County Juvenile
  - Second District Court of Appeals
  - Miamisburg Municipal
  - Oakwood Municipal
  - Montgomery County District
  - Vandalia Municipal
- Correction Units:
  - Montgomery County Jail
  - Montgomery County Juvenile Rehabilitation Facility
  - Montgomery County Juvenile Center
  - Dayton Municipal Court Probation Department
  - Montgomery County Court of Common Pleas Probation Department

CIRCLE – A COMPREHENSIVE REGIONAL CRIMINAL JUSTICE INFORMATION SYSTEM

APPENDIX 2

1. Accident-Traffic Reporting
2. Agency Activity Statistics
3. Bond/Bail
4. Booking Information
5. Car Terminals
6. Case Monitoring
7. Case Ranking (Priority)
8. Case Scheduling
9. Case Status
10. Computer-Aided Dispatching
11. Court Disposition
12. Criminal History Summary
13. Criminal History Detail
14. Dangerous Addresses
15. Dangerous Persons
16. Detention Status
17. Diagnostic Evaluation
18. Documentation of Treatment Decision
19. Document Flow
20. Evidence/Exhibits
21. Fingerprint Identification
22. Fleet Accounting
23. Gun Registration
24. Investigation Information
25. Jail Inventory
26. Jurisdictional Boundaries
27. Jury Selection
28. Law Retrieval
29. Manpower Utilization
30. Microfilming
31. Missing Persons
32. Modus Operandi
33. Motor Vehicle Registration and Operators License
34. Notification of Contact with police
35. Offense Information
36. Personal History
37. Persons of Interest
38. Photo Classification
39. Planning and Research
40. Policy Notification
41. Prisoner Release Information
42. Probationer/Parolee Status
43. Prosecution Uniformity
44. Recidivism Documentation
45. Resource Allocation
47. Standardized Case Referencing
48. Stolen Property (including stolen cars
49. Tow-In and Parking
50. Traffic Violations
51. Treatment Decision Modeling
52. Wanted/Warrants Information
53. Witness Notification

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THE ORGANIZATION OF CRIMINAL IDENTIFICATION INFORMATION

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If it were such that the subjects of all criminal record files had their respective file numbers indelibly tattooed on the back of their hand then, with the exception of a few who would chop their hand off, the identification of criminals and subsequent access to the information repository would not be a problem.

As it happens, the law enforcement community is not nearly as fortunate and frequently finds itself with minimal amounts of information upon which it must proceed.

Within this framework it is clearly evident that one cannot discuss personal attribute information organization (data organization) without recourse to how that organized information is itself collectively organized (file organization).

Data organization refers to the actual arrangement of stored data and, file organization refers to the structuring of the arranged data. However, the trouble with terminology – as with data – is that meaning is a function of context. Therefore, we can assume an on-line, multi-tasking, transaction-oriented law enforcement computer system within which a solution is presented.

One of the most difficult problems encountered in the development of the viable law enforcement information system is the search for a data and file organization technique best suited to the magnitude and natural distribution of names and associated index data. The solution so applied must of necessity optimize bulk storage utilization while at the same time not complicating or increasing the speed of information access.

The organization of name-oriented criminal identification data accepts the premise that an individual has or employs some family name – a surname. Consequently, one course of action is to organize relative to these names and accordingly, to organize the supporting name-oriented identification data.

Like many name systems before, this is precisely what has been done!

Embarking initially upon this tack involved an examination of the name distribution within the file. Is a name a prerequisite to criminality? Does the distribution of surnames within the criminal population conform to known distributions of other large non-criminal name files? How is the surname distribution affected by the individual distribution?

To support properly any overall distribution it was necessary to ascertain whether the distribution was stable or was affected by; for example, monthly additions which may alter the structure so that the distribution when totally formulated only reflects its position and composition for that month. If these monthly additive influxes supported the overall distribution, then it is statistically 'safe' to assume that the distribution, when measured, reflects the true picture.

The associated graphs, measured from 1450, 4600 and 5100 monthly record additions, reflect a stable surname initial letter distribution for the periods April 1948 and 1968 as well as August 1968 and individually reflect and equally support a total file distribution throughout 2.3 million name records.

Relative to the initial question now, the absence of name criminality is reflected in and is evident from the comparison of the total criminal file distribution to a "control" distribution file of a one-million individual, 144.5 thousand surname pension file. Group sizes are not contingent upon the surname distribution but on the individual distribution within each surname initial letter group -- there may be more surnames whose initial letter begins with M but there are more individuals encompassed by the S-surname initial letter grouping.

If name files and their subsequent accesses were equally distributed across the surname groupings and the associated number of individuals involved then, any discussions relative to groupings and group sizes would be superfluous.

Further compounding the erratic nature of such a file is the fact that computers are not heuristic and as usual rely on a finite algorithmic approach to problem solving.

Names by definition present a problem! Their structure, their use and, their sound are all functions of their environment. Have they been transliterated? Are they formally documented? Is this a criminal environment where the individual motiva-

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tion for identity concealment is high? Was the name in question merely hearsay and represents only a phonetic translation?

Embedded within any algorithmic approach to the name-handling problem should be capabilities to accommodate the multiplicity and combination of yes/no answers just to the four aforementioned situations.

As our own experience indicated, one of the reasons why the Soundex and Soundex-type versions of name codification has been widely accepted and employed, primarily in manually-oriented environments, is not only because they provide sound-equivalent classes of proper names but their inherent capabilities lie within the realm of organizational smoothing which compensates for the unevenness of name distributions.

However, with subjectivity removed as a consequence of manual-by-computer replacement, especially within a criminally-oriented environment, additional emphasis must be placed on the codification technique employed to compensate for individual subjectivity inherent within the employment of Soundex-type and code-to-letter-type algorithmic approaches. By necessity, subjective considerations must be algorithmically included to compensate for:

1. the de-emphasis of the initial surname letter within the respective name code;
2. excluding the codification of silent, intrusive consonants;
3. the problems of the ethnic disparity of names within the overall population;
4. phonetic discontinuities relative to the same name within different geographic areas, and,
5. to compensate for, especially in the criminal environment, increased motivation towards identity concealment.

Now, since the name within this structure is the key, attempts must be directed toward the integrated solution of the above considerations within an objective algorithmic technique. Consequently, it was necessary also to try to take advantage of the ensuing, and as usual, erratic distribution.

Rather than approaching these two problems – name codification and organization – from a single-solution standpoint; knowing that something would suffer, we effected a dual approach with the initial emphasis on name codification. Its solution was not to be dependent upon any preconceived notion of smooth organizations, 'flat' curves or equal overall distributions. The secondary problem, as previously stated, was to organize the file and its associated data within the resultant distribution in such a way as to optimize bulk storage and minimize file access.

Most name-grouping techniques in operation or available today, automated or manual, are primarily algorithmic and are designed to accommodate name alterations within the following areas:

1. spelling (orthographical);
2. sound (phonological);
3. spelling/sound;
4. structure (morphological);
5. substitutions by new and/or linguistically unrelated names (lexicographical).

To this end, relative to our own peculiar context and environment, we have developed a *pho*netically *i*ndexed *n*ame *d*irectory code (FIND) as a solution to the initial problem area. Primary emphasis in the development of the FIND technique was directed towards the solution of problems which were pertinent to categories (1), (2) and (3). Grouping and subsequent searching relative to the latter two categories for the most part, relies on linguistic subjective intervention. In all of these categories there exists sub-groups which involve further sound and/or spelling alteration. Until such time as computers become heuristic, there is very little which can be done to compensate for the deliberate name abbreviations, combinations and hybridizations.

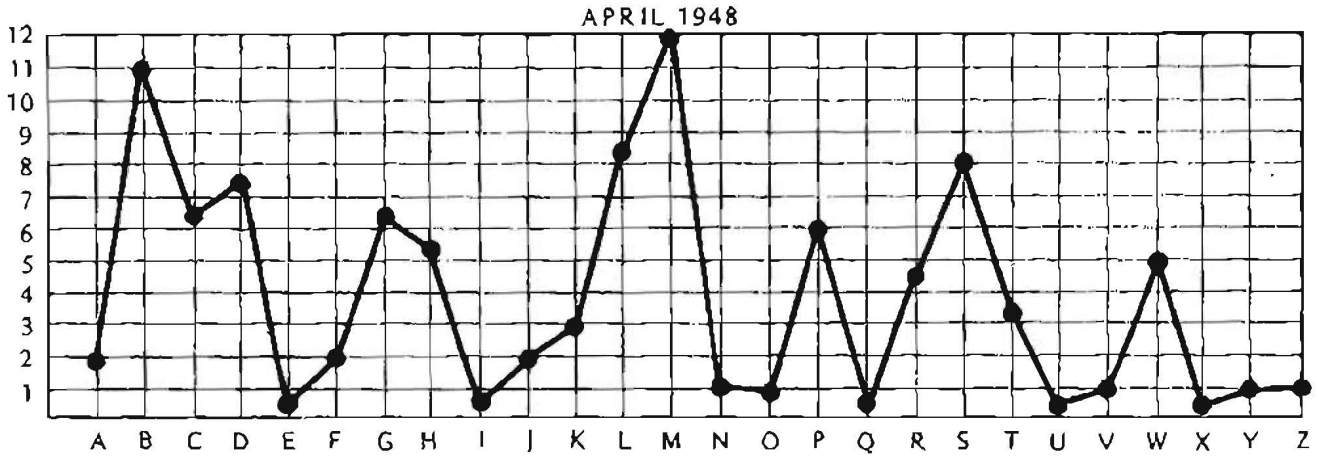
Within our approach we have deliberately increased our emphasis towards the first three categories because of the context within which the names are used. In North America, it is usually the environment which influences the phonological and ultimately the orthographic structure of a name. Usually, names of different ethnic origins have been transliterated in an anglicized sense and as such are relatively 'easy' to accommodate.

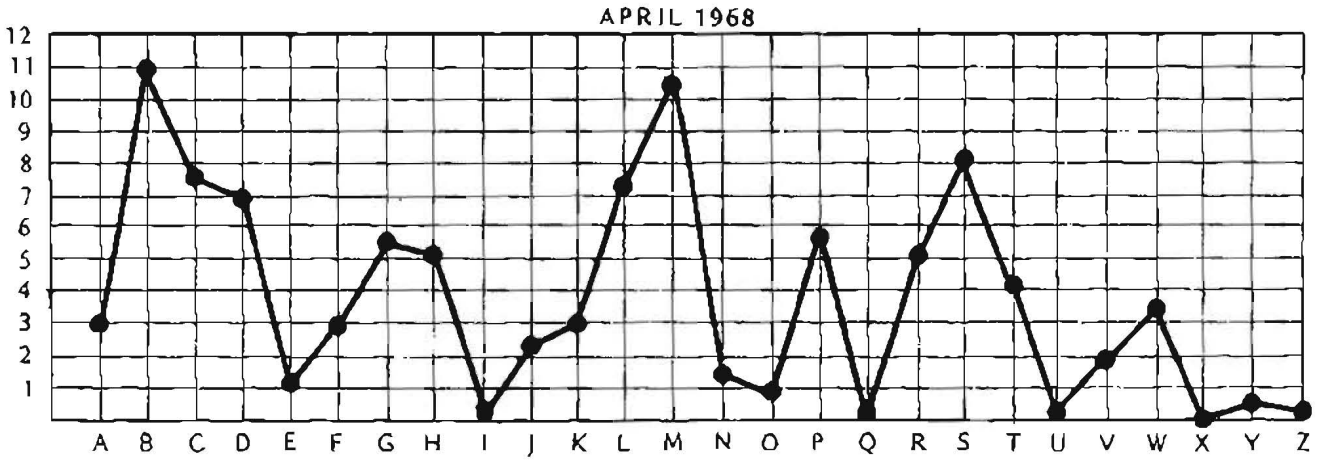
However, coupled with the ethnic disparity throughout Canada we have also a bilingual bicultural national complexion. As a result, the phonological adjustment of names is not always evident. To compensate for this type of phonetic translation, as well as orthographic transliteration, we have included within the structuring of the FIND technique a mechanism of cross-referencing.

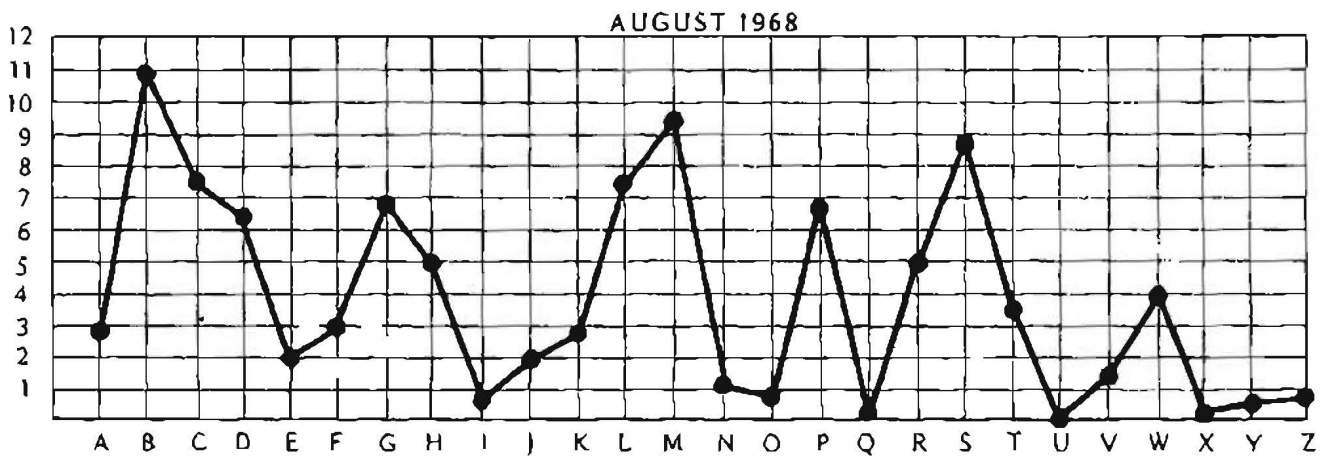
To be more specific and to cite just one particular letter grouping examine the structure context of 'GH'. It may be silent or have either a K/G or F sound but, the silent sound in one ethnic environment may become an F-sound in another environment. Likewise, the F-sound may be a K or G sound in a different geographical area.

In Canada, to a French-speaking individual the names GOYER and BARIL regardless of their origin or ownership are pronounced GOY-AYE and BAR-REE whereas to an English-speaking individual the name may be pronounced as before and as GOY-ER and BAR-IL.

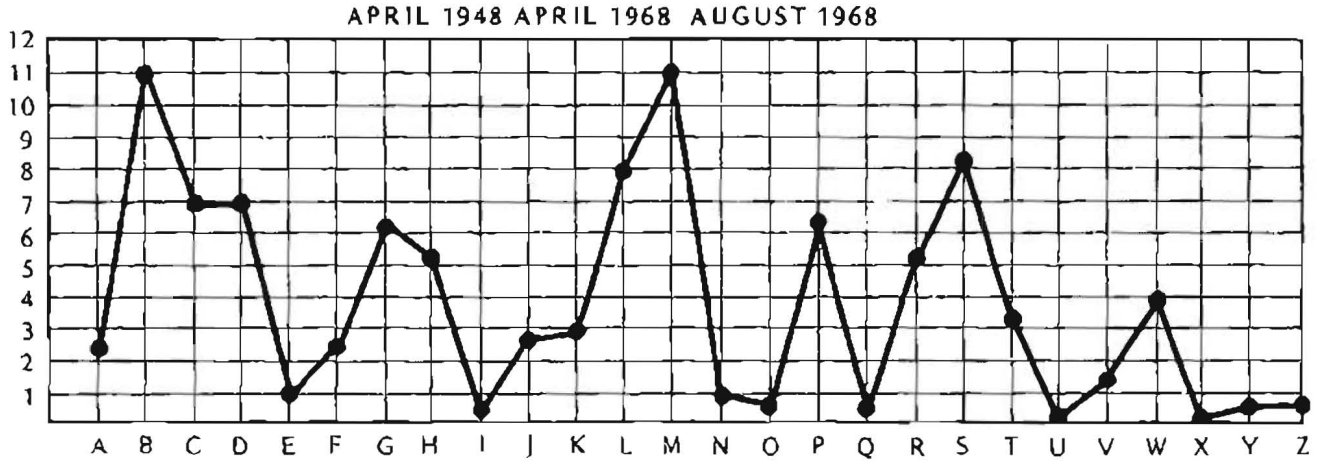
PERCENTAGE OF TOTAL ENTRY VS SURNAME INITIAL

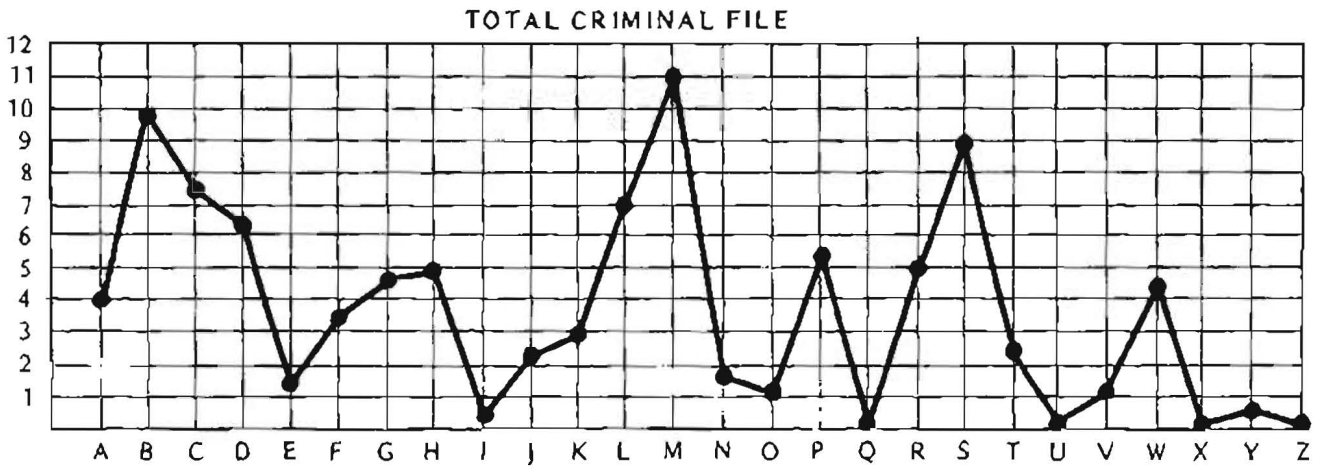


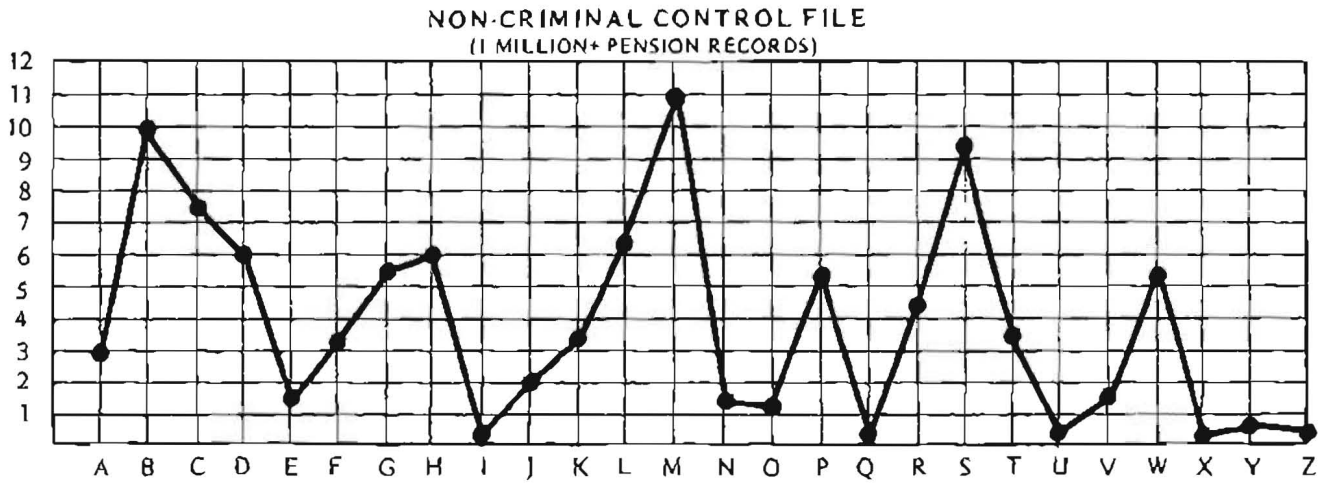




PERCENTAGE OF TOTAL ENTRY VS SURNAME INITIAL







Other names, dependent upon their environment and their ownership, fall into a similar category. The following names and their derivatives are shown to elucidate the FIND technique and its automatic cross-referencing.

NAME/FIND CODE, *CROSS REFERENCE FIND CODE	"USUAL" PRONOUNCIATION	NAME DERIVATIVES		
DAILLEBOUST	DIEBO	DALIBOST	DOWBUSH	DALEBOUGH
D8009	D8009			
*D5860		D5860		
*D8600			D8600	
*D5809				D5809
				*D5870 (DALEBOK)
				*D5880 (DALEBUFF)
MAUGHAM	MAWM	MOAKAM	MOFFAM	
M2000	M2000			
*M7200		M7200		
*M8200			M8200	
LEFEBVRE	LEFAIVE	LEFEEVER	LEFAIVRE	
L8800	L8800		L8800	
*L8840		L8840	*L8840	
BELVOIR	BELLEVOIR	BEAVER		
B5840	B5840			
*B8400		B8400		

SOME INTERESTING PHONETICALLY EQUIVALENT BUT ORTHOGRAPHICALLY DISSIMILAR FIND-GROUPED NAMES

CARLYLE	CARLISLE
DIXON	DICKSON
DAVISON	DAVIDSON
EWEL	YULLE
FOYTOE	FEUILTAULT
HOMES	HOLMES, OHMS
JOHNSON	JOHNSTON
LAWRENCE	LORENTZ
LEVINE	LAVIGNE
LEE	LEIGH
LESTER	LEICESTER
LECLARE	LECLERC
MAYER	MEILLEUR
PORSHES	PORTEOUS
RISHOVA	HRYCZOWA
SEAR	CYR
THOMSON	THOMPSON
WANG	HUANG
YOUNG	JUNG

The search for the file organization method which was best suited to the inherent characteristics of the criminal file was not without obstructions. The most significant of these which had to be and were surmounted was, as previously stated, the ungovernable and erratic distribution effected by the commonality of surnames. Since the distribution of the FIND code is directly proportional to that of surnames, any attempt to improve upon this distribution by "organizational smoothing" would jeopardize the phonetic structure of the FIND code.

The next characteristic in order of significance which proved to be as much of a benefit as a perplexity, was the highly repetitive nature of the file content. Additional characteristics of a lesser degree of significance were presented by the need for direct access by FIND code, optimal disk space utilization, and optimal read times.

There are two basic groups of inherent characteristics which can be applied to any file. They are data file characteristics and processing characteristics.

Data file characteristics can be grouped under volatility, activity and size. With respect to the criminal name index file, relative to the 2.5 million on-line records, Figure 1 provides a list of the fields of data to be associated with each record. The amount of data if stored in display format totals 87 bytes per record, or in an optimized multi-data type structure may be stored within 66 bytes. However, further savings have been achieved through the use of codes and multi-level file structure.

The criminal name index file is not highly volatile. Indications to date show an annual gross

increase of approximately six percent accompanied by an annual gross decrease of approximately one percent giving a net increase of five percent.

Activity, as a data file characteristic, takes on a different realm of concern when the file under consideration is to serve the purposes of an on-line system. To put it simply, as the degree of file organization efficiency rises, so does the overall degree of system performance and, inevitably, so does the activity.

DATA FIELD	*NUMBER OF BYTES IN DISPLAY*	*OPTIMIZED BYTE COUNT*	*STORED IN ABB. FORM*
FIND CODE	5	4	NO
SURNAME	24	24	NO
CHRISTIAN NAME (1)	10	4	YES
CHRISTIAN NAME (2)	10	4	YES
DATE OF BIRTH	6	6	NO
PLACE OF BIRTH	1	1	YES
HEIGHT	3	2	NO
WEIGHT	3	2	NO
COLOUR OF EYES	1	1	YES
SEX	1	*	YES
RACE	1	*	YES
FINGERPRINT PATTERN TYPE	10	10	YES
PRIMARY FPT. CLASSIFICATION	4	2	NO
SECONDARY FPT. CLASSIFICATION	2	2	NO
FILE NUMBER	7	4	NO

* These fields are stored in combination with other fields: Female Sex = Day of Birth +50; Coloured Race = Height (Ins.) +100.

FIGURE 1

The primary processing characteristic is that the processing of the search against a group cannot of necessity be terminated even in the case of achieving a complete match to all criteria provided. Therefore, there is nothing to be gained by providing direct access to any particular location in a group.

The file organization method selected for the criminal name index must provide for the direct access to all individuals, on a group basis, whose surname pertains to a common FIND code. Therefore, the distribution of the file is subject to the same distribution as that of the FIND code. Since the distribution of the FIND code is directly proportional to that of the surnames, any attempt to improve upon this distribution by 'organizational smoothing' would jeopardize the phonetic structure of the FIND code.

The solution exists within a file organization method which utilizes two levels of data storage (header and detail) and file distribution of detailed data (across sub-files of different page sizes) in accordance with FIND code group sizes thus employing the aforementioned erratic distribution for the most efficient utilization of direct access resources (97% utilization factor as opposed to 73% with a fixed page size).

Information retrieval is via the header file to the detail file. Direct access to the header file is effected by a radix transformation of the binary coded FIND code. The use of the radix transformation randomizing technique for the organization of the header file provided three advantages:

1. it furnished the necessary key for the direct access to a FIND code group;
2. it combined surnames of multiple FIND code groups in such a manner as to provide an even distribution for the optimizing of disk space utilization (i.e., 86% in the header file, and 97% in the detail file;
3. the number of individuals represented are equally distributed among the 1,000 transformed radix values.

The dual-level file concept was employed for many reasons, but among the more predominant was that it provided a means of storing the whole surname only once for each unique surname within the file.

A surname number unique within a radix value was assigned to each surname and was stored within the respective detail record as an identifier of the exact surname spelling for use in record matching and descriptor weighting. As an aid to the optimizing of read times, the surname records within a transformed radix value were stored in sequence of their frequency of occurrence. In spite of the average of 250 surnames per radix value with only 41 to a physical sector (page) of disk space, this sequencing of surnames provided for a match on a surname within the first of many pages (six or more) for 80% of all enquiries.

FILE DESIGN AND RECORD STRUCTURE

HEADER FILE

The header file has a page size of 41 records and a record size of 40 bytes and contains one entry for each surname within a FIND code. Each record contains the full surname with its respective data including the relative record number of the first detail file page for the respective FIND code.

The pages are organized by means of a radix transformation of the FIND code (Figure 3).

The entries pertaining to each transformed radix value are sequenced in descending order relative to their frequency of occurrence within the detail file. No attempt has been made to maintain this sequence of entries due to its relatively static nature. The layout of the header file is displayed in Figure 2 with a sample page in Figure 2A.

HEADER FILE ENTRY LAYOUT

FIELD NAME	*DESCRIPTION*
SURNAME	First characters of surname, no imbedded spaces or special characters;
REL-REC-NUMBER	Relative record number of first detail page for respective FIND code;
FILE-NUMBER	File number of detail sub-file for respective FIND code;
SURNAME-NUMBER	Surname number (relative to a FIND code) used to represent exact spelling of surname within detail file;
SURNAME-COUNT	Current count of individuals in index with surname as spelled within surname;
FIND-CODE-COUNT	Current count of individuals in index with respective FIND code;
FIND-CODE	FIND code for surname as stored in surname.

FIGURE 2

SAMPLE HEADER PAGE

MacDonald	41800	19	0001	3048	4669	M7125
McDonald			0002	1390		M7125
Gamache	22780	19	0003	130	334	J2600
Genest			0004	102		J2600
Melnychuk	38860	19	0005	56	151	M2670
McDonell			0006	56		M7125
MacDonell			0007	51		M7125
MacDonnell			0008	51		M7125
McDonnell			0009	48		M7125
Borland	2280	19	0010	39	102	B4521
Blundell	3559	19	0011	35	55	B5250
Janez			0012	22		J2600
Starley	52460	19	0013	17	121	S1479
McDaniel			0014	16		M7125
Swiderski			0015	16		S1479
Berlinguette			0016	15		B4521
Breland			0017	13		B4521
Navratil	584	18	0018	12	13	N8150
Mandziuk			0019	11		M2670
Melnichuk			0020	9		M2670
Dhaliwal	528	17	0021	8	9	T5500
Brillant			0022	7		B4521
Burlington			0023	7		B4521
Yanish			0024	7		J2600
Mensch			0025	7		M2670
Nattrass	43350	19	0026	7	34	N1409
Gionest			0027	6		J2600
Boreland			0028	5		B4521
Ballingall			0029	5		B5250
Janisch			0030	5		J2600
Manchuk			0031	5		M2670
Mandzuk			0032	5		M2670
Niddrie			0033	5		N1409
Straka			0034	5		S1479
Zatorski			0035	5		S1479
Dengler	53	17	0036	4	10	D2540
Odonaughy	80	17	0037	4	8	E1289
Odonoughue			0038	4		E1289
Gunst			0039	4		J2600
Manske			0040	4		M2670
Monasch			0041	4		M2670

FIGURE 2A

The content of the sample header page indicates that there exists multiple header page(s) pertinent to this example. All 41 entries within this page have been used and, page multiplicity is indicated by the fact that the surname count at the 41st entry encompasses four or less individuals. Consequently, no attempt should be made to reconcile the accumulation of all surname count entries for each FIND code entry with that of its corresponding FIND code count-entry.

For example, the FIND code count entry with FIND code M7125 = 4,669 whereas, the sum of all surname counts for FIND Code M7125 (i.e., at 1, 2, 6, 7, 8, 9 & 14) = 4,660, nine less. Therefore,

there exists at least two more surnames each having four individuals and one surname with one individual at the minimum number of additional surname level to a maximum of 9 surnames each having only one associated individual thus accounting for the nine-individual difference.

RADIX TRANSFORMATION

The FIND code for the surname JOHNSON is J2620. This FIND code is transformed to a different radix or base, excess digits are discarded leaving a relative record number of the required length.

An example of FIND code J2620 conversion to radix 11 to produce a relative record number for the respective header file page is shown in Figure 3.

RADIX TRANSFORMATION

STEP 1: CONVERT FIRST CHARACTER OF FIND-CODE TO NUMERIC VIA THE FOLLOWING TABLE:

B	0	F	3	L	6	P	9	T	12
D	1	J	4	M	7	R	10	U	13
E	2	K	5	N	8	S	11	W	14

J2620 = 42620

STEP 2: $(4 \times 11^5) + (2 \times 11^4) + (6 \times 11^3) + (2 \times 11^2) + (0 \times 11^1) = 644204 + 29282 + 7986 + 242 + 0 = 681714$

STEP 3: ADD 1 TO LAST THREE DIGITS TO ELIMINATE THE POSSIBILITY OF ZERO, 999 WOULD BECOME 1000.
714 + 1 = 715

STEP 4: SINCE 6 PAGES OF 41 ENTRIES ARE REQUIRED FOR EACH RADIX VALUE, MULTIPLY THE RESULT OF STEP 3 BY 6 AND SUBTRACT 5 TO OBTAIN THE FIRST RELATIVE RECORD NUMBER FOR THE TRANSFORMED RADIX VALUE.

(715 x 6) - 5 = 4290 - 5 = 4285

RELATIVE RECORD NUMBER = 4285

FIGURE 3

DETAIL FILE

The detailed file level of the criminal index file structure is comprised of multiple sub-files. The only structural difference between all of these sub-files is the number of entries per page.

FIND code groups have been allocated to the various sub-files as determined by the number of individuals within the FIND code. The file number and relative record number for the first page of each FIND code is stored within the header records for that FIND code.

The sequence of entries within a group of pages for a FIND code were, at time of file creation, by number, but no attempt has been made to maintain this sequence as it is of no consequence to the efficiency of the system. The layout of the detail sub-files is displayed in Figure 4 and a sample page in Figure 4A.

DETAIL FILE ENTRY LAYOUT

FIELD NAME		*DESCRIPTION*
FP-NUMBER	0	Fingerprint section file number. Full word binary;
SURNAME-NUMBER	4	Represents exact spelling of surname as stored within header file. Half word binary format;
PRIMARY	6	Primary fingerprint classification of subject. Binary format;
SECONDARY	8	Secondary fingerprint classification of subject. Display mode.
GIVEN1	10	First given name of subject; First 4 characters (equivalences JACK = JOHN etc)
GIVEN2	14	Second given name of subject First 4 characters;
DAY	18	Day of birth of subject; (plus 50 if female)
MONTH	20	Month of birth of subject;
YEAR	22	Year of birth of subject;
BIRTHPLACE	24	Birthplace code;
EYE-COLOUR	25	Eye-colour code;
HEIGHT	26	Contains height of subject in inches plus 100 if race is non-white. Packed decimal.
WEIGHT	28	Contains weight of subject in pounds.
PATTERN-TYPE	30	Contains 10 fingerprint pattern types proceeding from right thumb to left little finger. Display mode.

FIGURE 4

SAMPLE DETAIL PAGE

024660	0001	2428	WW	GEO	D	21	02	99	1	1	60	125	WWDRTWWCDX
040703	0001			MIC	RIC			01	0	1	61	135	RWW=DDCCDT
042756	0002	1022	TT	TOM	J			00	2	2	59	120	WTTWCUTTXD
056222	0001	3228	DW	WIL	ROB	21	04	02	2	4	63	129	CDXWAWWWWW
059426	0006	2303	XW	HARR	HEWI	21	08	97	1	0	65	137	AXTUUWWCTT
070094	0001	2630	CT	JOE	CAL	23	12	03	3	1	64	160	WCDWWTTACX
099715	0001	0325	TR	DAV	LES	14	06	10	0	2	60	150	CTDARARCUA
137989	0002			GEO	MAUR	27	03	99	4	1	67	149	DAWX=TUWXW
147229	0001			HARR	A	15	12	09	2	1	69	165	XRWTW=TWCD
159728	0001	0720	AW	JAM	DAV	21	15	06	3	4	68	166	DATRAWWXDA
168206	0009	0126	TT	CEN	GERA	09	07	03	2	0	160	095	WTWUUTTUWR
173308	0001	0102	AT	MILD		55	01	06	1	2	68	152	AARRAATTDT
185854	0014	1807	DX	ART	J	20	03	97	3	2	69	165	RDAUWTXRAW
219085	0001	2614	XR	GEO	JOE	29	08	99	8	1	66	192	AXCCARRRDD
232889	0001	1313	UT	JOH	JOE			06	9	1	67	158	TUWCXWTAAA
268194	0002			JOE	LEW	30	12	14	3	1	68	201	U==CUTATDC
387639	0001	3130	WR	ROB	ARCH	15	10	16	6	4	67	169	CWDDXDPWDT
463875	0007	2830	WT	DEN		01	12	17	4	0	69	175	WWWDCATCXW
586290	0001	2431	DX	JOE	MAUR	16	02	27	3	2	72	195	CDXACCXWUD
611479	0001	1126	TA	AL		03	05	23	7	1	71	185	WTCDRUAWDA
675655	0008	0108	AW	FRED	WIL	19	08	17	2	0	67	140	AARTDAWUWR
689842	0001	3239	XU	DON	LAWR	03	02	24	3	2	66	157	DXWWCCUWWX
698377	0001	2531	XW	JAM	RALP	06	01	29	0	2	69	180	CXWCDRWTRT
724361	0002			JOH	HENR	25	01	22	1	1	70	165	XCDRAXXUA=
759651	0001	0801	TT	MURC		04	10	35	3	1	165	90	TTAUADTWAX
812520	0001	1824	WD	LAWR		06	02	36	2	0	69	159	XWAUXRDACW
821922	0006	2625	WT	STEW		23	06	39	4	0	72	215	WWDXAATPTW
872020	0001			CHAR	CLAY	01	12	40	3	4	74	225	WCTUWRART=
901928	0007	3224	WC	GORD	WALT	01	01	36	2	1	69	139	CWTWWCCDXD
942034	0001	0604	TC	LAWR	MING	02	06	20	2	1	68	165	ATUUAWCUWD
996129	0002	1205	RU	MAUP	JOE	20	06	41	3	1	72	215	ARUWWUUDTC
1050140	0001	1308	RW	CHAR	DAN	26	12	41	2	4	69	149	RRTWCCWTXR
1080783	0001	2307	XD	DAV	GLEN	28	07	44	3	0	70	195	TXRUCDDCRA
1105667	0008	2316	WX	GEO	DON	25	07	37	2	2	69	187	UWCAWDXXDA
1141971	0001	1431	AX	DON	JAM	20	03	43	6	1	70	176	WADWWCXARX
1218345	0001	0123	RD	MARG	ELIZ	52	03	42	9	1	166	98	CRTUXUDART
1283198	0009	1521	AT	DAV	GERA	08	12	48	4	4	68	159	DATCDCTXRT
1352925	0006	2519	XW	ED	FARL	02	11	52	1	1	68	205	XXRDTUWRAT
1358461	0001	1127	UW	ROB	AL	06	01	49	8	0	71	190	XUDXRUWXAP
1372255	0001	2818	WA	HELE	IREN	70	08	51	3	2	70	180	DWACTRADCW
1376603	0002	1717	WA	NORM	GEO	14	11	51	2	1	72	210	CWUTRAARTU

P/S FINGERPRINT CLASSIFICATION IS NOT RETAINED IF THE
CORRESPONDING PATTERN-TYPE IS UNKNOWN: SCARRED OR AMPUTATED STORED (=)

FIGURE 4A

The evaluation procedures which embody the aforementioned record structures and led to the selection of the file organization technique included a study to facilitate the selection of an optimum record size and subsequent page size.

Across the horizontal axis of Table I, entry or record sizes are recorded from 24 to 47 bytes. The vertical axis is a count of the number of records per page and has a range of from 1 record per page to a maximum number of records which can be stored within a disk track for the minimum (horizontal) record size. The elements of the table contain the number of pages relative to the respective record-count and record size which can be accommodated within a physical track of disk space. An asterisk element indicates that the space which would be reserved for the respective record-count and size is sufficient to accommodate either an additional record or an additional character within each entry. As such, it indicates that this point does not provide for the optimal utilization of space.

The record counts recorded in Figure 5 are optimal for a record size of 40 bytes. They are the only record counts which were used by the criminal index system as all others resulted in unnecessary amounts of unused disk space.

TABLE I

LOGICAL INDEX RECORDS/TRACK TABLE

ENT SIZE···	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
1 ENTRIES	120	*	*	*	*	*	*	*	104	*	*	*	*	*	*	*	92	*	*	*	*	*	*	*
2 ENTRIES	84	*	*	*	76	*	*	*	68	*	*	*	64	*	*	*	80	*	*	*	56	*	*	*
3 ENTRIES	64	*	60	*	*	56	*	*	52	*	48	*	*	*	*	*	44	*	*	*	*	40	*	*
4 ENTRIES	52	*	48	*	*	*	44	*	*	*	40	*	*	*	36	*	*	*	*	*	32	*	*	*
5 ENTRIES	44	*	*	40	*	*	36	*	*	*	*	32	*	*	*	*	*	28	*	*	*	*	*	*
6 ENTRIES	*	36	*	*	*	32	*	*	*	*	28	*	*	*	*	*	*	24	*	*	*	*	*	*
7 ENTRIES	*	32	*	*	*	28	*	*	*	*	*	24	*	*	*	*	*	*	*	20	*	*	*	*
8 ENTRIES	*	*	28	*	*	*	*	24	*	*	*	*	*	*	20	*	*	*	*	*	*	*	*	*
9 ENTRIES	*	*	*	24	*	*	*	*	*	20	*	*	*	*	*	*	*	*	16	*	*	*	*	*
10 ENTRIES	24	*	*	*	*	*	20	*	*	*	*	*	*	*	16	*	*	*	*	*	*	*	*	*
11 ENTRIES	*	*	*	20	*	*	*	*	*	*	16	*	*	*	*	*	*	*	*	*	*	*	*	*
12 ENTRIES	*	20	*	*	*	*	*	*	16	*	*	*	*	*	*	*	*	*	*	*	12	*	*	*
13 ENTRIES	*	*	*	*	*	16	*	*	*	*	*	*	*	*	*	*	12	*	*	*	*	*	*	*
14 ENTRIES	*	*	*	16	*	*	*	*	*	*	*	*	*	12	*	*	*	*	*	*	*	*	*	*
15 ENTRIES	*	16	*	*	*	*	*	*	*	*	*	12	*	*	*	*	*	*	*	*	*	*	*	*
16 ENTRIES	16	*	*	*	*	*	*	*	*	12	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17 ENTRIES	*	*	*	*	*	*	*	12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	8
18 ENTRIES	*	*	*	*	*	12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	8	*	*	*
19 ENTRIES	*	*	*	12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	8	*	*	*	*	*
20 ENTRIES	*	*	12	*	*	*	*	*	*	*	*	*	*	*	*	*	8	*	*	*	*	*	*	*
21 ENTRIES	*	12	*	*	*	*	*	*	*	*	*	*	*	*	8	*	*	*	*	*	*	*	*	*
22 ENTRIES	12	*	*	*	*	*	*	*	*	*	*	*	8	*	*	*	*	*	*	*	*	*	*	*
23 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*
24 ENTRIES	*	*	*	*	*	*	*	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*
25 ENTRIES	*	*	*	*	*	*	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
26 ENTRIES	*	*	*	*	*	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
27 ENTRIES	*	*	*	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
28 ENTRIES	*	*	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
29 ENTRIES	*	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
30 ENTRIES	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
31 ENTRIES	*	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
32 ENTRIES	*	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
33 ENTRIES	8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
34 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
35 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4
36 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*
37 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*
38 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*
39 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*
40 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*
41 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*
42 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*
43 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*
44 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*
45 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*
46 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*
47 ENTRIES	*	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*
48 ENTRIES	*	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*
49 ENTRIES	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*	*
50 ENTRIES	*	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*	*
51 ENTRIES	*	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
52 ENTRIES	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
53 ENTRIES	*	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
54 ENTRIES	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
55 ENTRIES	*	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
56 ENTRIES	*	*	*	*	*	4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

280 ETC

RECORD SIZE: 40 BYTES

OPTIMAL RECORD COUNTS	ENTRY SIZE UTILIZATION FACTORS*
1	40/40 (1.0)
2	40/40 (1.0)
3	40/40 (1.0)
4	40/44 (0.91)
5	40/41 (0.976)
6	40/41 (0.976)
7	40/43 (0.93)
9	40/42 (0.953)
13	40/40 (1.0)
20	40/40 (1.0)
41	40/40 (1.0)

* – Proportion of bytes used to bytes available.

FIGURE 5

Further analysis with respect to measures of central tendency provided a sound basis for estimating the sizes of groups to be processed. The most commonly used measure of central tendency is a mean or average. Accordingly, there are different types of averages and their misuse (and statistics in general for that matter) are indeed responsible for critical errors in judgment. The most commonly used average is the arithmetic mean, the total number of records within the detail file divided by the total number of groups:

$$\text{i.e., } X = 2583232 \div 22250$$
$$= 116.1$$

This value, in all its accuracy, is highly deceptive. It has a value only were it such that all groups, regardless of their size, shared an equal probability of being encountered. However, this is not true and, the more common a surname, the higher the probability of its occurrence in an enquiry. Consequently, a second kind of average was employed and is the weighted mean:

$$M = \Sigma P_i C_i = 2162$$

where P_i = probability of a group size being encountered,

and C_i = the size of the group.

This average is the most appropriate because its formula employs relative weights to each group size within the file proportionate to the number of individuals occurring in the respective group sizes. These weights are directly equivalent to the probability of the various group sizes being encountered by any inquiry.

An additional statistic which is indicative of central tendency is the median. Herein, the median frequency has a class width of 1201 to 1225 individuals demonstrating that 50% of the enquiries will be directed towards groups which have less than 1213 individuals and the remaining 50% to groups which have more than 1213.

FILE UTILIZATION

The detail file now consists of 9 sub-files each having one of the following page sizes: 2, 4, 5, 6, 7, 9, 13, 20 and 41.

The principal reasons for the creation of detailed sub-files, as opposed to one detail file with a fixed page-size, were increased file utilization and optimized read times. This fact is appreciated when comparing the overall disk space utilization of 97.9% provided by the former as opposed to 73.9% achieved through the use of the latter.

READ TIME

All individuals within a particular FIND code must be evaluated in the processing of an enquiry. It has been found that the number of individuals whose surname generated the same FIND code may vary from one to in excess of 14,000. This being the case, it was necessary to be able to vary the size of the FIND code group. This process is available and is achieved through the use of multiple sector reads.

Due to the organization by frequency of occurrence within header file, access is one sector at a time. Similarly, 8 of the 9 sub-files within the detail file contain groups which do not exceed one sector of contiguous disk space. Therefore, the only file which utilizes the multiple sector reading facility accounts for in excess of 97% of all enquiries – the 41 record per page detail sub-file.

The following report indicates the total number of references required in the processing of one thousand enquiries by sector count based upon the distribution of the file of 2.5 million records. The group sizes within this file were examined to determine the number of sectors to be read and the respective entry within the attached table was incremented. The timings include an allowance for track and cylinder overflow.

Had we not opted to use the multiple sector read facility, the resulting average read time per enquiry would bear no semblance to that contained herein. To demonstrate–the timing per reference for an 8 sector multiple read is 125.8 milliseconds, whereas the same 8 sectors accessed

individually, would require 8 times 78.75 or, 630 milliseconds.

READ SUMMARY BY SECTOR COUNT

SECTOR COUNT	REFERENCE FREQUENCY/ 1000 ENQUIRIES (f)	TIME/ REFERENCE (t) (millisecs	f.t
1	171	78.75	13466.25
2	139	85.47	11880.33
3	121	92.19	11154.99
4	114	98.90	11274.60
5	119	105.61	12567.59
6	88	112.33	9885.04
7	138	119.04	16427.52
8	5537	125.80	696554.60

AVG. READ TIME/ENQUIRY ..... *783.21 ms.

*With 1 enquiry/sec., for every hour of CPU time, there is concurrent read time of 46 min. 59.4 secs.

On a single sector read basis, our average read time would have increased by 477% from 783.2 ms to 3,740.7 ms such that the ensuing total concurrent read time with one enquiry per second for every hour of CPU time would increase by the same percentage from 46 mins. 59 secs. to 3 hrs. 44 mins. 26 secs.

As such, in this instance, in its simplest form, the last enquiry output would be forthcoming 3 hrs. and 44 mins. later.

With respect to the header file, it has been determined, and fortunately so, that the distribution of surnames as a consequence of radix transformation, closely approximates the 'normal distribution curve' with an average group size of 248 surnames and a standard deviation of 20.8.

In order to provide for direct accessing of header pages, as determined by the surname within an enquiry, it is necessary that the relative record number for that record be directly calculable from the respective FIND code. Such being the case, the same number of contiguous pages must be allotted to each radix value. For the most efficient utilization of disk space as well as processing efficiency, sufficient pages must be allotted to each radix value so as to accommodate the mean group size. As previously indicated, the record size selected for the criminal index header file is 40 bytes with a respective page-size of 41 entries, with 6 pages of 41 entries (246) reserved within the prime area for each of the 1,000 (transformed) radix values.

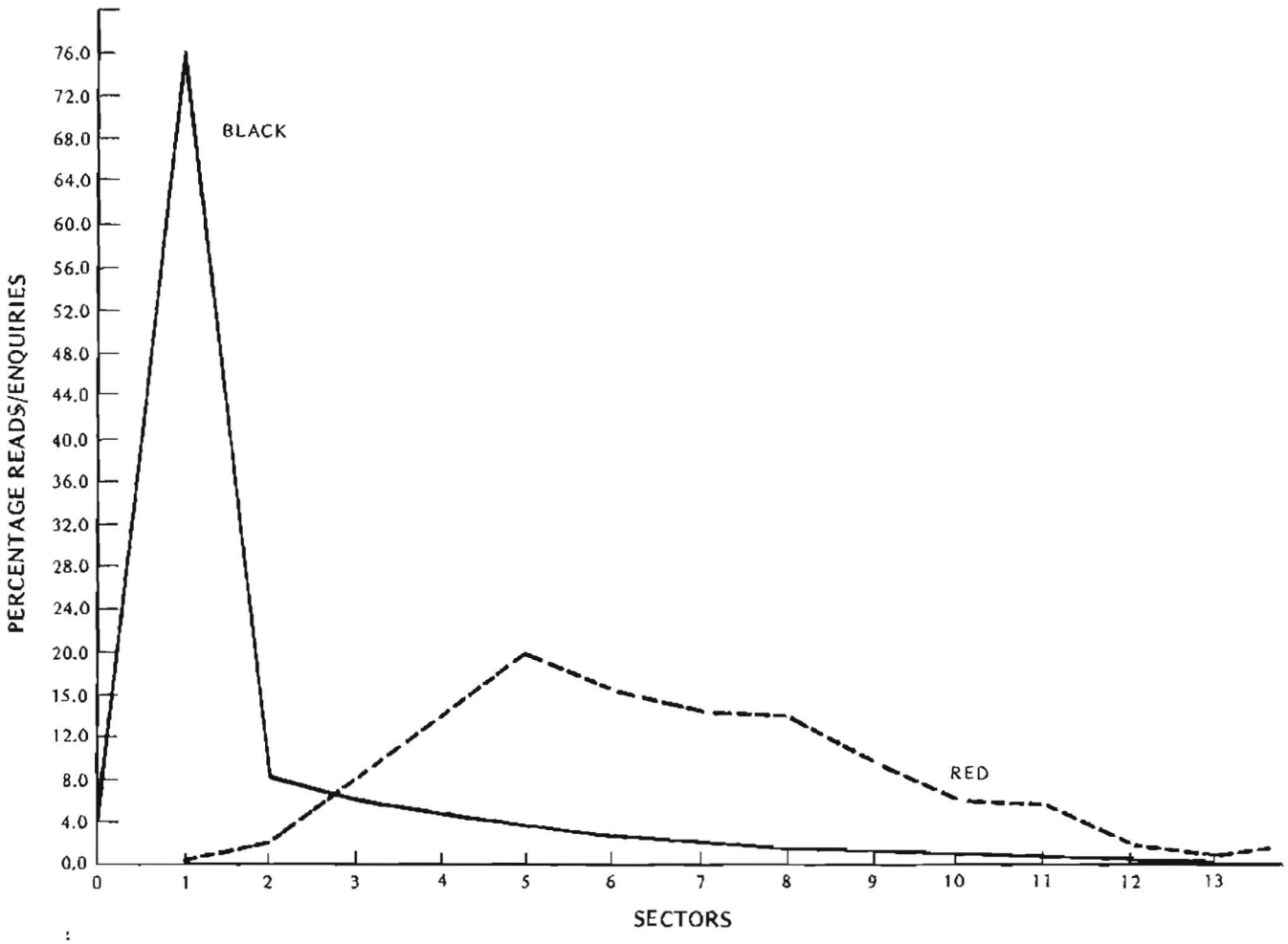
Due to the normal distribution, more than half of the transformed radix value groups use a portion of the 6th page, with an overall disk space utilization factor of 86%.

The entries contained within each radix value are maintained in descending sequence of their frequency of occurrence within the detail file. The philosophy here is that the more common the surname the more easily accessible that surname should be.

The following graph demonstrates the benefits of this sequencing. The 80% read curve (black) represents the percentage of enquiries satisfied by the number of sectors read after the sequencing of surnames. The other is the percentage of enquiries satisfied without sequencing. It can be seen that 80% of the enquiries are satisfied by a one-sector header read where sequencing has been employed, as opposed to upwards of six sectors without sequencing.

As a consequence to the employment of the previous principles, we have, in summary, been able to benefit as follows:

(1) to employ the name code as a direct access key;
(2) to save more than 25 million bytes of storage as a direct result of not repeating the surnames and, in excess of 65 million bytes by employing codes and abbreviations within the detail records. In total, 2.5 million name records have been contained within less than five disk packs of a 2314 disk drive;
(3) with the header/detail record structure effect a 98% disk utilization;
(4) by utilizing a multi-sector read facility, minimize the read time;
(5) develop a system which requires no near-future file re-organization as new records are added and others deleted


PERCENTAGE READS/ENQUIRIES
76.0
72.0
68.0
64.0
60.0
56.0
52.0
48.0
44.0
40.0
36.0
32.0
28.0
24.0
20.0
15.0
12.0
8.0
4.0
0.0
BLACK
RED
0
1
2
3
4
5
6
7
8
9
10
11
12
13
SECTORS

48305

TOWARDS AN ADVANCED CRIMINAL JUSTICE INFORMATION SYSTEM

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On September 1, 1971, New York State's new Criminal Procedure Law (CPL) became effective. The passage of the new CPL confronted the New York State Identification and Intelligence System (NYSIIS) with two formidable problems: the ability to handle a greatly increased workload and the capability of responding to high priority inquiries within a definite time constraint. The first problem was a result of the fact that the CPL stipulated that *all* misdemeanors arrests, as well as felonies, required the submission of fingerprints. The second problem arose from the CPL requirement that an accused could not be arraigned on a serious offense until a statewide criminal history report was supplied.

Two significant advances have enabled NYSIIS to meet this challenge; the installation of an advanced computer system and the implementation of an improved processing system called SYSTEM '71. This paper describes the background, systems design considerations, inter-action with the computer system and manual flow of fingerprint documents through the new processing system, SYSTEM '71.

BACKGROUND

The New York State Identification and Intelligence System was created by statute in 1965 as an agency within the Executive Department. The mission of the new agency was to develop a computerized information sharing system to serve the needs of the criminal justice agencies throughout New York State.

The first major undertaking in the development of the NYSIIS Automated Criminal Justice System was the design and implementation of the computerized criminal history system.

The development of this system was accomplished in three steps. These steps were:

1. Historic Data Conversion – Selection and conversion of historic records for inclusion in the initial criminal history data base. (Begun in 1966. Terminated in 1971).
2. Automated Fingerprint Search – Computerization of the searching of fingerprints in support of the identification process. (Operational in July, 1968).
3. Computer-produced Criminal Histories – The retrieval, updating and printing of criminal histories by computer. (Operational in January 1969).

Once an initial data base of historic records had been established and the Criminal History Retrieval System was functional, the fingerprint processing system was revised to incorporate the computer production of criminal histories. A brief description of that system is as follows:

1. All identification functions were performed first.
   a. Manual name searching and verification
   b. Classification, fingerprint searching (aided by the computer) and verification
2. After the identification function was completed, a determination of the type of response (computer or manual) was made.
   a. Manual Response – Jacket was drawn, edited and response prepared by typists.
   b. Computer Response – Fingerprint card was edited and coded, punched cards produced and entered into the computer, by batch, to produce the criminal history.

The identification process, (1) above, is by far the most difficult and time consuming of the operations performed. Prints to be responded to by computer were received, for preparation for entry into the computer system, in relatively large batches. This was the first point where processing backlogs built up.

Punched cards were then produced and batched by priority for entry into the computer system. This again produced a possible backlog situation.

It soon became clearly evident that a major redesign effort was necessary in order to improve the criminal history response time to the user agencies.

SYSTEMS DESIGN CONSIDERATIONS

As noted in the "Introduction", New York State's new Criminal Procedure Law (CPL) posed some serious problems for NYSIIS in September 1971. These problems were:

1. Increased Workload – Under the new CPL, all misdemeanor arrests, as well as felonies, required the submission of fingerprints.
2. NYSIIS Criminal History required at arraignment for all serious offenses.

The above requirements were to be met without increases in the clerical processing staff.

MICROFICHE

In order to achieve this formidable task, it was evident that major improvements must be made to the existing criminal history system. The following areas were determined to be most relevant:

a. Improve the overall work flow
b. Reduce, as much as possible, the manual tasks involved
c. Expedite the processing of high priority prints in the system.
d. Place less time consuming tasks prior to the identification functions

In the fall of 1970, the analysis and design work for the new processing system began. The new system is called simply SYSTEM '71.

SYSTEM '71 DESCRIPTION

The following is a description of the fingerprint document flow through SYSTEM '71.

COMMUNICATIONS SECTION AND MAIL UNIT

NYSIIS receives fingerprint cards in basically two ways: facsimile and mail. High priority prints are received by facsimile. These are usually made up of arrest prints for individuals awaiting arraignment. The response time for facsimile prints is established at three hours from time of receipt (present response time is averaging about two hours).

Lower priority prints (incarceration, pistol applicants, job applicants, police applicants, etc.) are sent in by mail. All prints, regardless of the input mode, are sent to the Input Quality Control Section by means of the Messenger Service.

INPUT QUALITY CONTROL SECTION

This unit performs three functions:

a. Preliminary quality check – to insure the basic data elements are present.
b Assigns the proper processing priority – depending on the document type, selects the appropriate Transaction Control Document (TCD -- See Exhibit 1) and attaches it to the top of the fingerprint card. The TCD is color-coded by priority.
c. Requests and attaches label to TCD -- the clerk, seated at a terminal device connected to the computer system, requests a label. The computer prints out the Transaction No. and date and time on a label. The operator places the pressure sensitive label in the space provided on the TCD.

NOTE: This is the first inter-action with the computer system. The transaction number assigned to the document will be used to trace this item both internally (in the computer queue) and externally (for manual expediting) throughout the system. An internal computer queue slot has now been activated showing the date and time.

PRIMARY CLASSIFICATION UNIT

Primary fingerprint classification is recorded on the document for all mailed-in prints (primary class was put on for facsimile prints when received in the Communications Unit).

DATA PREPARATION UNIT

A complete quality check is performed on the document and all necessary coding, editing or transcription is completed at this station. If any critical data elements are missing or found to be incorrect, the document is returned to Input Quality Control where the contributor is contacted by dataphone (facsimile prints only), telephone or by mail (low priority material). See Exhibit 2 – NYSIIS Arrest Fingerprint Card.

DATA ENTRY SECTION

All required data elements are entered into the computer queue by means of cathode ray tube (CRT) devices. The transaction number, printed on the label attached to the TCD, is the element which ties this transaction to the appropriate computer queue location.

Each data element is entered into the numbered location on the pre-formatted CRT screen (See Exhibit 3). The numbers on the screen coincide with the numbered boxes on the fingerprint card.

Once the data is entered, computer edits are performed. Any errors detected are returned to the operator for correction. The operator will then correct any improperly keyed items. After the second edit check, if any errors remain, the document is sent to Error Correction for resolution. If the error is deemed to be a "source information" error, the document is returned to Input Quality Control for subsequent contact with the contributor.

When the data has been accepted by the computer edits, two automatic functions are triggered by the acceptance of the valid record into the computer queue.,
These functions are:

a. An NCIC Wanted Inquiry Message is generated and sent to NCIC.
b. A name/number search is made of the NYSIIS Name and Wanted Files.

Positive responses from NCIC are printed out on a terminal in the NYSIIS Wanted Section and the appropriate indicator set in the computer queue.

If a positive response is returned from the search of the NYSIIS Wanted file, the Wanted Persons record number is stored in the computer queue for subsequent retrieval.

If any suspects are returned as a result of the name/number search of the Automated Name files, the identification number(s) is printed out on a terminal in the Data Entry Section. An operator records the number(s) on the TCD attached to the fingerprint card.

At this point in the system the fingerprint document can go in either of two different directions. If Automated Name Search suspects are returned and noted on the TCD, the print would be routed to the Master Fingerprint files for positive identification. Otherwise, the print proceeds to the Manual Name Index section.

MANUAL NAME INDEX SECTION

All prints which did not produce automated name search suspects are routed to this unit for manual searching in the 3 x 5 card manual name files.

The index cards are filed by Soundex Code of the last name, first name and primary classification within first name groups. Also, the files are separated by males and females.

If a possible identification is made, the print is forwarded to the Master Fingerprint files for positive verification of the identification.

If no suspects are found as a result of the manual name search, the print is forwarded to the Classification Unit.

CLASSIFICATION UNIT

Whenever a search of either the automated or the manual name files fails to turn up a possible ident, the print is routed to the Classification Unit for full fingerprint classification. The full classification is used as part of the fingerprint search argument.

A fingerprint technician classifies the print using the American Fingerprint Classification method.

The prints are then forwarded to the Master Fingerprint Unit.

MASTER FINGERPRINT UNIT

The fingerprint unit at NYSIIS is divided into two specific areas:

a. Machine Section
b. Manual Section

The fingerprint masters are filed in these areas depending upon the following breakdowns:

Machine Section – This unit contains prints for individuals born in 1925 and later, for all fingerprint classifications except those having "arch patterns" in any finger besides the index finger.

There are some other age groups with certain classifications also included but to try to explain which ones and the rationale would only tend to confuse the reader.

The fingerprints in this unit are filed by identification number for speedy retrieval.

Manual Section – Contains all other age groups not in the Machine Section. It also contains all prints that have an "irregular classification". This means the print has an "arch pattern" in finger(s) other than the two index fingers. Also any prints that have one or more missing digits are stored in the Manual Section.

The prints in this unit are stored by classification, within age group and separated by sex.

Searching – When a print was not tentatively identified by name searching, it was fully classified and sent to Master Fingerprint Unit for searching. Depending on the rules established above, the print will be either searched manually in the Manual Section or an automated search performed in the Machine Section. (Approximately 70% of the present fingerprint volume requiring search utilize the automated search).

In order to perform an Automated Fingerprint Search, an operator simply enters the transaction number from the TCD and the full fingerprint classification into the pre-formatted CRT screen located in the Machine Unit (See Exhibit 4 for the formats). Other elements utilized in the search (such as sex, date of birth, initials) are programmatically extracted from the computer queue. When the search is completed (most searches take about 30-45 seconds) the results are printed out on a terminal device beside the CRT input devices. Arrest fingerprint searches can produce a maximum of ten suspects.

The search results are removed from the terminal and attached to the fingerprint input. A fingerprint technician then pulls the appropriate master card from the files using the identification number printed out as a result of the search. The technician then compares the incoming print with the master and makes a determination whether the fingerprints match or not. If the technician declares the prints to be the same, they are then checked by a senior technician to insure the match. The NYSIIS Identification No. on the Master Print is then recorded on the incoming print in the space provided.

In the case where "no suspects" are produced by the fingerprint search or the suspects produced did not match the Master print, the incoming print is declared a "non-ident". The appropriate box is checked on the TCD and the document is passed to the Control Terminal.

Prints which require manual searching in the Manual Unit, take considerably longer to be processed.

As mentioned before, the prints in the Manual Section are filed by classification within age group. When a manual search is performed, the technician must manually find the proper section of the file and finally look at each individual fingerprint card containing like classifications. A positive identification is made in this section in the same manner as those made in the Machine Section.

Earlier in the processing flow, at the Data Entry and Manual Index Sections, it was stated that possible suspects may be found when doing either an Automated Name Search or a Manual Search in the Name Index Unit. In either case, the identification number(s) is recorded and the print is then routed directly to the Master Fingerprint Section for verification of the identification.

Prior to SYSTEM '71, the verification of a name index hit in the Manual Section, in all cases, required an actual search of the Manual file to retrieve the master print. A major improvement of SYSTEM '71 was to provide a supplemental file in which the prints could be retrieved by identification number. This file was created by making high resolution copies of Manual master prints. To date, only a portion of the Manual file is duplicated in the supplemental file. All new (non-ident) entries are presently being copied as a part of the SYSTEM '71 process.

Once an identification is made or the print is declared a "non-ident", the appropriate hit location box is checked on the TCD. If the initial identification was made by the Automated Name Search, box 1 is checked (See Exhibit 1 – TCD). If the initial ident was made in the manual search of the Name Index files, box 2 is checked. If the ident is a result of the automated or manual fingerprint search process, box 3 is checked. If the print was received with a NYSIIS number supplied and, subsequently, verified to be correct, then this print is considered a "Field Hit" and box 4 is checked. As stated previously, if the print is declared a "non-ident", then box 5 is checked. This "Hit Location" information is captured at the Control Terminal and is later tabulated as a part of the operational reports produced. In the case of an ident, the identification number (NYSIIS number) is written in the space provided on the fingerprint card. The documents are then sent to the Control Terminal for processing (located in the Machine Section).

SYSTEM '71 CONTROL TERMINAL

All SYSTEM '71 fingerprint documents are routed to the Control Terminal after the identification function has been performed.

Entry of control information at this station will trigger the updating of all appropriate computer files (criminal history file, automated name file, automated fingerprint search file). The computer response to this entry will inform the operator whether a computer-produced criminal history is being made or a manually prepared rap sheet is required.

The results of the wanted searches of NCIC and NYSIIS files are also printed out for the terminal operator.

An example of the entires made and the computer response at the Control Terminal is shown in Exhibit 5.

Based on the computer response received at the Control Terminal, the operator will note the type of response to be made (computer or manual) and also record the "Wanted" status on the TCD.

If the fingerprint being processed at the Control Terminal was declared a "non-ident", the computer will print out the NYSIIS number assigned to that print. The operator then records that number on the fingerprint card.

Also, if the non-ident print is a *facsimile* copy, a "charge-out" is made for the print and filed in the Machine Section by NYSIIS number. If the non-ident print is an *original, hardcopy* print (mailed in from an area not serviced by facsimile), it will be filed directly into the appropriate section, Machine or Manual. In the case of a Manual Print, a high resolution copy is made for filing by NYSIIS number as well as by classification.

The document flow from this point is dictated by the type of response being made to the user (computer or manual).

If a computer response is being made, the fingerprint card and TCD (or TCD only if the print was an original hard copy which is now filed in the Fingerprint files) are routed to the Output Quality Control Section. Incidentally, all non-ident responses are computer-produced.

If the response is to be manually prepared, the fingerprint card and attached TCD are routed to the Assembly Section.

NOTE: Additional Wanted File Search

When the Control Terminal operator enters the NYSIIS number for an identified print, the computer will automatically perform a "Wanted NYSIIS number" search. All users of the NYSIIS Wanted/Missing Persons System are requested to provide the NYSIIS number, if known, when making a Wanted Person Entry. This number, upon entry is posted internally as being "wanted" and would, therefore, be automatically checked when fingerprints are submitted to NYSIIS.

This additional check means that if an arrestee supplies a false name and is subsequently identified by fingerprint searching, the agency would be notified of his apprehension.

OUTPUT QUALITY CONTROL SECTION

At the moment that the Control Terminal operator received notification that a computer-produced criminal history response was to be made, the criminal history retrieval process had already begun within the computer system.

The arrestee's prior history is retrieved from the computer disk files, this latest event (including name, date of birth and other pertinent information) is added to his history and his complete record is printed on the high speed printer (See Exhibit 6 – Computer-produced Criminal History).

While the above process is taking place, the fingerprint document and attached TCD are routed to this section from the Control Terminal. The

criminal history produced is then matched up with the input document. A quality check is performed and any previously undetected errors corrected.

If the TCD indicates a "Wanted" status, the fingerprint card, TCD and criminal history are routed to the Wanted Section.

Transactions which do not require routing to the Wanted Section are forwarded directly to the Communications Section (for facsimile responses) or to the Mail Unit (for mailed responses).

ASSEMBLY SECTION

When the Control Terminal response indicated that a manually prepared "rap sheet" was required, the fingerprint document and TCD were routed to this section for processing.

In this section, the Assembly jacket is drawn, the data edited and prepared for manual preparation of the rap sheet. The jacket, fingerprint card and attached TCD are then routed to the Typing Section.

TYPING SECTION

Upon receipt of the documents from the Assembly Section, typists will prepare the criminal history response. A quality check is then performed and any errors corrected.

If the TCD indicates a "Wanted" status, the transaction and all associated documents are routed to the Wanted Section. Otherwise, the documents are routed to either the Communications Section or the Mail Unit.

WANTED SECTION

In the Wanted Section there are hard copy terminals used to print "Wanted Notices" for transmission to the inquiring agency. Input to this unit is received from both the Output Quality Control and Typing Sections as a result of the "Wanted Status" notification received at the Control Terminal.

When the "wanted" indication was received at the Control Terminal, the computer system retrieved the "Wanted" information and printed it out on the terminal(s) in the Wanted Section. The Wanted Notices are then matched up with and attached to the appropriate criminal histories (rap sheets).

The documents are then forwarded to Communications Section.

COMMUNICATIONS SECTION – MAIL UNIT

The Communications Section is responsible for both the receipt of fingerprint facsimile transmission from the user and the transmission of rap sheet responses to the user agencies. This, of course, includes notification of any Wanted information retrieved during the processing of fingerprint submissions through System '71.

The Mail Unit, of course, addresses, packages and mails all responses utilizing this type of response. Incidentally, all facsimile transmitted responses are also followed-up by a mailed copy of the criminal history response.

Once the response has been sent to the user, the TCD is removed and routed to the Queue Close Terminal. All other documents are filed in their appropriate sections.

If the input fingerprint was received by facsimile, the FAX copy is now sent to the Facsimile Hold File. Each print is then filed by submitting agency, in FAX Control No. (a sequential No. supplied by each agency) order. The submitting agency will, upon receipt of the criminal history response, mail in the original, hard-copy fingerprint card. Upon receipt of the original, the FAX copy is destroyed and the original filed (replacing the charge-out) in the Fingerprint (Machine or Manual Section) Files or in the Assembly jacket.

If the input print was an original, hard-copy (from an agency not serviced by facsimile) print, it would already have been filed in the Fingerprint Files (non-ident) or would now be sent to Assembly for filing in the jacket.

PROCESS CONTROL UNIT

The TCD is sent to the Queue Close Terminal in the Process Control Unit once the criminal history response has been made. An operator enters the Transaction No. into the terminal, notifying the computer system that this item is now closed out.

Daily, a special computer run is initiated which extracts basic information from the internal queue for each transaction closed out. This information is summarized to produce the "System '71 – Daily Operating Report". Once the information needed has been tabulated, the closed internal queue locations are re-initialized for subsequent re-use.

Another function of the Process Control Unit is expediting high priority transactions. In order to meet the requirement to respond to pre-arraignment facsimile prints within a definite time constraint (three hours), it was necessary to establish procedures for expediting these transactions.

Hourly, a computer program is run which searches through the entire internal System '71 queue. This program lists all high priority transactions that are presently in the work flow, noting

the time in process and the time the transaction was recorded at each computer-related station (i.e. Data Entry, Control Terminal, etc). This report is a very effective tool used by the Process Control expediters to insure the rapid processing of all high priority transactions.

The preceding pages are an attempt to give an overview of the fingerprint processing system presently operational at NYSIIS. For those readers interested, more in-depth details can be provided upon request.

CONTRASTING THE OLD SYSTEM WITH THE NEW

Listed below are some of the major improvements which have been realized in the new processing system.

On-Line Data Entry – Entry of all pertinent information at the "front end" of the system, prior to the identification function instead of after. This eliminates certain processing backlogs inherent in the old system.

The need for manual entry of the same data at different points in the old system has been eliminated (fingerprint search, wanted search and criminal history have many common data elements). Wanted searches and Automated Name Searching is a by-product of the entry of data for criminal history purposes.

Error correction procedures have been greatly simplified in the new system. Data Entry operator is notified immediately and in most cases, error can be rectified by re-entry, without need for re-cycling of the document. The old system provided computer error listing which had to be clerically-checked, documents collected, repunched and re-cycled through the computer system.

Improving Response Time To Users – The total response time for high priority prints has been significantly reduced. However, it is even more significant that the turn-around time for lower priority items has been *vastly* improved. Response time for these items can now be measured in days as opposed to weeks in the old system.

Improving The Overall Work Flow – Very significant improvements in the document flow have been made through SYSTEM '71. There are other improvements which are being planned and will, hopefully, be incorporated in the near future.

THE COMPUTER SYSTEM

The "heart" of SYSTEM '71 is contained in the computer system. The fingerprint processing function is truly controlled and driven by the interaction of the operating personnel and the computer system.

The following is a listing of the computer system components which support SYSTEM '71.

BURROUGHS B-6700 COMPUTER SYSTEM

Main Frame

2 – B6700 Central Processors (1.2 micro-second cycle time)
12 – Memory Modules (16,384 words each)
2 – Maintenance Diagnostic Displays
2 – Input/Output Multiplexors (6 I/O channels on each)
2 – Data Communications Processors (4,096 words each)

Peripherals

70 – Disk Modules (40 milli-second average access) – 1.4 Billion Bytes
5 – Tape Drives – Phase Encoded – 1600 BPI – 240 KB
4 – High Speed Printers – 1020 lines per minute
2 – Card Readers – 800 cards per minute
1 – Card Punch – 300 cards per minute

Terminals (By Location)

10 – Data Entry Section
3 – Error Correction
3 – Wanted Section
3 – Fingerprint Search – Input
3 – Manual Name Index (For Correspondence)
22 – Burroughs CRT Devices

1 – TCD Label Assignment
1 – Data Entry
1 – Fingerprint Search – Output
2 – Control Terminals
2 – Wanted Section
1 – Queue Close Terminal
8 – Burroughs TC-500 Hard Copy Terminals

THE ACID TEST

SYSTEM '71 became a reality on January 31, 1972.

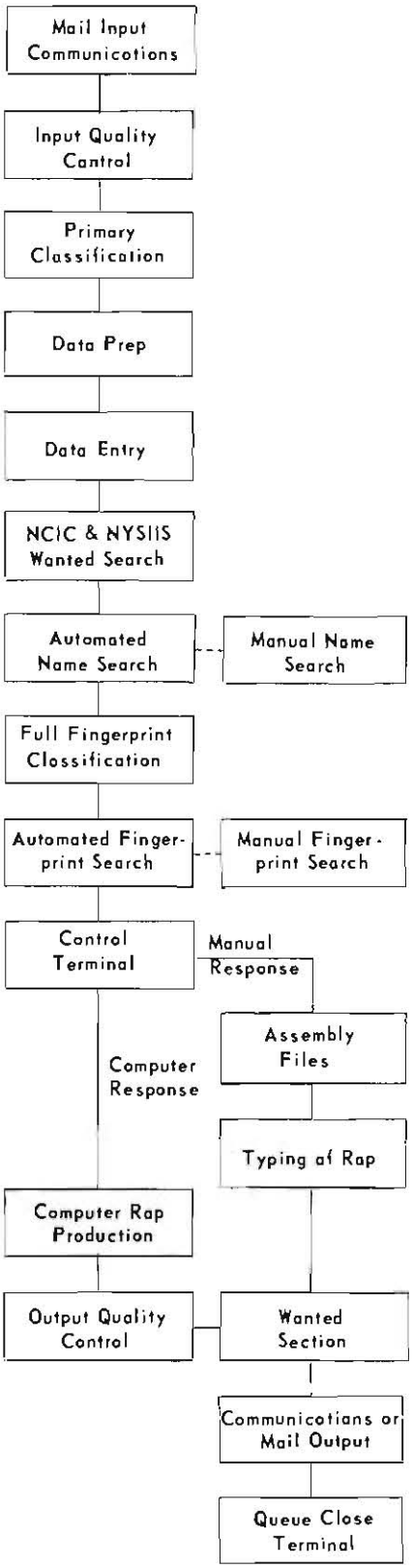
After many weeks of preparation and final system tests concluded, the "moment of truth" was at hand.

SYSTEM '71, by necessity, had to be implemented or superimposed over the existing fingerprint processing system. There was simply too much work-in-process to accomplish the conversion task any other way.

The key to the change-over was the Transaction Control Document (TCD). The new TCD was to be attached to all fingerprints entering SYSTEM '71 processing. Any document with an "old" TCD attached (the design, size and construction of the new TCD was entirely different from the old) was to be processed using the old system.

The initial days and weeks of the new system were literally "chaotic". Clerical confusion, coupled with intermittent failures of computer programs, software and hardware, made life totally unbearable for everyone involved – from top management on down to the least senior mail boy.

SYSTEM '71 – GENERAL PROCESS FLOW



Receipt af fingerprint cards, either through the mails or aver the facsimile cammunications netwarks. Primary fingerprint classification is recorded on Facsimile copies upon receipt of the facsimile fingerprint.

Transaction number and priority assigned and transaction control document (TCD) attached to input document. (See EXHIBIT 1). Computer queue is activated.

Primory Fingerprint classificatian recorded an non-FAX dacument far Name searching purpases. Facsimile copies had the primary fingerprint classificatian entered on dacument at time af receipt.

Data is quality checked, primary classificatian is coded far inputting and a cade/edit aperation is perfarmed preparatory to data entry. (See EXHIBIT 2).

All data available on the dacument that is required by the system for camputer pracessing is entered via Cathade Ray Tube Terminals. (See EXHIBIT 3).

Performed automatically after entry af data at the data entry terminals.

Performed autamatically after entry of data at the data entry terminals (and manually, if necessary) using name, date of birth, primary fingerprint classificatian and other secondary criteria for matching purposes.

Perfarmed on thase prints not identified through a Name Search. Classification data is used in a Fingerprint Search.

Operatar enters Tran. No. and Full Classification to perform automated search. (See EXHIBIT 4).

Specific control information keyed in for use in "triggering" all required file updating, NYSIIS Number assignment and informing key operator whether a computer response is being produced or a manual response will be required. (See EXHIBIT 5).

For a manual response, the identified individual's jacket is drawn and edited.

Preparation of manual response using the identified individual's jacket.

Automatic drawing of the identified individual's records from the computer disk files and preparation of a computer produced rap sheet. (See EXHIBIT 6).

Quality Control check of the computer-produced rap sheet.

If Control Terminal indicated a "Wanted" status, documents routed to Wanted Section for attachment of Wanted Notice.

Output response sent back to requesting jurisdiction by mail or by facsimile message transmission.

Transaction Control Document (TCD) is detached when response is made and farwarded ta Queue Close Terminal for close out.

Round-the-clock coverage, seven days a week, was required of virtually all the systems, programming and middle management staff. The response time to users truly suffered. There were several times when the decision was *nearly* made to revert back to the "old processing system". Fortunately, that decision was never made. To have done so, would have been sheer disaster.

By April, through the truly valiant efforts and total cooperation (though sometimes strained) of the Bureaus involved (Identification, Computer Operations and Systems Development), the major battle with the new system was won. The processing gaps were filled, the computer programs seldom aborted and the computer hardware settled down.

We were then able to devote our time to making the usual post-installation refinements necessary to smooth out the wrinkles.

In retrospect, one must wonder "there must be an easier way". Indeed there is, if one has the luxury of designing, building and installing a totally new system where one did not exist before. This luxury was not possible in our case. There simply wasn't any way to call a "moratorium on crime" for a few weeks until the SYSTEM could be smoothed out.

In the final analysis, if the circumstances are similar, it would appear that the only feasible approach to implementing a large, intricate system is to:

a. Prepare as best as is humanly possible.
b. Perform extensive overall "systems tests".
c. When satisfied with the above, put the system to the "acid test"; implement it.
d. Stick with it; make it work. Be prepared to spend a few (?) nights at the office.

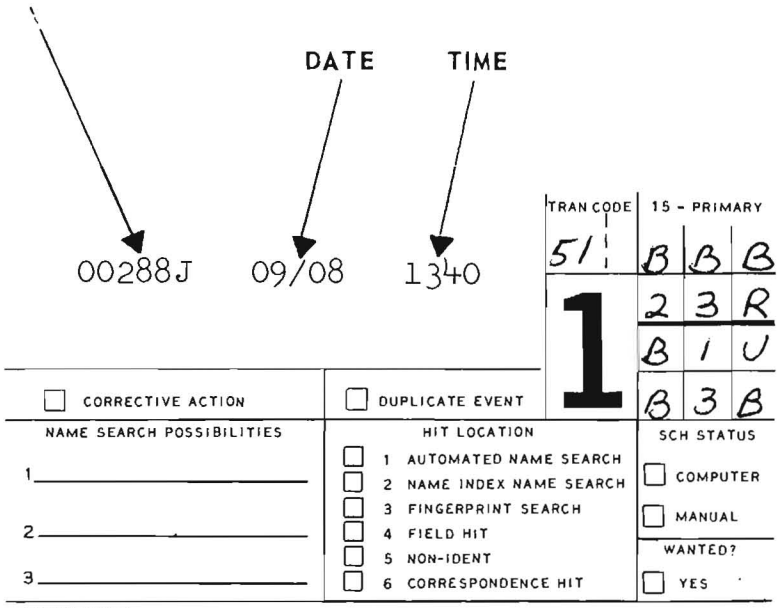
EPILOGUE

On September 1, 1972, the New York State Identification and Intelligence System was combined with the Division for Local Police and the Division of Criminal Justice Services to form the new Division of Criminal Justice Services. The new division in the Executive Department is under the leadership of Commissioner Archibald Murray.

The creation of this new agency will, undoubtedly, open new horizons for the Identification and Information System (as we are now called) in the services to be rendered to the criminal justice community.

SYSTEM '71 has been operational now for a period of eight months. It is working effectively and efficiently, surpassing all of our initial expectations. It is by no means completed, as many improvements are presently underway. It is merely a "beginning": A beginning in which all who participated in its development and those who have made it work, can justly take pride.

TRANSACTION NO. (WITH CHECK DIGIT)



I/I – 550 (3/71)

TRANSACTION CONTROL DOCUMENT

EXHIBIT 1

NYSIIS–2 ARREST F/P CARD



THE ABOVE IS AN EXAMPLE OF AN ARREST FINGERPRINT CARD – ALL DATA SHOWN IS PURELY FICTICIOUS. THE PRINTS ARE THOSE OF AN "INNOCENT" PROGRAMMER.

EXHIBIT 2

NYSIIS-2 (4/70) (Arrest)

STATE OF NEW YORK – EXECUTIVE DEPARTMENT
IDENTIFICATION AND INTELLIGENCE SYSTEM
ALBANY, NEW YORK 12203

Do not write in this space.

34. Name(s) and ID Number(s) of Associates

NONE

35. Description of Crime	36. Occupation	37. Wt.	38. Color of Hair
Suspect apprehended while burglarizing a dwelling at night and was in possession of stolen credit cards and ½ oz. of marijuana.	Laborer	165	Brown

39. Physical Marks & Oddities	40. Additional Information
2" scar on left cheek	

INSTRUCTIONS

Leave all shaded areas blank.

Enter dates as month/day/year, e.g. 11-29-67.

When rolling fingerprints, disregard the dotted box in lower right corner.

1. NYSIIS No. – Formerly DCI Number.
6. Nickname – Enter any identifier, except versions of person's name, usually descriptive, e.g., Baldy, Shorty, Butch, Fatso.
7. Alias and/or Maiden Name – Enter any aliases. An alias is a complete name in which the given and/or surname is different than those entered above.
9. Racial Appearance – Check the racial category which best describes the person's appearance. White if Caucasoid, Negroid if Negro, and Mongoloid if Oriental or American Indian. Classify as White persons those of mixed ancestry who are definitely not Negroid or Mongoloid.
10. Skin Tone – Check the skin tone category which best describes the individual's complexion in relation to his racial appearance. For example, classify white persons with olive or swarthy complexion as Dark Skin Tone, and classify light-colored Negroes in the Negroid Category as Light Skin Tone.
13. Place of Birth – If not U.S.A., enter city and country.
16. Agency Ident. Number – Enter your identification number assigned to this individual.
25. Date of Crime – If more than one, use space in Item 40.
26. Place of Crime – If more than one, use space in Item 40.
28. Facsimile Control Number – Enter when facsimile transmission is used.
30. Charge(s) – Enter all charges with most serious first, as set forth in the NYSIIS Charge Code Manuals. If more space is necessary, enter in Item 40.
    Law – Enter law abbreviation. For example
    PL – Penal Law CCP – Code of Crim. Proced.
    PHL – Public Health Law VTL – Vehicle & Traffic Law
    Section Number – Enter Section Number of Law.
    Subsection Number – Enter number found after dash in Section Number.
    Class – Enter class of crime, A, B, C, D, E, or U–Unclassified.
    Offense Category – Enter letter as follows.
    F – Felony V – Violation
    M – Misdemeanor I – Infraction
    Attempted Code – Enter letter as follows:
    A – Attempted Crime O – Actual Crime
    Name of Offense – Enter name of crime for which individual is charged, such as Fraud, Assault or Larceny.
    Degree – Enter degree of crime, if applicable.
31. Contributor – Enter name of agency if different than Arresting Agency.
32. Court of Arraignment – Enter Court name and City, Town or Village. Enter name of Justice of Peace or Police Justice and mailing address in Item 40.
    NYC – Enter court name including part of court and borough. For example, Criminal Court, Part 1A, Queens.
34. Name(s) and ID Number(s) of Associates – Enter name(s) and ID Number(s) if known, of persons arrested with or involved with the arrestee in the commission of the offense for which the fingerprint card is submitted.
35. Description of Crime – Describe the criminal act for which this individual was arrested.
39. Physical Marks & Oddities – Enter any amputations, deformities, visible scars, marks or tattoos.
40. Additional Information – Enter any miscellaneous information which may be helpful.
    Refer to the original entry whenever an item is carried over to Item 40, e.g., Item 25, Date of Crime – 11-29-67.

EXHIBIT 2A

DATA ENTRY SCREEN FORMAT FOR ARREST PRINTS

◀TRAN NUMBER ▶00288J◀ TRAN CODE 51 PRIORITY ▶1◀ 15 ▶BBB23RB1UB3B◀ CORR ACT ▶0◀

01 ▶ ◀ 02 FINSTER, ALBERT HENRY

03 ▶13 DIVISION ST ◀ 04 ▶ AMSTERDAM ◀ 05 ▶NY◀

06 ▶PINKY ◀ 07 ▶JORDAN, HENRY ◀

08 ▶M◀ 09 ▶W◀

10 ▶L◀ 11 ▶506◀

12 ▶090449◀ 13 ▶SARATOGA SPRINGS ◀ 14 ▶NY◀

16 ▶M712 ◀ 17 ▶143282J1◀

18 ▶069712413◀ 21 ▶092971◀

23 ▶NY2801P◀ 25 ▶090771◀

27 ▶NY2801P◀ 28 ▶ ◀

29 ▶422801H◀ 31 ▶422801H ◀ 33 ▶322801Q ◀

30 ▶PL 1403000BF01◀ ▶02◀ 30 ▶PL 1654502EF02◀ ▶04◀

30 ▶PHL3305000UM00◀ ▶01◀ 30 ▶ ◀ ▶ ◀

I Q C DATE/TIME ▶ ◀ MORE ▶N◀

ERRORS: ▶

EXHIBIT 3

AUTOMATED FINGERPRINT SEARCH INPUT SCREEN

◀ REQUEST ▶ S ◀

TRAN – NO ▶ 00288J ◀

RT HAND ▶ W23, R13, W15, W17, U16.

LT HAND ▶ U18, U10, U12, U17 W17, U13.

PRIORITY ▶ 1 ◀

SEX ▶ M ◀

DOB ▶ 09/04/49 ◀

INITIALS ▶ AHF ◀

AUTOMATED FINGERPRINT SEARCH SUSPECT LIST

09/08/72 TIME IN 13:28 TIME OUT 13:29 PRI 1

S 00288J M 09/04/49 AHF

W23, R13, W15, W17, U16, U18, U10, U12, U17 W17, U13.

SUSPECTS N3088246J 0154019
G1453488 0052404

EXHIBIT 4

EXAMPLES OF CONTROL TERMINAL ENTRIES AND RESPONSES

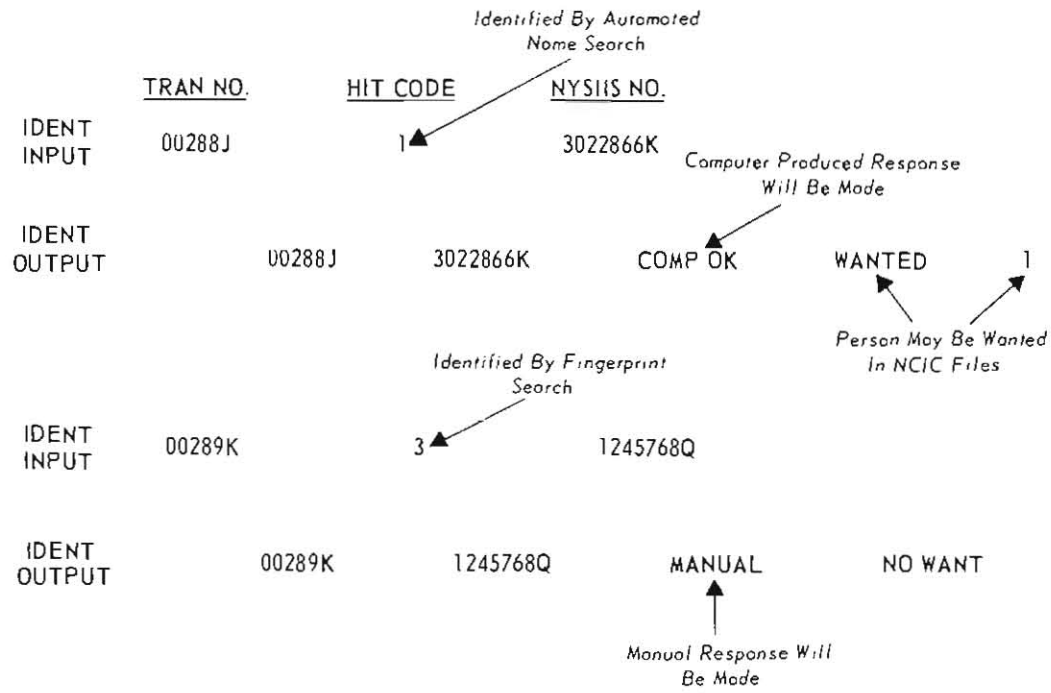


EXHIBIT 5

STATE OF NEW YORK — EXECUTIVE DEPARTMENT
IDENTIFICATION AND INTELLIGENCE SYSTEM
DATE 09-20-71 EXECUTIVE PARK TOWER STUYVESANT PLAZA ALBANY N Y 12203 TRANS. NO 12857 PAGE 1

NYSIIS NO 0078301A THIS RESPONSE TO YOUR INQUIRY IS BASED ON A F/P IDENT
INQUIRY NAME SAMPLE,SAM SKIN TONE MEDIUM SEX MALE HGT 6-01 FBI NO 04273738
KNOWN AS SAMPLE,SAMUEL RACE APP WHITE BIRTH 7-16-31 SOC SEC NO 183-32-1749

CONFIDENTIAL TO: FEDERAL BUREAU OF INVESTIGATION
FEDERAL BUILDING
ALBANY, N.Y. 12207

- - - SUMMARY OF NYS CRIMINAL HISTORY INFORMATION - - -

	ARREST DATE		CHARGES	DISPOSITION
1	09-02-67	PL B FEL	SELLING DANG DRUG 8OZ OR MORE	05-04-68 ACQUITTED
		PL E FEL	POSSESSION DANGEROUS DRUG -3RD	05-04-68 3 YEARS
2	07-26-71	PL A MISD	ASSAULT -3RD	08-01-71 COND DISCH

01 - - - - - CRIMINAL HISTORY - - - - -

ARREST: SAMPLE,SAMUEL AGENCY ID 8184667
ADDRESS: 121 3RD AVE NEW YORK CITY NEW YORK
CRIME DATE/PLACE: 09-02-67 NEW YORK CITY NEW YORK
ARREST DATE/PLACE: 09-02-67 NEW YORK CITY NEW YORK
AGENCY: NY CITY POLICE DEPT PCT 53 NEW YORK CITY NEW YORK
ARREST CHARGES:
PL 220.40-02 B FEL SELLING DANG DRUG 8OZ OR MORE
PL 220.10-00 E FEL POSSESSION DANGEROUS DRUG -3RD
DISPOSTION: 05-04-68 DOCKET NO 00003333
MANHATTAN SUPREME COURT NEW YORK CITY NEW YORK
CHARGE: PL 220.40-02 B FEL SELLING DANG DRUG 8OZ OR MORE
ACTION: 05-04-68 ACQUITTED
CHARGE: PL 220.10-00 E FEL POSSESSION DANGEROUS DRUG -3RD
ACTION: 05-04-68 CONVICTED
SENTENCE: 3 YEARS
SING SING STATE PRISON OSSINING NEW YORK
INSTITUTION ADMISSION: 05-05-68 INMATE ID 0045362
SING SING STATE PRISON OSSINING NEW YORK
NEW COURT COMMITMENT, NOT ON PAROLE
INSTITUTION RELEASE: 11-07-69 INMATE ID 0045362
SING SING STATE PRISON OSSINING NEW YORK
PAROLE: 11-07-69 18 MOS AGENCY ID 356723
PAROLED
DIVISION OF PAROLE NEW YORK

02 - - - - - - - - - - - - - - - - - - -
ARREST: JONES,DICK AGENCY ID 0235168
ADDRESS: 5366 1ST AVE NEW YORK CITY NEW YORK
CRIME DATE/PLACE: 07-26-71 NEW YORK CITY NEW YORK
ARREST DATE/PLACE: 07-26-71 LEEDS NEW YORK
AGENCY: N.Y.S. POLICE LEEDS LEEDS NEW YORK
ARREST CHARGES:
PL 120.05-00 D FEL ASSAULT -2ND

(THIS DOCUMENT IS AN EXAMPLE OF A COMPUTER-PRODUCED CRIMINAL HISTORY – ALL DATA SHOWN IS PURELY FICTICIOUS)

NYSIIS-5 (11/70) SUMMARY CASE HISTORY

*Represents arrest information unsupported by fingerprints in our files. All entries are as complete as the data furnished to NYSIIS

Director

EXHIBIT 6

STATE OF NEW YORK — EXECUTIVE DEPARTMENT
IDENTIFICATION AND INTELLIGENCE SYSTEM
EXECUTIVE PARK TOWER — STUYVESANT PLAZA — ALBANY N. Y. 12203

DATE 09-20-71 TRANS NO 12857 PAGE 2

NYSIIS NO 0078301A THIS RESPONSE TO YOUR INQUIRY IS BASED ON A F/P IDENT
INQUIRY NAME SAMPLE,SAM SKIN TONE MEDIUM SEX MALE HGT 6-01 FBI NO. 04273738
KNOWN AS SAMPLE,SAMUEL RAC APP WHITE BIRTH 7-16-31 SOC SEC NO 183-32-1749

- - - - - CRIMINAL HISTORY - - - - -

ASSOCIATES, ROBERT PETERS NYSIIS NO 06000148 AGENCY ID 8024956
SAMUEL P. JOHN AGENCY ID 8024957
JOHN ROBERT JONES AGENCY ID 8124956
DISPOSITION 08-01-71 DOCKET NO 00000001
MANHATTAN CRIMINAL COURT NEW YORK
CHARGE: PL 120.00-00 A MISD ASSAULT -3RD
ACTION: 08-01-71 CONVICTED PLEA OF GUILTY, LESSER OFFENSE
SENTENCE: CONDITIONAL DISCHARGE

- - - - - OTHER INFORMATION - - - - -

NAMES USED BY SUBJECT:
FREQ 04 SAMPLE,SAMUEL FREQ 01 JONES,DICK
RECORDED ADDRESSES,
09-02-67 121 3RD AVE NEW YORK CITY NEW YORK
07-26-71 5366 1ST AVE NEW YORK CITY NEW YORK
BIRTH DATE/PLACE:
FREQ 04 07-16-31 FREQ 04 NEW YORK CITY NEW YORK
FREQ 01 09-20-31 FREQ 01 ALBANY NEW YORK

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NYSIIS-5 (11/70) SUMMARY CASE HISTORY

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Director

EXHIBIT 6A

48306

RECORD-O-PORT
A New Concept in Field Data Capture

Michael R. Stewart
Coordinator – Utah Criminal Justice Information System
and
Arthur J. Hudachko
Assistant Coordinator – Utah Criminal Justice Information System

Law Enforcement Planning Agency
Salt Lake City, Utah

The increasing trend toward the development of comprehensive criminal justice information systems on the state level has brought into focus the need for more efficient and accurate data capture systems at the agency level. The involvement of all segments of the criminal justice system in the development and use of centralized data files has placed an additional burden on user agencies; that is, to produce additional and more detailed data for use in management information and operational systems on the agency level, and for submission to the state level. Of the different types of data which are generated on the agency level, crime and incident case reporting will be the target of this paper, specifically since this type of reporting relates to law enforcement agencies.

Today, we find that law enforcement officers must frequently operate in a tense and dynamic environment. The very nature of the enforcement function is such that an officer must often exercise considerable personal discretion in carrying out his everyday duties. Events of the recent past demonstrate dramatically that the way in which that personal discretion is exercised can have a significant impact on the peace and safety of the community.

The effectiveness of the individual officer is increased substantially if he has rapid access to information from the departments' records or from centralized files concerning such matters as whether a particular vehicle is wanted, whether a piece of property is listed as stolen, or whether a modus operandi is typical of persons he suspects of having committed specific crimes.

Consequently, the record system of law enforcement agencies plays an important role in forming the foundation for a statewide information system. If comprehensive records information is to be collected, it is necessary to encourage and assist agencies by developing an easily used and efficient crime and incident data capture system.

It should be noted, however, that the need for information and the ability to process data varies considerably between a one-man department and a force of 2,000. Thus, development of a records system of law enforcement agencies must (1) satisfy the internal needs and give adequate recognition to the unique requirements of each related agency; (2) operate with available resources; and (3) supply key data to statewide information systems.

Historically, efforts to improve field data capture methods have been stimulated by problems related to inaccurate and incomplete data, laborious handwriting or typing of reports, and a general state of apathy among officers regarding the quality of field data capture. Other problems encountered by agencies using totally manual data capture systems include field officers' having to transport, locate, and use a multitude of specialized forms and reports. In essence, as additional forms have been designed to support centralized files on the agency or state level, the officer's job has become more difficult rather than more streamlined. This situation presents an interesting paradox, since one of the primary reasons for developing central files and more sophisticated records systems is to assist the field officer in becoming more effective in his job. That is to say, that while his inquiries can be answered more rapidly, he has less time to inquire.

In order to update and increase the effectiveness of data capture methods, the amount of time required to generate and record field data must be reduced, accompanied by an increase in the quality of information reported. Improved investigative report quality will substantially increase the effectiveness of prosecution in obtaining convictions.

In the search for a field data capture systems concept which would redress the major difficulties experienced by officers, various approaches were examined which previously had been developed and utilized in the field of law enforcement. Beyond officer handwritten or typed reports, centralized telephone dictation, office machine dictation, and secretary dictation approaches were reviewed. All three approaches dealt directly with the problem of the field officer being required to handwrite or type reports.

It was noted that the centralized telephone dictation system solved problems of logistics and

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offered a dictation capability; however, user acceptance was very low due to an extensive amount of preparation before starting the recording. Users complained that it was difficult to make the report sound "polished" because the tape could not be reversed and corrected when major dictation errors were made.

The use of dictation equipment in central and sub-station locations allowed officers to develop a "polished" report without extensive preparation, and user acceptance was excellent. The major problem, however, centered around the time loss and data loss resulting from travel to the location where the dictation devices were housed. The same problems were experienced with the use of secretarial dictation of reports. The most common problem noted in each of the three systems was that without exception the final report must be generated away from the scene of the occurrence. This was considered a major problem due to the amount of time on each shift an officer must dedicate to report writing. Another important related factor was the potential loss of data which had been committed to memory.

After the review of both manual and automated field data capture systems which were being used, it was determined that a detailed set of system requirements be developed and that an update approach to field data capture be designed and tested.

The major requirements of an upgraded system were determined to be:

1. Elimination of handwritten reports;
2. Data capture must occur on site;
3. Reduction in the number of specialized forms;
4. Uniformity of reports between agencies to include data capture for input to local and state automated systems;
5. Reduction in the time required for field data capture;
6. Improvement in quality of reports.

Requirements of the system must avoid all unnecessary complexities, be well documented, and have local law enforcement agency involvement from development throughout implementation.

Development of a data capture medium was accomplished via voice recording on audio cassettes into which the investigating officer dictates all information to be contained in the offense report. The portability of the cassette recorders allows the officer to capture all pertinent information relative to each case, regardless of crime scene location or related factors.

A pilot Record-O-Port project was initiated using cassette recorders as the vehicle in capturing offense information. Although demonstrating the feasibility of the recorder concept, the reports produced from the pilot test indicated two significant deficiencies. First, the length of the reports increased substantially and contained much unnecessary verbiage. Secondly, specific data elements destined for computerized input were in random sequence since officers were dictating free-form reports. To combat these problems of conciseness and data standardization, "cue cards" were developed and tested in three police agencies. Each officer was provided "cue cards" to guide his dictation through all elements of the nine most common or serious offenses.

The "cue card" concept eliminates the need for multiple forms which were being utilized by various agencies in capturing offense information. Although voice recording of offense reports has been attempted elsewhere with mixed results, the use of the "cue card" represents a major advance in offense data capture.

The "cue cards" were designed with two primary goals in mind. First, they had to provide sufficiently detailed information to obtain convictions in court. Secondly, they must be brief so that the officer does not become frustrated in having to record information having no bearing on the case. These two goals are, of course, contradictory and were resolved through a series of meetings with representatives from law enforcement agencies, prosecuting attorneys, and judges. The final result was a compromise in that the "cue cards" ask for the minimum amount of information necessary to obtain convictions in the majority of cases brought to court. The officer, however, is free to record information not contained on the "cue cards" if he considers the information relevant to the case.

The "cue cards" for each offense have three separate sections: (1) an initial action section that merely reminds the officer to take appropriate preliminary action as soon as he arrives on the scene; (2) an identification section that utilizes a separate "Identification" cue card which is common to all cases and contains information related to basic offense data, such as case number, name, telephone number, addresses, etc. of all complainants, victims, witnesses, suspects, and arrestees; and (3) an "elements-of-investigation section" that is a guide for gathering data about the specific offense.

After the officer records all identification information, he then refers to the "cue card" most closely associated with the offense under investigation. There are "cue cards" for larceny, vandalism, burglary, auto theft, fraudulent documents/bad checks, sex offenses, assault and battery, robbery, homicide/manslaughter, and "other offenses." If

an offense does not fit one of the specific "cue cards," the officer would report under the "other offenses" cue card. In such cases, the officer must use his experience to determine what information is appropriate for the report.

Since the officer will no longer write out a report, the responsibility for accurate documentation of recorded offenses' reports falls directly on the secretary. Upon completion of the officer's particular shift, he brings all tapes into the agency's record section. The secretary then transcribes the information on the tapes to the appropriate offense report including all details necessary to provide support for follow-up investigation and court case preparation.

To assist the secretary in standardizing the documentation, secretarial guidance cards are provided. There is a card to cue her for each piece of data, just as the officer's cue cards serve as a guide in recording offense data. These guidance cards indicate to the secretary what the officer's cue was, and provide the lead-in title to be used in organizing the taped offense data.

The evaluation of the pilot test was primarily based on three criteria: user acceptance, report quality, and efficient use of the officer's time.

Acceptance by police officers may be compared to a learning curve type concept. As is evidenced in any new type of system, there is always apprehension and oftentimes reluctance to accept the new approach on the part of the individual directly involved with it. A similar situation existed with the Record-O-Port project. However, as the officer became more familiar with the various components of the system, the acceptance level gradually increased. Upon completion of the pilot, the acceptance rate was extremely high, as was the officer's confidence in the system's success.

Further evaluation of the system indicated a twenty-seven percent decrease in time required to capture offense data. This was measured by sampling times required for the officer to capture offense report data in the former system and comparing these to the time required to capture information utilizing the new system. Another random sample was taken of two types of reports – those using cue cards and those not using cue cards. These reports were read aloud and timed. The cue card reports were read in nine percent less time than the non-cue card reports. This test indicates that the new system was successful in reducing unnecessary verbiage while increasing report quality.

Sampling techniques were also used to measure the investigative tasks covered in a specific type of report. Quality measurements of the existing systems were compared to the Record-O-Port system. Results indicated a seventeen percent increase in report quality. Again, the comparison was made between cue card and non-cue card reports. On a scale of one to one hundred, results showed that the average cue card report netted ninety-nine points while the average non-cue card report netted ninety points. The non-cue card reports were handwritten and very difficult to read, in sharp contrast to the neatly-typed cue card reports. Due to the fact that officers were dictating reports as opposed to writing them, there was also noted a significant increase in the vocabulary level used by each officer. This accounts for the fact that officers in general speak more effectively than they write. Various conversations with officers involved pointed to the fact that oftentimes specific words or terms were not included in the report for the simple reason that they were unable to spell them properly.

In summary, the evaluation indicated the success of the project in that the primary objectives were all achieved. As a result, agencies will receive improved offense reports in a standard format, as well as having an upgraded records system for their internal use.

Implementation of the Record-O-Port system was initiated in large, as well as small, police agency installations. The goals and objectives of the Record-O-Port project were adjusted in the larger agencies to reflect the input needs of the Offense Name Index System (ONIS) and the Departmental Management Information System (DMIS). The ONIS system provides for a computerized index and summary record, which includes current case status on all incident offenses and accident reports. The DMIS system was also designed for use in computer supported law enforcement agencies and provides detailed management information to assist administration in more effectively allocating resources. The major components of DMIS relate to selective enforcement, manpower allocation, officer activity, section activity, division activity, department activity, and crime-to-suspect matching for investigative purposes. The pilot project addressed the report-writing problem on the field level, but due to input requirements of the ONIS and DMIS systems, it was necessary to make an adjustment in the scope of the project. This change, however, did not significantly alter the original intent of the project.

Design of the formats for the Record-O-Port system followed the completion of data element determination of both ONIS and DMIS, as well as programming and testing of each separate system.

The concept of the Record-O-Port system in computer-supported law enforcement agencies meets the Utah Criminal Justice Information System (UCJIS) requirements for field data capture, which emphasizes speed, completeness, and accuracy of inbound data. The new system provides report generating capability on the field level, which, in turn, increases the quality and quantity of the data related to offense reports and decreases the time required by the individual officer to capture the data. The system, as mentioned previously, also supports two automated files. Impact on the state and Federal levels is experienced as a result of this effort via data capture which will be produced through the system, and which will support crime activity statistical systems related to the Uniform Crime Report.

Historically, most small agencies, due to a lack of resources, do not report crime statistics on a regular or accurate basis. Because of this, there is reason to believe that a crime profile for sparsely populated areas has never been clearly established. The bulk of data currently collected is supplied by the larger urban agencies where the resources necessary to support a formal record system, including agency reference data and management information, are available.

The small agency phase of the Record-O-Port project is responsible for generating a records system for those agencies which presently have no formal system, as well as uniformly improving upon current operational record systems.

The scope of the original Record-O-Port pilot was expanded to include assistance to small law enforcement agencies in implementing a supporting records and filing system. Implementation began in forty-eight police agencies throughout the State. This is the first of three anticipated groups to adopt the system.

Data capture in the small agency system utilizes recorders as well as use of the cue cards. The secretary then transcribes the information on tape to the Uniform Incident/Offense Report. The original of this form is filed by case number and all names are indexed and filed in the Master Name Index file. The second copy is used as a work copy by the department, and the third copy is forwarded to the Utah Bureau of Criminal Identification for coding and subsequent data processing. This copy will provide UBI the vehicle to generate Uniform Crime Reports for each agency, as well as the capability of providing an optional service of processing and reporting management planning data and other reference data for agencies desiring this service. A Name Index card is the fourth copy and eliminates the need for typing one of the index cards. Various other forms are also provided by the system. A follow-up report is used to capture supplemental investigation information, and is filed with the corresponding Uniform Incidence/Offense Report. The Article/Vehicle card is used to index stolen cars and property, and the Want/Warrant Master Name Index card is used to index warrants.

The record systems of local law enforcement agencies will eventually be the foundation for a statewide information system designed to provide immediate access to all available information.

A fundamental purpose of this effort is a collection system for statewide police statistics to be developed and implemented through the Utah Bureau of Identification. The system is designed to generate automatically data elements required for State level statistical systems and for local agency management information systems. The system provides for automated analysis of information received from inputting agencies and, in turn, this data is analyzed and returned to submitting agencies for their use.

By providing an improved method of gathering offense information accompanied by a supporting records and filing system, law enforcement agencies will have the capability of generating more accurate investigations, which will result in more successful prosecutions.

48307

THE CLEAR/CJIS SYSTEM

Andrews O. Atkinson
Superintendent
Regional Computer Center of Cincinnati
Hamilton County, Ohio

Changes in law enforcement guidelines have provided a need for high-speed communications and investigative techniques among police agencies. Forty-three independent law enforcement departments – City, Village, Township, County and Regional Federal Offices – of Hamilton County, Ohio, have, by united action, developed such a tool. Project CLEAR (County Law Enforcement Applied Regionally) is the police system of the Regional Computer Center of Cincinnati and Hamilton County.

With the CLEAR System as a base, a comprehensive Criminal Justice Information System (CJIS) was also developed. Service is provided to Cincinnati and Hamilton County for sixty-one police installations (federal, county, and municipal), nine court offices, and two corrections agencies.

The Regional Computer Center of Hamilton County and the City of Cincinnati, Ohio, is an agency which fulfills all the data processing needs of the City and the County by sharing facilities, hardware and technical staff. This shared environment operates on the *only* contractually shared city/county computer center in the county. By sharing facilities and staff, the police systems of Cincinnati and Hamilton County can each be provided services at 60% of the cost of maintaining separate facilities; a 40% savings in three different areas.

The CLEAR System is financed by a county tax levy. The development of CLEAR led to the expansion of the Project into CJIS. CJIS is supported by LEAA Discretionary Grant 72-DF-05-0019 for installation and one year of operation. With the emphasis on development, CJIS will be brought under the umbrella of the CLEAR tax levy with no appreciable budget increase. This investment, with enthusiastic support of the tax paying citizen, has made Project CLEAR/CJIS the only tax levy financed criminal justice computer system in existence.

The hardware required to perform the functions of this System includes computer equipment:

1 RCA Spectra 70/60 Central Processing Unit
1 RCA Spectra 70/668 Communications Controller Multi-Channel
1 RCA Spectra 70/243 Printer
9 RCA Spectra 70/594 Disk Drives
2 RCA Spectra 70/432 Tape Drives

and user terminals:

24 RCA Spectra 70/752 Video Data Terminals
46 AT&T ASR-35 Teletypewriters
35 AT&T RO-28 Teletype Receivers.

CLEAR/CJIS functions can be roughly grouped into three categories:

1. Message Switching
2. Data Storage and Retrieval
3. Reports.

Message switching provides communications among the 105 terminals within the System for point-to-point, point-to multiple-point, and area or county-wide broadcast communications. Interface with the Ohio Highway Patrol's Law Enforcement Automated Data System (LEADS) permits the CLEAR/CJIS terminals communication with the 293 terminals of the state system and use of the Ohio terminal of the 54 station National Law Enforcement Telecommunications System (LETS).

Data storage and retrieval includes the file packages of CLEAR/CJIS, Ohio LEADS, and the FBI National Crime Information Center with automated interface among the three systems. All are accessed on-line in a real-time environment.

CLEAR/CJIS users have update capability and access to the Name Index cross reference and the three files which it controls: wanted persons, criminal history, and subject-in-process within the court procedures throughout the county. The same use is made of the wanted vehicles, wanted and registered guns, and stolen or missing articles files. Inquiry is provided into the vehicle registrations for a four-county area and ownership of real property within Hamilton County.

The CLEAR/CJIS interface with Ohio LEADS provides update and retrieval of the wanted vehicles and warrant and wanted files, and inquiry into the Ohio vehicle registration and drivers' license files.

The CLEAR/CJIS interface with NCIC allows update and access to wanted persons and vehicles and stolen guns, articles, boats and securities in the national files.

The use of these files can best be illustrated by following a typical case through the entire System.

A police warrant is issued for the arrest of the subject. An inquiry into the name index will determine whether this warrant is to be attached to pre-

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vious activity for the individual or if it is a new addition to the name index. The warrant is then entered either as a new entry or as part of the subject's "portfolio". The entry builds a name index entry or flags an existing entry as wanted, and creates a detailed record in the wanted person's file.

When arrested, the subject's wanted record is cancelled; the wanted record is then inactive and the wanted indicator is removed from the name index. The arrest is then entered which assigns a case number, flags the name index as a "Subject-in-Process", builds a criminal history record for that arrest and creates a subject-in-process record. The arrest entry triggers the date activity system which will control the chronology of the case throughout the process. The date activity process will dispatch a message to all manual records centers to update their records with the arrest and to the Clerk of Courts, and the Probation Department. The arrest record source document is printed by the System.

Preparation for the first appearance in court is controlled by the date activity program. Criminal history is scanned and a "rap sheet" is automatically printed by the system for the Clerk of Courts. Subject-in-process is used to create individual docket sheets for each defendant and a docket list of all scheduled cases. A "bring-up" list is sent to the corrections sites indicating prisoners who are to appear in court. All proceedings and reports just described are prepared in a real-time on-line operation. Expansion of these programs will trip alarms where conflicts of judges, courtrooms, counsels, prosecutors, or witnesses exist.

At the first court appearance, the case is called by the court and the clerk displays the case history on a video screen in the court room in a format which both shows all activity to date and serves as a transaction to update the developments as they happen.

The preparation of succeeding court appearances are the same as the first appearance. The rap sheet, individual docket, and docket list are prepared by the date activity system.

Continuance appearances follow the same process as the first appearance as does the final appearance. The case is displayed on the screen and updated by the clerk. The plea of the defendant, the finding of the court, and the final disposition as well as sentence, fine, cost, probation, etc., are entered. The date activity system continues to control the chronology of the case. This includes a "completed docket" at the end of each court day to double check the disposition of each case.

At completion of the disposition such as the termination of confinement or probation, the date activity system produces a "release list" for the appropriate agency, makes the final update to the criminal history record, and cancels the Subject-in-process record.

The reports which are produced by the CLEAR/CJIS programs have eliminated mountains of paper work which had encumbered justice agencies. These reports are published on a daily, weekly, or monthly basis.

The daily reports are six: docket sheet, docket list, rap sheet, arrest record, completed docket and the sixty-day case load report.

The docket sheet is an individual work sheet which specifies the particulars of a given case with a summary of prior action. The activity of the court appearance is filled in by the clerk and signed by the judge. This document is then compared to the completed docket at the end of the court day to double check the day's activity.

The docket list is prepared for the clerk in each court room. It lists each case on the calendar for that day with space to fill in the sentence as confinement, fine, cost, probation, and remarks. This report is also checked against the completed docket at the end of the court day.

The rap sheet is prepared for the clerk to show the history of the defendant in arrests and convictions and the disposition or sentence of each case.

The arrest record is the official document of record for the arrest of the individual. It contains all information required by the police and court agencies for their files.

The completed docket is published at the end of the court day. A report is prepared for each judge showing each case which he heard, the disposition of the case, and the date and type of the next action, if any.

The sixty day case load report is prepared each day to assist the judge in setting continuance and reappearance dates. It lists the total number of cases scheduled for each court room for the succeeding sixty days.

The weekly reports are nine: arraignment lists, probation caseload, case activity analysis, disposition summary, new probations, attorney activity, case status, prisoner analysis, and new bills.

The arraignment list is a "docket list" for first appearance in Common Pleas Court prepared for cases indicted by the Grand Jury.

The probation caseload is a report by probation officer listing the total cases currently assigned to him. It is used for the assignment of probation

officers in new cases.

The case activity analysis lists each active case in Common Pleas Court with the length of time, in thirty-day increments, that it has been active.

The disposition summary lists the individual cases which were completed that week. It includes the disposition and judge for each.

The new probation report lists the individuals placed on probation for the past week and the probation officers assigned.

The attorney activity report is a list for each attorney showing the appearance of his cases in Common Pleas Court for the week.

Case Status is a report by Common Pleas Court of the current status of each case which is pending at the end of the week.

The prisoner analysis report is a list of each prisoner in the county jail or the municipal workhouse with totals by sex and type (e.g., awaiting trial, contract, sentenced, etc.)

New bills is a Grand Jury report of all cases heard that week listed as indicted or ignored.

There are nine major reports produced monthly; they are Prosecutor Activity, Probation Purge List, Probation Analysis, Case Disposition by Elapsed Time, Jail Meals Served, Workhouse Bills, Days in Confinement, Arrest, Case Filed, and Appearances, and Continuances and Summary.

Prosecutor Activity shows, by assistant prosecutor, the common pleas case totals for the month. It lists convictions and acquittals by cause and days in trial. Summary totals for these, Grand Jury activity, resettings, and new caseload are included.

The probation Purge List shows, by case, all probations which have been terminated in the past month showing the probation officer and reason for termination.

Probation Analysis is a monthly list for municipal probation and one for County Probation of the names and particulars of each subject currently on probation.

Case Disposition by Elapsed Time is a breakdown, by offense, of case totals and elapsed times in thirty-day increments with sub-totals and grand totals by offense and by elapsed time. Two reports are published: one for elapsed time since arrest, and one for elapsed time since indictment.

Jail Meals Served is a report for the County Jail listing each prisoner and the meals served and three-meal days with summary totals by twenty-five prisoner pages. A summary page lists totals from each page with designations of federal prisoner totals.

Workhouse Bills are statements of charges from the Municipal Workhouse to other municipalities for prisoners confined for them.

Days of Confinement shows a total of prisoners released in the past month with a total of days served by each. A report is prepared for both the County Jail and the Municipal Workhouse.

A report of Arrests, Cases Filed, and Appearances provides monthly totals of activity in those three categories for both Municipal and Common Pleas Court in a separate report for each.

The Continuance and Summary Report lists, by case, each continuance for the month and the reason for the continuance. The Summary is a separate report, by judge, showing continuance totals by reason and grand totals.

The unique pioneer efforts made in the technical facets of the Regional Computer Center are matched by the dedicated spirit of involvement in administration. Overlooking political and geographic differences, the officials and citizens of Hamilton County have made the Center a monument to unselfish cooperation. Cincinnati City Council and the Hamilton County Commissioners have designated the Regional Computer Center's Control Board of government management representatives to execute the fiscal policy of the Center. The police and justice systems are managed by the CLEAR Board of Advisors, built on a history of inter-jurisdictional cooperation by the Hamilton County Police Association. This spirit has gained the support of the citizens of Hamilton County who have permitted the Regional Computer Center to prove its worth.

48308

PROBLEMS ENCOUNTERED IN DEVELOPING A STATE LEVEL CCH-OBTS SYSTEM AND INTERFACING IT WITH THE NCIC-CCH SYSTEM

William L. Reed, Commissioner
Florida Department of Law Enforcement

BACKGROUND

DEVELOPMENT OF FCIC

Recognizing the need for complete and timely information, the Florida Legislature, in the Florida Law Enforcement Act of 1967, instructed the Department of Law Enforcement to "establish a system of intrastate communication of vital statistics relating to crimes, criminals, and criminal activity." A survey of law enforcement and criminal justice officials throughout Florida defined the objectives of this system – to compile, massage, store, retrieve, and communicate crime related information to all law enforcement and criminal justice agencies in the state.

To accomplish these objectives, the Florida Crime Information Center (FCIC) was developed. FCIC, a computer-based information system, was designed to evolve into a Criminal Justice Information and Statistics system. Through computers and 300 remote teleprocessing terminals located in law enforcement and criminal justice agencies throughout the state, FCIC:

- Provides a secure system of intra and interstate communications
- Provides information storage and retrieval services immediately, through on-line, real-time capabilities
- Provides these services continuously, 24-hours a day.

The FCIC computer programs were developed giving consideration to both state and local requirements, and provide for the intra-state exchange of information concerning:

VEHICLES
- Stolen vehicles
- Stolen boats
- Stolen aircraft
- Stolen motorcycles
- Stolen or lost license plates (tags)
- Vehicles wanted in connection with crimes
- Repossessed vehicles
- Impounded, abandoned, or recovered vehicles

PROPERTY
- Stolen serialized articles
- Lost, stolen, or recovered serialized guns

PERSONS
- Wanted persons
- Missing persons
- Criminal histories, including:
  - Identification data
  - Arrest data
  - Conviction data
  - Parole data

In addition, a computer interface was established with the National Crime Information Center (NCIC). When FCIC entries meet mandatory requirements for entry into the national files, the FCIC automatically converts the data from state formats to national formats and forwards it to NCIC. Also, an interface was established with the National Law Enforcement Telecommunications System (NLETS), which allows Florida's local law enforcement agencies to communicate nationally with other law enforcement agencies.

The Department also integrated the operations of its Crime Information Bureau (CIB) into the FCIC operations. The Crime Information Bureau is the state's central repository for criminal identification and criminal history information. Recognizing the potential of computers in criminal identification and information processing, the Department automated its fingerprint and records system. Utilizing the technology of computers and microfilm, the Crime Information Bureau accomplishes criminal fingerprint identification and the generation of up-to-date, computerized, criminal history "rap sheets" with a minimum expenditure of time, personnel, and resources.

PARTICIPATION IN PROJECT SEARCH

As a result of its responsibility for providing criminal history information, the Department of Law Enforcement began participation in the Law Enforcement Assistance Administration's (LEAA) newly organized Project SEARCH in 1969. In 1970, Project SEARCH demonstrated the feasibility of operating an on-line computerized system allowing the interstate exchange of criminal history files based on compatible criminal justice offender records.

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Since Project SEARCH's prototype data elements were similar to those of the Department, the Crime Information Bureau modified and expanded its operation in order to achieve compatibility. The resulting criminal history information was forwarded to the FCIC for inclusion into the appropriate criminal history record. Before conversion to Project SEARCH standards, FCIC had criminal history records on over 250,000 individuals. Because the criminal history files were maintained in coded formats, special programs were created to extract records which met the mandatory SEARCH requirements. This resulted in approximately 16,000 individual criminal history records being utilized for the prototype SEARCH demonstration.

DEVELOPMENT OF NCIC-CCH

In 1971, as a result of the successful demonstration by Project SEARCH, the NCIC developed a computerized criminal history system which is to be implemented in two phases. The first phase concentrates on the development of a uniform data base for criminal histories at the national level. States, meeting mandatory NCIC requirements, submit criminal history information on individuals, and, in turn, inquire against this data base. When all states develop a uniform data base for NCIC compatibility, phase two will be implemented. This phase will have the NCIC serving as a national index and communications network for the fifty state criminal justice systems. With the established uniformity of data bases, states can communicate directly with each other to obtain detailed criminal history information.

Recognizing the need and value of the instantaneous interstate exchange of criminal histories, the Department of Law Enforcement, in June of 1971, recommitted its resources to the implementation of the NCIC Computerized Criminal History (CCH) system in Florida. The Department's first objective was to develop the CCH system for Florida and provide NCIC with an initial load file of criminal histories by November 1971.

Achievement of this goal required quick, accurate decisions and plans, a free exchange of ideas, access to necessary information, and the flexibility to develop and accept new concepts. Fortunately, the close infra-departmental working relationship of CIB (the State's repository for criminal identification and criminal history information) and FCIC, and the close inter-agency relationship with NCIC provided the framework to support these activities.

The FCIC had an operational statewide, on-line, real-time criminal history system prior to the NCIC-CCH. The FCIC file, by 1971, contained criminal history information on approximately 300,000 individuals. Preventing the loss of this data dictated conversion of the file instead of developing a totally new CCH system.

To some this may seem to have been an advantage. However, conversion of an automated system presents its own inherent problems. For example, the offenses and dispositions were in a state-coded form. The source document, literal for offenses and dispositions, was translated into standardized groups utilizing numeric codes. Thus, the translation from state numeric codes to CCH numeric codes required extreme safeguards to insure that the intent of the original literals was not lost.

Another problem area concerned agency identifiers. Since the state files mirrored the FBI's rap sheet, in some instances non-Florida arrest information was listed from agencies no longer in existence. Conversion necessitated the creation of special NCIC ORI's (Originating Agency Identifiers) for these agencies.

These and other problems were solved only as a result of the extremely close working relationship among NCIC, FCIC, and CIB. This cooperative effort resulted in the Department's meeting its November 1971 deadline for providing NCIC with an initial load file.

The conversion of the 300,000 criminal history files resulted in an initial load tape of approximately 52,000 individuals who met mandatory NCIC-CCH requirements. However, even with the safeguards, some 2,000 individuals were rejected by NCIC. Approximately 1,100 were rejected due to invalid ORI's, while the rest were rejected due to having already been entered by the federal government. In order to maintain proper control and insure the integrity of the information in both the NCIC-CCH and FCIC files, the Department expended additional resources to manually analyze and, where appropriate, correct the data on these individuals.

Whether an agency is converting an existing file or developing a totally new CCH system, generation of the NCIC-CCH initial load demands close cooperation from the Identification Bureau, the Computer Center, and the NCIC; the ability to retain maximum flexibility within established guidelines; and the realization that "rejects" will occur, necessitating corrective procedures.

DEVELOPMENT OF OBTS

As stated earlier, FCIC was designed to evolve into a Criminal Justice Information and Statistics system (CJIS). In this system, the three criminal justice modules (law enforcement, judicial, and corrections) will be interfaced to form an integrated Offender-Based Transaction Statistics system (OBTS). This offender-based system will provide the criminal justice community with: (1) a criminal history that includes each significant transaction from the time an individual enters the criminal justice process by arrest until he exits from the system, (2) status information or where the individual is within the system, and (3) derivative statistical information for management and decision making.

Information contained in this system will be more complete than that contained in NCIC-CCH. While CCH is interested only in the final outcome in each segment of the criminal justice system, OBTS concerns itself with *each* significant transaction within the segments. For example, OBTS is concerned not only with the final result of an offender's trial, but also with what action the prosecutor took relative to the offender's charges, what happened at the preliminary hearing, and the decision at arraignment.

Information contained in an OBTS system is also more detailed in certain areas than the information needed for CCH. For example, OBTS is interested in the manner in which the case was filed, pleas, whether the trial was jury or non-jury, types of defense counsel, and multiple release actions. CCH does not concern itself with these items of information.

Thus, CCH is the foundation upon which an OBTS superstructure can be built. Interfacing the two, however, presents problems similar to those which an engineer faces when constructing a building which has been designed by two architects, one for the foundation and another for the superstructure.

Concurrent with Project SEARCH's prototype criminal history demonstration, the Department of Law Enforcement participated in the Statistical Advisory Committee of Project SEARCH. This Committee's goal was to "design and demonstrate a computerized statistics system based on an accounting of individual offender's proceeding through the criminal justice system. As a part of this Committee's work, Florida, and nine other states, each conducted a historical study of an arbitrary sample of persons arrested in 1968, constructing longitudinal records by tracing offenders step-by-step through the criminal justice process using the concept of offender-based tracking. The results of this study provided a meaningful experience as well as insight into problems that would be confronted in attempting to develop and operate an OBTS system on an on-going basis.

In light of this experience, Project SEARCH established a Statistical Steering Committee, of which Florida is a member. The Committee defined the minimum requirements for an on-going OBTS system, aided five participating states in developing and implementing such a system, and evaluated and developed descriptions of each state's system to aid other states' contemplating the development and implementation of an OBTS system.

As a result of its participation on the SEARCH Statistical Steering Committee, Florida has taken the following steps toward implementing an OBTS system:

1. Finalized development of a document describing criminal justice in Florida.
2. Established a state advisory committee composed of leaders in all areas of criminal justice and held meetings.
3. Developed intrastate data elements.
4. Developed forms to collect OBTS data.
5. Prepared a Contributor's Reporting Manual describing how to complete the forms and route them.
6. Made liaison contacts in two Florida counties to lay groundwork for testing the prototype system.
7. Held training workshops in the two test counties.
8. Tested the prototype system.
9. Maintained field assistance during the test.
10. Modified in-house work procedures and created software to generate data to satisfy the grant requirements and update CCH.
11. Prepared a legislative budget and a grant application for full implementation of OBTS in Florida.
12. Developed a draft brochure describing the Florida OBTS system.

The following tasks still need to be accomplished in order to implement fully this system:

1. Obtain legislative funding for OBTS.
2. Complete staffing for development, implementation and operation of the program.
3. Train and orient the staff.
4. Modify and finalize system design based on test results and evaluation. This will include changes in forms design, paper flow, reporting manuals, training packages, internal work processing and software.
5. Finalize information brochure describing the Florida OBTS system and disseminate to all criminal justice agencies in Florida.
6. Make liaison contacts with all Florida criminal justice agencies.
7. Hold training workshops for all contributors.
8. Begin collection of OBTS data.
9. Provide individual agency assistance through a field staff.
10. Verify, correct (when necessary), and process OBTS data, updating CCH and deriving statistical information for management and decision making.

PROBLEMS AND ISSUES

Florida's experience to date has resulted in the identification of certain problems and issues which other states may experience in attempting to develop and implement a CCH-OBTS system, and at the same time interface it with the NCIC-CCH system. As in any new system, numerous problems and issues arise. While some are technical, others administrative, and still others are policy oriented, they are matters of concern to all participants. The following is a discussion of some of these areas with their possible solutions.

OPERATIONAL CCH – FEDERAL VERSUS STATE CONTROL

Since CCH has been developed to be the foundation for an OBTS system, it is relevant at this juncture to highlight a very significant issue encountered in the implementation of CCH. This issue concerns the question of state versus federal control of the system.

If states are to assume responsibility for records they enter in NCIC-CCH, they must retain control of the system. If the national system has and utilizes capabilities to enter state information which the state has already determined should not be in NCIC-CCH, the state's control of the system will be jeopardized.

As a matter of policy, it must be reaffirmed that the national system is and should remain a repository for the fifty states. Recognizing that this repository contains information which is not within the immediate possession of the states, methods should be developed to make states aware of the status of each entry and let them maintain control of the entry. In effect, NCIC should be treated as an extension of the states' CCH systems.

Since states will be developing systems at different time intervals, the national system must also maintain the flexibility to function through both terminal operations with manual intervention and through sophisticated computer-to-computer interfaces. Restricting the national system to one or the other method places an undue burden on the resources of the states.

MANPOWER RESOURCES AND WORK PROCESSING

When a state converts an existing criminal history program to the NCIC-CCH system or converts from NCIC-CCH to OBTS, additional manpower resources are needed. Considerable thought should be given to the additional work-load burden this conversion effort creates before a state commits itself to such a venture.

With the advent of the NCIC-CCH system in November of 1971, Florida found itself in the position of having to convert its entire criminal history file in order to meet the systems' requirements of NCIC-CCH. The Department realized that additional manpower would be needed in order to accomplish this conversion.

Anticipation of the increased data submission forthcoming under the NCIC-CCH program prompted projections for staff increases. Where eighty personnel (including supervisors) were required to process criminal history data and fingerprint cards in the past, some one hundred and ten were anticipated for NCIC-CCH. After the CCH implementation, however, even this figure proved inadequate. Based on work-load factors, it is estimated that it will take one hundred and sixty-five personnel to adequately process CCH data.

NCIC-CCH provided the Department with a foundation to process multiple forms concerning an individual's arrest and subsequent disposition. However, adaption to OBTS will require extensive development beyond CCH. Data elements will increase, and processing procedures will need to be modified. Due to the estimated 100% increase in data anticipated from OBTS, another staff increase will be unavoidable.

Of equal importance with the staff increase was the necessity to alter internal processing to include sophisticated audit and control procedures. The fingerprint card was no longer the only form passed through the processing sections for action. Therefore, procedures had to be developed to insure the accurate flow of all forms and to be able to determine their location immediately. In addition, audits became a routine operation, insuring that each section added the correct data to an individual's criminal history record.

At this time, the Department is analyzing various methods of inputing criminal history data to determine the staffing requirements. Methods under study include new ways to accomplish fingerprint identification, as well as a means of inputing the data into the files (e.g., optical scanners to capture the data from source documents, remote terminals to allow data to be input directly into the files without the need for an intermediate conversion step, utilizing edit programs to insure file accuracy).

TRAINING AND ORIENTATION

Concurrent with the need for additional manpower in converting to NCIC-CCH or OBTS is the need for in-house training and orientation for new personnel and existing staff as well. Another critical aspect of training is that instruction must be given to outside agency contributors to the system. If the input source (the contributor) does not understand the system, where that contributor fits into it, or how to submit accurate data, then there is no system, regardless of the amount of sophisticated hardware and software housed at the state level.

In-house training must include detailed instruction for the field service staff, identification technicians, coders, reviewers, analyst verifiers, keypunchers, keypunch verifiers, programmers, systems analysts, and computer operators. While detailed content will vary dependent upon the function of the personnel being trained, all personnel should be oriented to an overview of the entire system, its goals and objectives, and how it benefits the administration of criminal justice.

Contributor training can be broken down into three areas: managerial, supervisory, and worker. Managers of contributing agencies must be given an overview of the system, its goals and objectives. They should also be informed as to what will be required of their agencies and what benefits they can expect to derive as a result of participation. Supervisors should be given a managerial orientation as well as worker training. Workers who will be responsible for the physical completion and submission of the required information must be given an overview of the system, the importance of their role within it, the operating procedures, and details of how to submit the information accurately.

Because the functions of criminal justice agencies differ, all contributors should not be trained at the same time. Separate workshops should be held for law enforcement, court, corrections, and probation and parole personnel. While the detailed content of each workshop will necessarily differ, a system overview should be common to all. In this manner, all contributors are aware of the total system without their time being taken up listening to detailed training procedures for other agencies.

Finally, this effort requires the development of training manuals, written procedures, detailed job and task descriptions, and evaluation devices. Training and orientation is a critical aspect of conversion for, without it, the accuracy of the new system is negated. Further, the implementing agency must realize that training is not a one time affair, but due to system modification, attrition, and the need to facilitate the continued interest of personnel involved, training is an on-going effort.

FORMS DESIGN

Another aspect of the evolution from CCH to OBTS involves the design of data collection forms. While forms needed to collect CCH data are few in number and relatively simple in design, the expanded information requirements of OBTS dictate a greater number of forms requiring a somewhat intricate design.

Recognizing that the fingerprints taken at the time of arrest are the only positive means of identification, the Department of Law Enforcement identified two basic alternatives in designing forms to collect OBTS information. One was to fingerprint an individual at each stage of the criminal justice process. For fiscal and other reasons, this alternative was untenable. The other alternative was to fingerprint the individual at the point of arrest and have subsequent information submitted on forms not requiring an individual's fingerprints. However, for this alternative to function effectively, a method of maintaining control over the individual's identity was needed. The method utilized by Florida was the use of a common number, unique to a specific individual for a specific arrest, which would enable the system to track the individual through the criminal justice process even though he might be involved at various stages for multiple, unrelated offenses.

In keeping with this alternative, Florida set out to design forms which would meet three basic requirements: (1) they would capture required data for CCH and OBTS, (2) contributors would be able to complete them with a minimum degree of difficulty, and (3) contributors would be able to integrate the completion of the forms into their normal work flow, thus avoiding the creation of an additional processing step.

Two types of forms were developed. After consultation with local criminal justice agencies, one set was discarded as impractical because it utilized codes alone, with no literal explanation. This type of form would not fit all situations, would have a high error rate, and would be time consuming to complete until codes had been memorized. Advantages included the fact that a common number was preprinted on a five-part, carbon snap-out form and that the identification and arrest information would only have to be filled in once, at the time of arrest.

The second set of forms, which combined a check-the-box concept with room for literal explanation where necessary, was tested in two counties. While the shortcomings of the first set were overcome, the second set had the following inherent problems. All agencies taking action on the individual's case after the point of arrest had to transcribe both the common number and identification information onto forms describing their respective actions. This resulted in an intolerable error rate in transcribing the information as well as unacceptable time delays and backlogs.

Results of the test indicated that a merger of the two forms' design concepts described would result in optimum achievement of the three basic forms' design requirements listed above.

LACK OF PRE-TRIAL SEGMENT IN CCH

Having discussed several pertinent problems relative to the operation of an on-going CCH system and its evolution into OBTS, there remains to be addressed the problem of interfacing OBTS with NCIC-CCH.

One of the primary factors hampering this interface is the lack of a pre-trial segment at the national level. Currently, the NCIC-CCH system fails to record (or records in another segment) important transactions occurring between arrest and trial wherein the individual may exit the criminal justice system.

For example, the situation where an offender's case is dismissed at the preliminary hearing would not be recorded as such in NCIC-CCH. To reflect this disposition in the National system would require that it be coded as "dismissed without trial" in the arrest disposition field, or a judicial segment would have to be created. Dismissal at the preliminary hearing is not an arrest disposition; it is a judicial disposition. However, it is not a trial which, functionally speaking, is what the judicial segment of NCIC-CCH addresses. Thus, this disposition does not truly fit in either place. In addition, consider the case where an offender has an arrest disposition of "released on bail." The prosecutor then decides to dismiss the charge. The original disposition of "released on bail" must be cancelled and the new disposition of "dismissed without trial" is then placed on file. In this example, the "released on bail" information is lost from the system.

It is apparent that the state is then placed in the position of having to choose between two alternative actions, both of which are undesirable. On the one hand, the state can refuse to input the pre-trial disposition into the national system. This is undesirable from the standpoint that the record is then incomplete for anyone inquiring against the national data base. On the other hand, the state can "dummy" an arrest or court segment in order to get the disposition information into the national data base. However, this is equally undesirable in that it does not truly reflect how the disposition was made. In both alternatives, the state finds its own records reflecting one set of data while the national data base reflects another.

The creation of a pre-trial segment at the national level to include pre-trial dispositions where an offender exits from the system would serve to correct this problem and achieve needed flexibility.

DATA ELEMENT STRUCTURE

In order for states to interface successfully with the national level, considerable attention must also be given to the structure of data elements. Common denominators must be found which are applicable to all fifty states. The SEARCH Statistical Steering Committee has endorsed a data element structure for OBTS which is a mixture of transactions described by their location (e.g., lower court, higher court) and by their function (e.g., police/prosecution and corrections). This structure may be adequate for an OBTS system which limits itself to tracking "felonies only" as the SEARCH model does. However, a state level OBTS which expects to serve the needs of criminal justice and provide meaningful statistics relative to its operation must address itself to tracking misdemeanor offenders as well. This being the case, the recommended structure becomes inadequate because of inherent differences among judicial systems of the various states which make it impossible in some instances to describe transactions as having occurred in a lower court or a higher court.

In seeking standardization for OBTS and CCH, the model should be based on function rather than location, because the functions do not vary as much from state to state as do the locations of transactions. For example, the arraignment function is much the same in all states regardless of whether it takes place in a lower or higher court. With a data element structure by function, it becomes easier to input into the national data base. At the same time, a posture of flexibility is maintained at the state level in order to satisfy needs of local criminal justice agencies.

DATA PROCESSING SERVICES

In addition to the previously described problems and issues, a state must be aware of the tremendous increase in data processing services necessitated by CCH-OBTS. When the requirements of the NCIC-CCH system were examined, it was determined that existing FCIC criminal history files and programs were not completely compatible. Under CCH, a five-fold increase in information was anticipated, with the bulk of data being submitted by court, correctional, and probation/parole agencies. As a result, additional data processing support became mandatory.

The increased involvement affects both the software (programs) and hardware (computer equipment) portions of data processing. Software must be either modified to meet expanded needs or discarded as inadequate and new software created. Hardware must be evaluated to insure its capability to handle the increased workload and storage requirements. If remote teleprocessing terminals are used, terminal users must be redefined.

Because most of the 300 FCIC terminals were located in local law enforcement agencies, the need for close working relationships among these agencies and the courts was pointed out. The state is now developing a comprehensive plan to insure close cooperation in the routing of the expanded criminal history data.

The next challenge occurred as OBTS was being developed. Analysis indicated that OBTS implementation would result in approximately a 100% increase in data over CCH. As OBTS develops, new ideas and methods will increase the data needs. Also, anticipated utilization of OBTS indicates that use of the system by court agencies would be sufficient to justify its own FCIC terminals.

To implement OBTS, existing computer equipment must be evaluated to determine its capability of handling the increased data, criminal history processing software must be rewritten, disk storage must again be expanded, and the comprehensive plan must be revised to allow provisions for FCIC terminals in the court agencies.

As an insight to costs, full implementation of CCH indicated an added expenditure for data processing of about 25% annually. It is estimated that the implementation of OBTS will increase the Department's budget for data processing by an additional 60% annually. This includes increased computer capabilities, additional disk storage, and terminals.

COST/BENEFITS

The anticipated benefits from CCH-OBTS in providing documentation on the effectiveness of the criminal justice system are well worth the effort necessary for its development, implementation, and operation. With CCH-OBTS, flaws in the criminal justice process that the criminal justice community has heretofore been unable to document statistically will become available. This in turn, will facilitate a more comprehensive, in depth, evaluation of these flaws, from which realistic improvements can be undertaken.

However, these systems require a major expenditure of time, resources, and money while providing little visible signs of benefit in the short run. Criminal justice managers will be placed in the difficult position of going before legislatures to justify that CCH-OBTS returns are, in fact, worth the expenditures. The cost-utility relationship between the current and proposed systems will be given particular attention, for we are in an era of intense competition with other governmental services for the tax dollar.

It is only through the combined and coordinated efforts of the criminal justice community that a CCH-OBTS system can be successfully operated. Cooperation is not only necessary within each state to make state systems work, but is necessary among the states and with the federal government to create a workable national system of information exchange.

48309

THE DEVELOPMENT OF A COMPREHENSIVE CRIMINAL JUSTICE AND HIGHWAY SAFETY INFORMATION SYSTEM

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A CASE STUDY

The following is a description of the evolution of the Arkansas Criminal Justice and Highway Safety Information System – what it is and what it will be.

This Center is unique because it has been built on certain principles which are important to serving fully and usefully State and local criminal justice agencies. What are these principles?

First, two general categories of information – criminal and traffic records – are provided by a single agency and combined in a single system.

Second, the Center's goal is to provide both the "now" data needed on-demand by officers throughout the State to handle properly thousands of individual situations each day; and statistics on crime, offenders and traffic accidents important for measurement of problems and planning.

Third, what the Center does and how it is run is firmly rooted in law. A comprehensive legislative Act has been passed to specify the mission of the Center, to establish a politically independent Supervisory Board, to both authorize and restrict the types of records we can maintain, to require reporting of data by agencies and to prescribe penalties for misuse of the information.

The operations of the Center have just begun this year, but it has come a long way from inception to where it is today. Efforts really began in the Fall of 1969, when the Arkansas Crime Commission and the Governor's Highway Safety Coordinator jointly recognized the need for an information system to serve criminal justice users. At that point, there were a number of important, unanswered questions:

What should be the scope of an information system – in Arkansas, to meet Arkansas' needs?

What will it cost?

How long will it take?

Which should be the "home" agency responsible for the System?

How is such a System organized and staffed?

MICROFICHE

INTERLOCK, Incorporated, had a key role in finding answers to these questions and in helping to make it all happen.

Beginning in November, 1969, INTERLOCK covered the State in search for answers to these and similar questions. Representatives from every branch of criminal justice and traffic safety administration (both operating and planning agencies) contributed to the evolution of the system design.

In INTERLOCK's study it found the environment especially conducive to rapid systems development and successful implementation.

1.) A skeleton computer-based communication system was already operating out of the State's Department of Revenue. It was maintaining limited information on drivers' licenses and motor vehicle registrations. These files were available for inquiry from the fourteen State Police District Offices. 2.) There were no automated criminal justice records systems nor had there been any effort under way at any level of State or local government to create such systems. Consequently, the new system design proceeded without having to modify or integrate an existing system into the State plan. 3.) Arkansas represents a relatively small geographic area. From the City of Little Rock, located in the center of the State, no city is located more than 180 miles away. This fact had a significant influence on decisions regarding the number and placement of terminals and the number of field personnel required to support the information system. 4.) INTERLOCK's study found that the projected volume of traffic and crime activity could be satisfactorily handled by a single integrated computer system. 5.) Most important, perhaps, every user agency expressed a high level of interest in the system's design and each pledged its support in system design and development.

In May, 1970, the study results were presented to the Arakansas Commission on Crime and Law Enforcement and the State Highway Safety Planning Agency. The results of that study revealed that a comprehensive criminal justice and highway safety information system was not only feasible, but was needed, wanted and affordable.

The report included a detailed schedule of design, development and pilot testing activities, as

well as a distribution of work assignments. The schedule revealed that the system could be developed and pilot-tested by May, 1972. The report included a comprehensive schedule of projected Phase II development expenses and income sources.

The heart of the report was a conceptual design reflecting the use of both criminal justice and traffic records, as well as a substantial statistical data base. The offender and driver related records were to be accessible via a number of unique keys. One was the driver license number; another was the social security number; a third was the name, race, sex and other identifiers, if available. Still another was a unique state identification number. Property identification indexes included both vehicle registration number, license plate number and stolen property identification descriptions. The data files were to include warrants, court cases pending, prison-probation-parole, criminal histories, stolen property, driver's licenses, vehicle registrations, driver's suspensions and revocations and driver histories.

Other recommendations were: 1.) The system design should support both cathode ray tube and hard copy terminal devices. 2.) Great emphasis should be given to building into the system security features through appropriate policies and program controls. 3.) Each terminal site must have the capability of entering urgent, or "time critical" data directly into the system. As a result, the system was designed to support on-line entry of new records, modification of existing records, checking of the status of existing records and record deletion capabilities. Low priority or less time-critical data was to be submitted to the Center and entered in a batch process. 4.) It was also recommended that the system provide for an extensive message switching capability to support inter-state message handling and communications to and from NCIC. We also believed that an important feature should be the monitoring of all NCIC messages by State Police Headquarters. The conceptual design was reviewed and approved by all of the affected operating and planning agencies. The decision was made to begin immediately with the detailed design, programming and pilot testing of the criminal justice modules.

In order to minimize costs and comply with the State's desire to reduce the proliferation of computers, it was decided that all development work would proceed on the existing Department of Finance and Administration computer facility. Shortly after the project began, the State consolidated two existing computer centers, one at the Department of Administration and another at the Department of Revenue, placing the combined operation under Mr. Don Martin, head of the State's Administrative Services Division. Mr. Martin and his staff played a key role throughout the project, serving as an ex-officio member of the User Advisory Council, providing a home for the project and furnishing the State's programming and computer service support. When the project began, Mr. Martin's computer center consisted of an IBM 360 Model 40 with a 128K core memory, data cell and five 2311 type disk storage devices. The communications system was handling approximately 1200 inquiries per day. Today, Mr. Martin's computer center includes an IBM 370 Model 145, 392K with a billion characters of on-line file storage. The system has grown in use from approximately 1200 transactions per day in October, 1970, to approximately 12,000 inquiries per day in September, 1972.

The development of the Criminal Justice Information System was endorsed by both former Governor Winthrop Rockefeller and the present Governor, Dale Bumpers. In the fall of 1970, while development work was proceeding on schedule, a series of activities were initiated to prepare for the upcoming session of the legislature. Budgets were prepared and a number of legislative issues were recognized that had to be answered before the Criminal Justice Information System could be effectively implemented.

Before beginning operations, all those involved with this project felt that clear, legislative authority was needed to establish the Information Center as a legal entity. Provisions had to be spelled out for the security and privacy of information. Responsibilities for administrative and policy control of the Center should be defined by law. Mandatory reporting of needed data by user agencies would be necessary to assure a successful operation. Authority was required to establish a Statistics Division within the Information Center. Penalties for misuse of sensitive information had to be explicitly defined by law. We wanted to be sure to protect the rights of a public which was becoming increasingly aware and properly intolerant of the invasion of privacy, and to avoid misunderstanding of the legitimate role of the planned Center.

The legislation was drafted by members of the project team and the State Crime Commission and reviewed with the Governor who gave it his full support. The Project team was confident of speedy passage of the bill. Soon, however, the newspapers

proclaimed the spectacular failure of this bill on the floor of the Arkansas Senate. This failure was quite obviously the result of inadequately educating the legislature on the purpose and importance of the Center. When such legislation is not completely understood, it cannot be expected to be passed.

The project team went immediately into action. This time key legislators were asked to help draft the bill. It was re-written, strengthened and security and privacy restrictions were further tightened. The Senator who had led the battle to kill the original bill now became its enthusiastic supporter and co-author.

In its second appearance, the bill, now revised and firmly supported, passed both houses of the General Assembly with a lone dissenting vote.

In April, 1971, with the approval of funding by the Department of Transportation, authorization was given to develop and implement the Highway Safety components of the overall system. Driver's licenses, driver history records, and vehicle registrations were all to be integrated into the comprehensive Information System. Driver's license records were to be the basis of the master name file, to which most other criminal and traffic files are indexed. Hence, the Driver Licensing Division was given primary responsibility for creating and maintaining the all-important Master Name File.

There was an intensive effort to clean up the driver license file, which at project start time contained over 20% data error. The driver data was edited time and again until a high level of accuracy and completeness had been established.

Under the present system all driver's license applications and renewals are routinely microfilmed and the pertinent data is coded for entry into the computer-based system.

Changes to the driver's license are made on-line in the Department's Data Entry Section.

A clerk is responsible for identifying the proper driver license record, making the desired modification and verifying that the change was made properly. A hard copy audit trail is maintained for later reference.

At the time the Highway Safety project began, the State's Driver Control Section was seriously handicapped in its efforts to identify and correct problem drivers. Information on driving history (both the moving traffic violations and accident involvement data) was incomplete, obsolete, fragmentary and difficult to retrieve from massive manual files. As much as six month's backlog of moving traffic violations had accumulated in cardboard boxes because of the lack of file storage capacity and personnel to manage the driver history function.

As a result of the Highway Safety development work, three year's backlog of violations and accident involvement information was microfilmed, coded and entered into the computer-based Driver History System and linked to the expanding Criminal Justice and Highway Safety Information System through the Master Name file record.

Hundreds of thousands of violations are now, for the first time, immediately accessible to the Driver Control Section.

The computer is now used routinely for identifying problem drivers so that positive action can be quickly taken.

Computer generated driver history reports are produced both for use within the State and for mailing to other states where Arkansas drivers have moved and established new residences.

The State's vehicle registration file was converted to the new data base and program linkage was established between the stolen property files and the vehicle registration files. As a result of this linkage, the entry of a vehicle or license plate into the State's stolen property file will automatically update the vehicle registration record. A subsequent license or registration check will immediately alert an inquiring officer that the vehicle is stolen.

In January, 1972, recognizing the importance of the System to law enforcement officers, the project team provided early State-wide implementation of the warrant and stolen property subsystems. This early implementation resulted almost immediately in positive hits on the stolen property and warrant files. The remaining criminal justice and highway safety subsystems were designed, programmed, pilot tested and documented on schedule and turned over to the Information Center in May, 1972.

As the next series of computer terminals are installed, virtually every criminal justice agency will have access directly or by radio to the Criminal Justice and Highway Safety Information Center.

A mobile patrolman may at any time request a terminal query from his dispatcher. If his dispatcher has a computer terminal, he will make that inquiry immediately. If he does not, he will establish base-to-base communications with his designated terminal site and request the information of it. Approximately 90% of all law enforcement officers in the State will be within radio communication distance of an established computer termi-

nal site. The transaction is routed to the computer center located in Little Rock.

The inquiry is processed and the response is returned to the inquiring terminal in a matter of seconds. The response includes both the requested data and a reference to other files where the subject has an active record. For example, a driver license check on a wanted person or parolee will respond to the terminal accordingly.

All terminal traffic to or from NCIC is routed through State Police terminals.

While any authorized law enforcement terminal may enter warrants or stolen property information into NCIC, the responsibility for these records rests with the State Police Communications Center. Copies of all such inquiries and responses are sent to the State Police Headquarters.

As development proceeded on the Highway Safety and Criminal Justice subsystems, a concurrent project was initiated to define and establish for the State Information Center a Statistical Division whose responsibilities had been broadly described in Act 286. An LEAA discretionary grant was received from Washington to support the prototype development of the State's Uniform Crime Reporting System and an Offender Based Transaction System, both of which were to become integral parts of the State's Information Center.

The statistics project resulted in the definition, pilot testing and acceptance of a series of Arkansas Uniform Crime Reporting forms, operating procedures, and implementation aids.

A detailed study was made of the data requirements for an offender based transaction system. An Arrest/Disposition form was designed to allow the tracing of an individual from arrest through court disposition. Because of a restriction in Arkansas' enabling legislation, the Information Center is prohibited from linking an arrest record to an individual's master name file until and unless that arrest results in a conviction. Although the Arrest/Disposition form does contain identifying information, the arrest data is not linked to the defendant's computer-based master name file record until a conviction has been returned.

Responsibility for linking the Arrest/Disposition record to an individual's master name file will rest with the State Police Criminal Identification Division.

All requisite identifiers will be matched and a positive identification will be made through the fingerprint which appears on the Arrest/Disposition form. The hard copy criminal history records have always been maintained at the State Police Headquarters. Consequently, all offender-related records are the responsibility of that Department's Criminal Identification Division. A terminal has been installed at that site and criminal history is now being converted on-line. The Arrest/Disposition form will serve many purposes. It will feed the court cases pending module of the Information System. It will be the source of criminal history updating and it has been constructed to conform to the security and privacy constraints specified in Act 286. The offender tracking forms and procedures have now been pre-tested on a limited scale. We will soon begin implementation of these procedures in the State's most populous Judicial district.

In the spring of this year, using the organization and staffing plan prepared by the project team, the State selected Mr. David Eberdt as its first Administrator for the Criminal Justice and Highway Safety Information Center. Mr. Eberdt, his statistical and administrative staff and his field coordinators will operate the Center. Their responsibilities include training, supervision over terminal operations and completion and reporting of statistics.

This fall, The Information Center is proceeding at a fast pace with the State-wide implementation of the Criminal Justice Information System. The Center is both installing new terminals at selected sites and teaching old terminal users about the new facilities available to them. The Center has been staffed initially with five field coordinators whose duties include:

1. Training criminal justice personnel in the use of the terminals and the wide range of inquiries and Center services.
2. Another important field operation is the supervision of Uniform Crime Report data collection.
3. Monitoring system and terminal security through spot audits is another duty which is critical to the successful operation of the Information Center.
4. The staff will also assist agency administrators in interpreting and using the crime statistics produced by the Center's Statistical Division.

The Offender Based Transaction System has been designed and tested on a limited scale in Little Rock and will be fully implemented in the State's largest metropolitan area over the next six to nine months. By this time next year, the Uniform Crime Reporting System will be in operation State-wide and should cover about 90% of the State's reported indexed crime.

This entire system, while integrated in its design, has been modular in its construction. The system is available to any other authorized criminal justice agency which may be interested in transplanting it.

These are the primary factors contributing to the progress made at the Information Center.

1. Before anything was begun, the State had prepared a well-conceived, comprehensive master plan embodying criminal justice, highway safety and statistical systems and it stayed with that plan.
2. The State has been blessed with all of the resources required to carry out the design, development and implementation of the systems:
   a. The financial resources, thanks in large part to Federal funding from two sources.
   b. The people.
   c. The professional guidance and support.
   d. A well-staffed and well-equipped computer and communications facility.

   All of these resources have been pressed to their limits.
3. Finally, and most important -- the State has had the constant, positive, enthusiastic support of user agency personnel, technical and operations personnel, and the Governor's office.

Arkansas' system is open for all to see.

48310

LOS ANGELES COUNTY REGIONAL JUSTICE INFORMATION SYSTEM (RJIS)

SOFTWARE SYSTEM DESIGN

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In July, 1970, Los Angeles County, assisted by Federal funds obtained through the California Council on Criminal Justice, launched an 18-month, $434,000 project to design its Regional Justice Information System (RJIS). The design effort was performed by an integrated team of consultants and representatives of nine major county justice agencies (Sheriff's Department, District Attorney's Office, Municipal Court, Public Defender's Office, Marshal's Department, Superior Court, County Clerk's Office, Probation Department, and Data Processing Department) plus the Los Angeles (City) Police Department. The basic design work has been completed, and Los Angeles County is currently preparing to select a contractor to help implement the system. The following paper reviews briefly the case-following concept which is the basis for RJIS and then summarizes the software design recommended for the system.

SCOPE OF LOS ANGELES COUNTY JUSTICE AGENCIES

Los Angeles County Criminal Justice Agencies are among the largest in the world. With a population of nearly eight million, the County annually processes over 3.5 million traffic and parking citations, prosecutes 350,000 felony and misdemeanor crimes, and processes more than 50,000 juvenile cases. Within the 4,000 square miles of the County, there are 24 Municipal Courts, 2 Justice Courts, and 1 Superior Court with 203 Departments. There are 49 police agencies in operation in the County. Local custodial facilities, having an average daily population of 13,000, comprise the sixth largest such system in the nation.

CASE-FOLLOWING CONCEPT

RJIS is predicated upon the premise that as an accused offender's case is processed by the county's criminal justice system the case is handled by each of the concerned agencies in a sequence which generally begins with law enforcement agencies, proceeds through court and court-related agencies, and ends with correctional agencies. The RJIS case-following concept further maintains (1) that personnel in each agency dealing with an accused offender ought to have ready access to much of the information previously collected on the case by personnel in agencies that have already processed the case and (2) that agency personnel should be able to add information to the case records both for their own use and for the use of personnel in other agencies with a common interest in the case. Finally, the case-following concept maintains that because records have been centralized, it is possible to develop statistical and management information on both the overall performance of the justice system and on the manner in which any individual case has been handled. Clearly the whole approach presumes extensive applications of computers, telecommunications, and remote-access terminals.

Each of the participating justice agencies was studied to determine the applicability of the case-following concept. Current operations were determined to depend largely upon the separate and redundant collection of information, much of which is maintained manually. Investigation revealed that all the participating agencies could benefit from RJIS. Investigation also revealed that the case-following concept applied to juveniles as well as to adult misdemeanants and felons. It was also determined that the vast majority of information in the system could be shared among agencies without compromising either the individual's right to privacy or the security of agency information. The overall case-following concept is shown in Figure 1. Other systems, especially at the state and federal levels will be interfaced into this overall concept, but, for simplicity, are omitted from the figure.

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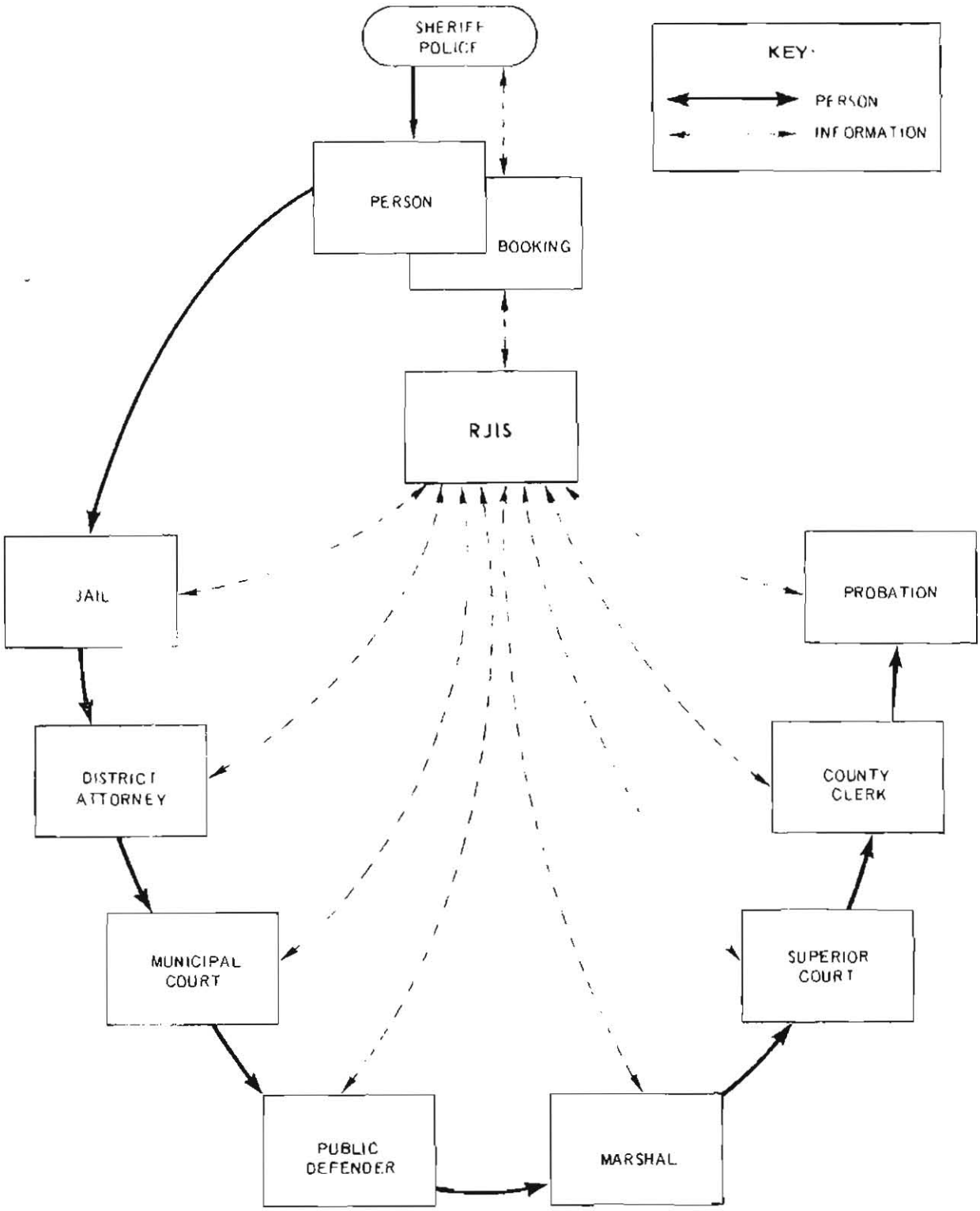

Figure 1. RJIS Case-Following Concept

OVERALL RJIS SOFTWARE DESIGN

The recommended RJIS design provides a computerized case-following system capable of storing, retrieving, and manipulating the data needed to process adults and juveniles through the Los Angeles County justice system. The Capabilities are shown in generalized form in Figure 2. The system of programs consists of six major modules operating on a common data base:

1. *Switching Module.* This module connects the RJIS user to the system so that he can input or retrieve data. It also connects the user to other computerized local, state, and federal systems.
2. *Service Module.* This module performs all the functions required to support the other RJIS modules including data input, retrieval, and routing; report and display generation; error control monitoring; need-to-know determination for access control; and protection of the system against failures.
3. *Indexing, Numbering and Identification Module.* This module links together all the cases in the system, active or closed, in which the same person is involved. It uses name, RJIS number, case number, incident number, fingerprints (where available), and other identifiers to provide the necessary linkages. (RJIS number, case number, and incident number are discussed below.)
4. *Status and History Module.* This module determines status, past events, and next scheduled event for each case in the system. It serves as an automated docket sheet or register of action for all cases. It also automatically abstracts key events in a case to produce a summary criminal history showing arrest, major milestones, and disposition for each case.
5. *Calendaring and Scheduling Module.* This module performs functions necessary to facilitate bringing an accused person, judge, prosecutor and defense attorney, witnesses and evidence together in a courtroom to conduct a trial or other judicial proceeding. It prepares all necessary calendars, subpoenas, witness lists, and other legal documents.
6. *Management Information Module.* This module provides supervisors in county justice agencies with operational information useful in directing day-to-day activities and provides the manager of those agencies with information useful in preparing and evaluating long-range plans.

The RJIS data base stores all of the information input to or generated within RJIS for easy access by system users. Provision is made for handling multiple cases for an individual, each at various stages in its processing. Provision is also made to provide access to prior cases as required.

NUMBERS USED IN THE SYSTEM

The RJIS number, case number, and incident number, together, are designed to facilitate tracking a case or an individual through the justice process.

An RJIS number is initially assigned to each individual when he first enters into the county's criminal justice system and is re-used to identify him any time he re-enters the system. In addition to the basic identification number, the RJIS number includes three suffixes:

1. *Cycle.* Identifies each prosecution cycle. A prosecution cycle starts with an arrest or with the filing of charges and ends with a conviction, acquittal, dismissal of a court action, or final disposition after arrest and no court action.
2. *Count.* Identifies each count within a prosecution cycle.
3. *Sequence.* Identifies sequence of each action within a prosecution cycle.

The case number is initially assigned to each case in the system. When a case is closed, its number is used to retrieve case information for future reference. While an individual can have only one RJIS number, he can be associated with several case numbers. The incident number identifies an individual crime report. Since the system deals primarily with incidents that have become cases, incident numbers will be assigned by individual law enforcement agencies, but must allow unique identification of reporting agency and individual crime report.

SOFTWARE SYSTEMS

In order to implement RJIS it is necessary to develop specialized computer programs. These fall into two categories: those programs that control the overall operation of the system and those that perform the specific user-oriented data processing required to support the administration of criminal justice in Los Angeles County. The system control functions are performed by computer programs included in the RJIS Service and Switching Modules. The user-oriented applications modules include the Indexing, Numbering, and Identification Module; the Case Status and History Module; the Calendaring and Scheduling Module; and the Management Information Module.

SERVICE MODULE

The Service Module performs all functions, except telecommunications' switching, designed to support the operation of the other RJIS modules. It contains the following computer program sets:

1. *Input Editing.* This computer program set performs a grammar edit, by examining the input message for syntax errors. The basic requirement is that all transactions will be grammar edited before going to the application modules in order to minimize the processing required on erroneous input data.
2. *Routing.* This computer program set transmits data from transactions to the various application modules according to prespecified rules. An entire transaction may be forwarded to only one module or to several, or various subsets of the transaction may be forwarded to various modules. Erroneous transactions discovered by the Input Edit Computer Program Set are forwarded to the Error Handling Computer Program Set.
3. *Control.* This computer program set determines the timing and order of processing as data flows through the system. Specific application modules may be required to generate reports or update files on a periodic time basis, i.e., daily, weekly, etc. The operational sequence of all modules will be under the control of this computer program set. It is anticipated that there will be control functions pertaining to the sequence of operation inside a given application module. This

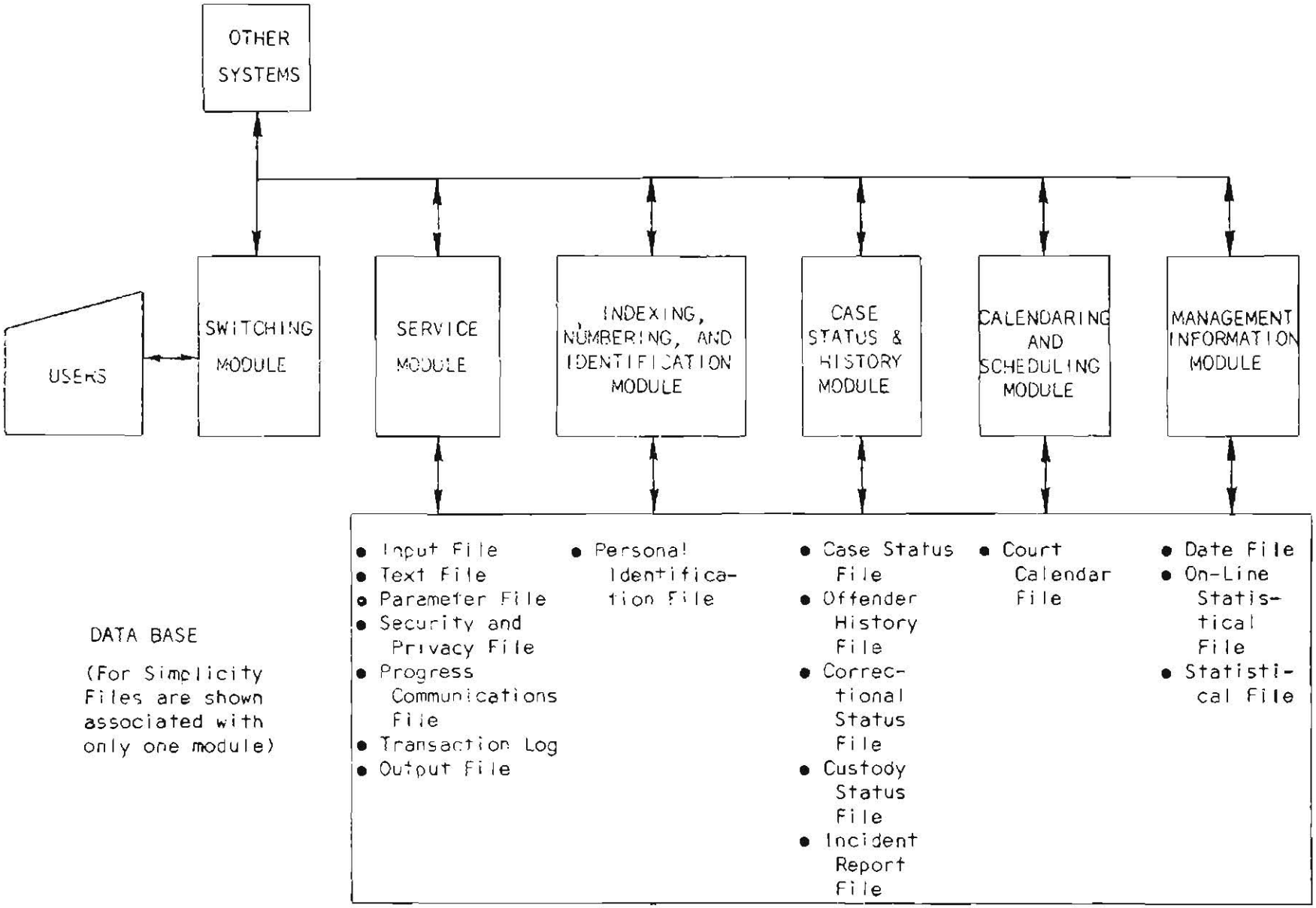

Figure 2. RJIS Structure: Modules and Data Base

function does not pertain to this type of intramodule control, but only pertains to the intermodule control of application modules and to the control of functions within the Service Module.

4. *System Maintenance.* This computer program set determines whether all the proper elements required for input from and output to the terminals are present and available.
5. *Error Handling.* This computer program set maintains a direct link between all the functions within the Service Module and the application modules. When an error is encountered, whether it was initiated from the user terminal or encountered in the application module, the error handling function is given control. The error is analyzed and the proper error message is pulled from an error message file and sent to the user terminals.
6. *Output Generator.* This computer program set is responsible for controlling the flow of data to all output devices including video display units, printers, and magnetic tape units.

The Service Module should not be confused with the basic operating system, which all computer systems require to operate. The Service Module functions within the environment of the basic operating system to control the overall operation of RJIS.

SWITCHING MODULE

This module concentrates input and queries from user terminals into queues; routes them to RJIS or to interfacing local, state, and federal systems; receives responses from RJIS and interfacing systems, or outputs generated as a result of internal RJIS operations; and routes all outputs to the appropriate user. RJIS will use the switching capabilities of the Los Angeles County Sheriff's Department Communication System, which is now being developed. The Sheriff's Communication System consists of two sets of switching elements that are of interest to RJIS:

1. Remote Computers, which will be located at each existing or planned Sheriff's station.
2. Justice Digital Interface Computers (JDIC), which provide interfaces among various automated systems.

The Remote Computers (see Figure 3) perform two separate, but related, functions. They process requests for service and transmit them on a priority basis to a Radio Telephone Operator at the Sheriff's Radio Center for transmission to a unit in the field; this function is separate from RJIS. Remote Computers also act as concentrators, channeling queries to the JDIC for relay to various interfacing automated systems at local, state, and federal levels.

In the Sheriff's Communication System, all users planned to interconnect with a Remote Computer will be Sheriff's Department personnel located within the Sheriff's station which is serviced by the Remote Computer. In the joint RJIS/Sheriff's Communication System configuration, non-Sheriff users located in the vicinity of a Sheriff's station will also be interconnected with the Remote Computer serving that station. In addition to the Remote Computers specifically planned for the Sheriff's stations several additional Remote Computers are projected to serve RJIS users who are not located near a Sheriff's station.

The JDICs are designed to do the following: receive a query for an interfacing automated system; convert that query, if necessary, to the format of the system being queried; receive the reply from the queried system; route the reply to the terminal requesting information. Two separate JDICs constitute a single installation (see Figure 4*). Under normal circumstances the Remote Computers they service are divided between the two machines so that they can share the inquiry processing load. Each JDIC senses the operational status of the other JDIC through a watchdog timer. If a JDIC fails, any queries being processed by that JDIC are lost, and users are signaled that they must reinitiate their queries. In addition to the two JDICs planned for the Sheriff's Communication System, several additional JDICs may be required solely to handle RJIS traffic. Each Remote Computer will be hardwired to the JDICs via the Los Angeles County microwave network. The JDICs will be interconnected with interfacing systems via dedicated telephone lines or via the California Law Enforcement Telecommunication System (CLETS), as appropriate.

INDEXING, NUMBERING, AND IDENTIFICATION MODULE

This module performs all functions involved in determining whether a person, case, or incident is new to RJIS or is already in the system. Among these functions are assigning numbers and establishing new files for entries on new persons, cases, and incidents and associating entries for person, cases, and incidents with existing files. The module also plays a key role in providing information (1) on the cross references among various entries such as from person to case to incident or from incident to case to person, and (2) on the physical location of data in the various RJIS computers and storage devices. These cross references and physical-location indicators are used by all other RJIS modules.

The overall structure of the module is shown in Figure 5. It includes seven computer program sets:

* The local terminals, shown in Figure 4, are included in the Sheriff's JDIC but are not planned for the RJIS JDICs. The matrix control unit, switching matrix, and signalling network interface units are all required to establish and maintain lines between the JDICs and Remote Computers.

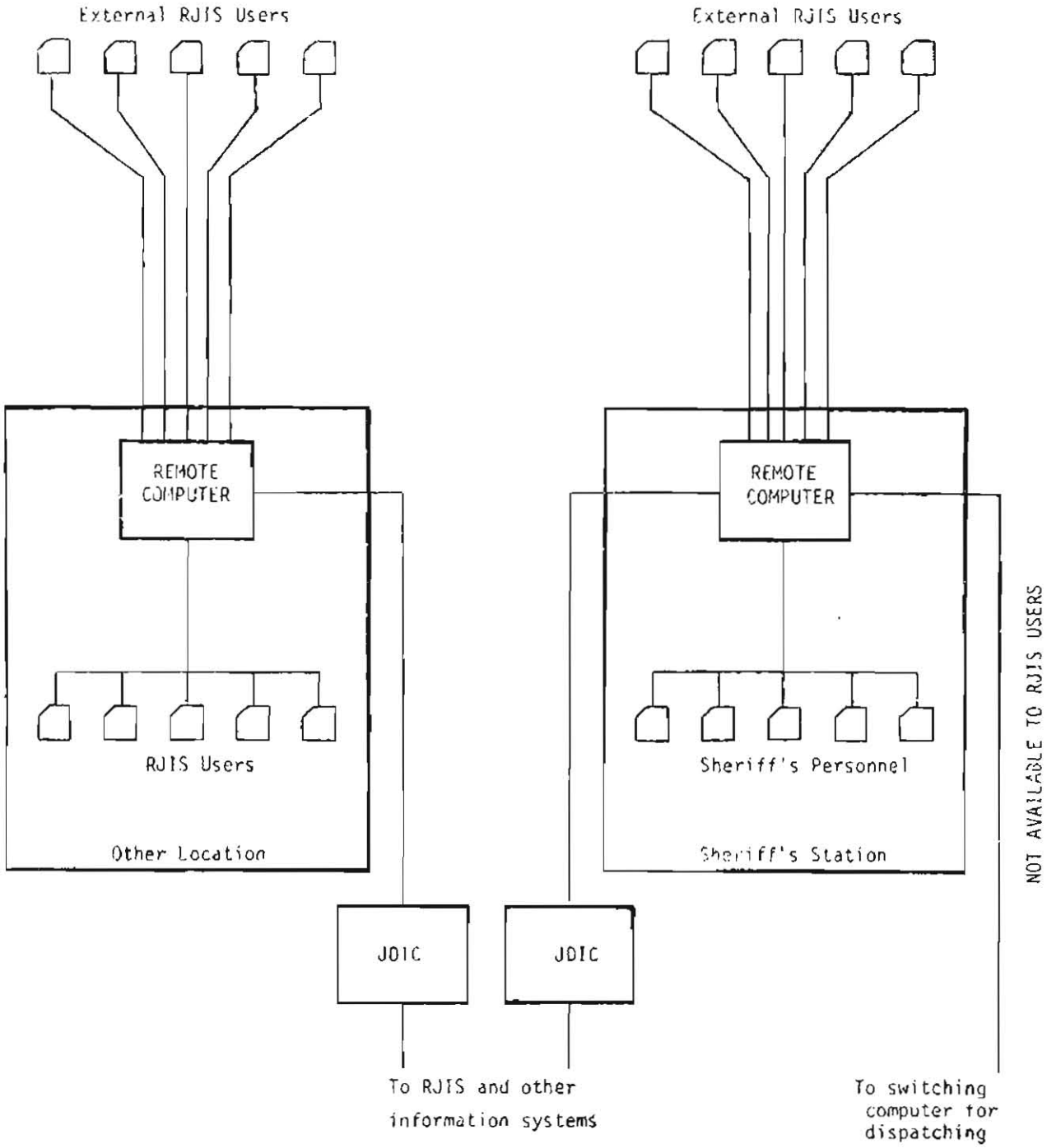

Figure 3. Switching Configuration

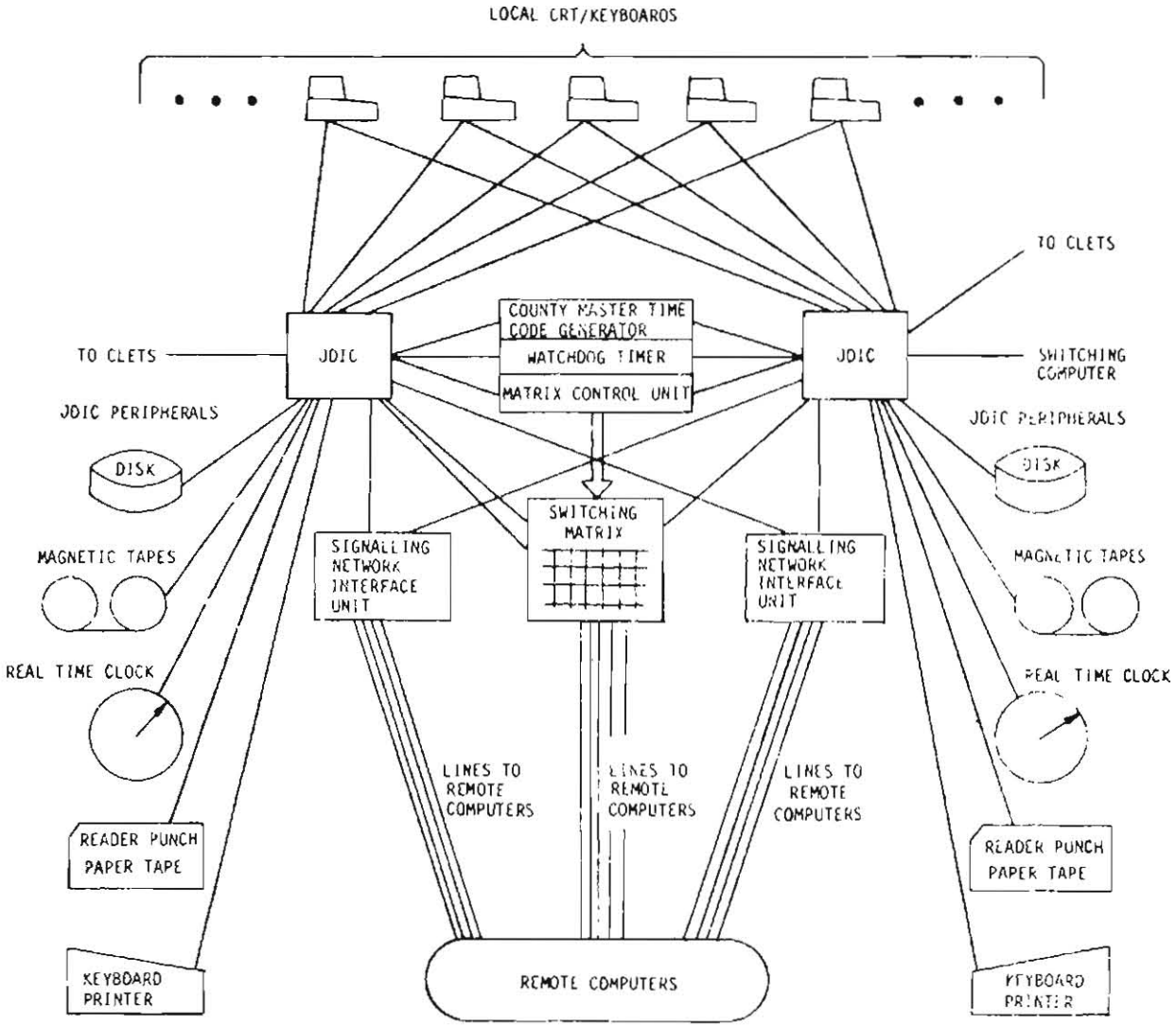

Figure 4. JDIC Configuration

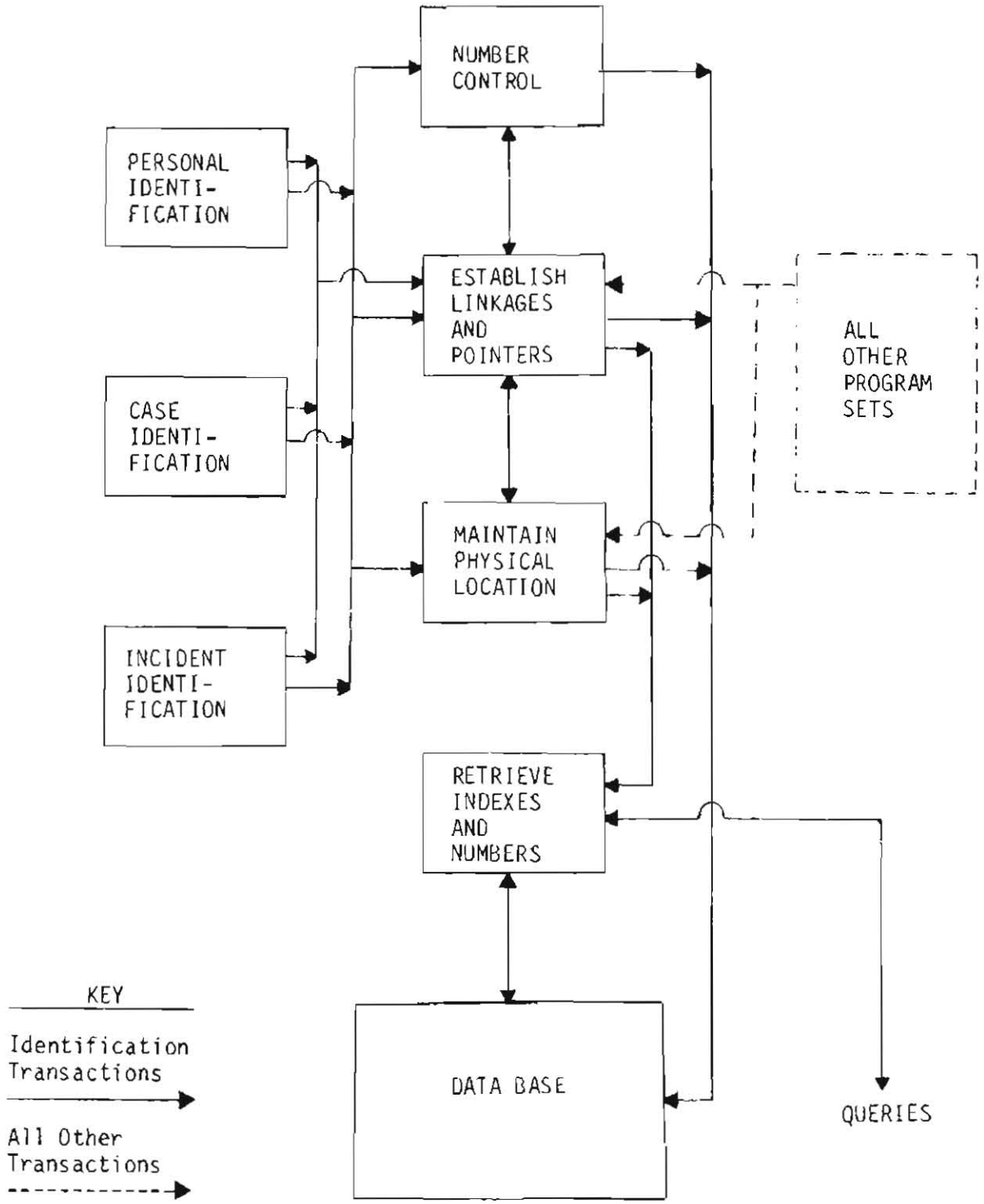

Figure 5. Indexing, Numbering, and Identification Module

1. *Personal Identification.* This computer program set supports the identification of people. It accepts inputs including name, physical characteristics, and fingerprints and produces information on whether the inputs probably match the personal information of anyone already known to RJIS. This computer program set also associates persons with RJIS numbers and other numbers used by the system.
2. *Case Identification.* This computer program set supports the process of establishing a case in RJIS and adding information to that case. When a new case is established in RJIS, this computer program set establishes a case file and associates the information in that case file with a case number. When action is taken on that case, the computer program set associates that information with the existing case. The computer program set also assures that any associated incident information is permanently preserved in association with other related case data.
3. *Incident Identification.* This computer program set supports the process of establishing a reported crime or incident in RJIS and adding information to the incident file as the investigation of the incident proceeds. Only those incidents for which a suspect is identified and against whom a complaint is requested are of interest to RJIS because only those incidents are associated with cases. (However, other incidents will be maintained in the system for the convenience of investigators and other personnel.)
4. *Numbers Control.* This computer program set assigns all numbers to persons (RJIS numbers), cases (case number), and incidents (incident number). It maintains and updates cycle, sequence, and count information associated with RJIS numbers. It associates RJIS, case, and incident numbers. It also provides the capability to audit numbers previously assigned by RJIS.
5. *Establish Linkages and Pointers.* This computer program set establishes for all of RJIS the linkages and pointers among all files associated with any individual case or incident. These linkages and pointers allow RJIS users to find their way, either automatically or in a step-by-step investigation, to the appropriate data.
6. *Maintain Physical Location.* This computer program set maintains for the entire RJIS the physical location of all information in the system. This function is critical because RJIS will operate on several computers and many shared storage devices, with storage locations subject to change as files grow and are purged.
7. *Retrieve Indices and Numbers.* This computer program set handles all requests to retrieve and display or print out data on persons, cases, and incidents. The computer program set is designed to locate files given either the identifying characteristics of a person, case or incident; or a combination of both number and identifying characteristics. The computer program set will respond to joint queries about two or more related persons, cases, and incidents. It also supports the auditing of previously assigned numbers.

As shown in Figure 5, all identification transactions may use any or all seven of the Indexing, Numbering, and Identification Computer Program Sets, while all other transactions will use the Linkages and Pointers and Physical Location Computer Program Sets.

STATUS AND HISTORY MODULE

This module performs two major functions: (1) it maintains information on the status of each case as it progresses through the justice system; and (2) it maintains summaries of all cases with which each individual has been associated. When a person enters the system, an on-line case status file is created; this file contains data which will provide current information on the status of an active case within RJIS. As a status file is created, the on-line history file is searched for an entry on that person. If an entry is found, the current information become part of the status file. If no entry exists, a new history record is created.

All transactions pertaining to the person as his case progresses through the Los Angeles County justice system are maintained and updated in the status file until final disposition. These transactions form an automated register of action or docket recording virtually every transaction in the case and the reason for that transaction. As the case passes major milestones, information is abstracted to the history file creating a RAP sheet which includes disposition information. When final disposition is made, the status file will be moved from on-line storage to off-line storage and only the history file will be maintained on-line. After a predetermined length of time, the history file is also moved to off-line storage, if no further activity has been recorded. Either status or history can be brought back on-line on demand.

The overall structure of the module is shown in Figure 6. It includes six computer program sets:

1. *Input Milestones and Orders.* This computer program set handles all inputs related to actions involved in processing an individual case. As any action is taken to change the status of the case – that is to advance it through the various justice functions – this action and its consequences are recorded for future retrieval and processing. This computer program set and the Input Custody Status Computer Program Set form the basis for the RJIS case-following capability.
2. *Input Custody Status.* This computer program set handles all inputs related to controlling the physical custody of a person in RJIS. Custody status includes confinement in county jail or probation facilities, release on bail or own recognizance (OR), and release on probation, county parole, or work furlough program. This computer program set records any action to change the custody status, physical location, or agency responsibility for any individual whose correctional program is the responsibility of a county agency. As indicated above, this computer program set and the Input Milestones and Orders Computer Program Set, together, constitute the basis for the RJIS case-following capability.
3. *Maintain Status.* This computer program set does all housekeeping necessary to reflect changes in case, custody, or correctional status. Any information that is input is automatically reflected throughout the RJIS files.
4. *Retrieve Status/History.* This computer program set handles all requests to retrieve and display or printout data on case, custody, or correctional status. The computer program set is designed to locate and extract required information given the information desired and the appropriate person and case identification information. Several specific functions are performed: identifying probable violations of summary or supervised probation and automatically notifying the appropriate agencies; and automatically generating various lists and/or court orders that are required during the processing of a case.
5. *Generate Probation Reports.* This computer program set processes all probation reports, assembling the required informa-

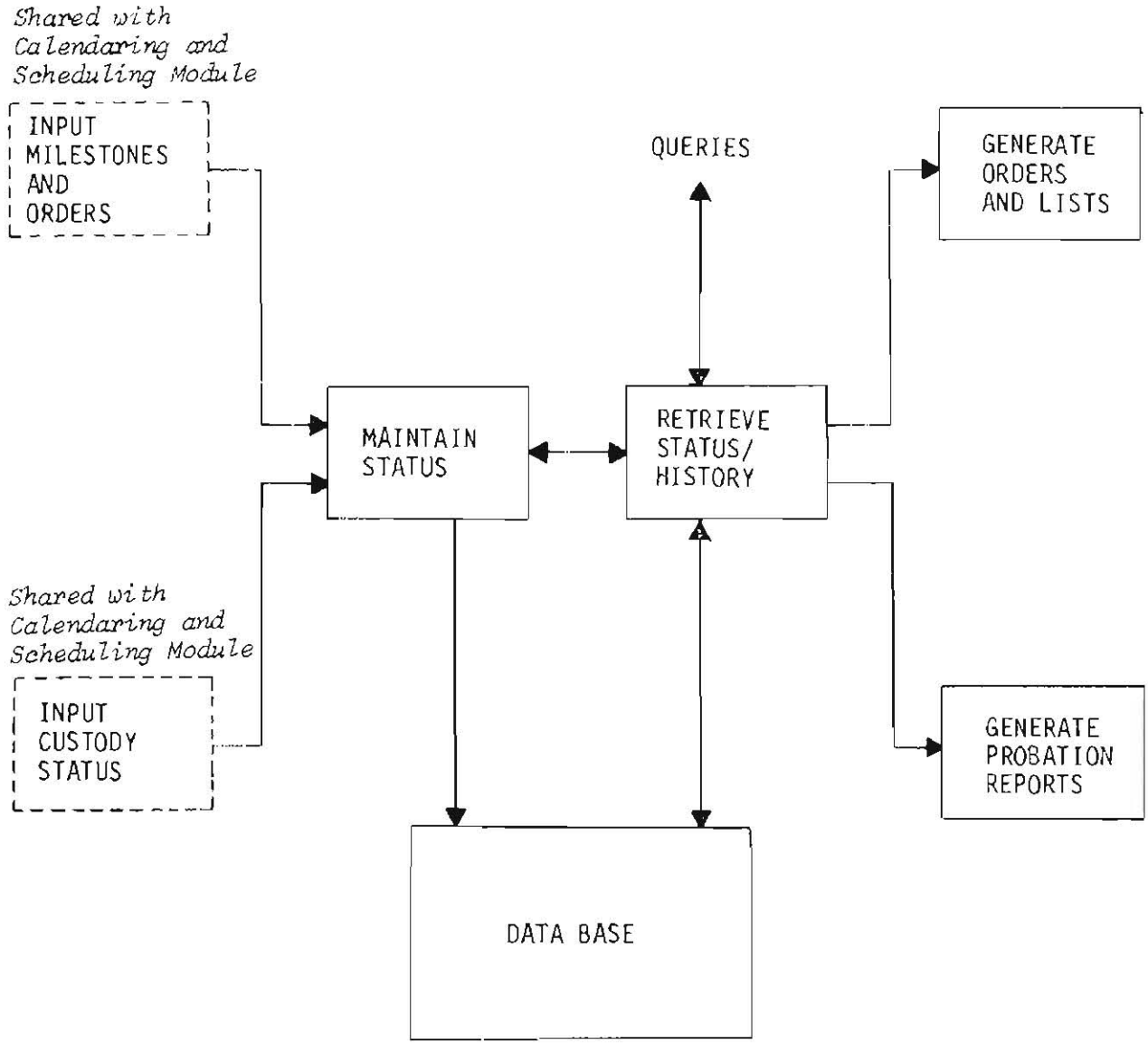

Figure 6. Case Status and History Module

tion and routing it automatically to judge and/or probation officer.

6. *Generate Orders and Lists.* This computer program set processes all lists and orders, assembling the required information and automatically routing it, if required, to the desired recipient or recipients.

CALENDARING AND SCHEDULING MODULE

The Calendaring and Scheduling Module performs all functions involved in bringing an adult defendant or a juvenile into a courtroom together with a judge or other hearing officer, witnesses, prosecutor, defense attorney, and other persons necessary to conduct the hearing. As a case progresses through the justice system new calendaring information is generated to reflect any new hearing or changes in hearing required by the processing of the case. The information is available in the form of daily and weekly printed calendars, other printed lists, and various displays and printouts generated on request as needed to assist in the calendaring and scheduling process.

A major concern of RJIS designers in this area is to allay the concerns of judges and professional personnel in the courts who may view the automated features of calendaring and scheduling as a restriction of their prerogatives. On the contrary, it will substantially reduce the administrative and clerical activities of both judges and court clerks and thereby provide more time for deliberation on the substantive issues of each case. Furthermore, an override capability will be available to ensure that personnel can make and input calendaring decisions if, in their judgment, these decisions are more suitable than those produced by the system logic.

The overall structure of the module includes six computer programs sets and is shown in Figure 7. Two of the computer program sets, Input Milestones and Orders, and Input Custody Status, are shared with the Case Status and History Module. The four computer program sets unique to Calendaring and Scheduling are described below.

1. *Maintain Calendaring Data.* This computer program set performs maintenance functions on all calendaring data. Receipt of any input that impacts upon the calendaring functions causes this computer program set to make the appropriate changes to the Court Calendar File. The computer program set has the capability of computing estimated hearing duration on the basis of offense, trial type, and number of witnesses or of accepting an estimate of duration as an input. The computer program set responds to changes in the locations at which accused persons receive various court notices; it also assembles the information required to prepare and mail subpoenas.
2. *Retrieve Calendaring Data.* This computer program set handles all requests to retrieve and display or printout data on court calendars. The computer program set is designed to locate and extract required information given the information desired and appropriate person and case identification data. Several of these functions, such as printing daily and weekly calendars and associated lists are performed automatically at predetermined times. Others are performed in response to requests for information from calendaring personnel.
3. *Generate Calendars.* This computer program set processes all calendars, assemblying the required information and providing for its printing at the appropriate time.
4. *Generate Modifications and Lists.* This computer program set processes all court lists, notifications, and related documents and displays, assembling the required information and automatically routing it, if required, to the desired recipient or recipients.

MANAGEMENT INFORMATION MODULE

The Management Information Module will provide managers with summary and analytical information which can be used for operational management, planning and scheduling of personnel and facilities, analysis and formulation of policies, and research. This module is capable of producing summary statistical data on-line and more detailed reports on a regularly scheduled batch off-line basis. This module also has the capability of accommodating detailed, one-time only, research requests. An overall structure of the module is shown in Figure 8. It includes seven computer programs sets:

1. *Maintain Exception Control.* This computer program set performs maintenance and update functions upon the status file in areas involving statutory and operational time requirements. The status of individual cases are monitored and dates calculated using pre-determined time limitation factors, helping to ensure that critical time limits are met.
2. *Maintain Statistical Summaries.* This computer program set performs maintenance functions on all statistical data. As entries and changes are made to the files within RJIS, predetermined statistical information is accumulated. This statistical information is maintained internally and updates the various statistical files.
3. *Retrieve Statistical Summaries.* This computer program set handles all requests to retrieve and display or printout statistical information. The program set is designed to locate and extract the statistical information requested.
4. *Generate Status Reports.* This computer program set processes all reports, accumulates and assembles the required information, and automatically routes it to the appropriate agency. The output reports will be in the form of aggregations, lists, and indices.
5. *Statistical and Analytical Reports.* This computer program set processes all statistical and analytical reports, accumulates, and assembles the required information routing it automatically to the requesting agency. The computer program set generates regularly scheduled reports. It also generates special reports for which the appropriate software has been developed. It has the capability of supporting one-time research efforts for which special purpose software is developed.
6. *Generate Query Responses.* This computer program set processes query requests. Only a predetermined list of queries are recognized. The program set is designed to locate, retrieve, and route the information to the requestor.
7. *Generate Exception Reports.* This computer program set processes all exception reports. The program is designed to locate and retrieve data on cases where previously identified

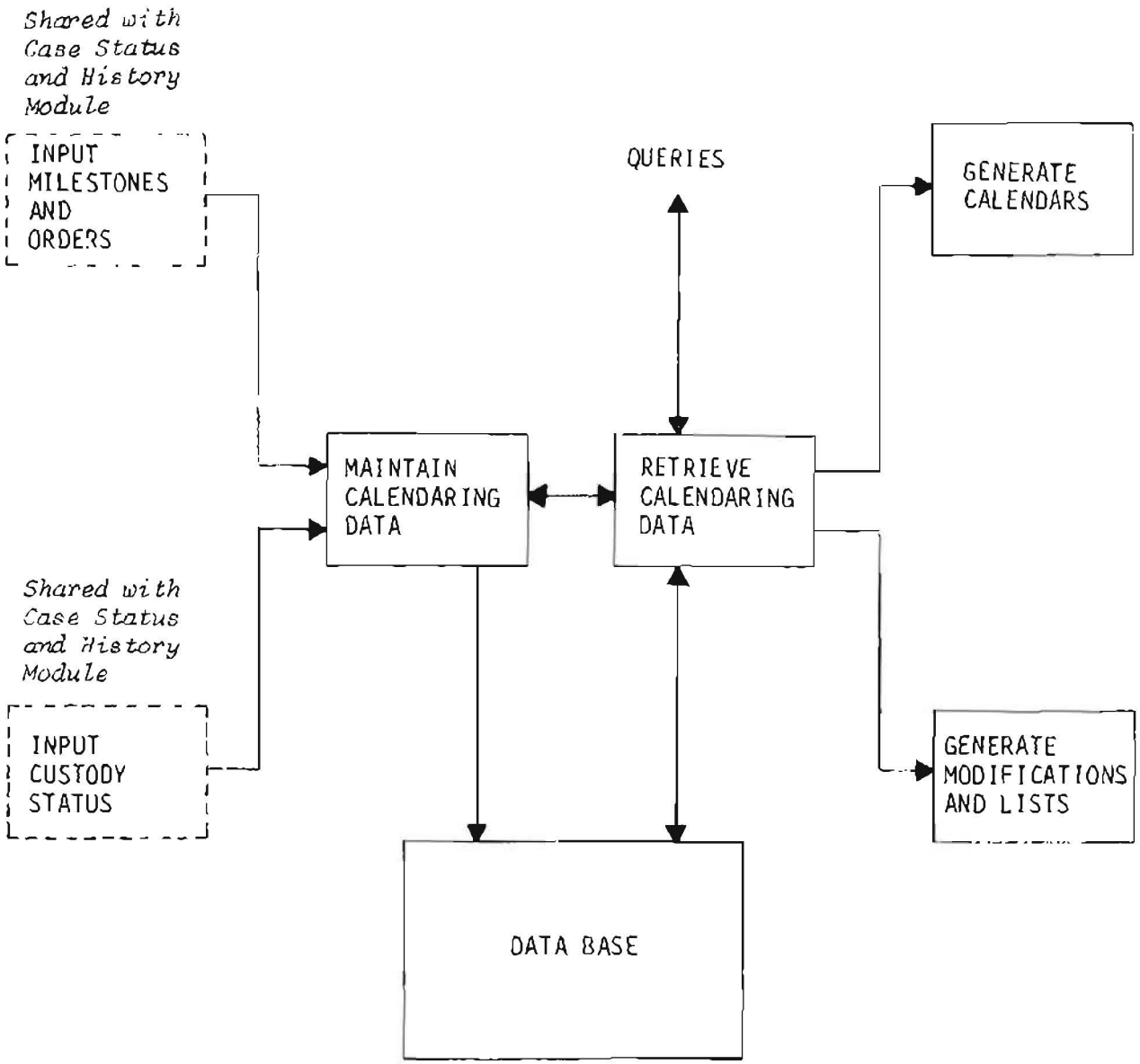

Figure 7. Calendaring and Scheduling Module

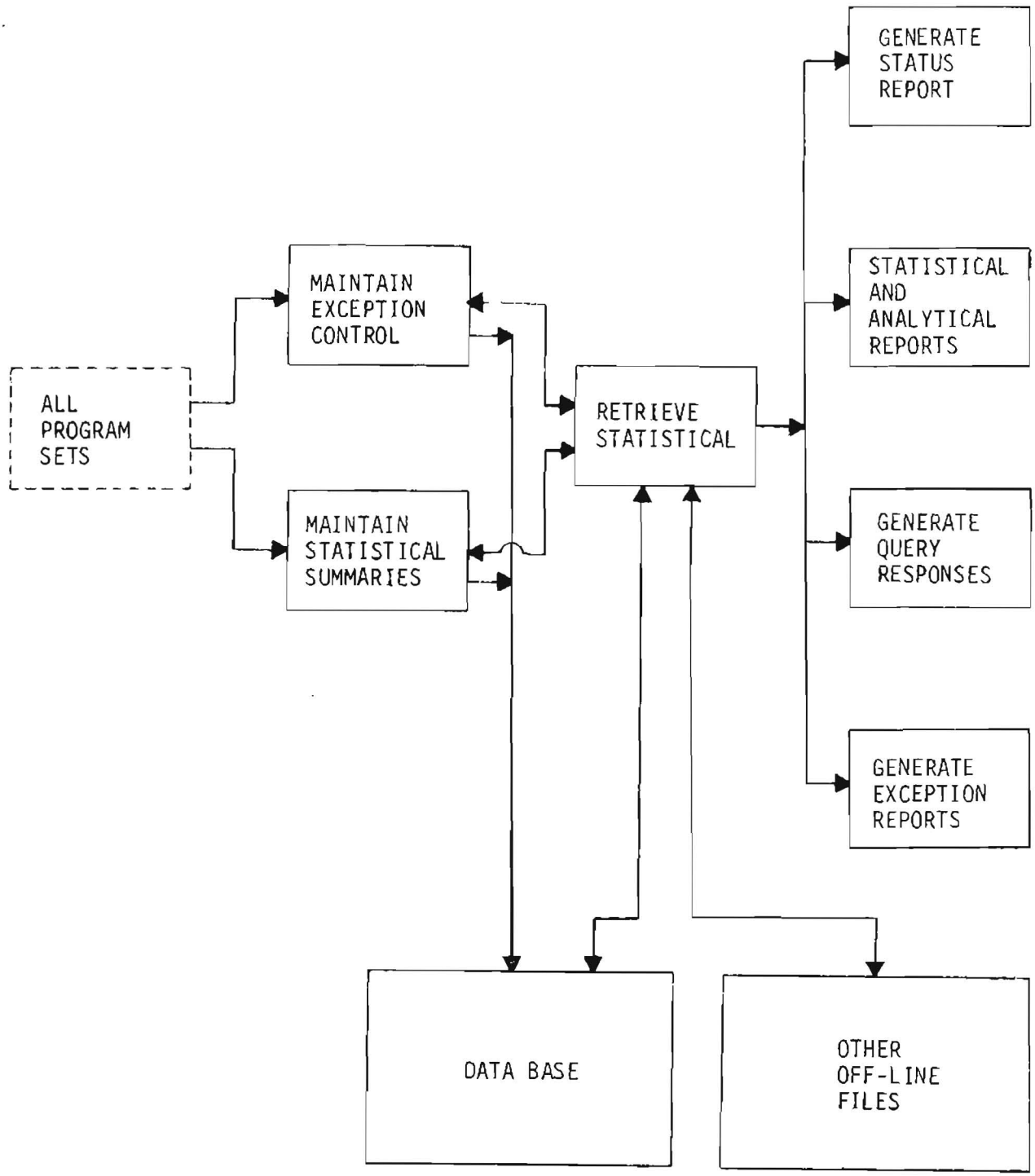

Figure 8. Management Information Module

milestones have not been met within the prescribed time periods. Exception reports are automatically routed to the appropriate agency facility.

In addition to the standard RJIS data base, the Management Information Module also has potential access to any compatible data base that is available on magnetic tape. Thus, for example, the module can use Census data as a component of RJIS statistical reports.

SUMMARY OF RJIS BENEFITS

Potential benefits of the RJIS case-following concept include reduced clerical efforts, especially on the part of professional staff personnel; faster access to data without the out-of-file problems that now occur; greater reliability and consistency of data; availability of data, especially for statistical and management purposes, not currently available; and, perhaps most important, improved communications both within individual agencies, which, in Los Angeles County, are decentralized to many separate locations, and among separate agencies. RJIS promises to remove those delays in the criminal justice process that stem from paperwork bottlenecks and to allow agency staffs to save time spent "pushing paper" and to put that time into administering justice.

SESSION II E

IDENTIFICATION SYSTEMS

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The area of identification systems has become a most dynamic area of the criminal justice spectrum in recent years. Giant strides have been made since the work done by the early pioneers in the area of personal and criminal identification such as Sir Francis Galton, Alphonse Bertillon, and Sir Edward Henry, along with agencies such as Scotland Yard and the Federal Bureau of Investigation. It is only logical that in these rapidly changing technological times, the use of computers and other related space age technology must be considered as having applications in the area of identification systems. Pioneering work utilizing recent technology has been accomplished by numerous agencies. Certainly one must look to the work done by NYSIIS (New York State Identification and Intelligence System) where many of the facets of criminal identification have been addressed in their research. The Florida Department of Law Enforcement has also adopted revolutionary new methods and techniques for the operation of their identification bureau. The Federal Bureau of Investigation in a paper to be presented at this session will discuss their work toward the development of an automatic fingerprint identification system utilizing computer technology which will, hopefully, in the future eliminate the human element from fingerprint identification. Computerized storage and retrieval systems are currently being used for fingerprint identification by the Royal Canadian Mounted Police, the Los Angeles County Sheriff, and the Illinois Bureau of Identification.

Project SEARCH itself must be given considerable credit for its many accomplishments in the area of identification systems. Computerized criminal histories, offender based transaction statistics, satellite communications for law enforcement use, and holographic fingerprint identification are areas which have all been addressed by Project SEARCH committees and have resulted in significant advances in the area of identification systems. The papers presented in this section serve to highlight much of the work which has been done and is currently under way toward upgrading and improving criminal identification systems as well as illustrating the dynamism of this important segment of the criminal justice process.

48311

PILOT COMPUTERIZED INFRARED DATA FILE FOR FORENSIC SCIENCE LABORATORIES

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Summary: A computerized infrared data search system is described with emphasis on its application to forensic science problems.

NOTE: The work described in this paper was initiated by the New York State Identification and Intelligence System. This agency, effective September 1, 1972, has become part of the New York State Division of Criminal Justice Services.

INTRODUCTION

Modern forensic science laboratories, in fulfilling their roles as the scientific arm of law enforcement, are increasingly taking advantage of modern analytical instruments to aid in the identification and individualization of common evidence materials. As the types of substances requiring analysis proliferate and as sample sizes diminish, laboratories must use such instruments as gas chromatographs, infrared spectrophotometers, and mass spectrometers to obtain data necessary for sophisticated investigations. These instruments produce great quantities of data in relatively short periods of time even when only small amounts of evidence material are available. However, the interpretation of the data is not always an easy task. Data analysis frequently takes far longer than the time required to obtain the data.

Reports prepared for the Office of Law Enforcement Assistance by John Jay College of Criminal Justice,[1] for the New York State Office of Crime Control Planning by Cornell Aeronautical Laboratory, Inc.,[2] and for the New York State Identification and Intelligence System by Arthur D. Little, Inc.,[3] have identified the current crises in the forensic science laboratories of the country with respect to volume of work, shortage of trained personnel, inadequate instrumentation and data analysis capabilities.

Recognizing the needs in the areas of data handling and analysis, the New York State Identification and Intelligence System (NYSIIS) has pursued a program to provide computerized scientific data files for the forensic science laboratories of New York State. In outlining this program, we identified the following types of files that should considerably aid these laboratories in the previously mentioned areas of data analysis.

The first type of file is designed to aid laboratories in the identification of unknown substances. Modern analytical techniques such as those mentioned above are powerful aids in the analysis of unknown materials.

Due to the data analysis requirements brought about by sophisticated analytical techniques, commercial firms have produced computerized files of reference data. The data for the files are obtained from the analysis of pure chemical compounds. The data resulting from an analysis of an unknown compound is searched against data stored in the files to obtain a list of possible identifications.

Another potential computerized file would aid laboratories in determining the origin of common evidence materials. These files would contain data on the physical properties of materials frequently encountered as evidence. After statistical relationships were derived for the occurrence of these properties, the data could be used to evaluate the probability of a direct relationship between a piece of evidence material and a suspected source or origin.

A third type of file would aid in relating evidence found in connection with one crime to evidence on file from another crime. This is a routine procedure with latent fingerprints, and is occasionally attempted with firearms. Utilizing central computer files, this process can potentially be of value in connection with a large variety of evidence materials.

Because of funding limitations and the desire to develop a service which would immediately assist forensic scientists, we chose to limit our current project to data from a single analytical technique and concentrate on the type of file used for identification of unknown chemical substances.

This paper describes NYSIIS' experience with the implementation and operation of a commercially supplied computerized infrared data file system as applied to typical analytical problems in two of the major forensic science laboratories of

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New York State. The following section provides background information on the theory and use of the infrared spectrophotometer as related to forensic problems.

THEORY AND USE OF THE INFRARED SPECTROPHOTOMETER

The infrared spectrophotometer, a highly sophisticated analytical instrument, presents very extensive, specific and complex data to the analyst.

The instrument measures the wavelengths in the infrared region of the light energy spectrum that a chemical compound absorbs. Each compound will absorb at different wavelengths in the IR region and therefore provide a unique spectrum. The IR spectrophotometer measures this and records the absorption on graph paper. (See Figure No. 1.) An analyst can then identify a compound by the shape of the absorption bands, their wavelengths and their intensities.

The samples to be analyzed can be in the gas, liquid or solid state. However, the IR spectrum will vary depending on the physical state of the sample. Due to the fact that glass absorbs IR radiation, the sample holder must be sodium chloride, potassium bromide or a similar salt. Most forensic samples are analyzed in potassium bromide pellets or between sodium chloride plates.

The instrument consists of an infrared radiation source, a sample holder, monochrometer, detector, amplifier and recorder. The instrument is a double beam spectrophotometer. That is, the detector compares the sample and reference beam and then amplifies the signal to drive a pen motor on the recorder. (See Figure 2.)

The IR spectrophotometer is one of the most useful analytical tools in a forensic laboratory. It is used in the analysis of pharmaceuticals, narcotics, dyes, pigments, polymers, explosives, inks and poisons.

The fact that no two compounds have the same IR curve makes the technique one of the most definitive ways to identify a substance. The sample preparation is simple and the data is presented immediately to the analyst. While other methods such as thin layer chromatography (TLC) or gas chromatography (GC) may be quicker and simpler, they rely on physical properties of the compounds and are subject to ambiguities in the interpretation of the data. The IR measures the actual types of chemical bonding in the molecule. Thus the IR is a very specific method to identify a substance. As stated above, the data presented to the analyst by the IR spectrophotometer consists of band shapes, band intensities and band wavelength. Both the intensity and wavelength can be represented as numbers. However, the band shape is subjective. Therefore, computerized treatment of the IR data can only be in terms of band wavelength and intensity.

The practical aspects of handling IR data has almost eliminated the use of band intensity except as a criterion in determining which bands to code. This criterion is somewhat flexible, but usually is 10% of the maximum band size. There is no coding of the absolute or relative intensities of the bands. The only data that is useful to a computer search program then is the actual wavelengths.

The amount of data involved in just using the wavelengths is enormous and if one is presented with an IR spectrum of an unknown compound there are only a few laborious methods of identification open to the analyst. One is to try to make a determination as to what types of bands are present in the IR spectrum by the use of group frequency correlation. Certain chemical groups have characteristic IR absorption frequencies and will be familiar to the analyst. Groups such as benzene ring, carbonyl, OH, N-H and methoxy have bands which are very common and easily recognized. This provides the analyst with information about certain substructures present in the molecule, but does not indicate its total structure.

Another option left open to the analyst is to compare manually his unknown spectrum with a known spectrum. This is an almost impossible task considering there are hundreds of thousands of possible IR curves or different chemical compounds open to comparison. In certain cases when an analyst is presented with a somewhat limited variety of compounds, manual comparisons can be done successfully in a relatively short period of time. An example of this occurs in the identification of some of the common barbiturates and derivatives.

Considering that a forensic laboratory handles evidence associated with drugs, narcotics, arson, hit and run, murder, etc., the types of possible samples are enormous. It would be impossible to identify routinely these samples using a manual search method. Thus, a rapid method of comparing thousands of IR spectra to the unknown curve is an essential tool for a forensic laboratory. A schematic diagram of the possible identification procedures using IR data is given in Figure No. 3.

The availability of a computerized data file aids a forensic operation in two ways. First of all, it increases the overall efficiency of an individual IR

analysis. Secondly, it allows the identification of compounds which were previously unidentifiable within the framework of an individual laboratory's operation. The overall time for analysis may increase because at the same time the speed of IR comparison is increasing, the use of IR by the laboratory increases. The analyst now knows he can identify the unknown with the help of the computer file. In other words, the laboratory can now spend more time in providing a definite answer on a case because there is a reasonable chance for success.

The information provided above indicates why a computerized infrared data file would be an asset to a forensic science operation. The following section describes the system currently operated by NYSIIS.

SYSTEM CHARACTERISTICS

A. General Background

The infrared data file system components in their current configuration are depicted in Figure No. 4.

The data file and search program were obtained from the Dow Chemical Company through a license agreement. Under the terms of this agreement, the NYSIIS Criminalistics Research Bureau has a non-exclusive license to store the data file and permit searches of the file by any governmental forensic science laboratory within the State of New York.

This type of arrangement was necessary because Dow Chemical Company retained the rights to the search program and the data file rights resided with the American Society for Testing and Materials. The fee for this license was negotiated by the Dow legal department and NYSIIS.

The Dow-ASTM system was chosen for evaluation because it offered several features which appeared to be particularly advantageous for use in the forensic science environment.

1. The program is designed to be used by a chemist in his own laboratory through use of a remote terminal. This on-line feature would provide rapid turnaround time.
2. The program is highly interactive. That is, it is easy to operate, is designed in accordance with bench chemist needs, and it provides the capability to perform many searches or alter input data in a specific search within a short period of time. This is in contrast with other search systems which have complex input requirements, are card oriented and require lengthy search times.
3. The search program was available for the Burroughs B6500 computer system and therefore required only minor modification to become operational on the NYSIIS system.

Both the New York State Police Scientific Laboratory and the New York City Medical Examiner's Laboratory agreed to participate in the pilot operation of the file.

Both these laboratories have large caseloads that are potentially amenable to IR analysis. Each of the laboratories expressed the desire to increase the utility of their IR instruments.

As Figure 4 indicates, we have utilized several methods (direct wire, dial data set, direct wire data set) of attaching the computer terminals to the B6500 system. Each of these methods provides the laboratory with access to the file any time the NYSIIS computer is operating. The communications aspects of the system are flexible and have been implemented with the advice of the New York State Office of General Services which operates a statewide telephone network for state agencies through Bell System facilities.

B. Operational Features

Figure 5 is a sample of typical input and output for a computer search of infrared data.

Duncan Erley of the Dow Chemical Company describes the philosophy and details of the search program in an article published in *Analytical Chemistry* in May, 1968, "Fast Searching System for the ASTM Infrared Data File." Modifications of the program for this pilot project have not been in the technical aspects of the search, but in the area of making the search more convenient for use in the forensic application. For instance, the NYSIIS system outputs not only the serial number of the potential "hit," but also the chemical name of the compound. This eliminates a previously tedious chore of manual lookup in an index.

Currently, the program cannot be utilized by more than one laboratory at a time. This has been no problem with only two users, but could potentially be a problem when additional laboratories are added to the system. We are currently working on the necessary programming changes to allow simultaneous use by more than one laboratory.

All file editing functions are performed by Criminalistics Research Bureau personnel through its terminal. A major addition to the file has been the inclusion of forensic laboratory IR standards. Both cooperating laboratories have provided their own standards which have been entered into the file by NYSIIS.

C. System Cost

1. File and Program

   The initial file and program fee was $2,500. This provided the basic ASTM data file as used by Dow and the search program. A subsequent purchase was made of a tape of

compound names and molecular formulas for $1,100. As stated previously, the initial fee was negotiated. The name tape was provided by ASTM for their standard rate. Additional file update tapes may be purchased as they are produced by ASTM for approximately $200.

2. Computer Terminal

The Dow-ASTM system was written to accommodate model 33 teletypewriters. However, we were able to substitute the Burroughs TC500 terminal computer under the terms of the NYSIIS contract for the Burroughs B6500 computer system. This enabled us to provide a reliable terminal with potential off-line laboratory uses for approximately $160 per month. The TC500 prints at double the character speed of the TTY and provides buffered input and output registers. This helps to conserve main computer processing time and provides rapid printout for long lists of chemical names.

3. Communications

a. *State Police Terminal*

	Cost/Mo.
Burroughs Data Sets – 2 at $16/mo.	$ 32.00
Telephone Line	8.00
Adaptor for B6500	45.00
Total/Mo.	$ 85.00

b. *New York City Medical Examiner's Terminal*

	Cost/Mo.
Bell System Data Sets – 2 at $48/mo.	$ 96.00
Telephone Line (NYS Tie Line)	44.00
Adaptor for B6500	45.00
Total/Mo.	$185.00

Currently, the cost of operating the system is shared between NYSIIS and the user agencies. NYSIIS provides file storage, search and update while the laboratories reimburse NYSIIS for terminal and communication costs.

One of the major goals of the pilot project is to document laboratory experience in using the data file system. Section IV provides an evaluation of the system from the viewpoint of each of the cooperating laboratories.

LABORATORY EVALUATION OF THE SYSTEM

A. State Police Laboratory*

During the period of the pilot project, NYSIIS has provided the State Police Laboratory with a Burroughs TC500 computer terminal, telephone communications lines, a search program, access to the infrared data file and computing time on the Burroughs B6500 computer system. Training in the use of the equipment and other technical services were also provided by the CRB and NYSIIS programming staff.

The State Police Laboratory provided technical personnel to perform file searches in both test and production modes. These personnel were asked to evaluate systems from the viewpoint of the operating forensic science lab and to provide input to NYSIIS Criminalistics Research Bureau personnel so that appropriate systems modifications could be designed.

An initial test series of 100 tests, conducted by two Senior Chemists with considerable infrared experience, soon established that the search program could, in fact, make "hits" on samples commonly encountered by forensic laboratories. This test series also served to furnish a genuine sense of confidence to all of the program participants.

Since the initial test period, the file has been used on about 150 actual forensic cases, representing approximately 400 searches. Fifty-five unknown samples were identified which would not have been identifiable without the aid of the program.

The types of compounds that have been identified have varied greatly. It has been successful in identifying many narcotics and dangerous drugs and has been used in toxicology for the identification of poisons. Success has also been achieved in the area of paints, dyes, pigments and polymers. It has also been useful in the identification of components of bombs and various high explosives. The system has, in fact, been used in practically every area of the laboratory.

The following illustrative examples serve to document the program's usefulness.

Case 1: A 50 year old chemistry professor was found dead in his car. Found with him was a glass containing what appeared to be some type of whiskey. An acid extraction and a subsequent IR analysis was performed on the liquid. A computer search on the IR spectrum identified the unknown as Chloral Alcoholate. Extraction of stomach contents of the deceased and subsequent IR spectrum computer search identified the unknown to be chloral. A visual comparison of the unknown curves with curves of chloral alcoholate and chloral confirmed the computer identification. Thus, the cause of death was determined by the search program and would not have been possible without it.

Case 2: An unknown white colored substance was turned over to the State Police as being a suspected explosive. An IR analysis and computer search were performed. The substance was identified by the program as being TNT. Subsequent visual comparison with a spectrum of TNT confirmed the identification.

Case 3: A suspected clandestine drug laboratory was raided by local police. The program helped identify eight chemicals used in the synthesis of illicit drugs.

The program has assisted many times in giving an indication that the unknown is of a particular type or class of compounds. While there is no positive identification, the type or class of the compound may offer investigative leads in solution of a case.

One of the most important outcomes of the pilot project has been the development of a

* Extracted from Interim Evaluation Report provided by New York State Police Scientific Laboratory.

systematic approach to performing a search on an unknown spectrum. It has been found that if an analyst starts with a minimum of IR data and adds additional data gradually he can carefully and accurately narrow down to a positive identification. This approach will help minimize discrepancies in two different IR curves of the same compound produced by different people on a different instrument.

Techniques of sorting out suspicious peaks, which may be due to solvents, have proven to be successful. The calling up of stored data on potential "hits" can lead to finding file errors due to coding or instrumental problems. This may lead to an identification by eliminating erroneous bands.

The success of the search also can depend on the operator's experience and knowledge of IR spectroscopy. An experienced operator can recognize any suspicious bands and can interpret group frequencies to aid in the search.

Thus, with a reasonable amount of training to familiarize the operators with the program, a very sophisticated searching procedure can be used which greatly increases the effectiveness of the IR search program.

B. Medical Examiner's Laboratory*

The concept of central files is not only invaluable in toxicology, but also in all scientific work involving criminal investigations. In the limited time the tie line between our laboratories has been in operation, we have had positive computer findings on many samples of material whose identity was unknown to us at the time. Computer data provided confirmation of suspected identity and, of equal importance, ruled out substances which our previous testing had indicated. Information that a chemical substance is not what is suspected can sometimes be just as important as positive identification.

With regard to IR in combination with gas chromatography, I would estimate that the overall effectiveness of IR would be increased by a factor of three to four. The major problem in identifying chemicals isolated from tissue and body fluids with IR is purity of the sample. With IR following gas chromatography, much better specimens would be analyzed. The limits would depend on the limiting sensitivity of the micro-technique employed.

In view of the success of the pilot program and the potential for further development of the central file concept, I incorporated $3,000 into the laboratory budget which becomes available in July 1972 for maintaining the TC500 terminal and associated telephone lines.

The present system for file maintenance works very efficiently. In my opinion, laboratory programming is a highly specialized science and could not be justified as a function for our laboratory. Nor do I see the need for other than a centrally operated location available to a number of laboratories. Our laboratory doesn't have time nor the personnel to maintain even a rudimentary cabinet filing system. The problems of work overload and limited personnel is universal in all technical organizations that I know of neither our staff, which is the largest, nor the staffs of any of the others in this field, has the time for programming even if they had the expertise.

As previously discussed, computerized data for toxicology should be expanded to include ultraviolet spectrophotometry, gas chromatography, thin layer chromatography and micro-color reactions.

Based on the operational experiences accrued over ten months' operation of the pilot system, certain conclusions have been drawn by the participants. These are presented below.

CONCLUSIONS BASED ON OPERATIONAL DATA

1. The system, as it presently exists, is of definite assistance in forensic infrared data interpretation. Its real value has not been to speed up routine cases, but rather to provide an extended capability in those cases which involve new or unfamiliar problems.
2. The program is easy to use and usually leads to a meaningful answer within ten minutes after the unknown data is obtained from an infrared spectrophotometer.
3. The nature of forensic laboratory work requires ready access to the infrared file, thus the central computer system must be available for searching when the analyst requires it.
4. The State Police indicate that their estimated normal use of the infrared search system will be from 30 to 40 cases per month, requiring from 100 to 120 actual searches of the file per month.
5. One of the key issues in development of this program was to determine if an efficient and effective working relationship could be developed and maintained between NYSIIS and the cooperating laboratories. Since the development and maintenance of this type of system requires considerable systems design and programming efforts, a close liaison must be maintained between the user and central service. This liaison is also important because troubleshooting systems problems and their solution is one of the important functions of the central agency. All operational experience attests to the close working relationship that has been developed and the desirability of maintaining this relationship.
6. Modifications should be made in the search program to make it more "forgiving" when erroneous search data is entered. As the program is constructed now, fifteen correct items and one incorrect piece of data will result in a miss. If the program were more flexible, our "hit" rate would be increased.*

* Extracted from Interim Evaluation Report provided by New York State Police Scientific Laboratory.

*An improved version of the original search program is currently commercially available.

7. To confirm an identification, the examiner should have available a "hard copy" of the standard infrared curve for use in a visual comparison with the unknown curve.
   There is no access to such a hard copy with the present system. Although our laboratory maintains some hard copies of selected infrared spectra, the retrieval operation for those curves is cumbersome and represents the greatest time loss in the system. Thus, a major improvement in the system would be for laboratories to have access to hard copies of all the standards in the file through an automatic or semi-automatic retrieval system. With such a system, the actual copy of the known infrared spectrum could be rapidly compared with the unknown spectrum making confirmation of identification a simple matter.
8. The concept of storing scientific data relevant to the forensic sciences in a computer and retrieving it when needed is certainly feasible. File effectiveness would be greatly enhanced if additional files could be created to store additional data such as: ultra-violet data, gas-liquid and thin-layer chromatography data, color and crystal test data. These different types of data could then be correlated into a complete cross-referenced master search and retrieval program.

The foregoing has described the operation of a pilot computerized infrared data file system as applied to the needs of two forensic science laboratories in New York State. Future development of the system will be to provide the service for all laboratories that express a need and can share in the cost. The central file concept will also be further developed using the conclusions reached during the pilot project as a guide.

NOTICE

The work described in this paper has been assisted in part by the Law Enforcement Assistance Administration's National Institute of Law Enforcement and Criminal Justice. Grant Number NI 70-065-PG-17, *"Pilot Computerized Infrared Data File,"* authorized by the Omnibus Crime Control and Safe Streets Act of 1968 supported purchase of the data file and implementation of the current system. The conclusions expressed herein do not necessarily represent the opinions of the government of the State of New York nor the government of the United States of America.

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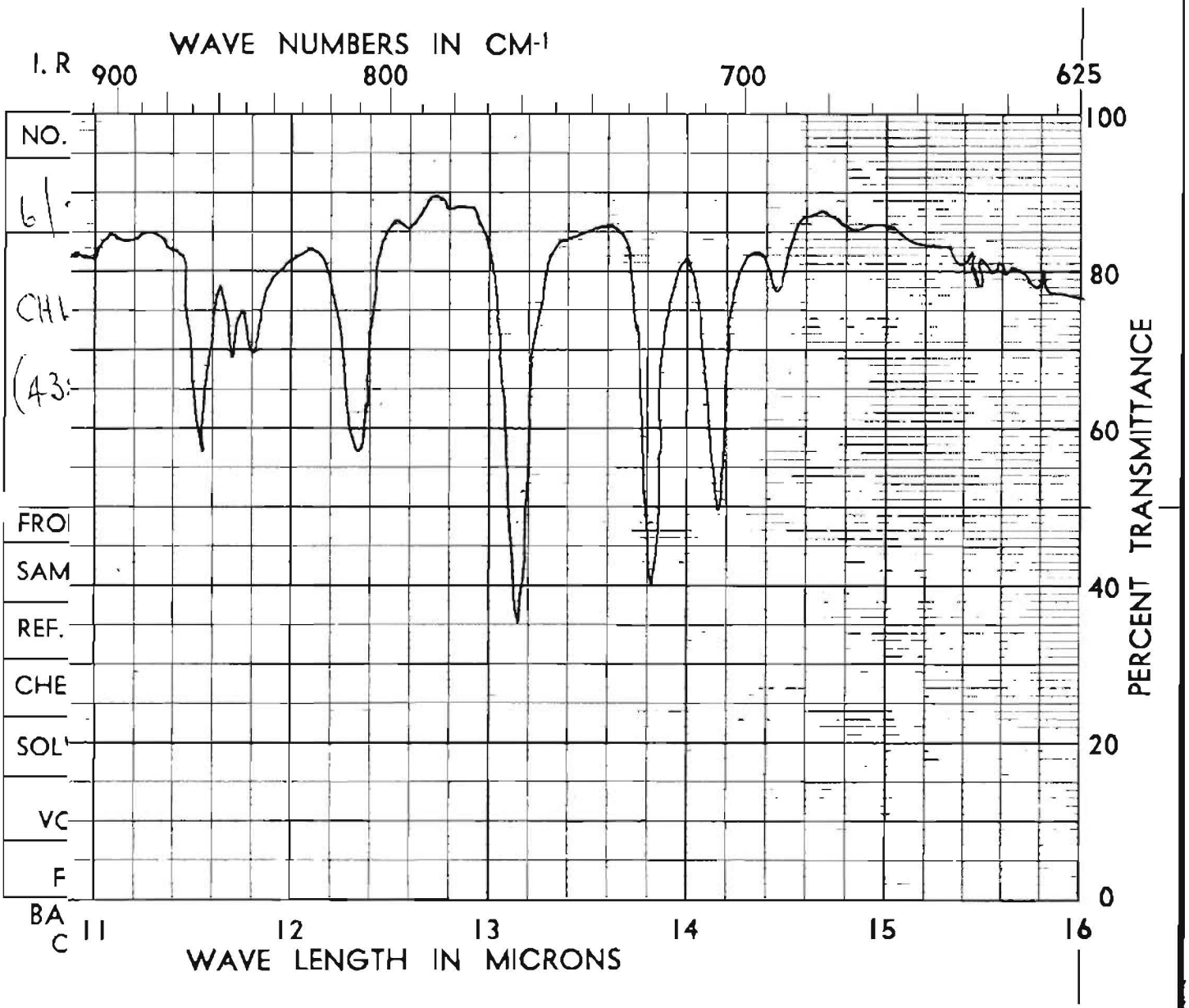
1 O.L.E.A. Project No. 013, "Study of Needs and the Development of Curricula in the Field of Forensic Science," Dr Alexander Joseph, John Jay College of Criminal Justice, the City University of New York.
2 "Planning Study for Evaluation of Forensic Laboratory Services in Erie, Niagara and Wyoming Counties, New York," Cornell Aeronautical Laboratory, Inc., Grant from the New York State Office of Crime Control Planning.
3 "Computerized Data Files for Forensic Science Laboratories: A Utility Study," Arthur D. Little, Inc., under contract to the New York State Identification and Intelligence System.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100
80
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40
20
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PERCENT TRANSMITTANCE
11
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16
WAVE LENGTH IN MICRONS

SCHEMATIC DIAGRAM OF AN IR SPECTROPHOTOMETER

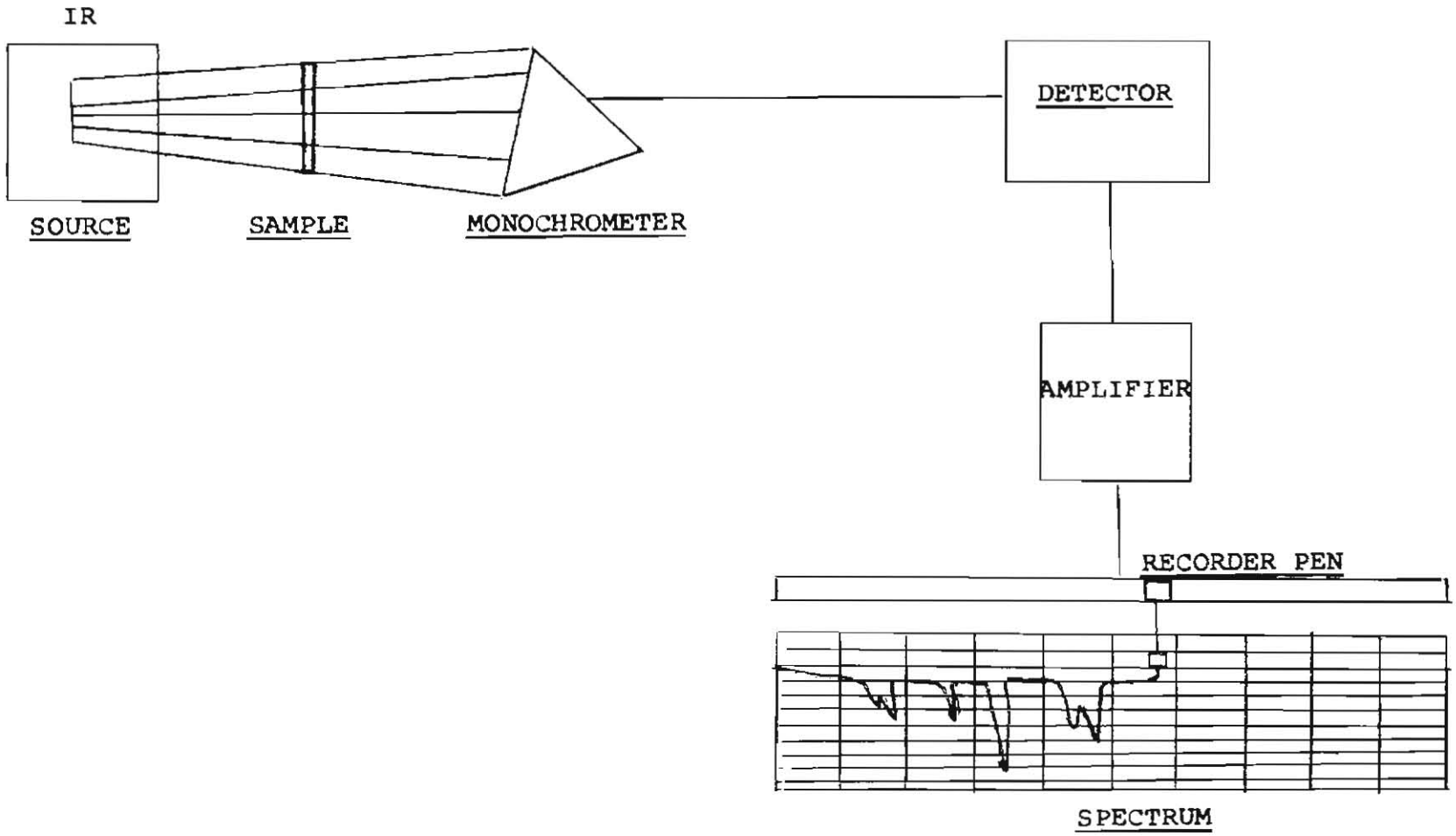
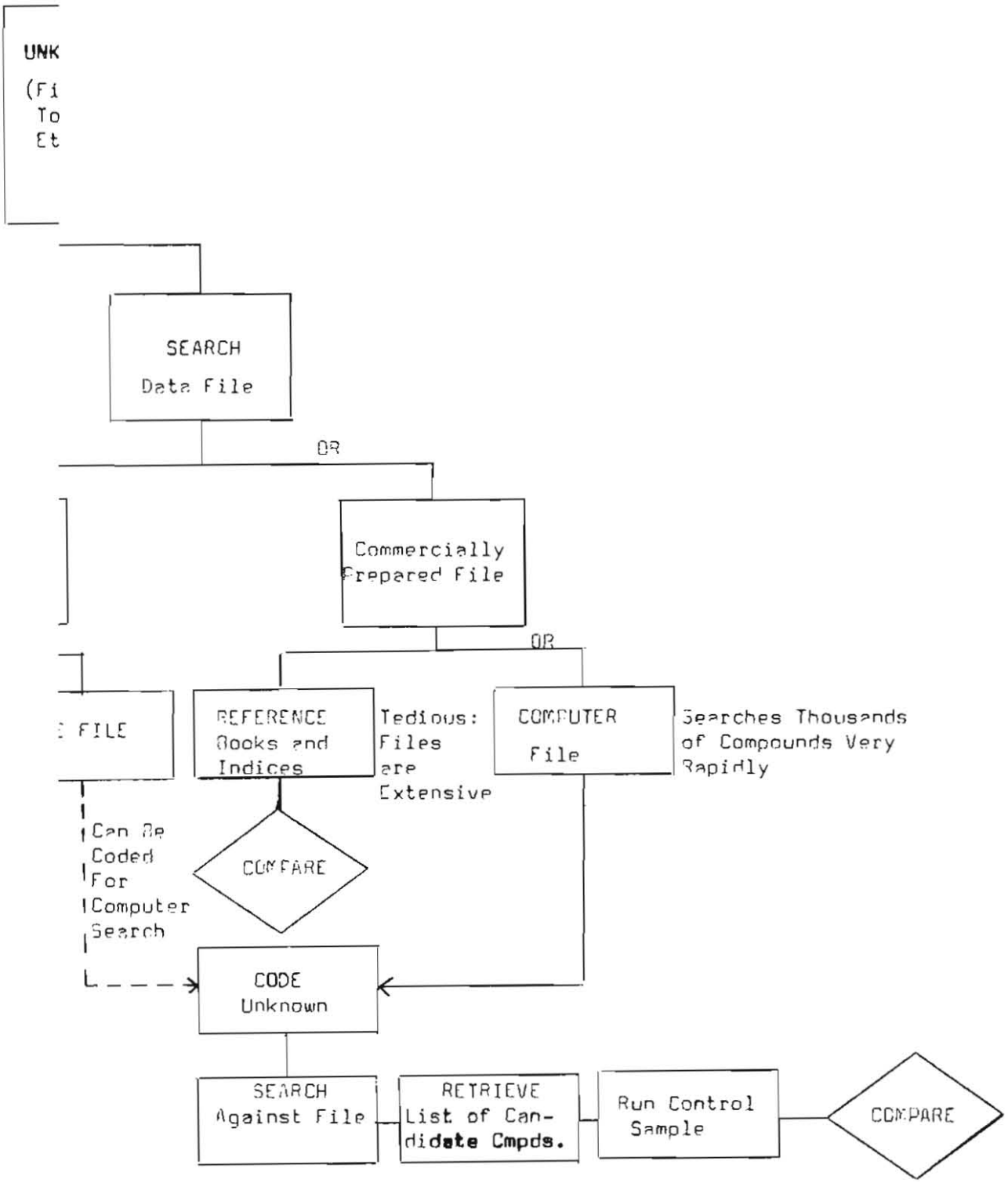


FIGURE 2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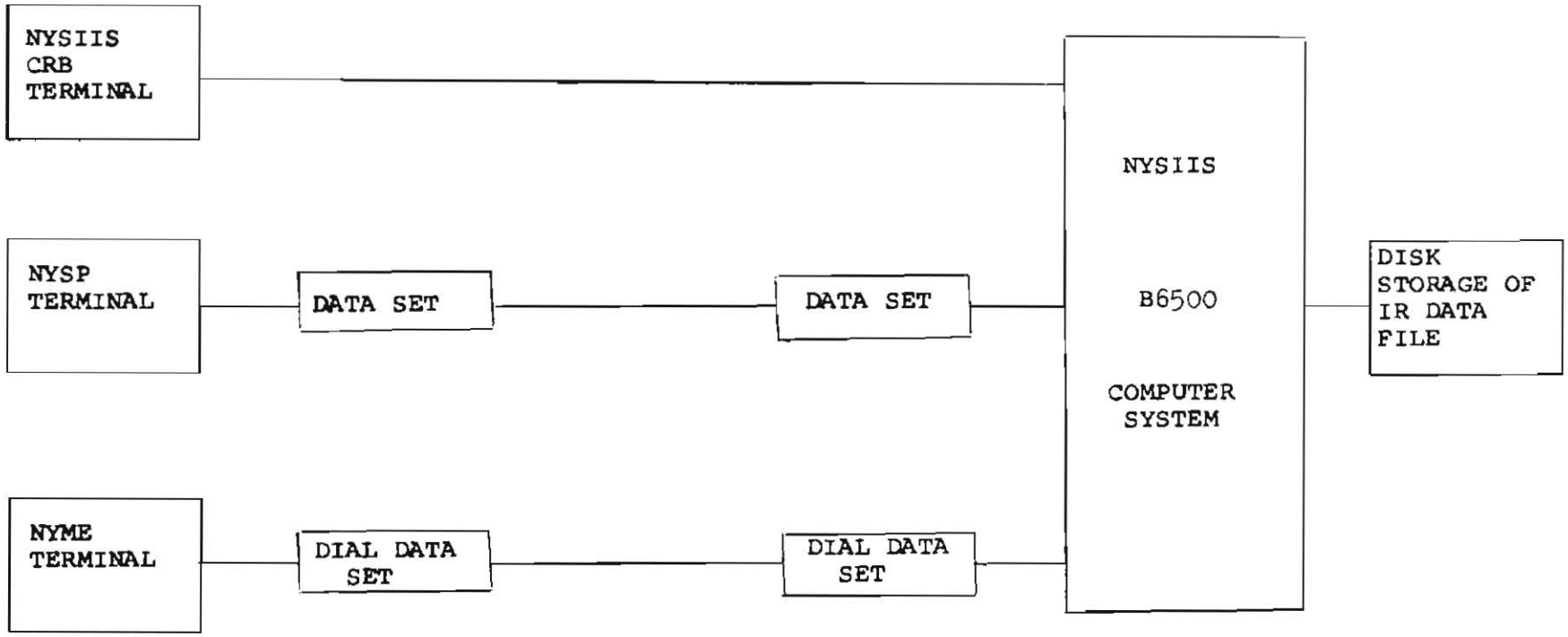

FIGURE 4

```
INFRARED FILE SEARCH PROGRAM          09/11/72
DO YOU WANT PROGRAMMATIC INSTRUCTIONS--YES OR OCK


SAMPLE...
DEMONSTRATION SEARCH                          OPERATOR ENTRIES UNDERLINED
GROUPS AND BANDS PRESENT
6.2 6.5 6.9 7.3 7.4 7.7 7.9 8.0 8.2 8.5 9.2
GROUPS ABSENT, NO BAND REGIONS



INPUT DATA
GROUPS
**** NO DATA ****
BANDS
 6.2  6.5  6.9  7.3- 7.4  7.7  7.9- 8.0  8.2  8.5  9.2
NO GROUPS
**** NO DATA ****
NO BANDS
**** NO DATA ****
OPTION...
1                    SEARCH OPTION
SUBFILES...
CR
TOTAL MATCHING 11-WORD RECORDS =      17
NUMBER OF UNIQUE SERIAL NUMBERS SAVED FOR REPRINT =      10
OPTION...
2                    HITS RESULTING FROM SEARCH
WHAT STARTING POINT - 3 DIGITS
001
00088CR        METHYLENE-BIS-/4-HYDROXYCOUMARINE/,3,3PR

00101CR        CARBAMATE, 2-HYDROXY-3-O-METHOXY-  PHENOXY-PROPYL

00163CR        CODEINE ALKALOID

00270CR        ESTRATRIEN-3-OL-17-ONE, 1,3,5/10/-

00277CR        PHENOTHIAZINE, 10-/2-DIETHYLAMINO- PROPYL/-, HCL

00311CR   1,2-PROPANEDIOL, 3-/O-METHOXYPHENOXY/-

00324CR        PHTHALAZINE, 1-HYDRAZINO-,  HCL

00555CR        PHENOTHIAZINE, 2-CHLORO-10-/3-/1-  METHYL-4-PIPERAZINYL/PROPYL/

00578CR        PHENOTHIAZINE, 10-/2-/1-PYRROLIDYL/ ETHYL/-,  HCL

00774CR        ETHANOL, 1-/P-BETA-DIETHYLAMINO-    ETHOXYPHENYL/-1-/P-TOLYL/-2-


OPTION...                          ALTER DATA OPTION
4
GROUPS AND BANDS PRESENT
6.2 7.6 10.3                       CHANGED DATA
GROUPS ABSENT, NO BAND REGIONS
8.8-9.0                            CHANGED DATA


INPUT DATA
GROUPS
**** NO DATA ****
BANDS
 6.5  6.9  7.3- 7.4  7.6- 7.7  7.9- 8.0  8.2  8.5  9.2 10.3
NO GROUPS
**** NO DATA ****
NO BANDS
 8.8- 9.0
OPTION...
1                    NEW SEARCH
SUBFILES...
SP                   DIFFERENT SUBFILE
TOTAL MATCHING 11-WORD RECORDS =      4
NUMBER OF UNIQUE SERIAL NUMBERS SAVED FOR REPRINT =      2
OPTION...
2
WHAT STARTING POINT - 3 DIGITS
001
00128SP  D,8,-AMOBARBITAL(FREE ACID)

00193SP  O,8,-PSILOCYBIN


OPTION...
7
TIME FOR SAMPLE:
DEMONSTRATION SEARCH
006 MIN 08 SEC ELAPSED,  000 MIN 02 SEC PROCESS,  000 MIN 05 SEC I-O.

OPTION...
8

END OF PROGRAM..
```

Figure 5

48312

AN EXPERIMENT TO DETERMINE THE FEASIBILITY OF HOLOGRAPHIC ASSISTANCE TO FINGERPRINT IDENTIFICATION

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This paper describes a recent experimental investigation into the feasibility of providing technological assistance to state identification bureaus in their task of identifying persons on the basis of full set fingerprint impressions. This investigation was carried out by the Project SEARCH Technology Committee during early 1972. A full description of the experiment and its findings is published in *Project SEARCH Technical Report No. 6*, entitled "An Experiment to Determine the Feasibility of Holographic Assistance to Fingerprint Identification" dated June 1972.

Before going any further, it is important to point out that this feasibility experiment did not address itself to the question of holography as part of a latent fingerprint identification system, such as those used to process prints taken at a crime scene. That application has a special set of problems associated with it: the prints taken from the crime scene may be smudged, partially missing or obscured, combined and confused with other prints from the same person or different persons who were in the same area, and on the other hand are usually compared against much smaller libraries of master prints. Because of these special circumstances, it was determined that the latent print application could not easily be combined in a feasibility experiment with the identification bureau application.

While still focusing on the title of this paper, one might properly ask why we limited our attention to holographic assistance to the identification process, rather than allowing ourselves a broader scope such as "technological assistance" or "electromechanical assistance" to the identification process. Our reasons for this self-imposed limitation of scope are threefold: first, the potential techniques which might be appropriate for assistance in this area are so broad and so diversified that it would have been extremely difficult to design an experimental configuration which would adequately have tested all possible methods, especially within the time constraints we imposed upon ourselves and the financial constraints imposed on us by LEAA. Second, other research and development programs presently under way have addressed themselves to other possible technologies. In particular, the FBI is developing through the services of Cornell Aeronautical Laboratory a fingerprint identification method which relies on computerized processing of a digital representation of fingerprints. The New York State Intelligence and Information System is similarly engaged in development activities concerning computerized processing of fingerprint images. Thus it seemed reasonable to us to intentionally limit our scope in an effort to focus our resources on one possible technological avenue, namely holography, and rely on other programs to investigate other such avenues. Third, by the time we initiated our project, holography had reached a state of technical maturity and public notice sufficient to argue that someone had to take this possibility seriously and study it in an effort to focus further development efforts, and especially to provide guidance to state identification bureau administrators concerning possible avenues of development and procurement in future years.

In order to establish the operational context in which our experiment was set, I would like to review briefly with you the state identification bureau identification process (Exhibit 1). A fingerprint identification inquiry of the type we are interested in begins with the arrival of a fingerprint card at the state identification bureau. The fingerprint card is 8" x 8", contains 20 inked fingerprint impressions, 10 flat impressions and 10 rolled impressions. In the analytical model which we developed for comparative analysis purposes during this project, we assumed approximately 20,000 such inquiry cards arriving monthly at the state identification bureau; this is typical of a medium-size state operation. All of these cards received an initial fingerprint preclassification and proceed to a name search routine which, by the way, uses not only the person's name but his fingerprint preclassification, identifying numbers, and physical

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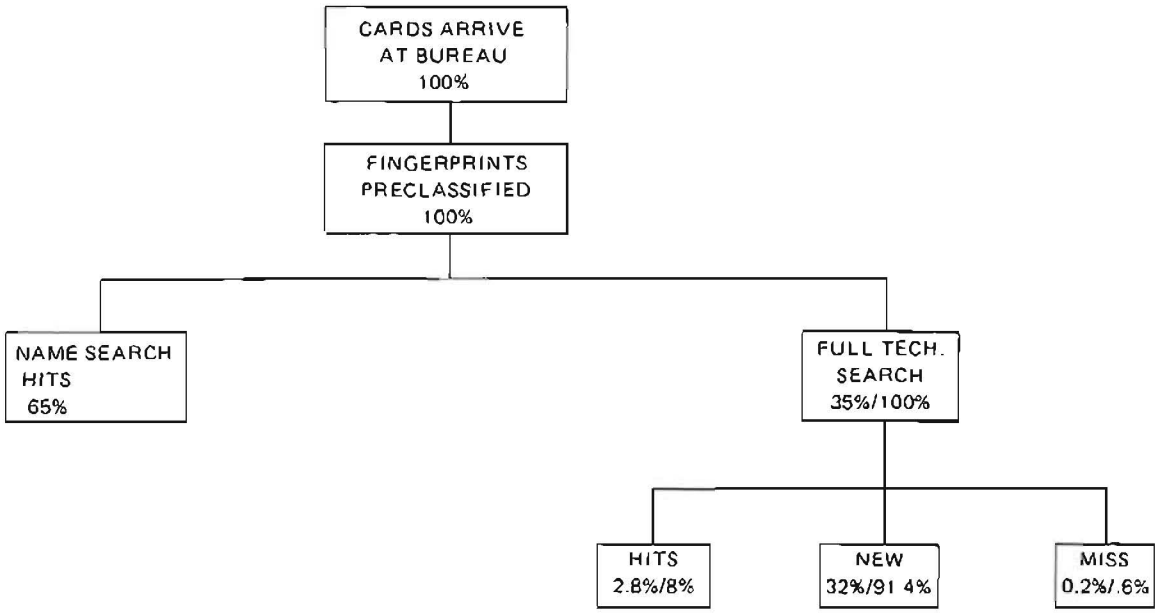


TYPICAL STATE IDENTIFICATION BUREAU PERFORMANCE

EXHIBIT 1

descriptors in an attempt to narrow down the search from the million or million and a half fingerprint cards on file to perhaps two or three candidates, which can then be quickly checked visually and an identification made. In the typical identification bureau represented in our analytical model, approximately 65% or 13,000 identifications per month are in fact made on the basis of such a name search routine.

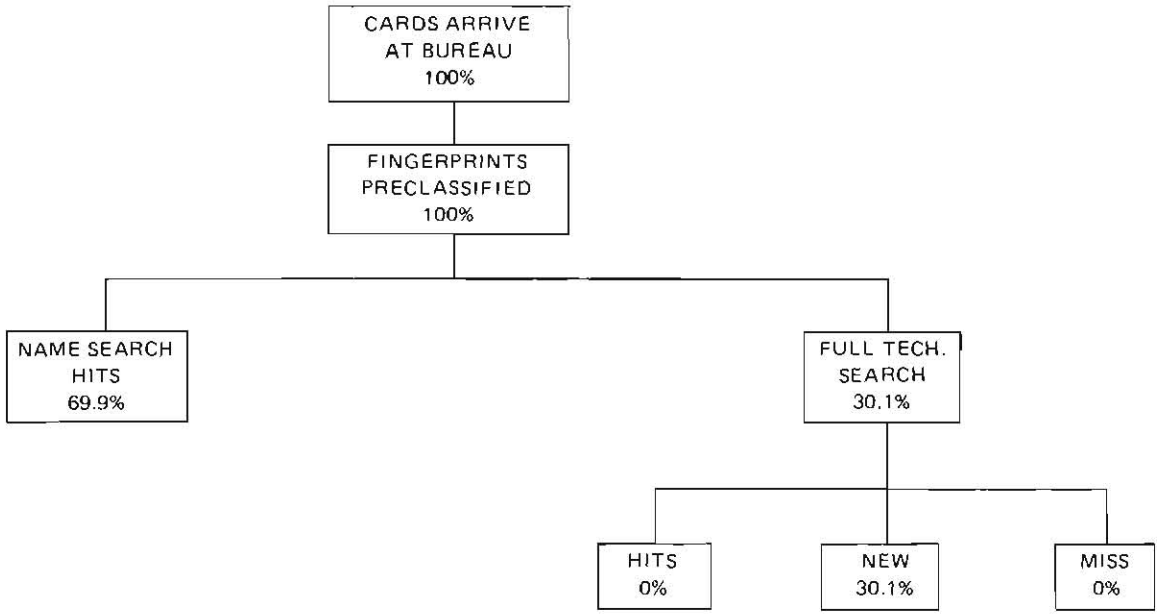
The 35% or 7,000 cards per month which do not result in an identification on the basis of name search technique are submitted for full technical search of the fingerprint file. The file, consisting in our model of 1.5 million fingerprint cards, is divided into subfiles on the basis of the Henry fingerprint classification system, which allows for 1,024 major subcategories, and further subdivision in larger subfiles.

Shift our base now so that the 7,000 cards per month submitted for full technical search are considered to be 100%, we find in our model that approximately 91.4% of the cards represent first-time offenders within the bureau, 8% are identified as previous offenders from the file, and 0.6% should be identified as previous offenders but are missed for various reasons.

One may wonder at this point why we are concentrating our efforts on the full technical search process, rather than on the name search which after all handles 65% of all the cards. The first answer to this question lies simply in pointing out that the 65% of the cards processed successfully through name search account for nothing like 65% of the cost or effort of the identification bureau, but probably closer to 20%. The remaining 80% of the cost of the identification bureau is borne by the full technical search process. Therefore, the opportunities for cost reduction lie primarily in cost reduction of the technical search process itself.

One still might argue that substantial economies could be obtained by increasing the effectiveness of the name search, so that fewer cards would have to be submitted to the full technical search process. The next chart (Exhibit 2) shows that even a "perfect" name search technique would reduce the workload of the technical search function only insignificantly, from 35% of full bureau input to 30%. Thus we were led to the conclusion that concentration in the full technical search area would be in the best interests of both technology and the operational needs of state identification bureaus.

The major participants in this experiment included first of all the Technology Committee of Project SEARCH, which acted as a steering committee for the project. Under the Chairmanship of Al Kwiatek of Pennsylvania, the committee included Joel Tisdale of Texas, Andy Shehan of Georgia, Bill Reed of Florida, Dick Plants of Michigan, Jim Paley and Paul McCann of New York, Gary McAlvey of Illinois, Roy Lewis of California, Ron Johnson of Massachusetts, Joe Barry



STATE IDENTIFICATION BUREAU PERFORMANCE WITH "PERFECT NAME SEARCH"
EXHIBIT 2

of New Jersey, and Ron Allan of LEAA. Paul McCann was Chairman of the subcommittee which actually controlled this project.

Administrative staff services to this project were provided by the California Crime Technological Research Foundation in the person of Doug Roudabush and George Buck. Technical staff services were provided by Paul Wormeli, Howard Hayes, and myself as principal investigator for the technical staff, all from Public Systems incorporated.

Finally, three corporate participants actually conducted the experiment, each using a holographic configuration developed by that corporation. Dr. C. E. Thomas acted as principal investigator for the KMS Technology Center. Jerry Belyea was principal investigator for the McDonnell Douglas Electronics Company, and Dr. Donald McMahon was principal investigator for the Sperry Rand Research Center.

The experiment itself was conceptually very simple. The library of 10,000 fingerprint cards was assembled, and names and other identifying information were removed from each card in order to preserve the privacy of the individuals concerned. These cards were provided by the California Bureau of Identification from cards just purged from its master library. The library was assembled in such a way that the distribution of cards with respect to Henry fingerprint classification was representative of the distribution of classifications found in the master California files, at least for the 10 most frequently occurring Henry classifications which together account for 55% of the entire file.

Next, a set of 600 test cards was assembled, again from the California Bureau of Identification, and these test cards were divided into three sets: the first set or "tuning set" of 100 cards was given to the corporate participants along with the 10,000 library cards in order to allow them to pretest and adjust their holographic equipment; the second or primary test set of 100 cards was given to each of the three corporate participants at the time of test administration; the third or secondary test of 400 cards was given to those two corporate participants (KMS Technology Center and Sperry Rand Research Center) which had indicated a willingness to undertake this optional portion of the test procedure.

The experiment was configured as an openended experiment. That is, some cards in the test set did not have matches in the master library, while others did. Such an openended design is basically more difficult than a "closed experiment in which the participants knows ahead of time that each test card has a match in the library, and are never required to make "no match" decisions during the experiment.

On the other hand, multiple responses were allowed for each test card, up to a limit of 10 responses per test inquiry card. This reflects the belief of the committee that a human being will always have to be available at the end of the pro-

cess to inspect visually the card claimed as a match by the holographic system; as long as he is there it will not unduly delay the process nor increase process costs if he is required to look at a relatively small number of possible candidates.

The individual test cards were provided to the corporate participants (in the form of transparencies made to the quality standards specified by each participant) by a project representative, and all subsequent activities by the participants were monitored. The official monitor for each participant recorded the time required to make the holographic comparisons against the library card images, and recorded the responses by each participant by a sequence number written on both the test cards and the library cards. The monitor was not aware during the experiment of the sequence numbers which represented correct matches, and simply brought the data back for later analysis.

When the data was returned, analysis began. It had originally been intended to perform a relatively detailed analysis of time required for various portions of the comparison process. After an examination of the equipment configuration used by the corporate participants, however, it was determined that equipment was of such a prototypical nature that substantial changes in operating times could be achieved with relatively minor engineering changes to the equipment, so that effort expended in determining processing times could be better spent focusing on the accuracy performance achieved during the experiment.

As mentioned previously, each participant was allowed to list up to 10 candidates, in rank order of preference, for match between a test card in the library. In any case where the correctly matching card was included on a list of candidates, the response was scored as a correct match, and the rank order of the correct response was tabulated. If in fact there was no matching card in the library and the respondent correctly listed this by showing no candidates, the response was scored as a correct dismissal. If in fact there was no matching card in the library but the participant did provide one or more candidates for visual inspection, the response was scored as a false match. If on the other hand there was truly a matching card in the library but the respondent listed no candidates for visual inspection, the response was scored as a false dismissal. Finally, if there was a match in the library and the respondent listed candidates for visual inspection, but the true matching card was not on the list of candidates, the response was scored as a mismatch.

Of the three types of error responses a false match is by far the least serious error type, since visual inspection of the candidates will reveal that a match does not exist, and the total man-machine system response will then be a correct dismissal. On the other hand, false dismissal and mismatch responses provide no opportunities for the human portion of the total system to correct the error, so these are serious errors.

The next chart (Exhibit 3) shows the results achieved during the primary experiment, involving 100 test cards processed against that portion of the 10,000 card library having the same Henry classification as the test card. The three vertical divisions of the chart refer to the three corporate participants, namely KMS Technology Center, McDonnell Douglas Electronics Company, and Sperry Rand Research Center. The first three rows refer to those responses which are possible when a match in fact exists in the library, while the lower rows refer to those responses which are possible when no match in fact exists in the library. For each response type two numbers are tabulated, first the actual number of trials during the primary experiment that resulted in that response type, and second a so-called conditional percentage, which merely means that the number of that response type is divided by the maximum possible number; hence for correct match, false dismissal, or mismatch, the number is divided by 73, which is the number of test cards in the primary test set which actually had matches in the master library.

First, notice that of all the cards submitted for test, only one was not processed by a participant. This clearly shows that the holographic process is capable of processing the normal spread of fingerprint impression quality encountered in a state identification bureau, since both the test set and the library cards were chosen to be representative in quality of those received during normal operations. Second, we re-emphasize our statement that, from a total system viewpoint, correct dismissal and false match responses are in a sense equivalent, since we trust the human being at the end of the stream to sort through up to 10 candidate cards and change the false matches to correct dismissals, with only the expenditure of a relatively small amount of time.

Thus, the real import of this chart is in the first row, where we find that the correct match rates of the three participants ranged from 88 to 96%. This compares to our estimate of the performance of an existing good manual state identification bureau operation, which would exhibit a correct match

	KMS		MDEC		SRRC	
	NUMBER	CONDITIONAL PERCENT	NUMBER	CONDITIONAL PERCENT	NUMBER	CONDITIONAL PERCENT
CORRECT MATCH	64	88	70	96	64	88
FALSE DISMISS	4	5	2	3	2	3
MIS-MATCH	5	7	1	1	7	10
CORRECT DISMISS	8	42	13	68	8	42
FALSE MATCH	10	53	6	32	11	58
NON PROCESSED	1	5	0	0	0	0

PRIMARY TEST RESULTS
EXHIBIT 3

rate of approximately 93%. Since the completion of the experiment, in fact, I have been informed that another of the corporate participants has changed the matching algorithm used, and is prepared to demonstrate accuracy rates above the 93% level.

One might think, then, that the feasibility of holography as a technological assistance to state identification bureau fingerprint identification function has been conclusively proved. One and possibly two of the corporate participants, after all, have demonstrated on a statistically valid experimental basis the ability to meet or exceed the accuracy standards presently obtained in state identification bureaus. Unfortunately, while accuracy is critical, and the results of this experiment mark a great step forward in this area, there is more to be said before feasibility can be assured.

I mentioned earlier the fact that processing times were not considered particularly valid during the experiment because of the prototypical nature of the equipment configurations used. Nevertheless, we cannot ignore the fact that processing times were, in general, not merely longer than manual systems but longer than manual systems by several orders of magnitude. Again, however, I must report that subsequent to the conclusion of the experiment two of the corporate participants have, through internal development efforts, substantially decreased the processing times required.

Finally, as I mentioned earlier, holography is not the only form of technological assistance available to state identification bureau operations. Other programs presently under way use digital processing of various forms to provide the same functional service. Thus we find that the state identification bureau identification process, so long conducted without any technological support, now finds itself in a position of being wooed by alternative technologies, none yet ready for operational implementation but all showing great promise of providing assistance in this difficult and important area of criminal justice. We have preserved the test cards and library used in our experiment, and hope that, at the appropriate stage of development, these other technologies can be measured as has holography.

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THE STATE OF DEVELOPMENT OF THE FBI'S AUTOMATIC FINGERPRINT IDENTIFICATION SYSTEM

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Identification Division
Federal Bureau of Investigation
Washington, D.C.

INTRODUCTION – THE CHALLENGE

We have long taken for granted the ability of a fingerprint technician to classify fingerprints by their general ridge contours and identify them by their distinctive ridge detail. This feat is made all the more remarkable by the fact that in doing this he must make allowances for inconsistencies in the inked fingerprint impressions caused by such things as over- and under-inking, smudging, differences of positioning, mutilation by cuts and scars, and distortion caused by the pressures used in recording the prints.

The question arises: *"Can a machine duplicate these remarkable faculties of the human eye and brain?"* Over the past several years the FBI has pursued a program of research and development in an effort to find the answer to this question. The purpose of this paper is to report the progress we have made to date in resolving the question.

The FBI's decision to undertake a program of research and development was prompted by the ever-increasing demands being placed upon the FBI's Identification Division for fingerprint processing services. Since its establishment in 1924 as the nation's clearinghouse for fingerprint records, the volume of fingerprint card submissions has grown until now the Division receives between 20,000 to 30,000 fingerprint inquiries each day which must be searched against a file of arrest fingerprint cards representing approximately 20 million persons. This enormous task is presently accomplished manually by a staff of fingerprint technicians and clerks numbering over 3,000.

In order to meet its growing responsibilities and at the same time increase operating efficiency, thereby saving the Government money, the FBI in 1965 decided to embark on a program of research and development to find a way to automate its operations. Early, and wisely, the FBI sought and received the technical collaboration of the National Bureau of Standards. Since that time the National Bureau of Standards has not only participated in planning and monitoring the research program, but has made major technological contributions to the project as well.

STEPS TAKEN TO MEET THE CHALLENGE

The first task undertaken under the program was to examine the problem of automatic fingerprint identification and survey the available technology to establish a logical plan of attack. It was determined that this difficult and complex problem could be broken down into four more manageable components: (1) *reading*, the entry of fingerprint data into a computer; (2) *registration*, the normalization of the fingerprint data to a standard reference position; (3) *classification*, the assignment of the fingerprint data to a class or category for filing and retrieval purposes, and (4) *matching*, the comparison of the distinctive minute characteristics of one fingerprint with those of previously computerized fingerprints for the purpose of identification. Further, it was determined that in view of the technology then available, the two most critical areas to be addressed were reading and matching.

Therefore, in June, 1967, contracts were awarded to Cornell Aeronautical Laboratory, Inc., Buffalo, New York, and North American Aviation, Inc. (now North American Rockwell Corporation), Anaheim, California, to demonstrate the feasibility of automatically reading and recording the identifying characteristics of fingerprints appearing on inked fingerprint cards. The National Bureau of Standards had earlier begun work on devising computer logic and programs that would take the data generated by an automatic fingerprint reader and match it with previously computerized fingerprint data.

By 1969 both Cornell Aeronautical Laboratory and North American had demonstrated the capability of reading fingerprint cards of good quality through the use of optical flying-spot scanner and computer equipment. In 1970, Cornell Aeronautical Laboratory performed additional work to

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demonstrate that such equipment could read fingerprints of poorer quality, e.g., those with smudged or broken ridge structure. By 1970, the National Bureau of Standards had developed and successfully demonstrated computerized procedures for matching fingerprint data read by the Cornell Aeronautical Laboratory and North American experimental model equipment,[1] and had already launched into experiments to devise automatic procedures to register and classify fingerprints.

Based upon these successes, in September, 1970, the FBI contracted with Cornell Aeronautical Laboratory to design and construct prototype automatic fingerprint reader equipment incorporating the theories and procedures developed during the research program.[2] The prototype equipment was completed in August, 1972, and is presently undergoing extensive testing and evaluation at the FBI Identification Division in Washington, D.C.

THE FINDER SYSTEM

The prototype automatic fingerprint reader is called "FINDER," a contraction of *fin*gerprint re*ader*. Figure 1 is a photograph of the actual equipment, while Figure 2 is a drawing of the system with each major unit labeled. A functional block diagram of the equipment is shown in Figure 3.

In Figure 2, an operator is shown sitting at the *card-moving mechanism* loading standard fingerprint cards into card-holding trays. The operator places the trays onto a motor-driven belt which transports them to the scanner reading station. Figure 4 illustrates further details of the card-moving and scanner mechanisms. Each rolled fingerprint is scanned as the card-moving mechanism positions it under the scanner reading head. Once the card is completely scanned, the card tray is returned to the operator for unloading of the scanned card and reloading of a new card.

The *scanner* is a precision flying-spot scanner. This unit utilizes a moving ("flying") small spot of light (approximately .001 inch in diameter) which makes consecutive horizontal sweeps across the fingerprint working its way, line by line, from the top to the bottom of the print. As this tiny beam of light sweeps across the fingerprint, it encounters white (uninked), black (inked), and gray (partially inked) areas. The light beam is reflected when it passes over white areas, it is not reflected by black areas, and it is partially reflected by gray areas. Detectors that are sensitive to light record the variations of reflection encountered and pass this information on to the preprocessor.

The *preprocessor* contains special high-speed computer logic which takes the data generated by the scanner and produces an enhanced representation of the fingerprint. It does this by applying continuity logic to locate fingerprint ridges and then reinforcing their structure by eliminating small breaks resulting from improper inking, pore holes, and other imperfections in the inked fingerprint impression which was scanned; by separating ridges that are blurred; and by eliminating blank and smudged areas. Figure 5A shows a fingerprint as it appears on an inked fingerprint card, and Figure 5B shows the same fingerprint as it appeared on the operator display scope after being enhanced by the preprocessor.

The preprocessor uses the enhanced fingerprint representation to derive two types of information: (1) *ridge direction data*, which are later used for registration and classification purposes; and (2) *minutiae data*, which are subsequently used for matching purposes. The preprocessor collects ridge direction data by sampling the average direction of ridge flow at selected intervals across the print. Figure 6 shows the enhanced fingerprint representation with ridge direction data superimposed, as seen on the operator display scope.

The preprocessor also uses special detection logic to collect information regarding the distinctive minute details of the fingerprint, which are called "minutiae." Information on two types of minutiae is collected by the preprocessor—ridge endings and bifurcations (forks) in the ridges. The locations of these minutiae in an X-Y coordinate system and the angles (θ) they make in relation to the X axis are determined and recorded. This coordinate system is illustrated in Figure 7 using a ridge ending; however, since if one examines the negative of a photograph of a fingerprint, a bifurcation appears as a ridge ending, the same coordinate system can be and is used for bifurcations. Figure 8 shows a graphic plot of minutiae detected by the FINDER system. Figure 9 shows an enhanced fingerprint as seen on the operator display scope of the system with each recorded minutia indicated by a small white circle. Note that smudged areas at the top and bottom of the print have been edited out to avoid false minutiae detections in those areas. The preprocessor passes the detected ridge direction and minutiae information data (X, Y, and θ measurements) on to the computer. The preprocessor accomplishes all its

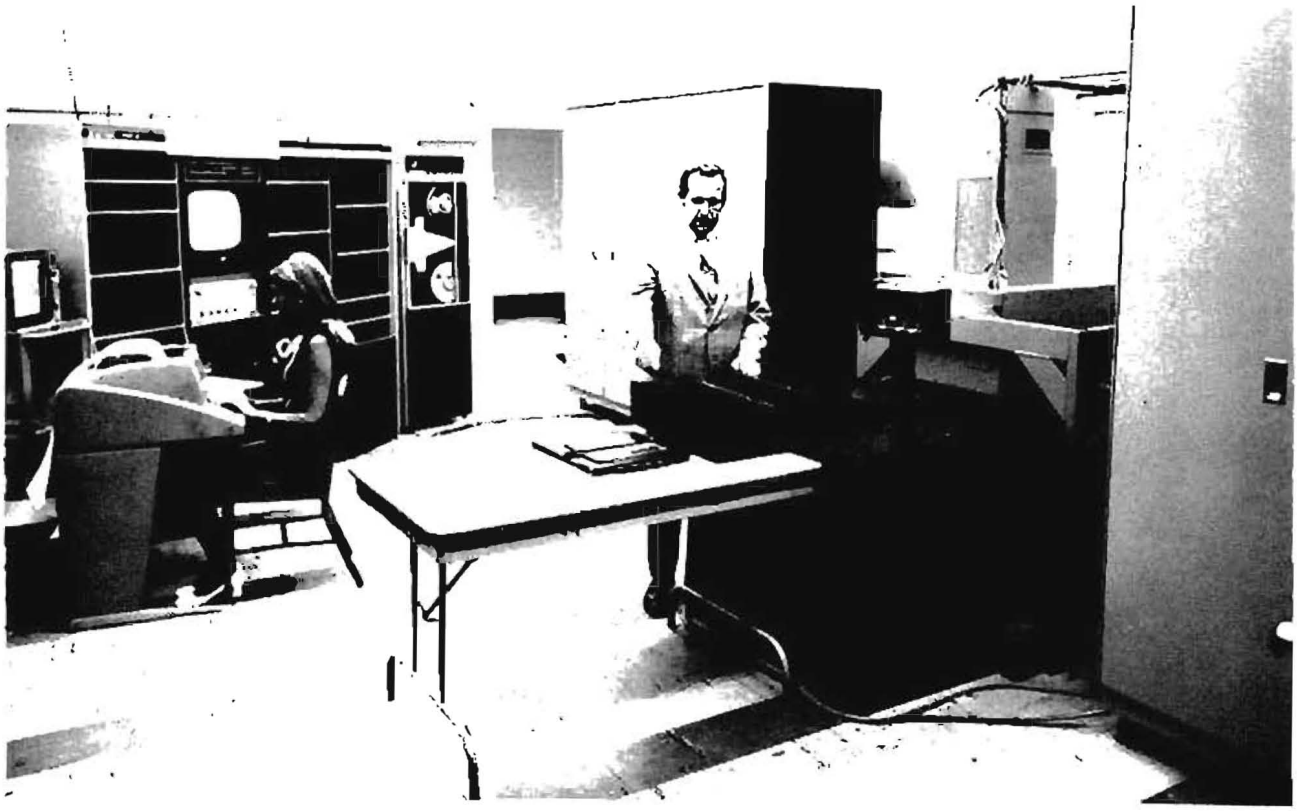


Figure 1 PHOTOGRAPH OF FINDER SYSTEM

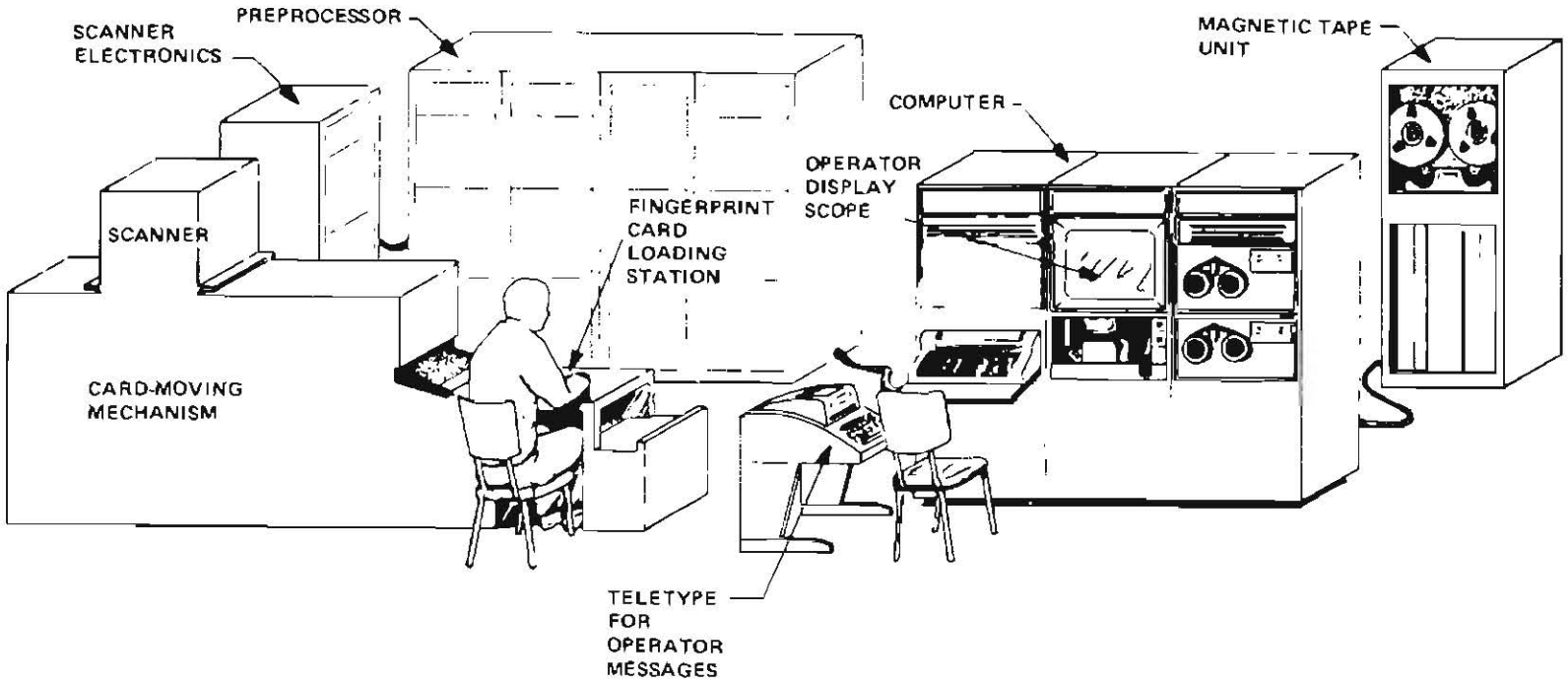


Figure 2 DRAWING OF FINDER SYSTEM

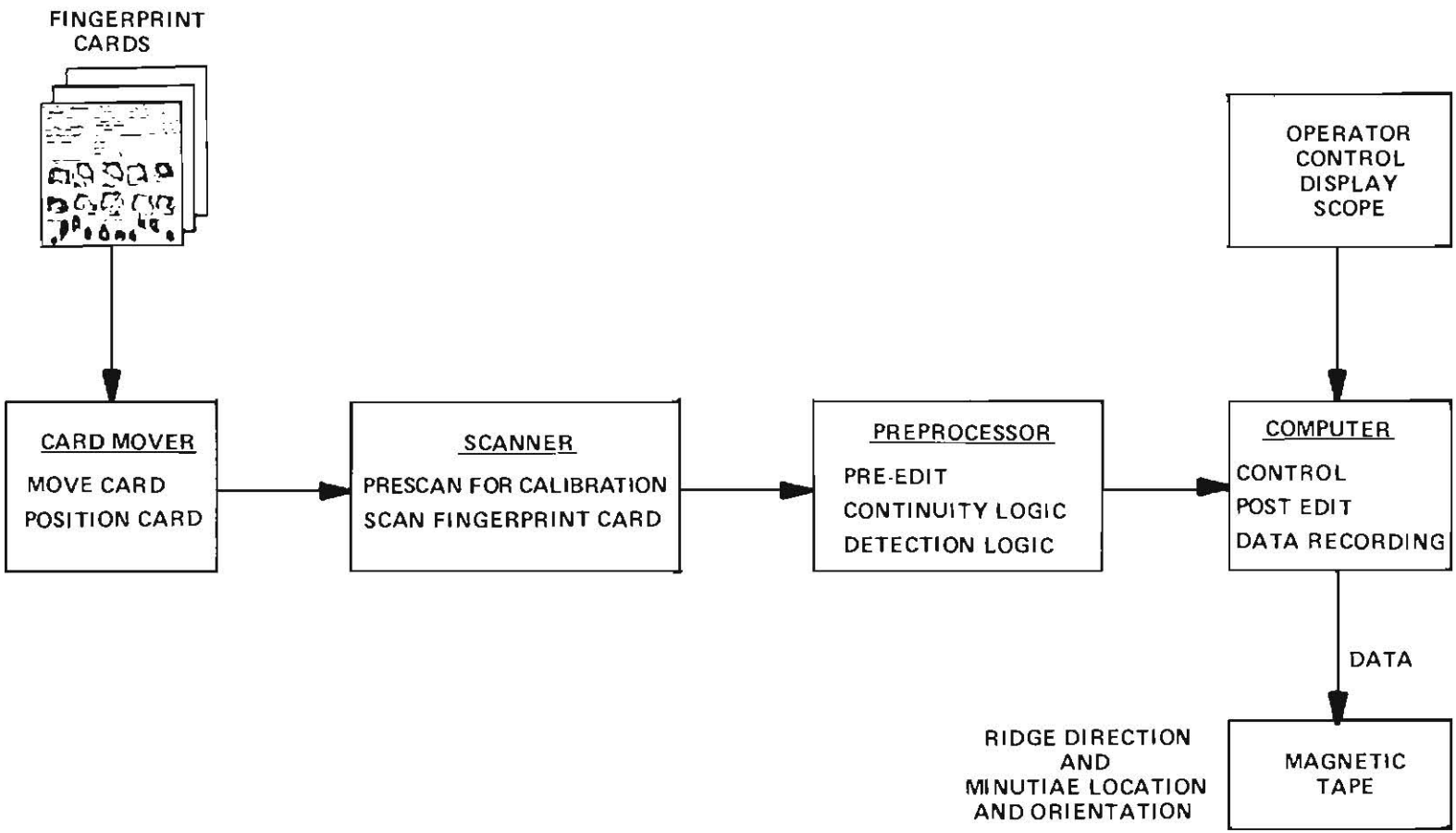


Figure 3 FUNCTIONAL BLOCK DIAGRAM OF FINDER SYSTEM

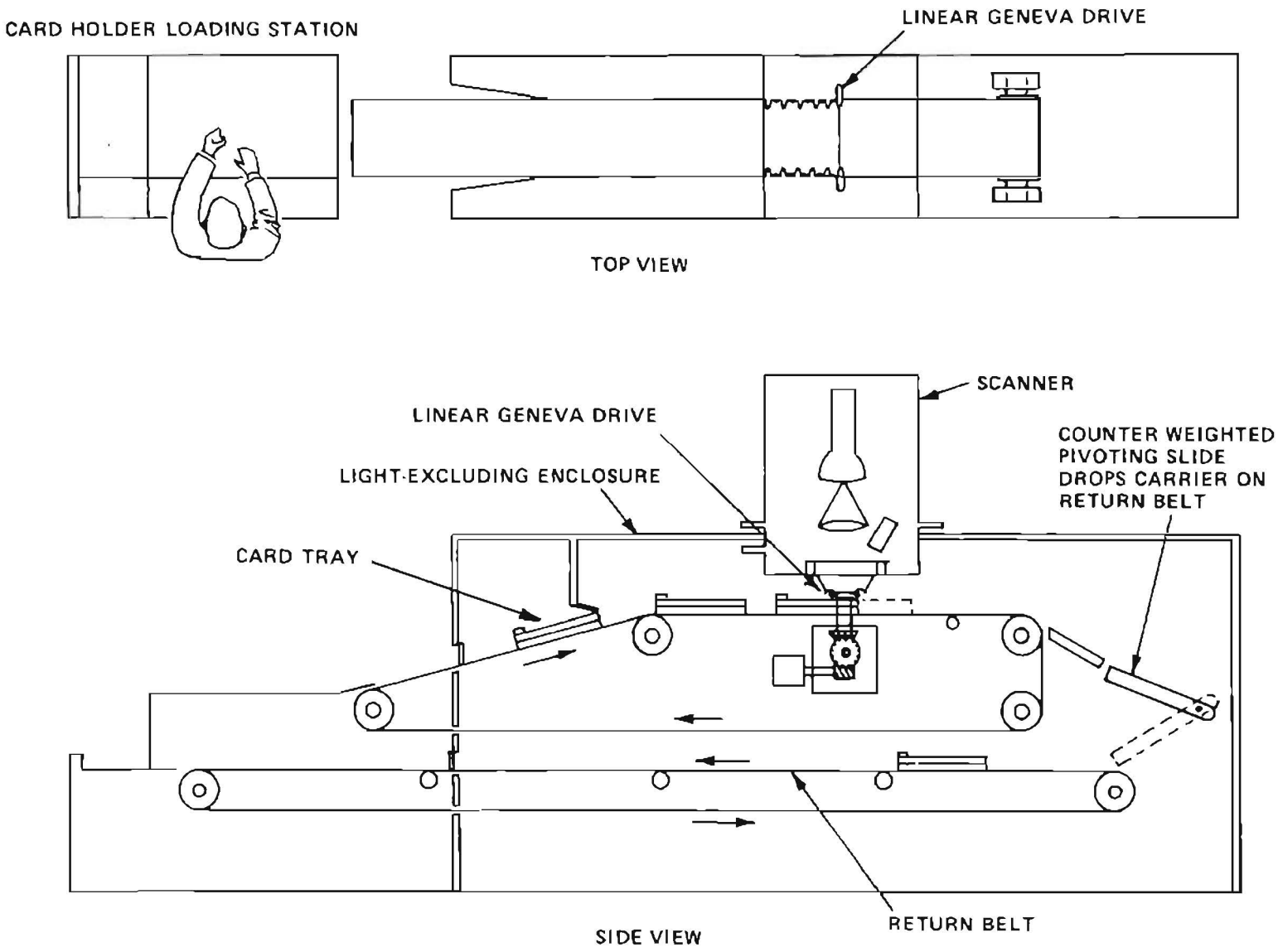
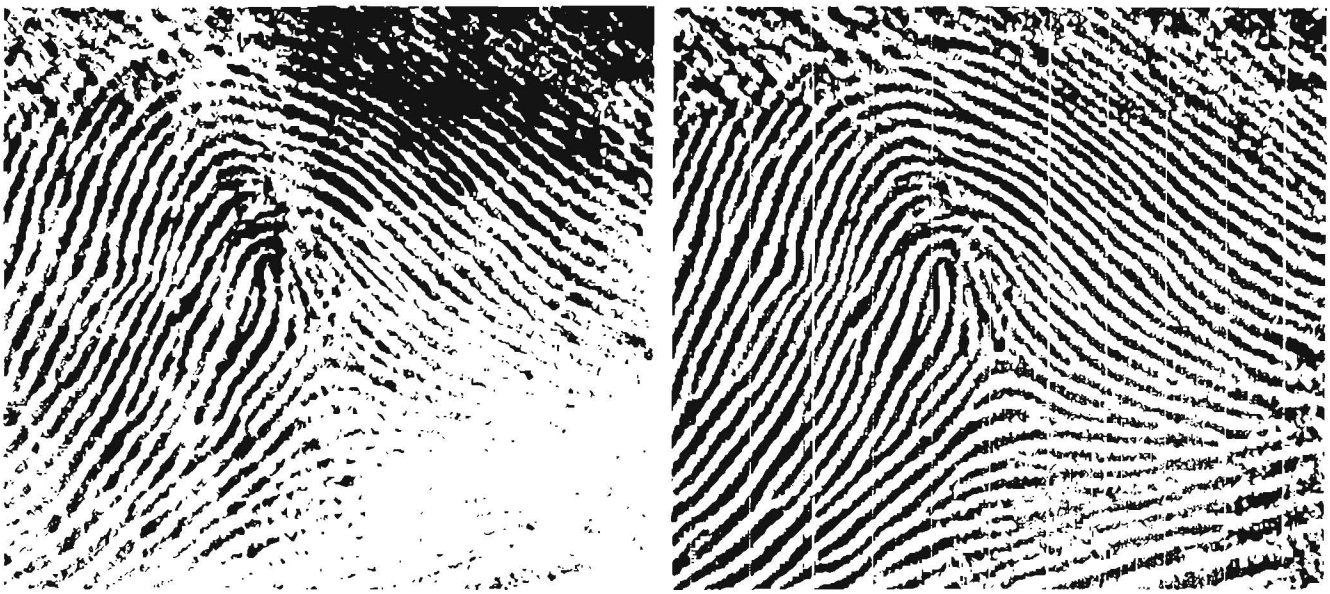


Figure 4 FINDER SYSTEM CARD MOVER AND SCANNER



A. INKED FINGERPRINT

B. ENHANCED FINGERPRINT

Figure 5 COMPARISON OF INKED PRINT AND ENHANCED PRINT SHOWING ENHANCEMENT OF RIDGE STRUCTURE BY PREPROCESSOR

functions in an average one-half second per fingerprint.

The *computer* performs certain post-edit functions on the data it receives and records them onto magnetic tape for subsequent processing. The computer also performs the task of controlling the system's processes from the time a card is loaded into the card-moving mechanism until the fingerprint data read from the cards are finally recorded onto a magnetic tape.

COMPUTERIZED FINGERPRINT REGISTRATION, CLASSIFICATION, AND MATCHING

The magnetic tape containing the data collected and recorded by the FINDER system is next taken to a general purpose computer where the tape is processed by programs that register, classify, and match the data. The logic and procedures used in these programs were developed by the National Bureau of Standards.

The first processing task performed is that of *registering*[3] the fingerprint data to a standard reference position. This step is required before any meaningful classification or matching can be accomplished. This is because the manual procedures used in recording inked fingerprints result in variances in the location and angle orientation of the prints in the fingerprint blocks on the cards. The registration program uses the ridge direction data output of the FINDER system to compute a center point for each print and the angle through which the print must be rotated. These registration values are then used to translate and rotate both the ridge direction and minutiae data to a standard position.

The next step in the processing is *classification.* In this process the computerized fingerprints are assigned to preestablished classes or categories by which they can be addressed for filing and retrieval purposes. The use of a classification system precludes the necessity of searching the entire file each time a search is conducted, since through its use only that part of the file with the same classification needs to be searched.

The classification system presently under development uses the ridge direction data output of the FINDER system. Since the ridge direction data describes the contour of the ridge flow of a fingerprint, the data can be compared with a selection of basic fingerprint patterns to determine the pattern type of a questioned fingerprint. This procedure has been successfully used to identify fingerprints as whorls, arches, and ulnar and radial loops. From such a procedure it is apparent that the manual Henry classification system could be duplicated in several aspects. However, the wealth of information available in the ridge direction data holds promise of a great range of classification systems, ranging from a ten-finger scheme like the Henry system to entirely new systems using less than ten fingers.

After the registration and classification processes are performed, the ridge direction data are no longer needed. Therefore, they are discarded and only the classification codes and the minutiae data are retained for filing and matching purposes.

The final processing step is to *match* (i.e., compare) the retained data with computerized fingerprint data already on file. The classification codes previously derived from the search card ridge direction data are used to retrieve candidate file data with the same class codes. The specific data used for the matching process are the minutiae location (X, Y) and angle (θ) outputs of the FINDER system, as modified by the registration program. The matching program uses a statistical scoring procedure to determine the degree of correlation between the X, Y, and θ measurements for minutiae appearing in a candidate file fingerprint and those of a search fingerprint.

First the X, Y, and θ measurements of all minutiae in a candidate file fingerprint are subtracted from the corresponding measurements of the search fingerprint, giving the differences ΔX, ΔY, $\Delta\theta$. Only those pairs of minutiae which produce differences that satisfy previously set parameters for ΔX, ΔY, $\Delta\theta$ are given further consideration in the matching procedure. Those ΔX, ΔY, $\Delta\theta$ values that qualify are next examined in regard to how they would plot in relation to each other in space. Such values resulting from subtractions of minutiae involving nonmatching file and search fingerprints tend to plot as random points in space, while those from matching fingerprints tend to plot in one area as a cluster of points. The matching program is written to determine the presence of a cluster and to assign a score based on the density of the cluster. The higher the cluster score, the greater the probability of having achieved a match.

The described matching procedure has been used successfully with both manually recorded and machine read minutiae data from both rolled and plain fingerprints. Further, it has been demonstrated to be relatively unaffected by normal distortion of the fingerprints and by the presence of some uncorrelated minutiae caused by false detections or undetected true minutiae.



Figure 6 RIDGE DIRECTION DATA DISPLAYED OVER ENHANCED FINGERPRINT

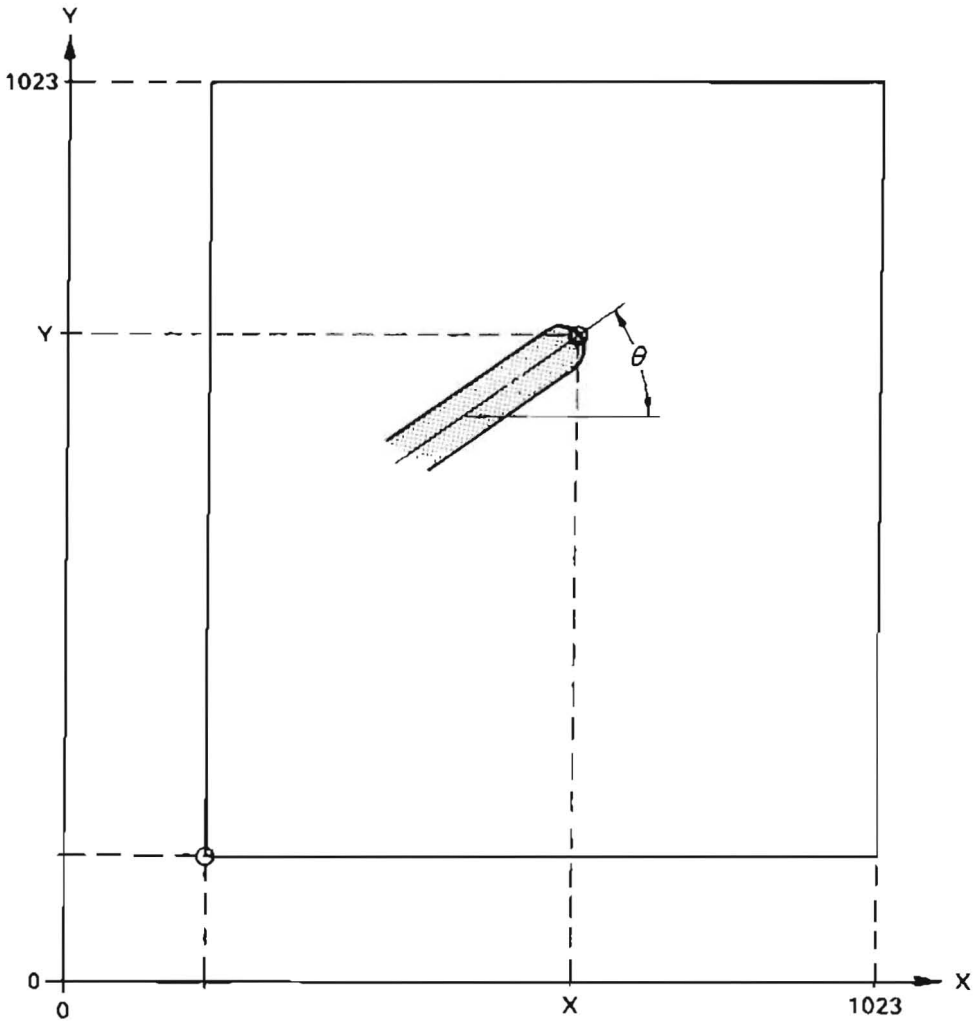


Figure 7 COORDINATE SYSTEM FOR MINUTIAE DETECTION AND LOCATION

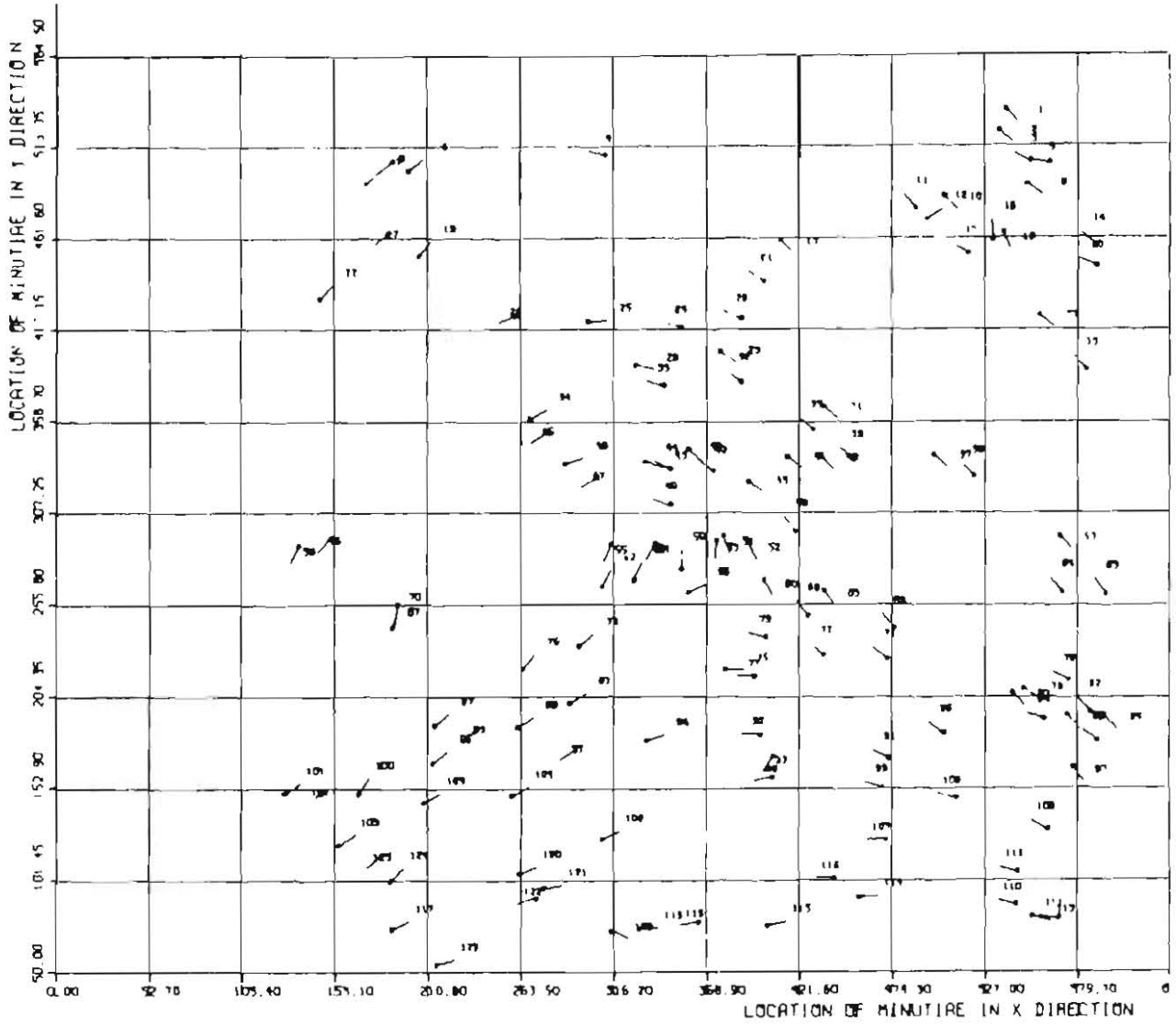


Figure 8 PLOT OF MINUTIAE FROM FINGERPRINT



Figure 9 ENHANCED FINGERPRINT WITH MINUTIAE DETECTIONS CIRCLED SHOWING PRE-EDITED AREAS AT TOP AND BOTTOM

In running the matching program on a general purpose computer (UNIVAC 1108), it has taken on the average a little less than one-tenth of a second to compare a pair of fingerprints. As this processing speed is too slow for searching any appreciable number of fingerprints, plans call for the development of a specially built processor which will perform the comparisons at a much higher speed. Preliminary designs have been drawn up for possible processors which would have the capability to perform fingerprint comparisons at speeds ranging from one comparison in one-thousandth of a second to a device which, if required, would perform a comparison in a few millionths of a second.

THE ENVISIONED FUTURE AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM

The FINDER system has been designed to process ten-finger fingerprint cards. This is because FINDER is intended to be the prototype of eventual production model equipment which will be used to process the large quantity of fingerprint cards received daily at the FBI Identification Division. Figure 10 is a simplified functional block diagram of the future automatic fingerprint card processing system as currently envisioned.

As depicted in Figure 10, all fingerprint cards received will first undergo a computerized name search. This processing step corresponds to the name search procedure practiced in the manual records system presently employed at the Identification Division and is utilized for the same purpose. Experience in the manual system has shown that because of the high percentage of recidivism by criminals, it is cost/effective to perform a search of the names and other descriptive data appearing on incoming fingerprint cards against a name index file compiled from previously received arrest cards. A name search which leads to a positive match avoids the more complex and costly search by fingerprint characteristics. However, in order to insure the accuracy of such matches, each name search match must be verified by having a fingerprint technician visually compare the fingerprints on the search card with those on the matched prior arrest card.

Fingerprint cards that are not matched to prior arrest records by the computerized name search procedure, and those cards matched to records by name searching but failing subsequent visual fingerprint verification, will be sent on to the automatic fingerprint identification system for processing. Other inputs to the system are the general descriptive data (i.e., age, sex, etc.) previously digitized for use in name searching, but which can now be used to limit searches to special subdivisions of the computerized arrest fingerprint file.

The automatic fingerprint identification system will consist of several production model version FINDER fingerprint reader systems, a special purpose high-speed minutiae matching processor, a mass data storage and retrieval system, one or more medium- to large-scale general purpose computers, and related control and interface units. Fingerprint cards that are to be searched will be fed into fully automatic card-handling units of the fingerprint reader systems. Each fingerprint reader will scan all or a preselected number of fingerprints on the cards, extracting both the minutiae and ridge direction data from each fingerprint scanned. These data are passed on to a general purpose computer which utilizes the ridge direction data to register (i.e., normalize) the measured values of both the minutiae and ridge direction data to a standard positional reference system. The general purpose computer next derives classification codes from the registered ridge direction data and the general descriptive data. The resulting classification codes are then communicated to the mass data storage system for retrieval from the fingerprint minutiae file of all sets of minutiae data that fit the same classification codes.

The candidate sets of fingerprint minutiae retrieved from the file and the registered minutiae of the search fingerprint card are next sent to the special purpose high-speed minutiae matching processor, or "matcher." The matcher uses a statistical scoring scheme to measure the degree of correlation between the minutiae values of each fingerprint of the candidate file cards and those of the fingerprints of the search card. If a high degree of correlation is found between the minutiae values of a file fingerprint and a search fingerprint, a high matching score for the two fingerprints will result. These one-against-one matching scores calculated by the matcher are then transmitted to the general purpose computer. The computer selects candidate file cards that received consistently high matching scores on all ten, or other predetermined number of fingerprints, and combines the scores in such a way that the candidate file card that matched the search card with the best overall score will be identified as the match.

The automated fingerprint identification process will terminate with a verification step to insure the accuracy and integrity of the system. Present plans call for this step to be performed by a fingerprint

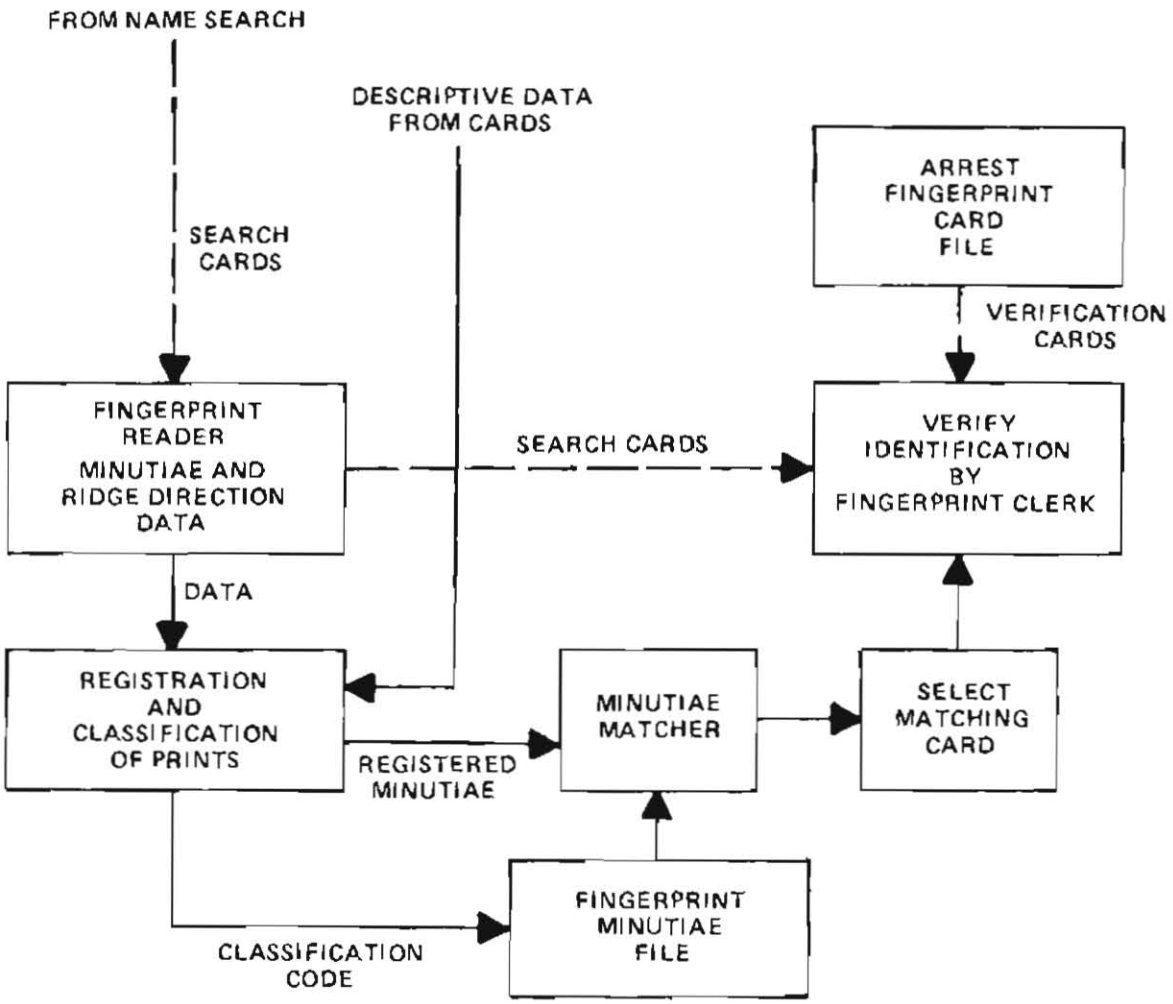


Figure 10 FUNCTIONAL BLOCK DIAGRAM OF THE AUTOMATIC FINGERPRINT IDENTIFICATION SYSTEM

technician who will conduct a visual comparison of the fingerprints appearing on the actual search card with those on the actual file fingerprint card that was identified as a match by the automated system. This is a duplication of the verification procedure presently practiced in the manual system; however, it is possible that at some future time an automated verification procedure will be developed and adopted.

CONCLUSION

It is apparent from the foregoing that much progress has been made toward finding the answer to the question of whether a machine can duplicate the fingerprint processing capability of the human technician. But, however tempting it might be to answer the question now in the affirmative, based upon the successes achieved in experiments to date, we feel compelled to refrain from doing so as it must be recognized that the experiments represent limited samplings and were conducted under laboratory conditions rather than production work conditions. Much additional research work remains to be accomplished before we will acquire the confidence to supply a conclusive answer.

However, with the acquisition of actual automatic fingerprint reading equipment, we have hastened the day when we will be in a position to supply a definite answer to the question. This is because the equipment provides us with the means by which we will be able to test thoroughly, evaluate, and perfect our theories on automatic fingerprint identification. For example, before we acquired the FINDER equipment we were unable to generate a large number of computerized fingerprints for use in experiments without incurring exorbitant processing burdens and costs. It previously took 1¾ hours for an IBM 360/65 computer to perform the functions that are now performed by the preprocessor unit of the FINDER system in one-half second. With the FINDER system we can now generate data bases of computerized fingerprints of whatever size required and this can be done economically.

As previously indicated, construction of the FINDER equipment was completed in August, 1972, and the equipment is presently at the FBI Identification Division in Washington, D.C., where it is undergoing extensive testing and evaluation. These tests include experiments to evaluate how well the FINDER equipment performs its assigned functions as well as experiments designed to evaluate and perfect the computer programs that are used to register, classify, and match the computerized fingerprint data generated by the reader equipment. We are unable to predict at this time how long it will take to complete this evaluation phase; however, it is clear from the complexity of the subject matter that a prolonged time period is involved. Further, our plans and timetable for the implementation of production model fingerprint processing equipment in the FBI Identification Division will depend, of course, upon the successful testing and perfection of the FINDER system.

Although the equipment is presently designed to process ten-finger fingerprint cards with the objective of reducing the amount of time and manpower presently expended in processing fingerprint inquiries at the Identification Division in Washington, D.C., we see even greater potentials for the equipment. One such potential is the possibility of searching latent fingerprints (i.e., fingerprints found at the scene of a crime) against the computerized fingerprint file. Traditionally fingerprint cards have been manually filed using ten-finger classification schemes, such as the Henry system. This has meant that in order to search efficiently the manual card file, information from all ten fingers is required. Consequently, it is not feasible to search a single latent fingerprint against a ten-finger manual card file of any significant size. The only alternative available to date has been to establish special single fingerprint files of necessarily limited size which are more amenable to searching latent fingerprints. But, preliminary studies indicate that, although latent fingerprints are not usually themselves readable by automatic fingerprint reader equipment because of their frequently poor quality and fragmentary nature, they can be coded through the use of manual or semi-automated equipment[4] and then searched against a ten-finger file of computerized fingerprint data produced by the FINDER system. The potential here not only involves a reduction of manpower effort with concomitant cost savings, but also involves a dramatic new capability to identify criminals who have heretofore gone undetected.

Another potential lies in the possible use of automatic fingerprint reader equipment as a means for transmitting fingerprint card data over long distances. There is presently a great deal of activity in the law enforcement community directed at finding ways to increase the speed by which information is communicated within the criminal justice system. Facsimile equipment is presently being employed, or considered, by several agencies as a means of increasing the speed of transmitting

fingerprint card data. Until now the main impediment to the wide use of facsimile for such purposes has been the high cost of the communication facilities required to support high-resolution equipment. Since the FBI's automatic fingerprint identification system requires only certain selected data from fingerprints for registration, classification and matching purposes, complete fingerprints need not be transmitted to perform fingerprint identifications, as is the case with facsimile devices. Consequently, less data are required to be transmitted, resulting in shorter transmission times; and, since the data are in digital rather than analog form, they can be transmitted over less expensive, lower grade communication lines. This suggests that it may well be possible some day for distant law enforcement agencies to possess remote fingerprint reader terminals which would extract the needed characteristics from fingerprints and transmit them to the FBI Identification Division over the National Crime Information Center communications network for on-line searches of the FBI computerized fingerprint file.

The realization of these and other potential capabilities would result in immeasurable benefits to all of law enforcement. Our former FBI Director, the late John Edgar Hoover, assessed the value of a fully automated fingerprint identification system in these words, "Eventual success in this project will constitute the most significant advance in law enforcement since the adoption of fingerprints as a means of identification."[5] We believe you will agree.

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PERSONAL IDENTIFICATION – PRESENT AND FUTURE

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and

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BACKGROUND AND PROBLEM

The State of New York has developed a statewide information sharing system for all criminal justice and law enforcement agencies in the State. The New York State Identification and Intelligence System (NYSIIS) was created in 1965 to implement and maintain this system. NYSIIS is now a part of New York State's newly created Division of Criminal Justice Services. As one of its projected ongoing capabilities, NYSIIS has been evaluating the feasibility and efficacy of creating and supporting, at the state level, a computer processed data base, structured upon individual personal appearance attributes or descriptors. A viable capability of this type could extend immeasurable assistance to local law enforcement agencies in the rapid and reliable identification of unknown suspects, particularly where they might not be known to that jurisdiction. Therefore, NYSIIS initiated a study of the Personal Appearance aspects of the identification process early in 1965 as one of its initial research programs. To obtain an accurate assessment of this area of the law enforcement methodology, the study was conducted on a statewide level.

As a result of this study, it was concluded, in part, that a need exists for personal appearance data to assist in the investigative process, but the effectiveness of most of the current personal appearance methodologies was generally low. It was also concluded that automating any of the existing personal appearance data systems will probably not result in a commensurate improvement in effectiveness; and that the foundation for any new personal appearance data system must be established by scientific research beginning with the witness.

WHERE WE STAND AT PRESENT

The work by NYSIIS also served to identify where we presently stand as to major areas of deficiency in personal appearance data systems. A few are broadly enumerated as follows:

1. Limited base files for photographic identification existed at most local law enforcement agencies.
2. Many descriptors used to catalogue individuals for record purposes often were not meaningful for identification purposes.
3. There was a lack of standardization of descriptors, with little agreement found among law enforcement people as to what constitutes adequate description.
4. There was a lack of universal method for classifying facial elements.
5. There was a lack of uniform photographic quality for mugshots.
6. There was a lack of additional stimuli about suspects, such as voice and movement.
7. There was a lack of training of witness interviewing.

As a result of these preliminary studies, it appeared that the automatic processing of personal appearance data was feasible and desirable. A research program was then formulated with the objective of acquiring the necessary data to support any development of a personal appearance module.

The objectives of this program were to review studies and methods aimed at achieving an understanding of how people recognize or identify others on the basis of personal appearance. Cornell Aeronautical Laboratory (CAL) was then contracted to assist NYSIIS in achieving the objectives of the research program. This work is reported in detail in a book by Zavala and Paley, 1972, and identifies where we presently stand in terms of completed research. Here is a brief summary of the results of that work.

Following a literature review, three experiments were performed to learn how well people can identify others from mug shots. Those studies showed that:

1. To identify a person after seeing him for the first time, it is better to know in advance that the identification will have to be made.
2. The more time spent looking at a person, the better one can identify him.
3. The greater the number of mug shots one must scan, the lower is the likelihood he will make an identification. People get poor at this task after looking at about 40 mug shots.
4. Some people are easier to identify than others, because they have one or more distinctive features.
5. When a witness has a high level of confidence in his identification, he is more likely to be correct than not.
6. There is not much difference between portrait shots and front view mug shots in helping a witness identify a suspect.
7. Black witnesses do about as well in identifying White suspects as Black suspects. But White witnesses do better with White suspects than with Black.

After those three experiments, another three were conducted to learn which specific facial features and characteristics people use in identifying suspects. The data were quantified and factor

analytic techniques were used to analyze the data. We learned that:

1. People most often look at the nose, eyes, face shape, hair color, chin, eye color, mouth, complexion, eyebrows, and ears, respectively, when identifying suspects from mug shots.
2. Features that good witnesses (identifying suspects) use, but which poor witnesses do not, are facial markings, ears, eye color, and teeth.
3. Features that poor witnesses use, but good witnesses do not use include, complexion, lips, general appearance, weight, facial features (unspecified), eyebrows, hair color, intuition, and eyes (unspecified).
4. The specific characteristics of features that people can categorize.

These were found to be consistent with results obtained by others (e.g., Penry and Bledsoe) working in the area who used non-quantitative methods of study. Our results have the added advantage that, with the quantitative results, an alphanumeric coding system could easily be derived, facilitating the incorporation of personal appearance data into automated information storage and retrieval systems, and allowing for long distance narrow bandwidth data transmission. Automatic facial composition could also be easily developed to replace existing manual compositor systems.

Following these studies, three more studies were performed to examine the value of using video tape for mug shots. Video tape has a number of obvious advantages over still photography, such as sound or talking, and movement, so we wanted to examine these differences. From a review of the literature in the area of talker recognition, it was learned that factors used by listeners to identify male talkers are:

1. the degree to which the talker's voice appealed to the listener;
2. the roughness of the talker's voice;
3. the magnitude of masculinity of the talker's voice; and,
4. the degree of anxiety of the talker which the listener sensed.

Also, from these studies a set of criteria were established for utterances to be made by suspects who were photographed onto video tape as part of the booking process. These criteria were:

1. The utterances should include the most frequently used elements (phonemes, individual sounds) in English language.
2. The utterances should not take too long to administer and yet should not be too limited a sample of speech.
3. The utterances should be simple as to intellectual demands made upon the suspect, but not be too simple, because the suspect may then balk at making them.
4. The utterances should reveal the ways in which the suspect pronounces words, his intonations, or any accents he may have. However, the content of the utterances should not reveal biographical data about the suspect.
5. The utterances are recommended for use in all cases in which booking interviews are recorded which include the audio recording of what the suspects says.

We found that having the suspect count from one to ten and recite the months of the year meet these criteria adequately.

In the next two studies, we compared the utility of black-and-white video tape versus black-and-white and color still mug-shot photography. The results showed that witnesses can identify suspects better from black-and-white video or from color still photography than they can from black-and-white still photography.

WHAT WE SEE FOR THE FUTURE

Where we stand as to the future is that a need exists for an automated personal appearance data capability. The basis for standardized and quantifiable descriptors for personal appearance classification exists. These descriptors could be used for file searches as well as for automatic facial compositing. Also, video tape methods can be used to incorporate movement and speech along with other identification parameters. The basis for training potential victims/witnesses to do better at making identifications also exists. Potential victims/witnesses include store clerks, bank tellers, and gas station attendants. Novice police officers could also benefit from such training.

Where we can go from here is based on the key factor of being able to store information digitally. Digitally coded information permits: 1) large volume storage; 2) random access; 3) inexpensive and rapid long distance data transmission; and, 4) data manipulation such as file maintenance, file search, statistical compilation, and facial feature compositing. In line with this key factor of digitally coded data to represent qualitative, photographic types of information such as personal appearance, is the need for a convenient means for entering such data into an automatic system.

CAL has been working on the problem of a convenient digital input for personal appearance data. The goal of this work is to implement our techniques in a pilot search and retrieval system and to evaluate the feasibility of the technique. The key elements of the system are, of course, the set of facial feature measurements and the encoding of these measurements into a characterization of a mug shot set (i.e., front face and profile). The major system functions are shown schematically in the flow diagram and graphically in Figures 1 and 2, respectively. The five functions are: 1) locate key points on mug shot; 2) calculate distances and angles; 3) encode measurements into characterization of mug shot set; 4) search mug shot file; and, 5) retrieve tentative matches. For the feasibility

work, we are using only a few arbitrary items of data: 1) identification number; 2) pose number (front face, profile, or stand-up); 3) face-shape (square, oval, round, or triangular); 4) interocular distance; 5) length of nose; 6) angle between eyes and nose; 7) length of head (i.e., top of head to chin); 8) width of head, ear-to-ear; 9) length of mouth; 10) year of birth; 11) sex; and, 12) race. A small file of data sets has been made to test equipment concepts and search algorithms. This work is very preliminary in nature and requires thorough study and evaluation toward its final development. Some of the questions that need to be answered are:

1. Are the feature measures adequate?
2. How well do the characterization and matching techniques work?
3. What is the system error rate?
4. What improvements can be made to the system?
5. Will the system work for a large data file?

We think that the answers to these questions will be favorable, and where we must go from here is to obtain those answers. We also see the training of potential victims/witnesses, and police cadets to improve their capabilities to identify suspects, and the development of an automatic facial compositor that provides photographic quality, is convenient to use, and can be used along with other data such as M.O. and fingerprints to make file searches.

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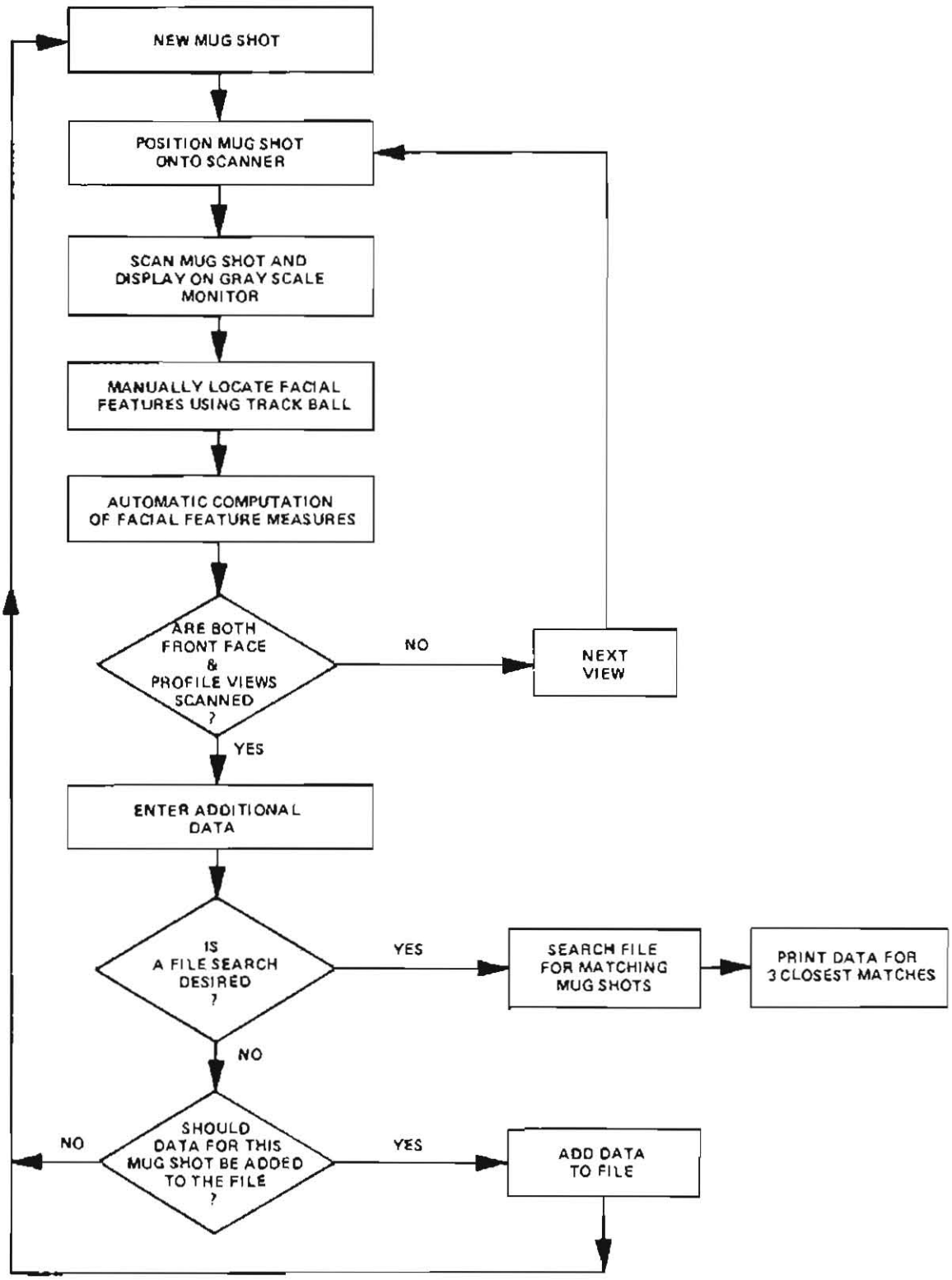

Figure 1 MUG SHOT DATA ACQUISITION AND MATCHING SYSTEM. PROGRAM FLOW DIAGRAM

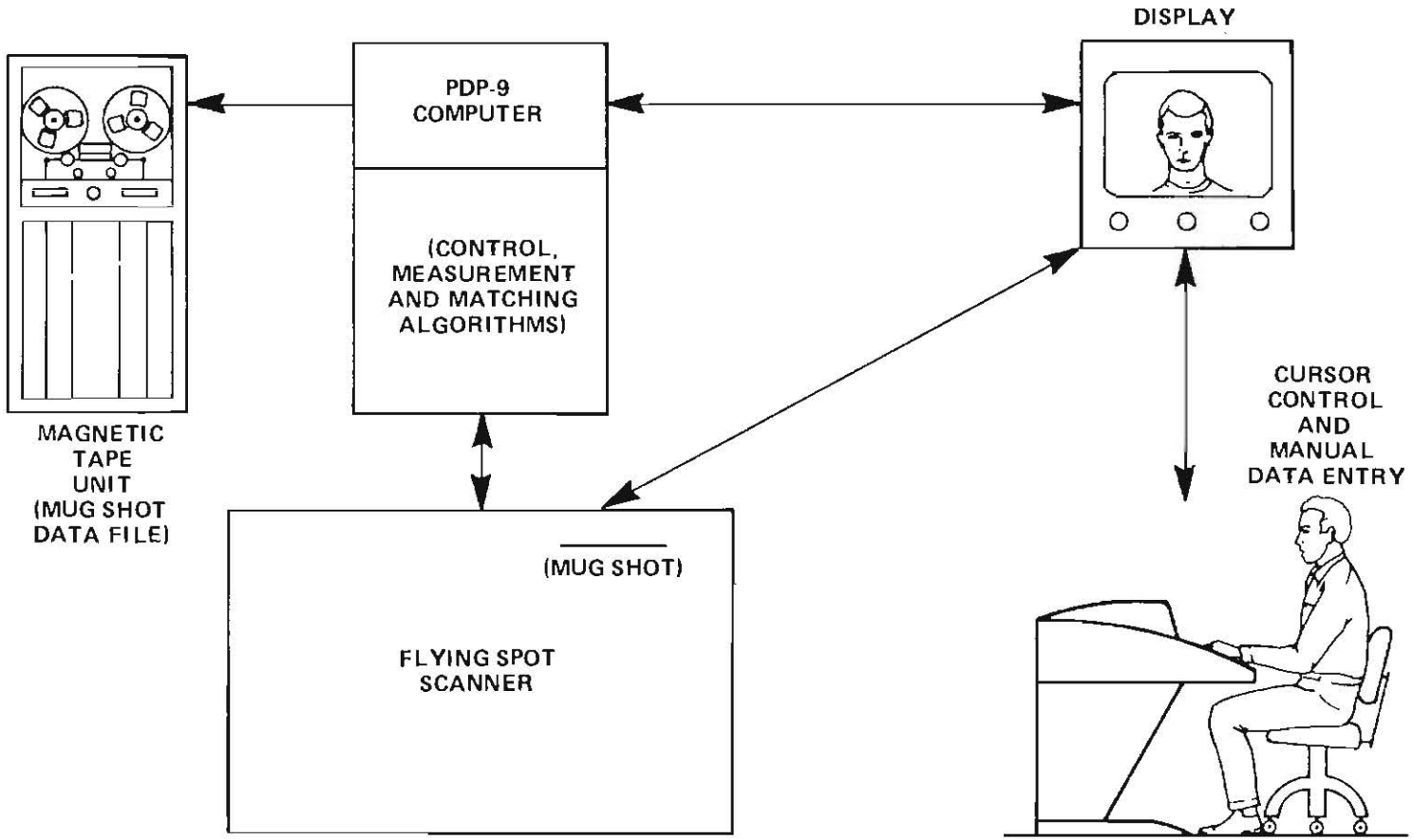

Figure 2 HARDWARE CONFIGURATION FOR THE SEMI-AUTOMATIC MUG SHOT READER

SESSION II F

INFORMATION FOR CRIMINAL JUSTICE PLANNING

Robert E. Crew, Session Chairman
Executive Director
Governor's Commission on Crime
Prevention and Control

The purpose of the panel on "Criminal Justice Planning" was to provide a forum for the presentation and discussion of a variety of mechanisms used in gathering and analyzing data for use in criminal justice planning.

Criminal justice planners have long been plagued by a paucity of complete and accurate information about the operation of the system which they hoped to understand and improve upon. They have also lacked systematic data about the implementation of their programs. These problems have been a function of both incomplete collection of data and the absence of mechanisms and techniques for analyzing the data systematically.

The papers presented at this panel represent some of the pioneer attempts to deal with these two problems. Three of the papers discuss methods of gathering and analyzing aggregate and individual data which can be used in the development of general criminal justice plans and programs. A fourth provides a mechanism for managing information about a particular segment of the criminal justice system; and the fifth provides the managers of criminal justice agencies with some of the data needed to administer their program. All of the papers represent important contributions to the development of the information base needed to attack the problems of the criminal justice system.

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GRANT MANAGEMENT INFORMATION SYSTEM (COMPUTERIZED ASSISTANCE TO GRANT MANAGEMENT)

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Management Consulting Services
Lybrand, Ross Bros. & Montgomery
Detroit, Michigan

GMIS (Grant Management Information System) was the first major effort by a State Planning Agency (SPA) to provide coordinated and computerized *information* needed by management to monitor, evaluate and generally control the total grant management process. By recording, summarizing and reporting information which extends beyond the traditional fiscal control approach to grant administration, GMIS enables management to make informed judgments and provide performance improvement guidance on such matters as program or project effectiveness, cost/benefit analysis, and the establishment of program priorities.

At the outset, GMIS was seen as a management tool, not merely as a data repository – and so was designed to embrace the entire grant management cycle (see Exhibit 1). In its present form, GMIS enables management to:

1. Determine the status of any grant application or grant at any point in the processing cycle from receipt to award or rejection, through project implementation and completion. GMIS replaces an effective, but cumbersome and expensive, manual system.
2. Evaluate the performance of grant recipients by providing information for comparing actual performance with expected performance. From a fiscal standpoint, this means comparing actual costs against approved budgets. From a programatic standpoint, this comparison measures project goals. Monitoring is strictly objective in that it does not impose a "value" or "worth" on the data being monitored.
3. Readily access central, automated files which contain a wealth of data available for routine reports (which, where applicable, satisfy state and federal format requirements) and special reports that management can "order" to satisfy non-routine information needs.

GMIS in its raw form is a series of routine computer reports which provide essential information concerning each element of the grant process: Program Planning, Project Design, Application Development and Review, Grant Rejection/Award, Project Implementation/Monitoring/Evaluation/Audit, and Program Evaluation. Statistical data relating to the overall activity of the SPA is also included in these reports. The system is designed to operate in a remote batch EDP mode. The manner in which these reports become an integral part of the overall grant management process is depicted graphically, in Exhibit 2.

The system can best be understood by analyzing the reports it generates and their intended use by various levels of management. Users have been encouraged to seek new uses for the reports and to suggest modifications which would make the reports easier to work with. Descriptions of the routine reports follow. Their specific content and format are depicted graphically in Exhibits 3 - 17.

Sequential Listing of Applications Received This Year and To Date (Exhibit 3):

This report, a control log for program and fiscal management, facilitates review and evaluation of applications by staff. It enables program management to determine whether applications have been assigned to the appropriate program area, provides a ready reference for funds requested and funds awarded and permits management to gauge the nature and extent of the administrative workload at anytime.

Applications Received To Date, By Applicant Agency (Exhibit 4):

This report serves both grantee management and applicant agencies by providing a handy reference document showing the nature and status of all applications submitted by a given applicant agency. It is intended to improve communications between the applicant agency and the SPA through the use of consistent project identification and standardized terminology. In some instances, the need for personal communication is eliminated, thus providing more time for the typically burdened SPA management. In addition, because the system relies heavily on an application/project identification number, this report provides a handy cross-reference between the project name and the identification number.

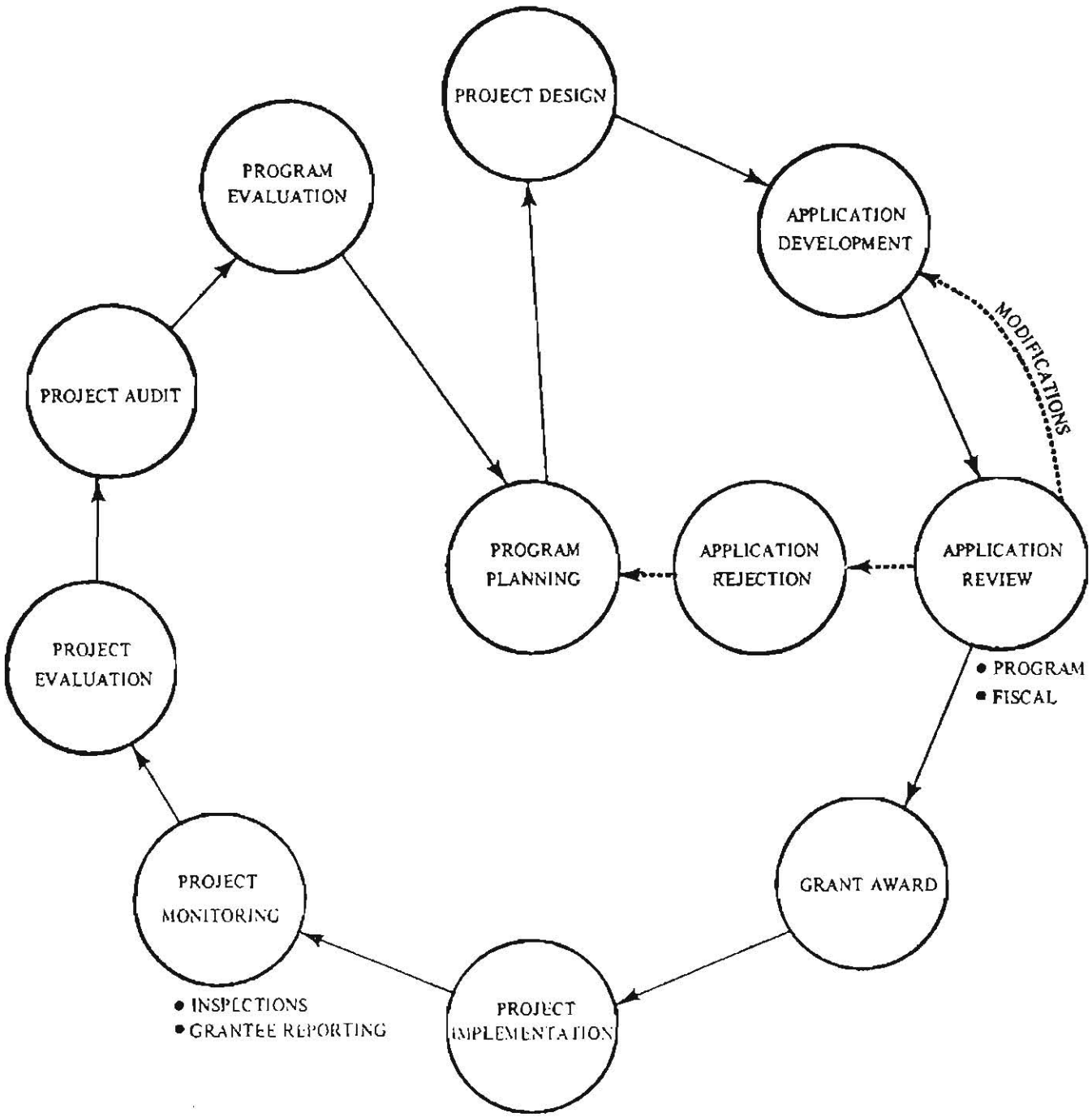
Master Status Report (Exhibit 5):

This report serves as a computerized check list that enables management to determine when each major task in the review process is performed. To

MICROFICHE

Exhibit 1

GRANT MANAGEMENT CYCLE



THE GMIS PROCESS - TOTAL GRANT MANAGEMENT

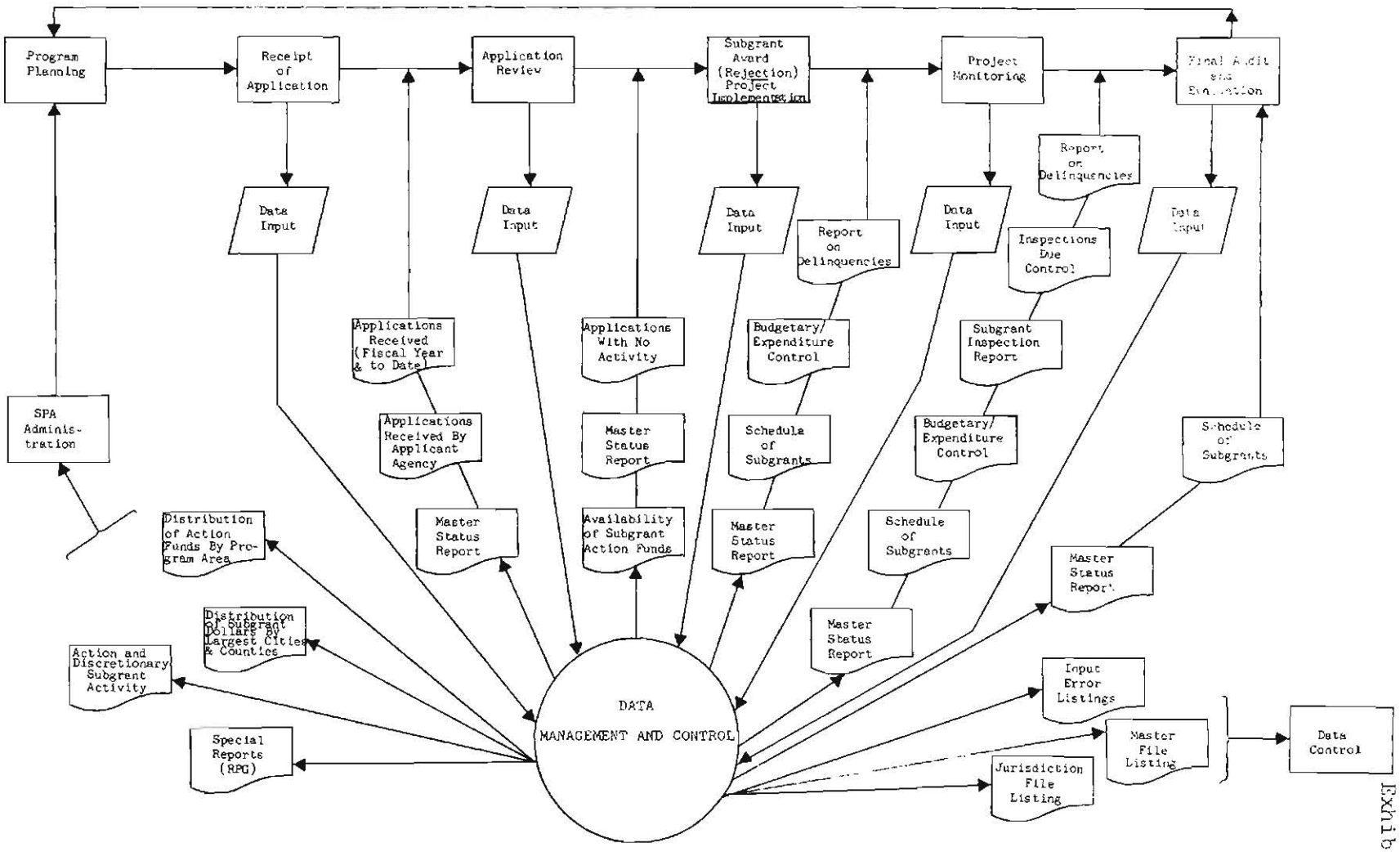


Exhibit 2

SEQUENTIAL LISTING OF APPLICATIONS RECEIVED
(THIS FISCAL YEAR AND TO DATE)

CONTROL NUMBER	APPLICANT'S NAME	APPLICANT AGENCY NAME	PROJECT NAME	DATE APP'L RECEIVED	FUNDS REQUESTED	PROGRAM AREA	PROGRAM MANAGER

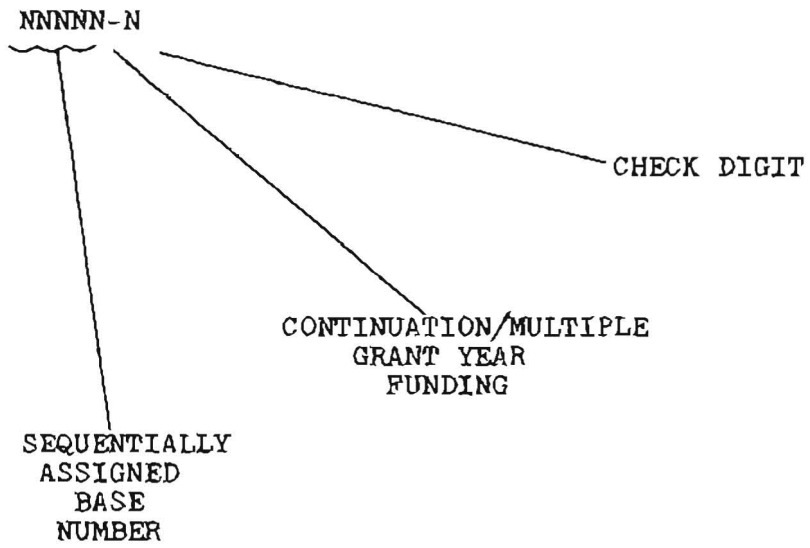


Exhibit 3

APPLICATIONS RECEIVED TO DATE
BY APPLICANT AGENCY

APPLICANT CODE/NAME _____ APPLICANT AGENCY CODE/NAME _____

CONTROL NUMBER	PROJECT NAME	DATE APPL RECD.	FEDERAL FUNDS	OCJP PROGRAM AREA/ OCJP PROGRAM	PROGRAM MGR. NAME	GEN. PROCESSING STATUS
↓	↓	↓	↓	↓	↓	↓

TOTAL FEDERAL FUNDS/STATUS

APPLICATION RECEIVED xx,xxx
APPLICATION UNDER REVIEW
SUBGRANT APPROVED
PROJECT IN PROCESS
PROJECT COMPLETED
PROJECT CLOSED

TOTAL FEDERAL FUNDS xx,xxx

Exhibit 4

facilitate its distribution and use (restricted to those who "need to know"), the report is organized on the basis of source of funds (i.e., action, discretionary, and planning), by program area and by control number.

Applications With No Activity (Exhibit 6):

This report alerts management to applications that are bogged down in the processing cycle. Organized by program area, it pinpoints the last activity associated with the application, thereby giving management a reference point for follow-up.

Report on Delinquencies (Exhibit 7):

This monthly report informs program and fiscal management of the failure by subgrantees to submit required reports (programatic and fiscal) and the failure by SPA personnel to perform required inspections (program, fiscal, final evaluation and final audit). Based on information contained on the report, delinquency notices can be mailed to subgrantees. The report subsequently serves as a control log for recording the receipt of reports and performance of inspections.

Availability of Subgrant Action Funds (Exhibit 8):

This quarterly report helps management determine if there is a need to split an application between more than one Program Area, reallocate Program funds, or utilize available funds from earlier LEAA Grant Years. This determination is cued by the report which shows whether there are sufficient dollars to fund the applications under review.

Budgetary/Expenditure Control (Exhibit 9):

A key monthly fiscal report, it provides fiscal management with a one-page summary of the fiscal activities by each subgrant agency and the information to be reported by the SPA to federal authorities.

Inspections Due Control (Exhibit 10)
Subgrant Inspection Report (Exhibit 11):

Issued on the first day of the month preceding the month during which an inspection is due, these reports provide for control over scheduled inspections and key information (including inspection factors) concerning the project to be inspected. In addition, the Subgrant Inspection Report provides space for the inspector (either program or fiscal) to record the results of his inspection, as well as assign an overall rating to the progress of the project and performance of the subgrantee.

Schedule of Subgrants (Exhibit 12):

This is a local version of a quarterly report to LEAA concerning the SPA's distribution of action funds to subgrantees. It has been formatted to agree with LEAA Report 156A.

Distribution of Subgrant Dollars by Largest Cities and Counties (Exhibit 13):

This quarterly report to senior management shows the distribution of grants to the various cities and counties within the state. Smaller units may be grouped while the largest cities and counties are listed individually.

Distribution of Action Funds by Program Area (Exhibit 14):

This report provides senior management with a quarterly summary (to date) of grants by program area for the three most recent grant years.

Action and Discretionary Subgrant Activity Report (Exhibit 15):

Comprehensive in its coverage, this report provides (on a quarterly basis) senior management with a summary of the subgrant activity and spending in each program area.

Master File Listing (Exhibit 16)
Jurisdiction File Listing (Exhibit 17):

These reports allow data control personnel to determine quickly the status of the master files without accessing the computer files directly. After each update (weekly), new listings are provided for those applications/subgrants affected by the update.

The computer master files contain substantially more information than appears on the routine reports. For most applications and subgrants, the master files contain information on subgrant categories, objectives, procedures, evaluation criteria, project types, and similar classification data. A separate computer file contains information on the allocation of subgrant dollars according to the benefits received or estimated to be received by various entities, regardless of the subgrantee.

SPA personnel can access this reservoir of information by means of a report program generator (RPG) to get such non-routine information as a listing, for example, of all equipment subgrants by city, or to analyze the relationship between success (or failure) of projects and the specific objectives and procedures utilized by those projects.

MASTER STATUS REPORT

SOURCE OF FUNDS (E.G. PART C ACTION)

PRIMARY PROGRAM AREA_____

CONTROL NUMBER	APPLICANT NAME/ APPLICANT AGENCY NAME/ PROJECT NAME	$ REQUESTED $ RECOMMENDED $ AWARDED

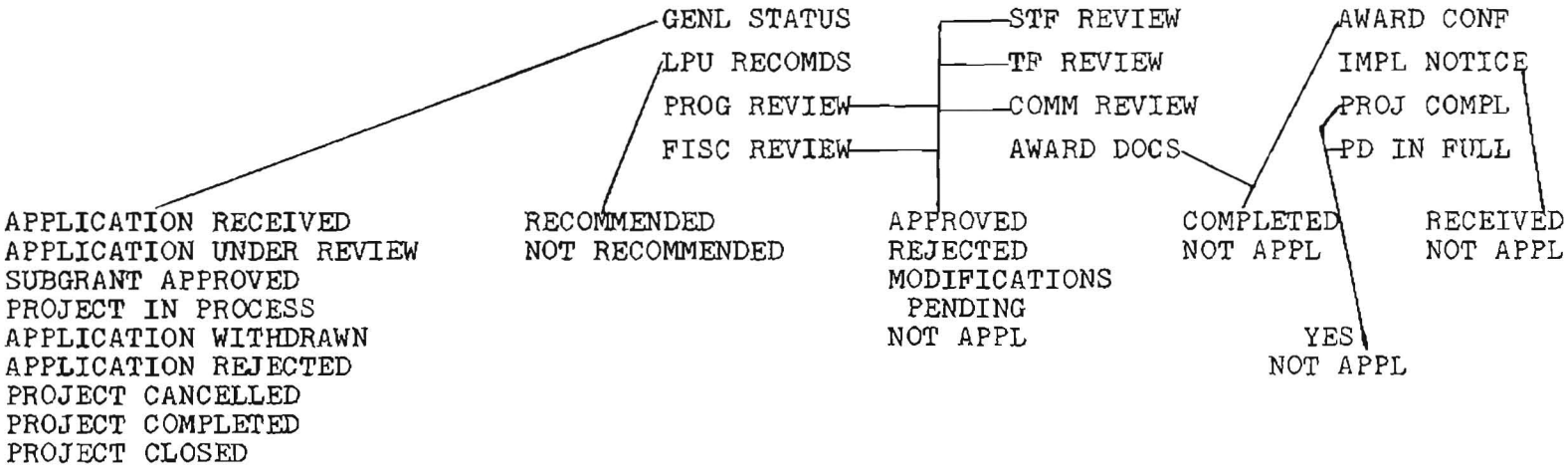


Exhibit 5

APPLICATIONS WITH NO ACTIVITY

PROGRAM AREA_____

PROGRAM MANAGER_____

CONTROL NUMBER	APPLICANT/ APPLICANT AGENCY	PROJECT NAME	DATE APP'L REC'D	DATE PROG. MGR ASSIGNED	DATE OF LAST ACTIVITY	LAST REPORTED ACTIVITY

APPLICATION RECEIVED
ASSIGNED TO PROGRAM MANAGER
PROGRAM REVIEW COMPLETED
FISCAL REVIEW COMPLETED
ADM. STAFF REVIEW MADE
TASK FORCE REVIEW MADE
COMMISSION REVIEW MADE
AWARD DOCUMENTS PREPARED
AWARD CONFERENCE HELD

Exhibit 6

REPORT ON DELINQUENCIES

PROGRAM AREA _____ PROGRAM MANAGER _____

CONTROL NUMBER	SUBGRANTEE NAME/ SUBGRANTEE AGENCY NAME/ PROJECT NAME	SUBGRANTEE REPORTING DUE DATES PROGRESS	FISCAL	**PROJECT INSPECTIONS TYPE OF INSP.	SPECIAL INSP.	DUE DATE	NOTICE OF IMPLEMENT DUE DATE
				PROGRAM FISCAL FINAL EVAL FINAL AUDIT			

DATES SHOWN ONLY IF DELINQUENT

Exhibit 7

AVAILABILITY OF SUBGRANT ACTION FUNDS

LEAA GRANT YEAR _____

PROGRAM AREA _____

PROGRAM _____

DOLLARS ALLOCATED _____ *

ORIGINALLY ALLOCATED _____

DOLLARS TRANSFERRED FROM OTHER PROGRAMS _____

DOLLARS TRANSFERRED TO OTHER PROGRAMS _____

ADJUSTED ALLOCATION _____

APPROVED SUBGRANTS****

CONTROL NO	APPLICANT	PROJECT NAME	AMOUNT
↓	↓	↓	↓

TOTAL APPROVED _____ *

BALANCE AVAILABLE _____ *

RESERVED FUNDS****

			REASON	
↓	↓	↓	↓	↓

TOTAL RESERVED _____ *

UNENCUMBERED FUNDS _____ *

APPLICATIONS UNDER REVIEW****

↓	↓	↓	↓

TOTAL UNDER REVIEW _____ *

*SUMMARIZED BY PROGRAM AREA

Exhibit 8

BUDGETARY/EXPENDITURE CONTROL

LEAA GRANT YEAR _____
CONTROL NUMBER _____
CLASS OF SUBGRANT _____
PROGRAM AREA _____
SUBGRANTEE _____
IMPLEMENTING AGENCY _____
PROJECT NAME _____
PERIOD OF FUNDING _____
PROGRAM MANAGER _____

SOURCE OF FUNDS _____
REQUIRED MATCHING FUNDS _____ %
SOURCE OF MATCHING FUNDS — AMOUNT
TOTAL
TYPE OF MATCHING FUNDS
TOTAL

****

BUDGET CATEGORY	BUDGET AMOUNT	REQUIRED MATCH	REQUIRED FED FUNDS	ADVANCES TO DATE	EXPENDED TO DATE	UNPAID OBLIGATION	TOTAL EXP/ OBLIGATION	UNEXP. AMOUNT %	UNENCUM. AMOUNT %
PERSONNEL									
OTHER									
301 D									
TOTAL									
CONTRACTUAL									
TRAVEL									
SUPPLIES/EXP									
EQUIPMENT									
CONSTRUCTION									
TOTAL									

BUDGET CATEGORY	MATCH FUNDS THIS PERIOD	PROVIDED TO DATE	MATCH BALANCE AMOUNT	%	ADVANCES THIS PERIOD	EXPENDED THIS PERIOD

(REPEATED)

(NOTE: ALL BUDGETARY/EXPENDITURE DATA ALSO SUMMARIZED BY SOURCE OF FUNDS, BY LEAA GRANT YEAR)

INSPECTIONS DUE CONTROL

TYPE OF INSPECTION_____ PROGRAM MANAGER_____ PROGRAM AREA_____

PROGRAM
FISCAL
FINAL AUDIT
FINAL EVAL

CONTROL NUMBER	SUBGRANTEE	IMPLEMENTING AGENCY	PROJECT NAME	NAME OF SPECIAL INSPECTOR	LAST RESULTS	TO BE COMPL BY	DATE SCHEDULED

A =
B =
C =

SCHEDULED DUE DATE

COMPLETED MANUALLY

Exhibit 10

SUBGRANT INSPECTION REPORT

FINANCIAL OFFICER:

Mr. CHARLES SMITH
STATE POLICE
714 S. HARRISON ROAD
ANYTOWN, USA 00001

SUBGRANT AMOUNT | PROJECT COMPLETION DATE | CONTROL NO.

DATE OF INSP. | EST. % COMPLETE

INSPECTOR'S NAME | INSPECTION TYPE | INSPECTION NO.
X

PROJECT DIRECTOR:

MR. LAWRENCE JONES
INTELLIGENCE SECTION
714 S. HARRISON ROAD
ANYTOWN, USA 00001

SUBGRANTEE NAME

SUBGRANTEE AGENCY NAME

PROJECT NAME

SUBGRANTEE PERSONNEL CONTACTED

INSPECTION FACTORS

EXAMINE STAFF SELECTION PROCEDURE

EXAMINE TRAINING CURRICULUM AND MATERIALS

VERIFY ACQUISITION AND INSTALLATION OF EQUIPMENT

REVIEW PROCEDURES FOR COMPILING STATISTICAL DATA

INSPECT PROCEDURE AND DOCUMENTATION EVALUATING PROJECT EFFECTIVENESS

OBTAIN SUBJECTIVE EVALUATION FROM AFFECTED AGENCIES

Exhibit 11

SCHEDULE OF SUBGRANTS

LEAA GRANT YEAR_____ LEAA PROGRAM CATEGORY_____ MATCH REQUIRED___%

SOURCE OF FUNDS_____

CONTROL NUMBER	SUBGRANTEE	CLASS OF SUBGRANT	DATE OF SUBGRANT AWARD	PERIOD OF FUNDING	AMOUNT OF SUBGRANT AWARD	FUNDS PAID TO SUBGRANTEE
	PROGRAM TOTAL		(NAME OF PROGRAM)		xxx,xxx	xxx,xxx
LEAA PROGRAM CATEGORY TOTALS					x,xxx,xxx	x,xxx,xxx

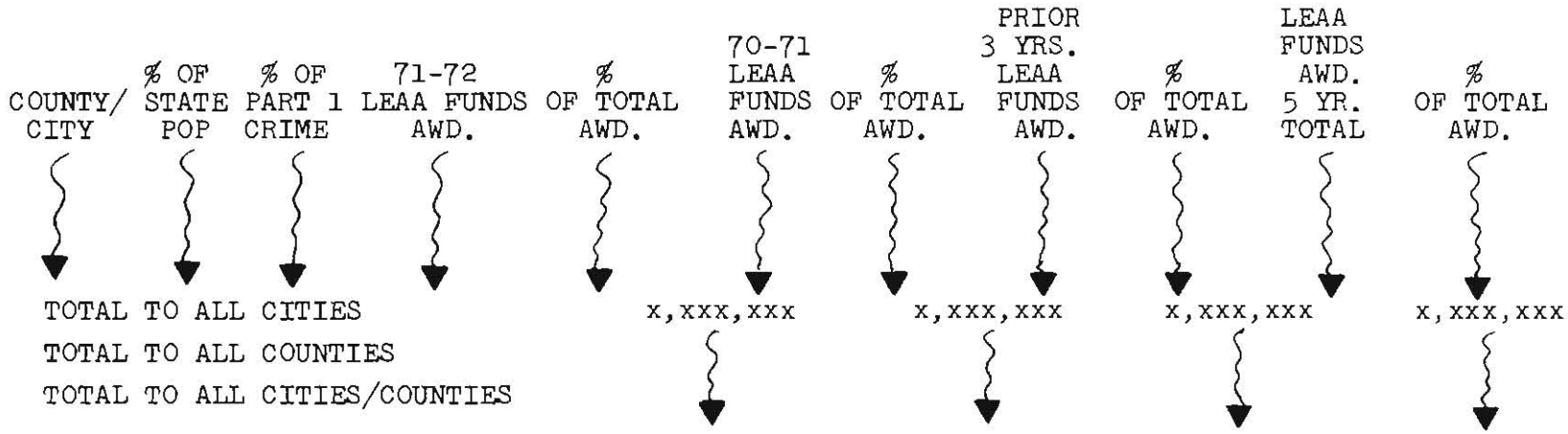
(SAME FORMAT AS LEAA REPORT FORM 156A)

Exhibit 12

DISTRIBUTION OF SUBGRANT DOLLARS
BY LARGEST CITIES AND COUNTIES

71-72 FUNDS 70-71 FUNDS PRIOR 3 YEARS 5 YR TOTAL

ACTION FUNDS AVAILABLE
CLASS 1 FUNDS AVAILABLE
CLASS 1 FUNDS GRANTED



DISTRIBUTION OF ACTION FUNDS
BY PROGRAM AREA

LEAA GRANT YEAR _____

LOCAL PLANNING UNIT _____

SUBGRANTEE NAME	PREVENTION /COMM REL	ORGANIZED CRIME	POLICE SERV	CIVIL DIS CONTROL	ADM CRIM JUSTICE	CORRECTION REHAB	JUVEN PROB	RESEARCH & DEVEL	TOTAL
LOCAL PLAN, UNIT TOTAL									xxx,xxx

TOTAL ALLOCATED
TOTAL AWARDED TO DATE
BALANCE AVAILABLE

Exhibit 14

ACTION AND DISCRETIONARY SUBGRANT ACTIVITY REPORT

SOURCE OF FUNDS _____

LEAA GRANT YEAR _____

PROGRAM AREA	TOTAL COMMISSION APPROVED	WITHDRAWN OR CANCELLED GRANTS	STATUS OF GRANT AWARD ISSUED PENDING	COMPLETED AND PAID IN FULL	FINAL EVALUATION RECEIVED	FINAL AUDIT CONDUCTED

(Number of subgrants, by category is displayed)

	******FEDERAL GRANTS AWARDED*******				
PROGRAM AREA	LOCAL-75%	STATE-25%	TOTAL	FUNDS PAID TO DATE	BALANCE TO BE EXPENDED

TOTAL AWARDED

TOTAL PAID TO DATE

TOTAL BALANCE TO BE EXPENDED

TOTAL AVAILABLE

TOTAL UNALLOCATED

ADD UNALLOCATED

TOTAL TO BE EXPENDED

ACTION AND DISCRETIONARY SUBGRANT ACTIVITY REPORT

SOURCE OF FUNDS _____

LEAA GRANT YEAR _____

PROGRAM AREA	(LPU 12)	(LPU 13)	(LPU 14)	(LPU 15)	LPU 1	TOTAL LPU 1	LPU 2	LPU 3

PROGRAM AREA	LPU 4	LPU 5	LPU 6	LPU 7	LPU 8	LPU 9	LPU 10	LPU 11

ACTION AND DISCRETIONARY SUBGRANT ACTIVITY REPORT

SUMMARY
****

	NUMBER OF APPROVED SUBGRANTS	SUBGRANT AWARDS	AMOUNT PAID TO DATE
ACTION			
67-68			
68-69			
69-70			
70-71			
71-72			
SUBTOTAL			
DISCRETIONARY			
67-68			
68-69			
69-70			
70-71			
71-72			
SUBTOTAL			
TOTAL			

MASTER FILE LISTING

CONTROL NO
APPLICANT CODE/NAME
AGENCY CODE/NAME
PROJECT NAME

LEAA PROGRAM CATEGORY
OCJP PROGRAM AREA
OCJP PROGRAM

CLASSIFICATION DATA:
- SOURCE OF FUNDS CODE
- LEAA GRANT YEAR
- PROJECT DURATION
- PERIOD OF FUNDING
- LOCAL PLANNING UNIT CODE
- CLASS OF SUBGRANT CODE
- GEN. PROCESSING STATUS CODE

- JURISDICTIONS SERVED COUNT
- MAJOR MISSION CODE
- FEDERAL GRANT NUMBER
- PROJECT EXTENSION IND
- REV. COMPLETION DATE
- REJECTION CODE
- REPORTING DATES

CLASSIFICATION ALLOCATIONS: CODE AMOUNT CODE AMOUNT CODE AMOUNT CODE AMOUNT CODE AMOUNT
- SOURCE OF MATCHING FUNDS
- TYPE OF MATCHING FUNDS
- LEAA PROGRAM CATEGORY
- OCJP PROGRAM AREA
- PROGRAM
- PROJECT
- TYPE OF CRIME
- MAJOR ACTIVITY
- SUBGRANT CATEGORY
- OBJECTIVES
- PROCEDURES
- EVALUATION CRITERIA

DATE DATA:

			PROGRAM	FISCAL
DATE APPLICATION RECEIVED	DATE PROJECT COMPLETED	DATE 1st INSP REQD BY		
DATE ASSIGNED TO PROG MGR.	DATE APPLICATION WITHDRAWN	DATE 2nd INSP REQD BY		
DATE PROG REVIEW COMPL.	DATE PROJECT CANCELLED	DATE 3rd INSP REQD BY		
DATE FISCAL REVIEW COMPL.	DATE APPLICATION REJECTED	DATE 4th INSP REQD BY		
DATE OF ADMIN STAFF REVIEW	DATE FINAL EVALUATION DUE	DATE 5th INSP REQD BY		
DATE OF TASK FORCE REVIEW	DATE FINAL AUDIT DUE			
DATE OF COMMISSION REVIEW	DATE/CODE LAST ACTIVITY			
DATE IMPL NOTICE DUE				
DATE SUBGRANT AWARDED				

Exhibit 6
Page 1

MASTER FILE LISTING

CONTROL NO

FUNDING DATA:
- FUNDS REQUESTED BY SUBGRANTEE
- FUNDS RESERVED INDICATOR
- FUNDS RECOMMENDED
- SUBGRANT FUNDS AWARDED

NAME, ADDRESS, PHONE NO. DATA: PROJECT DIRECTOR FINANCIAL OFFICER AGENCY
- NAME
- ADDRESS LINE 1
- ADDRESS LINE 2
- ADDRESS LINE 3
- PHONE NUMBER

SPECIFIC PROCESSING STATUS DATA:

	CODE		CODE		CODE
LPU RECOMMENDATIONS		1st INSPECTION		PROJECT COMPLETED	
PROGRAM STAFF REVIEW		2nd INSPECTION		PAID IN FULL	
FISCAL STAFF REVIEW		3rd INSPECTION		FINAL EVALUATION	
ADMINISTRATIVE STAFF REVIEW		4th INSPECTION		FINAL AUDIT	
TASK FORCE REVIEW		5th INSPECTION			
COMMISSION REVIEW		1st REPORT			
AWARD DOCUMENTS		2nd REPORT			
AWARD CONFERENCE		3rd REPORT			
NOTICE OF IMPLEMENTATION		4th REPORT			
		5th REPORT			

INSPECTION DATA:
- NAME OF SPECIAL INSPECTOR
- INSPECTION FACTOR CODES
- RESULT OF LAST INSPECTION

MISCELLANEOUS DATA:
- FEDERAL SUPPORT IND.
- EST. PER CENT COMPLETE

BUDGETARY DATA:

LINE ITEM BUDGET CODE	REQUIRED AMOUNT OF BUDGET AMOUNT	AMOUNT OF MATCH FUNDS	AMOUNT OF SUBGRANT	TOTAL EXPENDED THIS PERIOD	TOTAL EXPENDED TO DATE	ENCUMB.	ACTUAL MATCH FUNDS PROVIDED THIS PER.	ACTUAL MATCH FUNDS PROVIDED TO DATE	TOTAL FUNDS ADVANCED ALL BUDGET CODES THIS PERIOD	TOTAL FUNDS ADVANCED ALL BUDGET CODES TO DATE
01										
02										
03										
04										
05										
06										
07										

JURISDICTION FILE LISTING

CONTROL NO
APPLICANT CODE/NAME
AGENCY CODE/NAME

LEAA PROGRAM CATEGORY
OCJP PROGRAM AREA
OCJP PROGRAM

CLASSIFICATION DATA:
- SOURCE OF FUNDS CODE
- LEAA GRANT YEAR
- PROJECT DURATION
- PERIOD OF FUNDING
- LOCAL PLANNING UNIT CODE
- CLASS OF SUBGRANT CODE
- GEN. PROCESSING STATUS CODE

- JURISDICTIONS SERVED COUNT
- MAJOR MISSION CODE
- FEDERAL GRANT NUMBER
- PROJECT EXTENSION IND
- REV. COMPLETION DATE
- REJECTION CODE
- REPORTING DATES

CLASSIFICATION ALLOCATIONS:

	CODE	AMOUNT	CODE	AMOUNT	CODE	AMOUNT	CODE	AMOUNT	CODE	AMOUNT
SOURCE OF MATCHING FUNDS										
TYPE OF MATCHING FUNDS										
LEAA PROGRAM CATEGORY										
OCJP PROGRAM AREA										
PROGRAM										
PROJECT										
TYPE OF CRIME										
MAJOR ACTIVITY										
SUBGRANT ACTIVITY										
OBJECTIVES										
PROCEDURES										
EVALUATION CRITERIA										

JURISDICTION DATA:

BASE CITY CODE	COUNTY CODE	OTHER CODE	AMOUNT OF SUBGRANT	ALLOCATED AMOUNT	ACT/EST IND	SOURCE CODE	TYPE CODE

MISCELLANEOUS DATA:

% STATES POPULATION-COUNTY	% STATES POPULATION-CITY
% PART I CRIME -COUNTY	% PART I CRIME -CITY
% PART II CRIME -COUNTY	% PART II CRIME -CITY
% TOTAL CRIME -COUNTY	% TOTAL CRIME -CITY

Exhibit 17

SUMMARY

While GMIS can help SPA management do a better job by providing relevant, timely and comprehensive information, it is vulnerable to misuse. Management must be alert to misguided, if well intentioned, attempts to overload the system with unnecessary data or to modify the system without consideration of the impact on the total system.

These observations should not be construed as a plea for a STATIC system. The GMIS system is, by necessity, dynamic; changes are inevitable. Substantial improvements could be made, for example, in program and project evaluation criteria which is now rather simplistic and restrictive – for the most part only generalized criteria is included and the number of criteria permitted is limited.

Agencies that attempt to install a GMIS system should carefully study the relative merits of on-line versus batch processing. GMIS is presently a batch system by reason of economy and the specific circumstances of the SPA for which it was developed. If the sponsor-agency plans to maintain and operate the computer on its own premises in close proximity to and under the dedicated control of users, a case can usually be made for batch processing. If the equipment is off premises and under the control of another department as a central processing facility, on-line capability may be *desirable.* Without rapid retrieval of data, users are likely to fall back on manual systems and documents rather than wait for periodic routine reports or line up for special reports.

Finally, until very recently systems like GMIS were concerned almost entirely with the sponsor's own needs. Now steps are being taken to establish consistent standards and specifications which will enable agencies to exchange information readily. When fully developed and operational these uniform systems will go a long way toward eliminating "reinvention of the wheel" which inevitably exists in SPA's throughout the country.

GMIS is likely to be seen 10 years from now as a first generation system. It has proved that grant management can be facilitated and improved by computerization. Some successor systems will be on-line, while most, if not all, will be interchangeable and allow unlimited input of performance criteria. No matter how many "bells and whistles" the systems of the future have, it is probable that they will look very much like their progenitor, GMIS.

48315

USE OF AN ON-LINE COMPUTER INFORMATION SYSTEM IN MANAGEMENT OF VOLUNTEER PROGRAMMING IN THE CRIMINAL JUSTICE SYSTEMS

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The use of probation, parole, and other community-based corrections programs as means of facilitating treatment and rehabilitation of offenders began as a volunteer movement in the eighteen hundreds.[1] However, the use of volunteers in courts and corrections has only recently received national impetus. The number of volunteer programs in courts and corrections has increased phenomenally from a few experimental programs in juvenile courts in the early 1960's to over 2000 programs in courts, institutions, and other community-based corrections programs in 1971.[2]

The rapid growth in volunteerism has created several information needs. Local program coordinators and court administrators need assistance in recruitment, selection, training, assignment, and evaluation efforts. State coordinators have difficulty in maintaining up-to-date information on new and established programs. State LEAA planning agencies need accurate appraisals of current and projected programs for planning purposes. National agencies, e.g., LEAA, YDDPA, and National Center on Voluntary Action, seek data on use of volunteers, successful programs, and impact on the offender and community-at-large for purposes of budgetary planning and information dissemination projects.

The National Information Center on Volunteerism has performed a vital function in responding to requests from agencies on all levels of government and from persons in the community attempting to establish new programs and improve existing volunteer programs in courts, parole, probation, institutions, and other community-based corrections programs. However, the estimated present and projected magnitude of requests for information and consultation combined with the increasing number of volunteer programs mandate a systematic, computerized approach for maintaining an information system capable of providing up-to-date data to local, state, and national planners and managers of volunteer programs.

This paper presents a brief description of a plan for the development of a Volunteers In Courts and Corrections Information Retrieval System (VICCIRS). The research study selected to implement the plan involves (1) establishment and maintenance of an up-to-date, comprehensive data base for volunteer programs and (2) establishment and maintenance of an on-line retrieval system to provide rapid access and easy availability of data by remote computer terminals. Primary users of the retrieval system would include state planners of LEAA monies and state correctional departments, state coordinators of volunteer programs, and local coordinators of volunteer programs. Secondary users of VICCIRS would include (1) national agencies seeking descriptive information in such areas as the status of the volunteer movement, impact of volunteer programs upon recidivism, and the use of volunteers to utilize community resources for preventing crime and delinquency, (2) community leaders attempting to establish volunteer programs and improve existing ones, and (3) interested citizens requesting information on volunteerism as potential participants in the correctional process.

BENEFITS OF VICCIRS

VICCIRS would be action-oriented to meet the operational needs of volunteer managers and criminal justice program planners. In this respect, VICCIRS represents a computerized form of technical assistance in that it would combine both quantitative and qualitative information appropriate to efficient and effective conduct of volunteer programming in the various criminal justice systems.

In addition, VICCIRS would utilize results and resources of other past and present LEAA projects, e.g., the thesaurus of criminal justice terms, the national survey of criminal justice agencies, the national survey of jails, and other LEAA funded projects.

MICROFICHE

Benefits of VICCIRS to users would include the following capabilities:

- Provision of up-to-date, comprehensive information on volunteer programs for managerial decisions.
- Facilitation of coordination of volunteer programs within each state and locality
- Justification of budget requests for support of volunteer programs
- Determination of geographic areas for development or implementation of volunteer programs
- Provision of data for a directory of volunteer programs
- Facilitation of compilation of selected statistics on county, district, state, region, or national level of volunteer programs

It is noted that the indirect benefits of VICCIRS are perhaps more essential to the rehabilitative process. As more information flows more efficiently, volunteer programs should improve. This would lead to better rehabilitation program efforts and more effective relationships of volunteers and offenders. Thus, the information flow and residual benefits begin at VICCIRS and filter through policy and planning levels and administrative and coordination levels to the line level of the direct providers of volunteer services and the receivers of services, i.e., juvenile and adult offenders. This conceptualization of VICCIRS information flow is illustrated in Figure 1.

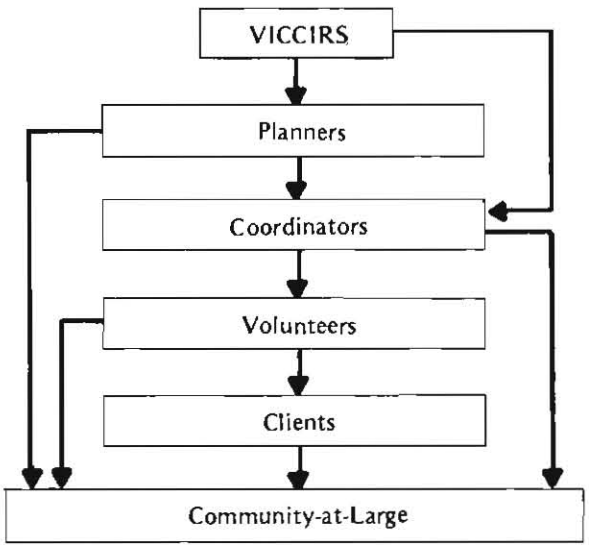


Figure 1. VICCIRS INFORMATION FLOW

Lastly, third order benefits would result from VICCIRS usage in that community resources would be more universally utilized in combatting crime and delinquency and, thus, providing (1) a more enlightened citizenry, (2) reduction in costs of correctional systems, (3) focus of attention on offender needs and community resources, and (4) a more positive image of LEAA projects among the general public.

The above benefits and additional benefits are related to VICCIRS users in Table 1.

A PLAN FOR DEVELOPMENT OF VICCIRS

Development of a Volunteers in Courts and Corrections Information Retrieval System would involve three major clusters of work tasks.

Cluster I would involve a comprehensive survey of criminal justice agencies concerned with rehabilitating juvenile and adult offenders. These agencies would include courts, probation departments, detention centers, jails, state and federal institutions, parole departments, halfway houses, and other community-based correctional systems. Non-correctional agencies such as welfare departments and youth bureaus which handle juvenile offenders would also be included in the survey.

The objectives of Cluster I would be (1) to identify existing and planned volunteer programs in courts and corrections, and (2) to establish a comprehensive, descriptive data base of volunteer programs.

Cluster II would involve development of key information on needs of model programs and methodological subject areas. The data about model programs would expand the "program locator series" of the National Information Center on Volunteerism (NICOV) to a more sophisticated, up-to-date, comprehensive system. The data about methodological subject areas would provide information on funding, volunteer recruitment, training, staff training, and other relevant subject areas. The data base developed in Cluster II would be designed for interface with the data base of Cluster I. Cluster I data would be collected from individual volunteer programs and incorporated into the Cluster II data. Individual, exemplary programs of Cluster I would be identified and cross-referenced by accession numbers with programs in the Cluster II data base. Thus, the user identifies a program in Cluster II and retrieves more detailed information about the program from the data base of Cluster I.

Objectives of Cluster II include (1) to develop pre-formulated responses to common questions based on NICOV's experience, (2) to identify exemplary programs, and (3) to coordinate Cluster I data with the Cluster II data base.

The information retrieval system would be developed as Cluster III. Objectives of Cluster III would include (1) to develop an on-line retrieval system of volunteer program information, (2) to develop a User's Guide for use by nontechnical persons, and (3) to coordinate VICCIRS with other

TABLE 1. BENEFITS OF VOLUNTEERS IN COURTS AND CORRECTIONS INFORMATION RETRIEVAL SYSTEM

	VICCIRS users					
Benefits of VICCIRS	*State Coordinator*	*State Corrections Planners*	*State LEAA Planners*	*Local Coordinator*	*National Agencies*	*Interested Citizens*
Provide comprehensive information on volunteer programs	√	√	√	√	√	√
Facilitate coordination of volunteer programs within each state	√					
Justify budget requests for support of volunteer program	√	√	√	√	√	
Plan more effectively for in-service training and recruitment of volunteers	√			√		
Determine areas for development or implementation of volunteer program	√	√	√		√	
Facilitate scheduling of consultative visits to program area	√				√	
Utilize information from other courts and states to solve problems specific to county or state volunteer program	√			√	√	
Facilitate scheduling or evaluation of program	√				√	
Share success and failure experiences among court programs	√			√	√	
Facilitate compilation of selected statistics for county, district, state, region, nation e.g., cross referencing data items	√	√	√	√	√	
Compile directory of volunteer programs	√	√		√	√	√
Provide assistance in searching and compiling data for special assignments				√	√	
Complement other statistical data and information centers, e.g., LEAA		√	√		√	

appropriate information systems, e.g., the National Criminal Justice Reference Service (NCJRS).

The survey instrument developed in Cluster I could be utilized to update VICCIRS periodically. It is suggested that updating of the data base be scheduled quarterly for occasional status changes in volunteer programs on an as needed basis and biannually for total updating through questionnaire re-administration.

To facilitate use by nontechnical persons, the information system would be structured to respond to English-word searches of the data base. A User's Guide would also be developed specifically for dialog usage. The guide would include (1) a listing of the line elements, i.e., major categories or titles of aggregate data subjects, (2) a thesaurus of terms to accommodate searching of similar legal definitions, treatment modalities, and program scopes, (3) instructions for assessing and managing information, e.g., cross referencing subject areas, and (4) description of the information system capabilities and limitations.

TASK AREAS

The research program to develop VICCIRS is planned to follow the flow chart shown in Figure 2. This would be modified as necessary during the conduct of the study.

Initial project tasks include development of a detailed operations management plan. State planners would be selected and utilized as project advisors. They would contribute throughout the project especially in validation of survey responses, selection of states for on-line testing of VICCIRS, and formulation of recommendations for national implementation of VICCIRS.

Developmental tasks are grouped into three clusters for planning purposes.

CLUSTER I

Cluster I is comprised of the data collection tasks directed specifically toward individual volunteer programs. Tasks necessary to this goal include:

- o Construct questionnaire
- o Develop survey and administration plan
- o Test and revise questionnaire
- o Administer mail survey
- o Administer follow-up mail survey
- o Monitor returns
- o Make site visits.

CLUSTER II

Cluster II involves data collection directed toward model programs and methodology. Tasks include:

- o Selection of model program criteria
- o Identify model programs
- o Develop data format
- o Collect data
- o Make site visits
- o Cross-reference data.

CLUSTER III

Cluster III is directed toward the development of the retrieval system and the successful implementation of that system including user training. Tasks include:

- o Develop data retrieval formats
- o Establish interaction with other systems
- o Develop user guide
- o Prepare data for entry
- o Load files
- o Train operators in selected states
- o Revise system and guide.

Additional activities to be conducted as a part of the overall study would include:

- o Assessment of pilot study
- o Recommendations
- o Final report.

SYSTEM DESCRIPTION

BASIS-70

The information storage and retrieval system to be used will be a tailored version of Battelle's on-line interactive system called BASIS-70. This system is the product of a project initiated at Battelle several years ago and has been applied in numerous projects at Battelle. BASIS-70 represents a blend of the most current in computer technology and the experience of Battelle's information scientists in developing manual and automated systems over the last 20 years.

The system operates on a Control Data 6400 computer and provides immediate access to large files of information via a standard telephone and terminals which can be set up almost anywhere.

This system is currently used by various agencies, including the Department of Transportation, Environmental Protection Agency, Department of Defense, and the Price Commission.

VICCIRS

A brief sample of the search dialog is presented in Figure 3. This example is taken from a prototype file for VICCIRS and shows how a number of search parameters can be specified quite easily to form a complex search strategy. The system relies on a minimum of commands and is built primarily around user entry of keywords. Note that the line numbers of keywords, once entered, may be used in place of those keywords from then on. The basic commands for the system are as follows:

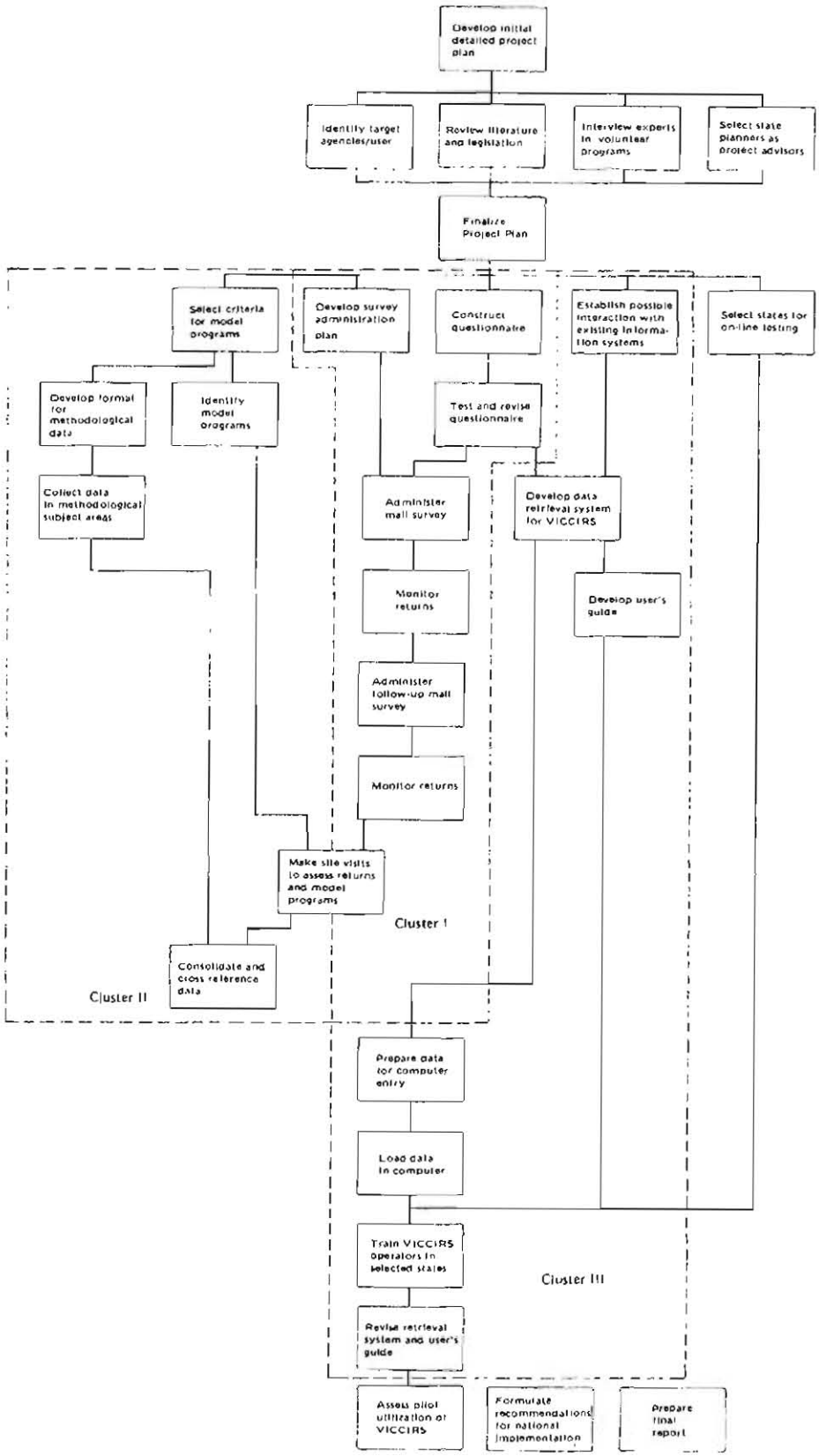
	1/ STATE, HAWAII	
PRIMARY	2/ ST YEAR, 1968	search parameters
	3/ (1 AND 2)	search combination
	4/ DISPLAY	request to see records
	5/ LIST ALL	request to see previous search strategy
SECONDARY	6/ STATE,*	request to see portion of index
	7/ RESTART	request for new file
	8/ QUIT	request to exit

The components shown in the example of Figure 3 are representative of the elements anticipated as essential for this file. They include twenty-five elements which can be displayed at the computer terminal or printed off-line. Most of these elements can be used as search parameters as well.

SYSTEM BENEFITS

There can be several benefits to an on-line system such as the one just described. One obvious

Figure 2. TASK AREAS



example is that of remote access. A file stored in this manner can be made available instantly to widely dispersed users. A benefit that is somewhat less obvious, but perhaps more important, is the stimulation to thought that rapid information manipulation can bring about. With the ability to group and regroup programs or concepts in rapid succession, the process of hypothesis formulation and testing is drastically shortened. The data bases become not only an information source, but also a research tool for the users.

In one case, last year, a scientist at Battelle used the system to store task analysis data in a social service setting. He was able to formulate and test his hypotheses using the on-line system for data compilation. We feel this type of intellectual stimulation offers as much promise as the more traditional benefits of rapid retrieval, remote access, rapid update, and complex search capability.

In summary, the ancient Greek god, Prometheus, gave man the gift of fire which facilitated technological development. Through the centuries, technology has enabled man to leave the cave behind and build complex metropolitan habitats. Technology has placed man on the floor of the ocean and the surface of the moon. It is appropriate that technology also be applied to solving man's social problems as well as facilitating his physical convenience and scientific discovery.

The information system discussed here is not a panacea to the operational problems intrinsic to volunteer programming in the criminal justice systems, nor is VICCIRS meant to displace interpersonal relationships, nor dehumanize crime prevention processes. It is a technological tool for managers analogous to a slide rule for engineers, or a crucible for chemists. VICCIRS is designed to serve the needs of planners of national criminal justice systems, managers of state volunteer programming, implementers of local programs, and providers of humanized services on the volunteer-to-client level. As such, VICCIRS provides a constructive, feasible approach to one of contemporary society's greatest problems.

1 Becker, Dorothy G., Agustus, John (1785-1859), "Encyclopedia of Social Work," Edited by Harry L. Lurie, National Association of Social Workers, 1965, p. 98.

2 "Vital Statistics on Volunteers In Courts" prepared by the National Information Center on Volunteers In Courts, Boulder, Colorado. August, 1970.

Query: I would like information on volunteer programs which serve juvenile clientele of a city level court in a large metropolitan city in the East North Central area of the U. S.

Search Sequence	*Reference Notes*
09/17/71 LOGGED IN AT 15 13.42. WITH USER-ID CO LQUIP/PORT 61/04 COMMAND- ATTACH, BASOI, KROHNITEST. 15.14 12.ATTACH,BASOI, KROHNITEST. COMMAND- BASIS	A–the user logs in
(PHASE I) B A S I S 7 0 IS ON LINE! DO YOU DESIRE OPERATING INSTRUCTIONS? TYPE YES OR NO/NO PLEASE ENTER YOUR LAST NAME. /MILSTEAD ENTER THE NAME OF DATA BASE TO BE SEARCHED. / VOI.	B–on-line orientation C–the user chooses a data base to search
ENTER YOUR SEARCH ONE TERM AT A TIME 1/ CT LEVEL, CITY 1 ITEMS 2/ GEO LOC, EAST NORTH CENTRAL 9 ITEMS 3/ POP SIZE, 300,000 - 499,999 3 ITEMS 4/ SUB KW, JUV 6 ITEMS 5/ (1 AND 2 AND 3 AND 4) 1 ITEM	D the user enters search terms
ENTER YOUR REQUEST 6/ DISPLAY 5 WHAT FIELDS DO YOU WANT TO SEE? ENTER FIELD NUMBERS SEPARATED BY COMMAS OR ALL / ALL	E–the user constructs a logical combination of search items––and asks to display information F–the user selects specific information for printing
PROGRAMS FROM THE VOLUNTEER DATA BASE ARE . . . ITEM 1 PROG NAME: VOLUNTEERS IN PROBATION, INC (4) PROG ADD.:KEITH J. Leenhouts, 200 WASHIN GTON SQUARE PLAZA, ROYAL OAK, MICHIGAN 4 8067 GEO LOC: EAST NORTH CENTRAL STATE: MICHIGAN STATE,C/S:MICHIGAN,OAKLAND STATE,CITY:MICHIGAN,ROYAL OAKS NUMBER OF CTS WITH VOL PROGS:35 SETTING:OPEN,PROB** CT TYPE:JUV CT LEVEL:CITY START YEAR:1960 SUB KW:JUV*MALE-FEM*PROB*VOL*PRIVATE! Y/*ONE-TO-ONE*CITY** ADM OF VOL PROG:VOL PROG COORD:PRIVATE PROG COORD ADD.:KEITH J. Leenhouts, DIRECTOR, PROJECT MISDERMEANENT FOUNDATION, INC., 200 WASHINGTON SQUARE PLAZA, ROYAL OAKS, MICHIGAN 48067 STATE VOL COORD:DR. EARNEST SHELLEY, INGRAM CO UNTY JUVENILE COURT, 600 LESHER PLACE, L ANSING, MICHIGAN 48912 POP SIZE:690250 CLIENT LEG AGE:JUV TYP OF SCREENING:ASSOC*INTERVIEW*PROF**	G–the system prints the designated information
NO OF VOLS:100 VOL RELATIONSHIP:ONE-TO-ONE CASE HOURS:5-10 VOL/CL MATCHING:NOT AVAILABLE VOL SERVICES:ASST PROB OFF*PROF*CLERICAL*AD MIM*TESTING** VOL KEYWORDS:MALE-FEM*ALL*MIDDLE**	
FINISHED WITH PRINTOUT. CONTINUE ENTERING SEARCH TERMS. 6/ (QUIT) B A S I F 7 0 HAS ENJOYED SERVING YOU. DO YOU HAVE ANY COMMENTS? YES:NO/NO (DONT FORGET TO "LOGOUT." BEFORE DISCONNECTING.) GOODBYE	

FIGURE 3. SAMPLE QUERY OF VOLUNTEER PROGRAM DATA BASE

48316

THE USE OF OFFENDER BASED TRANSACTION STATISTICS IN CRIMINAL JUSTICE PLANNING

John R. Longley
Executive Director, Central California
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Tulare, California

Because I am a public administrator and not a systems analyst, I hope to give you an administrative, not a technical, report describing the development and implementation of a criminal justice statistics system, using the new concept of offender tracking. This concept has been demonstrated at other times, but to my knowledge no attempt has been made before to collect actual offender data for the specific purpose of analyzing the administration of criminal justice to provide information for criminal justice planning and program evaluation.

I shall relate to you the experiences of the organization I represent – the Central California Criminal Justice Planning Region. To give you some perspective of the magnitude of the study, the Region contains five counties, thirty-nine cities, and well over one million people.

To plan for the "overall improvement of the performance of the criminal justice system" requires that we understand the functioning of all agencies which, although acting to satisfy separate goals, must work in concert toward system objectives if system improvements are to be realized. This understanding can come only from information which describes the ways in which the system operates as it processes individual defendants and offenders.

As more criminal justice agencies and programs compete for limited resources, planning and overall coordination activities become critical. And, because crime and criminality are primarily local problems, planning must be done on a county and regional basis. Therefore, as the planning region works to develop a comprehensive plan for criminal justice, it must begin to develop programs addressed at the priority system problems within its counties with the intention of "parlaying one program on another with each program reinforcing the next to geometrically achieve the improved programming necessary to reduce the incidence of crime and delinquency."

Such a planning effort is immediately confronted by the fact that present data cannot provide the needed information for uses ranging from daily decision-making to long-range policy considerations. Today's criminal justice statistics detail agency workloads and represent only the number of actions taken during time periods that usually coincide with budgetary periods. Few practitioners have ever attempted to reconcile their output data with that of agencies on other levels, and as a result the inputs of agencies cannot be related to the outputs of agencies which precede them in the sequence of criminal justice processing. These relationships are further obscured because the unit of count is often different for different processes. For example, the police count arrests, the courts count cases, and corrections count people. Consequently, present data do not show the proportions of defendants who are released at various levels of processing, or the types and frequency of charges and pleas, or the dispositions at various agency levels. Thus, the efficiency of criminal justice processing cannot be accurately appraised.

Similarly, it is impossible to account for the time it takes for the criminal justice system to carry out its functions. This lack of information about the passage of time precludes the changing of procedures in order to prevent resource and human waste. Likewise, penalty levels and correctional programs cannot be evaluated and their effects on individuals cannot be determined.

Lastly, present criminal justice statistics do not describe the "clients" of the system. Multiple actions toward the same offender cannot be accounted for. Therefore, programs cannot be designed specifically for certain categories of offenders and evaluated on the basis of that more limited impact. For example, it might be advantageous to institute correctional programs directed toward repeaters or toward specific crime types and to evaluate these programs on their success in accomplishing more carefully defined objectives.

Recognizing these limitations, a new approach – offender based transaction statistics (OBTS) – has developed from demonstrations sponsored by Project SEARCH. The OBTS concept focuses on the individual person and "tracks" the processing of the individual from point of entry in the criminal justice system to point of exit. Because the individual is the only unit of count common to all criminal justice agencies and processes, he is the thread that holds the system together. By monitoring the

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various paths that offenders take, we are able to describe the functioning of the criminal justice system in terms of the aggregate experiences of those who have passed through it.

This concept loses none of the advantages of older systems. In addition, the design produces information about:

- How the criminal justice system operates to process defendants, and how agencies and functions relate to one another.
- How much time it takes for the criminal justice system to process individuals, and
- Who the clients of the criminal justice system are.

Offender-based transaction statistics have the disquieting characteristic of raising questions about the administration of criminal justice. Because this information is completely descriptive with regard to individuals, criminal justice processing relationships, and time, its function is to picture existing operations, and by so doing, to expose problem areas that deserve attention. At first thought, it might be alarming to generate data which poses additional questions in an already confusing field. This, however, is exactly the stimulus necessary for effective planning.

The questions raised by transaction statistics pertain to matters of fact in the on-going operations of the criminal justice system. No longer must planners rely solely on subjective state and agency priorities but can begin to concentrate resources in areas of known needs. Further, as the relationships among agencies and functions become known, the *system* implications of specific programs become clearer and the potential impact to all criminal justice agencies is calculable.

The type of transaction statistics being developed forms a baseline to monitor criminal justice operations and to high-light trends. In this way, trend shifts might be related back to programs instituted during a prior time period or might indicate new problems and foretell a reordering of priorities. As a tool, the statistics are indispensible for documenting the existence of criminal justice needs.

It must be emphasized that this is a *criminal justice statistics* system, not a police system, nor a judicial system, nor a correctional system. As a tool for planning, the data must be analyzed and synthesized; hypotheses once developed must be tested and evaluated. In short, it is aimed at system improvement.

The plan for the implementation of the criminal justice statistics system was unique in that it incorporated data routinely collected at the state level with data collected by Regional Planning staff from agencies within the five counties comprising the Region. Overall coordination and analysis was provided by Public System, Inc., a Sunnyvale based consulting firm.

For purposes of the study, the levels of criminal justice processing have been labeled Police/Prosecutor, Lower Criminal Court, and Superior Court. The system has been designed to track the defendant from point of arrest through disposition, either by exit from the system or commitment to corrections. The cycling of offenders through various correctional programs has not been detailed at this time.

Exhibit 1 is an example of how offender based data can be displayed.

Superior court data is routinely collected from every California county each year by the Bureau of Criminal Statistics, State Department of Justice. The Bureau of Criminal Statistics (BCS) is a state agency created by the California Legislature in recognition of the need for centralized statistics. I would like to state now, by way of acknowledgement, that BCS was completely cooperative and of tremendous assistance to our project.

Superior court statistics developed by BCS identify all proceedings in the state's superior courts by tracing each criminal defendant's progress through the court segment of the justice system This "tracing" is consistent with the concept of transaction statistics. To duplicate accurate data collected by an authorized state agency would have been wasteful and inefficient, consequently, BCS agreed to provide the Region with the Superior Court segment of the data record for every felony defendant tracked whose path led to this court. With the Superior Courts taken care of, the development of total system transaction statistics additionally required the design and collection of the Police/Prosecutor and Lower Criminal Court data modules.

The plan described above was developed to track felony defendants – those individuals arrested for the more serious crimes. Criminal Justice agencies, however, spend a great deal of their time and resources on the less serious or misdemeanor cases. A set of these cases was tracked using the same methodology. Since misdemeanor cases are adjudicated at the lower criminal court, exit or disposition must have taken place by that point; so there is no superior court data for misdemeanors.

With the individual defendant defined to be the unit of count, felony and misdemeanor defendants were tracked during the development of the transaction statistics. A 20% random sampling of defendants was tracked through the criminal justice

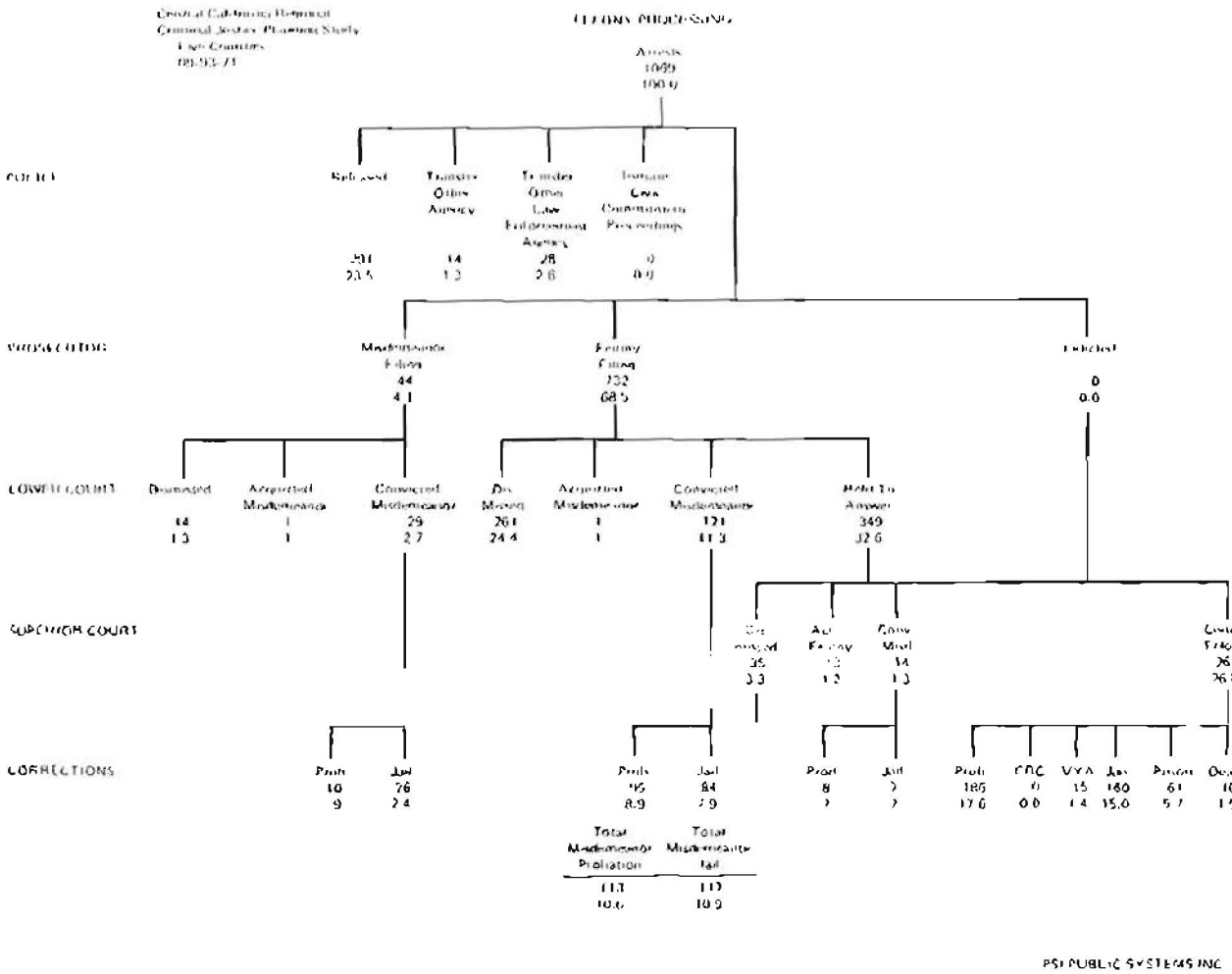

EXHIBIT 1

systems of Fresno, Kern, Kings, Madera and Tulare Counties and later aggregated to provide a regional picture of the administration of criminal justice.

The planning staff of the region, under supervision of PSi, was responsible for data collection. This has a number of advantages – First, because the staff is responsible for guiding the development of programs and the establishment of priorities, they are intimately familiar with the criminal justice agencies. Functions, policies, and practices of working with an agency's files provide some of these insights. Second, the agency personnel are familiar with the planning function and those who carry it out. The close working relationship developed during a sustained data collection activity provides an opportunity for interpersonal involvement and discussion. Third, it is more economical for the planning staff to work in the agencies than it is to hire a consultant to perform the work. In addition, operating agencies are much more willing to cooperate with fellow practitioners. Finally, the exercise of data collection gives the staff a better appreciation of the difficulties involved in securing the needed data and the problems encountered in consistency, completeness, and interpretation of records.

The structure of the offender-based transaction statistics data base lends itself to an almost infinite variety of processing and analyses, and is directed specifically at the questions previously mentioned, – to repeat:

- How does the criminal justice system operate to process defendants?
- How much time does it take for the criminal justice system to process individuals?
- Who are the "clients" of the criminal justice system?

As these questions are answered, planning and ultimately policy questions are posed. Examples of

questions brought into sharp focus by analysis of offender-based statistics are:

- What portion of the felony processing time is controllable by increasing the number of prosecutors? Number of judges?
- What effect would decreases in processing time have on jail population? On court recorder workload? On witness availability? On conviction rate?
- If proposed removal of drunkenness from the penal code passes, what will be the effects on court loading? Prosecutor workload? Jail population and parole workload?
- Is the fact that almost half of all felony arrests result in release/dismissal desirable? Acceptable? Unacceptable?
- Would changes in arrest policy or case preparation procedures significantly change these figures?
- Would such changes result in lower clearance rates? Lower conviction rates? More crowded court calendars?

These are but a few of the many questions that might result from analyses that are possible using offender-based transaction data – impossible using existing criminal justice statistics.

Planners and administrators within the criminal justice system will find a great number of applications for a data base configured as described. The improved descriptive statistics – through better system definition and resolution of ambiguities – can only increase the potential for targeting improved strategies and directing available resources.

In addition, the data and the information it produces will be invaluable to program evaluation. Costs and benefits of individual programs with respect to objectives can begin to be monitored by interrelationships among agencies and the effects of directed programs on other parts of the criminal justice system cannot be known.

Finally, in the area of general research, the data base lends itself to many methods of data aggregation. Because each record represents an individual, there is the flexibility necessary for various research designs and the ability to perform multidimensional analysis with the hope of isolating causal relationships. This is a data system with great and varied potential.

There is another very important reason for the continued development and use of offender-tracking statistical systems. Usually, when a system is designed, a set of specifications for its operation is established and, when the system is put into operation it is monitored for deviation. The criminal justice system, however, came into being without formal design. There are no specifications against which to measure performance. Offender-based transaction statistics describe the system as a function of the processing of those who pass through it and by so doing, provide the necessary "control" or baseline description. The baseline, periodically collected, will provide all the planning, management, and research benefits previously presented and, in addition, will permit a trend monitoring of changes attributable to new programs or a changing environment. Knowledge of these trends is necessary to assure that planning is directed toward current problem areas.

The sampling approach to data collection is efficient; as more experience is gained, data can be compiled more quickly and a full system description can be generated within a few months. If done yearly, a continuing picture of the administration of criminal justice will be available.

I hope that what I have presented to you will give you some ideas of the potential of offender-based transaction statistics. We believe they are an absolute necessity if the subjective factors of whim and fancy are to be minimized in criminal justice planning.

JUSSIM, AN INTERACTIVE COMPUTER PROGRAM AND ITS USES IN CRIMINAL JUSTICE PLANNING

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INTRODUCTION

The criminal justice system (CJS), is charged by society with trying to deal with the problems of crime through a process of arrest, adjudication, and "correction". The traditional operation of the CJS has called for independent and autonomous operation of the individual subsystems, subject to independent judicial review. This process has been developed principally to provide checks and balances within the system, and to prevent any single "system manager" from being able alone to decide the fate of an individual who flows through the process.

An important contribution of the President's Crime Commission[1] in 1967 was the recognition that even though autonomy in handling individual *cases* was necessary, the operating *policies* of the separate parts of the system interacted intimately, and so must be examined and dealt with in an integrated way. The arrests by police represent the principal input into the courts, the convictions by the courts provide the input to corrections, and the failures of corrections provide the bulk of the subsequent input to the police.

There are important interactions and tradeoffs among the parts of the system that should be considered in any examination of the total system. For example, in many jurisdictions, arrested offenders without bail money spend extended periods in detention cells awaiting trial. In many of these cases, it may be very wise to put additional resources into the courts to speed up the court processing of these cases, thereby reducing the time spent in pre-trial detention, and thereby saving more money than it would cost to speed the processing through the courts. This, of course, would be in addition to the other social values of speedier trial – avoiding undue imprisonment of the innocent, excessive detention of the guilty, and increasing deterrence of potential criminals.

Criminal justice planners are, therefore, faced with a mammoth task. They must collect and integrate data on the operations of all the agencies within the criminal justice system. They must also identify the crucial points of interaction among the agencies and anticipate the system-wide and indirect effects of changes in any area of the system. Because all CJS planning agencies have the same methodological needs, the Urban Systems Institute at the School of Urban and Public Affairs, Carnegie-Mellon University, has developed JUSSIM,[2,3] an interactive computer model designed to assist planners by reducing the problem to a manageable level.

NEED FOR INTERACTIVE MODELS

A central concept underlying this model is that the use of mathematical or computer models for planning requires finding means of coupling the models to decision makers. If the models are to be useful in dealing with problems where the knowledge of cause-effect relationships is poor (as is certainly the case in the CJS), then a feedback relationship must be established between the model and the decision-maker. He must identify what questions are to be explored, what assumptions are to be made, what changes in the system are to be considered, and what kinds of output measures interest him. Also, since the use of any such model calls for a large volume of data, much of which may be in error in the early stages of a planning effort, his interests and concerns and his reaction to apparently implausible results serve either to define new data that must be collected or new records that should be maintained.

For instance, if an SPA is considering a new program involving a significant increase in the number of public defenders assigned to defendants, then it is important to be able to assess not only the costs of these extra public defenders, but also the impact they will have on workloads in the courts, on the workloads on corrections, on the

distribution of offenders between commitment and probation, and on the number of offenders set free. These detailed considerations involve a variety of assumptions about how the public defender will affect the court process and how he will affect conviction and sentencing decisions. Assumptions about these detailed micro-effects are needed to assess the macro-consequences, which can then be calculated.

While there can be no ultimate resolution of the micro-effects without empirical observation, there can be assessment of the consequences of alternative estimates of these effects. Thus, one person might argue that the extra public defenders will result in a greater demand for jury and bench trials, and one could then assess the consequences in terms of the courtrooms, prosecutors, judges, etc. required for the extra trials thereby demanded. Alternatively, one could assume that the number of judges will remain fixed, that the number of trials will remain fixed, and that the introduction of the public defenders will result in more charges being dismissed or nolled with a consequent reduction in the number of guilty pleas entered.

It is for this reason that strong attention has been directed at translating our mathematical models into highly flexible, on-line interactive computer models. In these, a criminal justice planner, sitting at a time-shared computer terminal in his office, can easily change the system represented in the model, he can then rapidly observe some of the implications of that change, and then he can immediately make a subsequent change using the information he just gained.

STRUCTURE OF JUSSIM

In JUSSIM, the CJS is regarded as a simple production process and represented by a flow diagram. The flow diagram specifies various nodes and connecting paths between the nodes. The nodes represent the processing stages within the CJS, and the connecting paths describe the way that individuals flow through these stages.

Figure 1 depicts a flow diagram of a highly simplified CJS consisting of 6 stages. In this diagram, the stages are represented by boxes, and the flow paths by the connecting lines with arrows to indicate the direction of flow. The identifying names appear in the appropriate places. Drop-outs from the system are indicated by terminating a flow path with an arrow. This simple model (the "Demo System") is used only to illustrate the model's capabilities, since JUSSIM can easily handle a system of three dozen stages and over 100 flow paths.

Each stage in the Demo System involves a decision making process. As an individual flows through the system, at each stage there is some probability that he follows each of the output flow paths. These probabilities, referred to as "branching ratios", sum to unity for each stage.

The next thing to add to our model is some means of calculating workloads on the various resources in the system. JUSSIM allows the user to specify workloads per unit flow, (i.e., the amount of work or processing time to process one individual at some stage or flow path). Each unit workload is usually associated with a resource that the workload consumes (e.g., detectives or detention cells). It is possible to have several unit workloads associated with a single resource. For example, in the Demo System, there are three separate judge workloads (for hearing nolles, guilty pleas, and trials), but the resource type is the same for all three.

Each resource is described by three numbers; a unit cost, an annual time availability; and a capacity constraint. The unit cost is the cost per unit of workload (e.g., dollars per judge-day) and JUSSIM simply multiplies the total workload (i.e., the unit workload of a resource multiplied by the flow through that resource) by the appropriate unit cost to arrive at a total cost in dollars.

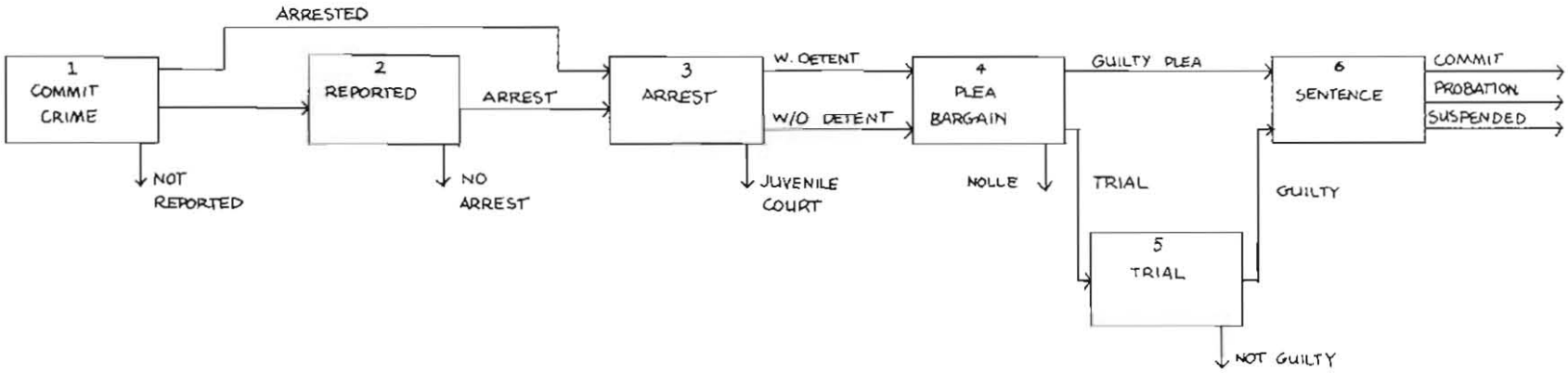
JUSSIM also permits us to calculate the number of resources required to handle the calculated total workload. This is done by specifying the annual time availability per unit resource (e.g., judge-days per judge per year), or the total units of workload that one resource can perform in one year. The total workload divided by the time availability then specifies the resource requirement.

The final number associated with a resource is its capacity constraint. This is the number of resources that are available for the year. If the calculated requirements for any resource exceeds the capacity constraint, the user gets a warning message specifying the resource, the constraint that would be violated, and the calculated resource requirement. In a subsequent run, he can then revise his plan to indicate how the system is most likely to respond to this conflict.

At this point, we need to add another dimension to our model, that of crime type. JUSSIM permits up to 30 distinct crime types, sufficient for the UCR categories. Each crime type has the same system flow diagram, but the branching ratios and the unit workloads at each stage may be different.

If the user must keep track of all 30, however, things may become unwieldy. To aid this problem, he can create "crime groups" or an aggregation of

FIGURE 1 - DEMO SYSTEM



one or more crime types into a single crime group. The parameters associated with a crime group are simply the weighted average of those of its component crime types.

APPLYING JUSSIM

The operation of the JUSSIM model begins with a "base case" reflecting the current operation of the system. Thus, all of the data defining the base case must be collected and stored, and the JUSSIM model provides a consistent basis for collecting and organizing those data. The user of JUSSIM – the CJS planner – then creates a "test case" by entering at the computer terminal changes in any of the base case parameters. The program then reports to him the changes in flows, costs, workloads, and resource requirements resulting from the changes he introduced, and he can generate another run, using as a base case the original base case, the just-completed test case, or any other base case stored on a data file.

A. BASE CASE – APPLICATION TO ALLEGHENY COUNTY

The first step in applying JUSSIM is the development of a base case. Much of the effort in developing JUSSIM was devoted to enhancing planners' ability to expeditiously create a "test case". Experience with the implementation of JUSSIM has shown ways in which the development and analysis of the base case of itself provides significant benefits in the planning process.

First, the structure of the JUSSIM model imposes a structure and discipline to the data gathering problem. Without such structure, the data collected are likely to be incompatible across the system (as is almost universally the case today) and inconsistent in basic definitions (as in crime-type categories, for instance). As a result, an enormous data gathering effort may result in merely collecting copies of all of the "pertinent" records maintained by the operating agencies throughout the CJS. The problem of absorbing the resulting volume of data, compounded by the disparity between records maintained by different agencies, is likely to retard any thoughtful analysis of the operation of the system.

The contribution that JUSSIM makes to structuring the data gathering problem is evidenced by the achievements of three graduate students from CMU's School of Urban and Public Affairs in developing a preliminary description of the Allegheny County CJS. These students, with no previous experience with any phase of the CJS, developed an operating base case describing the Allegheny County CJS in three months.[4]

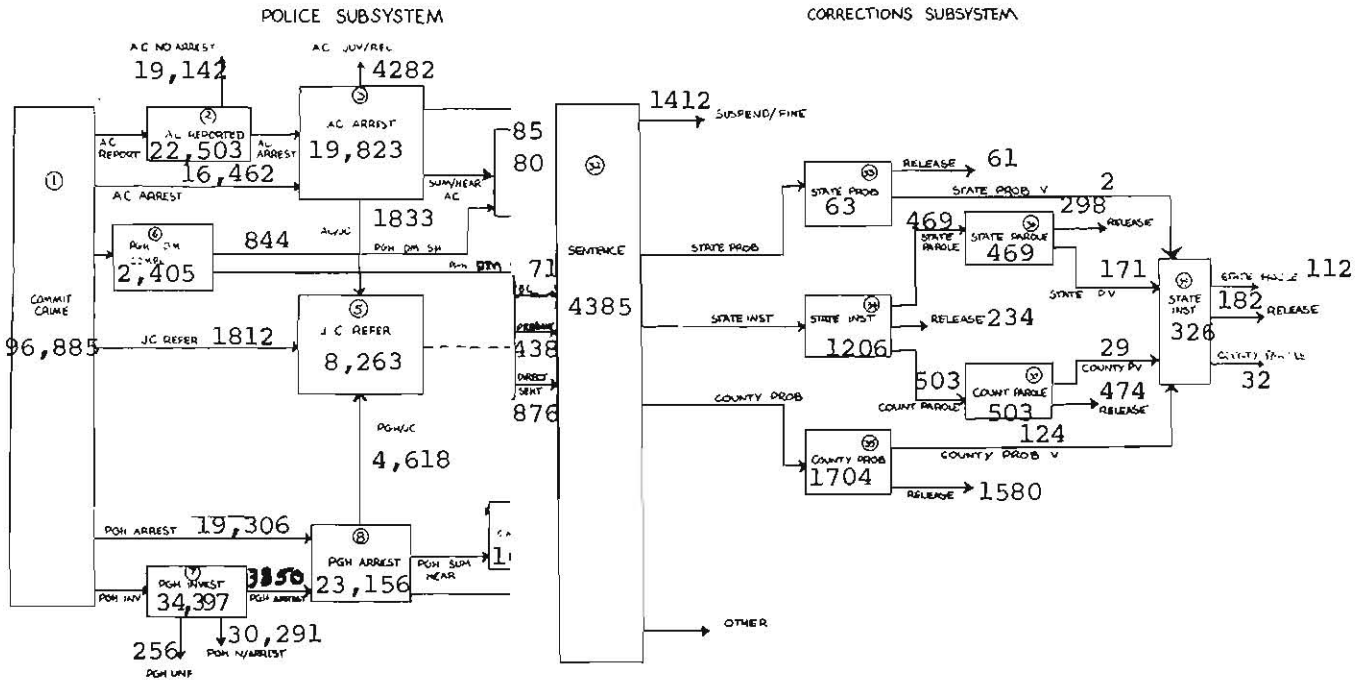
One of the outputs from the SUPA research team's efforts was the flow chart shown in Figure 2 indicating the processing of all crimes which come to the attention of the Allegheny County criminal justice system. The data needed to complete the basic description of the Allegheny County criminal justice system included the flows through each stage, the branching ratios, the workloads, the resource availabilities and the unit costs. These data were collected from a variety of different sources. Exact figures were often obtained from the annual reports and budgets of the various agencies. Lacking these sources, many of the officials and employees of the system were able to supply reasonable estimates. These were the primary sources of data; the secondary sources included estimates from other jurisdictions and various combinations of primary and secondary sources. These data served to give only a preliminary description of the AC-CJS and the data base has subsequently been refined by a student-faculty research team.[5] However, this preliminary description served as a basis for an appendix to a report issued by the Allegheny County Regional Planning Council.[6]

The second significant benefit from the development of a base case stems from the fact that the computing power of JUSSIM makes it feasible to both consider the entire system from the police through corrections and to disaggregate the data by crime type. Thus, while the entire system is described by the sample shown in Figure 2, the data base actually consists of twenty-seven such flow charts, each giving the flow and branching ratios for one of the twenty-seven different crime types identified in this study of the Allegheny County CJS.

Finally, the analysis of the base case data that can be done with JUSSIM provided the AC planning council with an empirical base for characterizing the operation of the system in ways that could not have been achieved otherwise.

For example, Table 1 shows the distribution of the total adult costs among the major subsystems by crime type. Corrections account for almost two thirds (63.9/) of the total adult criminal justice costs. There is some distortion in the allocation of costs by major subsystem because we here consider only those costs directly attributable to criminal arrests and reports and so neglect, for example, the costs to the police subsystem of such activities as

STEM



POLICE SUBSYSTEM
CORRECTIONS SUBSYSTEM
AC NO ARREST
19,142
AC JUV/REC
4282
AC REPORTED
22,503
AC REPORT
AC ARREST
16,462
AC ARREST
19,823
SUM/NEAR AC
85
80
1833
844
2,405
PGH DM SH
COMMIT CRIME
96,885
JC REFER
1812
J C REFER
8,263
71
438
876
PGH/JC
4,618
PGH ARREST
19,306
PGH ARREST
23,156
PGH SUM NEAR
PGH INV
34,397
3850
30,291
256
PGH UNF
PGH N/ARREST
SENTENCE
4385
1412
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STATE PROB
STATE INST
COUNTY PROB
OTHER
STATE PROB
63
RELEASE
61
STATE PROB V
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469
STATE PAROLE
STATE PAROLE
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COUNT PAROLE
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29
COUNTY PV
474
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1704
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1580
STATE INST
326
112
182
RELEASE
32

TABLE 1

Distribution of Total Adult Cost Among the Major Subsystems by Crime Type

	% Of Total Adult Cost For Police	*% Of Total Adult Cost For Court*	*% Of Total Adult Cost For Correction*	*Total Adult Cost*
All Crime Types	14.3%	21.7%	63.9%	$17,085,900
Murder & Non-Neg. Manslaughter	1.3	8.1	90.5	2,237,700
Forcible Rape	5.8	22.5	71.6	386,500
Robbery	4.3	12.1	83.6	2,774,800
Agg. Assault	13.6	33.1	53.3	933,000
Burglary	12.3	22.2	65.5	3,033,600
Auto Theft	45.1	40.9	14.0	344,400
Simple Assault	6.1	34.0	59.9	295,000
Stolen Property	10.6	18.4	71.0	310,000
Commercial Vice	16.5	14.6	68.9	318,600
Narcotics	10.0	19.7	70.3	2,143,300
Drunk Driving	3.0	70.9	26.1	391,100
Disorderly Conduct	31.0	56.2	12.8	113,400

maintaining patrols, traffic control, etc. However, valid comparisons of cost allocations for different crime types can be made. Thus, depending on the crime group, the major cost component can be police (e.g., auto theft), courts (e.g., drunk driving), or corrections (e.g. robbery). This cost breakdown indicates the large system costs associated with robbery and burglary which account for one-third of the total system cost.

The adult court subsystem in Allegheny County includes the minor judiciary, detention, and the Court of Common Pleas. A summary of the flows and costs of this court subsystem is shown in Table 2.

The first column of Table 2 shows the input to the Court expressed as a percentage of the total arrests for each selected crime type. These percentages indicate the probability of penetrating to the Court of Common Pleas given arrest, and they reflect the effect of both the minor judiciary and Juvenile Court in limiting the flow of arrested individuals into the Court of Common Pleas. It is clear that with the exceptions of murder and narcotics most arrested individuals never reach trial in the Court of Common Pleas.

TABLE 2

Flows and Costs in the Adult Court Subsystem

Crime Type	*% of Arrestees Disposed of in Court of Common Pleas*	*Total Court Cost*	*% of Total Court Cost*		
			Minor Judiciary	*Detention*	*Court of Common Pleas*
All Crime Types	19.2%	$3,712,600	8.0%	25.5%	66.5%
Murder & Non-Negligent Manslaughter	100.0	182,300	4.7%	47.1%	48.2%
Robbery	49.9	334,400	2.6%	12.9%	72.0%
Aggravated Assault	39.9	308,600	5.7%	26.2%	81.4%
Burglary	36.2	672,500	2.9%	29.8%	70.9%
Larceny	14.0	279,100	4.2%	29.8%	66.0%
Stolen Property	42.1	57,100	7.0%	26.9%	63.2%
Weapons	48.1	45,000	8.0%	12.9%	65.1%
Narcotics	55.7	421,800	6.8%	0.0%	80.3%
Gambling	44.9	54,100	14.6%		85.4%

The remainder of the table presents the distribution of total court costs among the magistrates, detention and the Court of Common Pleas. The Court of Common pleas is the most expensive component of this subsystem. Its costs are generally 8 times the costs of the minor judiciary, even though the magistrates handle more cases than the Court. Detention costs also constitute a sizeable portion (26%) of the total court cost.

Tables 3 and 4 illustrate the chances of penetrating to the corrections subsystem after entering the CJS. Table 2 presents the probability that an arrested adult is sentenced to probation or incarceration for several representative crime types. The chances are relatively high for the serious property crimes (.54 for robbery, .51 for burglary) and quite low for vice crimes (e.g., .01 for gambling). Table 4 presents the probability that a juvenile is committed to a juvenile correctional institution after referral to Juvenile Court for several crime types. Surprisingly the probability of being institutionalized is highest for the strictly juvenile crimes of truancy and ungovernable behavior. This may be largely due to the Court's practice of often suppressing more serious charges so that the juvenile will not have a record of criminal charges against him. In this case, the juvenile is really being institutionalized for more serious criminal acts, although formally charged with a minor juvenile offense.

The data on the detention or bail status of arrestees was also analyzed. This indicated that the probability of dismissal at the preliminary hearing is higher for arrestees on bail than for arrestees held in detention. Over all crime types, the probability of dismissal for arrestees on bail is .521, while it is only .356 for arrestees held in detention.

This type of descriptive analysis is often the basis for new insights into the functioning of the

TABLE 3

Probability of Arrested Adult Being Sentenced to Probation or Incarceration for Various Crime Types

	Adult Arrests	*Number of Adults Sentenced to Probation or Incarceration*	*Prob. of Arrested Adult Being Sentenced to Probation or Incarceration*
Murder & Non-negligent Manslaughter	86	58	.67
Robbery	464	249	.54
Aggravated Assault	1,011	204	.20
Burglary	1,103	560	.51
Larceny	1,038	189	.18
Stolen Property	373	88	.24
Weapons	383	49	.13
Narcotics	1,687	623	.37
Gambling	774	8	.01
All Others	25,413	945	.04

TABLE 4

Institutionalization of Juveniles for Various Crime Types

Crime Type	*Total Juveniles Referred to Juvenile Court*	*Number Juveniles Committed to Institution*	*Probability of Being Committed to Institution*
All Crime Types	8,263	530	.064
Aggravated Assault	262	32	.122
Burglary	823	61	.074
Larceny	930	29	.031
Auto Theft	789	96	.122
Simple Assault	558	12	.022
Vandalism	607	9	.015
Narcotics	502	29	.058
Disorderly Conduct	1,155	12	.010
Runaway	637	38	.060
Truancy	230	46	.200
Ungovernable	533	102	.191
All Others	1,237	65	.053

system. It also documents the extent of known problems in system operations. In either case the results of the analysis frequently suggest changes which might improve the operations in question. These changes can then be "tested" with the JUSSIM model. By using the extensive data base and the analytical methods provided in JUSSIM, the indirect and system-wide effects of any change can be anticipated and evaluated. With this kind of information the planners can compare the merits of various programs and make choices among them.

In addition, of course, there are analyses that can be done external to the JUSSIM model which are possible only after the JUSSIM data base has been developed. For example, data collected in Allegheny County for the JUSSIM base case was used in identifying groups of magisterial offices for efficient assignment of public defenders representing indigent defendants at preliminary hearings.

B. TEST CASE – APPLICATION TO ALLEGHENY COUNTY

The test case is constructed by changing the values of the base case parameters to reflect the implementation of new programs or procedures. Entering the appropriate changes at the computer terminal is straightforward once the user has become familiar with the JUSSIM model. The more demanding task is identifying all of the appropriate parameters and estimating the changes to be made.

Estimates of parameter changes appropriate to a proposed program or procedural change may be obtained by 1) examining similar programs or procedures in other jurisdictions (e.g., pre-trial probation program in Philadelphia), or 2) indicators from other parts of the system (e.g., the proportion of defendants at the Court of Common Pleas who are indigent indicates the proportion of indigent defendants at preliminary hearing. As a last resort the program being investigated can be evaluated over a range of parametric values. To illustrate how these methods have been used, a brief description is given of some of the analyses performed[7] by the SUPA student-faculty research team of several proposals that appeared to warrant consideration by the planning staff of the Allegheny County Regional Planning Council.

These examples reflect the systems analysis approach engendered by the use of JUSSIM and its associated data on flows, branching ratios, workloads, and resource requirements. The description of each analysis is deliberately brief, not only because of space limitations, but also to focus attention on how the JUSSIM model and data base can be used to examine a variety of programs rather than to focus attention on the details of each analysis. The details are available in the report resulting from the analyses.[7]

1. Reduction of Some Indictable Offenses to Summary Offenses

Computations were made to determine the impact of diverting from judges of the Court of Common Pleas defendants charged with some minor indictable offenses to summary hearings before magistrates. In order to identify those crime types most suited to a reduction to summary offenses, the sentencing dispositions were examined for a large number of indictable offenses to determine the percentage of convicted offenders currently receiving the same type of sentence as summary offenses (fine, probation, 6 months or less in the County Jail). Crime types for which more than 80% of the convicted offenders received such sentences were selected as candidates for reduction.

The reduction in judge workload made possible by such diversion was estimated by subtracting the judge time associated with these offenses, as calculated by JUSSIM, from the total prior judicial workload resource requirement. In exchange, magistrates' workload was increased (but by a lesser amount) by assigning to them the workloads for each offender for each of these crime types that had been diverted from the judges. No savings were attributed to reductions in either public defender or district attorney workloads, because of the possibility that counsel might be required at summary hearings in the future.

2. Implementation of a Pre-Indictment Probation Program

Estimates were made of the costs of implementing a Pre-Indictment Probation Program modeled after the Philadelphia program, and the resulting reduction in court costs by this early diversion. The number of offenders eligible for the program was estimated using the 20 percent eligibility proportion experienced in Philadelphia for offenders in Allegheny County charged with the same crime types to which the program has been applied in Philadelphia. The number of offenders actually accepted into the program was estimated by applying the 80% acceptance rate experienced in Philadelphia.

The estimated costs of the program include: the costs of holding pretrial hearings involving a judge, an assistant district attorney and in some cases a public defender; and the cost of special treatment programs for an estimated half of the defendants placed on pre-trial probation. The reduction in court costs was based on the avoidance of Grand Jury and court proceedings for defendants placed in the program.

3. Implementation of a Bail Release Program

Estimates of the savings in both public and private costs of extending the opportunities for bail release were compared to estimates of the costs of implementing a bail release program in Allegheny County. The public savings occur through a reduction in detention costs and the private savings reflect a reduction in the nonrefundable premiums.

The estimated reduction in detention costs follows from assuming that a proportion of the defendants who are currently released from detention after preliminary arraignment but before trial would be released under a program that made available at preliminary hearing the information that led to their eventual release from detention. The estimate of the associated public savings from the earlier release of this group of arrestees was based on the daily costs of detention applied to the average length of detention incurred between preliminary arraignment and release from detention for those released prior to trial.

The private savings were based on an estimate of the non-refunded bond premiums paid by defendants, whether or not detained for some time after preliminary arraignment, who are finally either dismissed at preliminary hearing or acquitted or dismissed at trial. This estimate combined the bail schedule by crime type recommended by the District Attorney's office with the flow by crime type contained in the JUSSIM data file.

Three components of the cost of implementing the program were considered:

1) The manpower costs of preparing a bail recommendation and of notifying released defendants to appear in court;
2) The operation of a central bail agency;
3) The public costs of bail jumpers. A weighted average bail was computed from the bail schedule (by crime type) recommended by the District Attorney's office and the flow (also by crime type) in the JUSSIM data file. This average was combined with the skip rate reported by other jurisdictions that have implemented a nominal bond system to estimate the public costs of bail jumpers.

4. Increased Use of Adult Probation for Convicted Offenders

Computations were made which demonstrated the tradeoff between the diversion of sentenced offenders from imprisonment to probation. The current cost of imprisonment per individual per day was used to estimate the savings per individual from diversion. The cost estimates included:

1) increasing the number of pre-sentence investigations of convicted offenders from its current level to 30 percent of the convicted offender population. This reflects an estimate of the proportion of this population composed of first offender felons, repeating offenders whose circumstances could have altered during a long interval between offenses, and offenders convicted of non-felonious crimes;
2) increasing the number of probation officers so as to decrease the average caseload per officer from its current level to the level recommended by the President's Commission on Law Enforcement and the Administration of Justice;
3) the provision of special treatment programs.

5. Juvenile Detention Facilities

An examination was made of the potential reduction in the requirements for juvenile detention facilities that might be achieved through 1) increased commitment of resources to speed the processing of juveniles and 2) through the increased use of community shelters. This examination included the following considerations:

1) reducing short-term detention by increasing the responsibility and staffing of the intake unit of Juvenile Court. The savings in detention costs incurred for juveniles detained for less than 3 days and subsequently released unconditionally or on recognizance. The increased intake staff requirements were estimated by combining the recommended caseload given by *NCCD Standards* with the sum of the number of juveniles that currently pass through the intake unit and the number of juveniles currently held for probation officer review who instead could pass through the intake unit.
2) a reduction in the average time in detention through an increase in the number of investigative officers. The effect on the average detention time was estimated by eliminating the detention time accumulated by juveniles currently held longer than 21 days. The increased requirement for investigative officers was based on achieving a workload of 7 cases per month per officer.
3) The shifting from detention to community shelter of juveniles under 13 years old and juveniles currently held for more than 24 hours without a court filed petition.

FEEDBACK MODEL

The JUSSIM linear model discussed so far looks only at the downstream consequences of a change in the criminal justice system. It cannot explicitly calculate the effects on the future load on the CJS of new programs that might change either the probability of rearrest of released individuals or the time between release and rearrest. For example, a pre-trial probation program might reduce the probability of arrest for some of the treated individuals. (This could occur if the threat of prosecution for the deferred charges acted as a deterrent, or the treatment provided during the

probation were more successful in rehabilitation than would any of the alternative treatments that the defender might have received.) On the other hand, these released individuals would return to the street more quickly than they might otherwise, and so the opportunity for earlier rearrest is increased.

Because so many programmatic and procedural changes under consideration by CJS planners involve these kinds of considerations, an extension of the JUSSIM model is being undertaken to incorporate these feedback flowpaths into the model.

A simple flowchart of the feedback version of JUSSIM is shown in Figure 3. The new feedback flowpaths, however, cannot be characterized simply by the branching ratio, i.e., the average proportion of individuals released from some point of the CJS who will ever be rearrested, denoted as ^{i} for the jth feedback flow path. We must also associate an average time from release to arrest for each of the feedback flow paths. Such a concern for time was not necessary in the linear model.

Also, since a vital aspect of the JUSSIM structure is its crime-specific characterization of systems operation, the feedback JUSSIM model must specify the new offense for which recidivists are rearrested. This requires the inclusion of a crime-switch matrix in the model, a matrixs which distributes the flow of individuals released from the CJS after arrest for crime type i into a flow of individuals rearrested for crime type j.

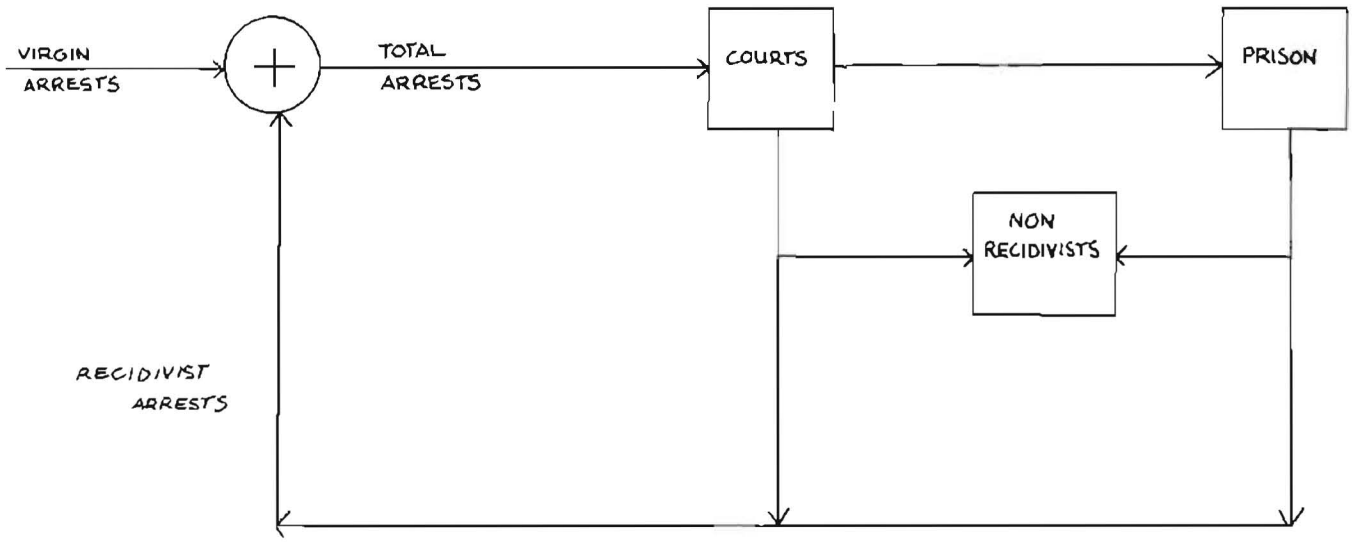
In addition to the flow of recidivists, the feedback model also requires specification of the input flow of virgin arrests, the individuals arrested for the first time, who may subsequently reappear as recidivists. This is a distinction rarely made in the conceptualization of the CJS, and less often in available data.

Thus, the principal new elements required to extend the linear JUSSIM model to incorporate the feedback flow of recidivists are:

1) α_i, the probability of rearrest;
2) τ_i, the average time between release and rearrest;
3) s_{ij}, the probability of the (k+1) arrest for offense j after the kth arrest for offense i;
4) v_{it}, the number of virgin arrests for offense i in time period t.

In addition to these extensions to the basic model the development of a feedback version of

FIGURE 3 - BASIC FEEDBACK MODEL



JUSSIM requires significant changes in the use of the model. The linear JUSSIM model is a one-period model, typically one year. Because of the significant time constants in the recidivism process, the feedback version must be a multi-year model. Thus, a new user option has been added to the feedback version. The user can request a printout of selected results at the end of each intermediate year in the multi-year run and he can examine these results before the impact of these results, in the form of a new queue of recidivists, has been registered on subsequent years. This is in keeping with the interactive character of the JUSSIM planning tool that encourages the user to reexamine his assumptions if the results either do not seem plausible or satisfactory.

The most significant change in the operation of the model, however, is the new data demands placed on the user. Obviously the user must now come to grips with the problem of identifying virgin arrests, recidivism probabilities, recidivism time constants, and elements in the crime switch matrix. To aid the user in meeting these demands we are in the process of collecting and analyzing recidivism data from the Wolfgang juvenile cohort,[8] from a twelve-year follow-up conducted by the California Corrections Department, and data collected by the Philadelphia Police Department. In addition, we provide an estimate of the virgin arrest rate that is consistent with the users' supplied history of total arrests and the average recidivism probabilities. This estimate is based on our work in the development of an analytic model describing the feedback process.[9]

The development of this feedback version of JUSSIM is now well along, and we expect to have a first version operating by the end of 1972. At that time we hope to have criminal justice system planners who have previously worked with the linear version of JUSSIM experiment with using the feedback version.* This trial run with users will identify modifications necessary to adapt the model to user convenience – a critical requirement in the JUSSIM philosophy.

*JUSSIM or some variation of it is now being implemented in Philadelphia, Pittsburgh, Washington, D.C., Vermont, Alaska, California.

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PHILJIM, THE PHILADELPHIA JUSTICE IMPROVEMENT MODEL

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INTRODUCTION

This paper discusses the background and development of a general computer model for the simulation of total state and metropolitan criminal justice systems -- from initial police processing, through court procedures with various release and detention options for defendants, to correctional dispositions and referral alternatives.

Entitling the model PHILJIM recognizes that its principal development was accomplished in work undertaken for the Philadelphia Regional Planning Council, the body which allocates Law Enforcement Assistance Administration (LEAA) funds for the City of Philadelphia. PHILJIM was developed as one part of a comprehensive criminal justice planning process; the model should be viewed as one significant management technique that can be employed in deciding how both LEAA and general fund revenues may be spent to improve criminal justice systems. Certain refinements in the PHILJIM model have been made as part of work undertaken for the Division of Corrections of the State of Alaska.

For most public officials the notion of a simulation model is an abstraction. Therefore, the bulk of this paper is a fifty-six page Philadelphia/Alaska Sample output which is completely annotated to explain the characteristics, dimensions and options available in the PHILJIM model; concepts, data, and modelling decisions from both Philadelphia and Alaska outputs are combined in this illustration. The Philadelphia/Alaska output contains both an indication of how the sample criminal justice system is now performing -- which is termed a *base case*, and an indication of its performance after several changes are made -- an *alternative plan* which includes additional judges, a District Attorney arrest screening project, and the creation of an Alcoholic/Drug referral unit. The structure of the sample criminal justice system is shown in the flow diagram; the effect of the project changes are analyzed in a comparison of several key indicators of the performance of the system.

USES AND BENEFITS OF SIMULATION

Experience with the development and application of PHILJIM suggests three principal benefits to governmental officials responsible for operations and planning: (1) a model permits a thorough understanding of the present status and performance of any criminal justice system; (2) the simulation effort leads to a comprehensive diagnosis of the problems that confront the CJ system; and (3) the operational model enables key officials to experiment with changes in criminal justice procedures and resource allocations designed to improve the system, without actually changing it.

Obtaining an understanding of the status and performance of state and local criminal justice systems has been a hard task for those involved in LEAA planning. Incompatible data from separate agencies, statistics that focus on physically and jurisdictionally distinct operations, and the absence of information systems designed to support simulation models used in comprehensive planning, have made it difficult to comprehend what is happening to cases and defendants. A model such as PHILJIM can have considerable value in resolving some of these problems: first, it provides a common structure (the flow diagram with its processing stages and branches) for data gathering on operation and performance of the criminal justice system under study; it shows the processing of cases and defendants by whatever crime detail is initially available in criminal justice agency reports; it shows the existing use of manpower and other resources and the total cost of the system; finally, a flow diagram and model can guide the development of information systems to support planning by defining the data elements and key indicators which will be used to evaluate the performance of the pertinent criminal justice system. Such results occurred in both the Philadelphia and Alaska experiences. In Philadelphia, the process of developing the system representation led to resolution of several mis-

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understandings among judges as to adult and juvenile case processing and dispositional alternatives. In Alaska, the process of representation development resulted in the realization that, in effect, five separate systems were operating that could only partially be defined by geography.

With the output from the simulation model – even in its earliest development with serious problems of data availability and reliability – planners can diagnose and recognize priority problems that confront the CJ system. Deficiencies, bottlenecks, delays, operational problems, procedural problems and resource needs become more apparent. The interactions and linkages in the loosely structured and poorly defined entity called a criminal justice system are more visible, and thus more susceptible to improvement.

Most important in terms of payoff for the considerable time, effort and expense that is required to develop an operational simulation model is the ability to test alternative ways of doing things. The model provides a planning tool for evaluating proposed changes, such as LEAA projects, on the operations of the system; changes in procedures, the effect which additional personnel and facilities in one part of the system may have on downstream agencies and operations, and the resources required to achieve defined objectives and standards agreed upon by policy-making officials can be analyzed.

The three major benefits of modelling and simulation efforts tend to occur in chronological sequence as criminal justice research and planning agencies mature in analytical and political sophistication.

BACKGROUND ON THE SYSTEMS CONCEPT OF THE PHILJIM SIMULATION MODEL

The PHILJIM program is an adaptation and refinement of several concepts developed by Alfred Blumstein and Jacob Belkin of Carnegie-Mellon University. The Blumstein-Belkin model called JUSSIM for Justice Simulation is a steady-state linear model which treats the criminal justice system as a series of processing stages through which cases flow. From each processing stage there are various paths which a case can take; the proportion following these paths are termed branching ratios. Each processing stage has workload measures associated with the manpower and other resources available for processing cases at each stage. The total cost for a stage is the personnel cost plus other non-salary costs which vary with workload. Because the costs and workload for each processing stage will vary with the type of offense, groupings of crime types are employed.

Starting with JUSSIM as a base, substantial features and improvements were added to respond to the needs of the City of Philadelphia and the State of Alaska where PHILJIM has been implemented. These refinements in the computer program were a direct response to the planning needs of these jurisdictions. Two examples of modifications incorporated in the PHILJIM program will illustrate.

The initial JUSSIM program treated each processing stage in a criminal justice system as one where all flows coming into that stage were processed and the manpower and other resources required were computed – compute resources stage. Early in the experience with Philadelphia it became clear that many operating and planning officials preferred to see the precise number of manpower they knew to be available – whether police detectives, judges, or probation officers – and to compute either the backlog or workload in terms of the cases and/or offenders available for processing. Thus, when the PHILJIM program was written, it incorporated four options which officials could use in setting up the simulation model:

- a stage where all flow is processed and the manpower resources required are computed (*Compute resources*); as an example, see the Police Arrest/Apprehension stage on p. 11 of the sample output
- a stage where all flows are processed, the available resources are read in, and the workloads per case are computed (*Compute Workload*); as an example see the Probation/Parole stage on p. 26 of the sample output
- a stage where the capacity to process flow is compared with the flow of cases entering to determine how many cases are processed and the remaining backlog (*Compute Backlog*); as an example, see the Court Trial stage on p. 17 of the sample output
- a stage where only the caseflow is processed and no manpower or other costs are used (*Only Flow*); as an example, see the Court Sentencing stage on p. 21 of the sample output

Another modification grew out of the work with the Division of Corrections of the State of Alaska. The basic JUSSIM program requires that the flow from all the branching ratios at a stage must equal the total flow entering which means that the branching ratios must sum to 1.0. Where an agency is concerned with detention stages, it becomes necessary to be able to separate the case from the defendant flow. Thus, PHILJIM provides a case-people split; branches are coded as carrying cases or people, and branching ratios and flows are computed for a stage's case and people branches separately.

The total range of options available in the PHILJIM program can only be understood by a page-by-page review of the sample output which

follows after a brief discussion of the approaches to entering criminal justice data into the model. The "running characteristics" of the PHILJIM model are incorporated in Appendix A.

PHILJIM INPUT DATA APPROACHES

Two types of data are input to PHILJIM: the structure of the criminal justice system being represented and its numerical values. The user describes the structure by inputting which crime types, crime groups, stages, branches, manpower, and cost types are to be used. With the structure so described, the user fills in the input flows, the branching ratios, the number of manpower available, average salaries, times required per case, costs per case, fixed costs, and so forth. Because the structure is input, PHILJIM is not specific to any criminal justice system and, therefore, may be tailored to any criminal justice system as desired.

PHILJIM allows many alternative ways of inputting data so as to (1) fit the data sources, (2) make the computer output understandable by matching how criminal justice personnel view their stages, and (3) support the phases of a planning process by representing stages and branches differently for different planning tasks over successive runs. Stages may be represented as compute resources required from required workloads per case or compute available workloads per case from available resources or compute flow able to be processed and backlogged flow from required workloads per case and available resources.

Manpower data may be input as variable or fixed manpower and may be input as manpower available or computed as manpower required. Non-salary costs may be variable or fixed and may be input as total costs or computed on a per case or per time unit basis. Workloads may be represented as manpower time per case or time duration a case spends in a stage. For time durations PHILJIM accepts or computes average populations in days or months. Branches may represent cases or defendant flows and ratios or actual flows may be input. Flows entering from outside the criminal justice system may occur at any stage.

Input data about proposed changes to the current criminal justice system, called the Base Case, uses the project concept. Projects may change any of the existing elements of Base Case stages: manpower, workloads, costs, etc., and projects may add new elements to the Base Case stages or add new stages and branches. Given a set of projects, the user forms alternative plans by directing PHILJIM to combine a list of projects with the Base Case. PHILJIM automatically re-structures the criminal justice system representation, adding stage, branches, manpower types, etc. Various alternative plans may be easily generated in the same or successive computer runs.

All the alternative ways PHILJIM models the elements of a criminal justice system are illustrated in the following sample printout. A comparison of the base case and alternative plan incorporated in the sample output follows the output. This analysis illustrates changes in such key indicators of criminal justice agency performance as (1) proportion of reported crimes dropped prior to Court Trial, (2) conviction rates at Court Trial, (3) average population of detentioners and sentenced prisoners, (4) court backlog, (5) probation officer caseload, and (6) overall and specific stage processing costs.

The Philadelphia/Alaska Sample printout is a small model constructed to display the features of PHILJIM. The Philadelphia/Alaska Sample has 7 stages and 10 crime types and the Base Case part of the output is 29 pages. One of the actual Philadelphia models developed (a complete run of 1970 data) has 119 pages of output in the Base Case – with 28 stages, 89 branches, 89 manpower types, 20 non-salary cost types, and 29 crime types.

THE INTEGRATION OF SIMULATION MODELS INTO COMPREHENSIVE CRIMINAL JUSTICE PLANNING SYSTEMS

Having presented the output of a fully operational and completely programmed simulation model, it is necessary to raise an important caveat. A simulation model will not alone define the changes to be made, by means of projects, in a total criminal justice system. The simulation model must be integrated into a total comprehensive planning system.

A planning system is a set of procedures, schedules, organizational roles or responsibilities, and computer models which permit an organization to arrive at a plan, either periodically or on an exception basis. A computer simulation model, a linear programming model, any OR model or statistical time series or econometric forecasting model can and should be embedded in a comprehensive planning system.

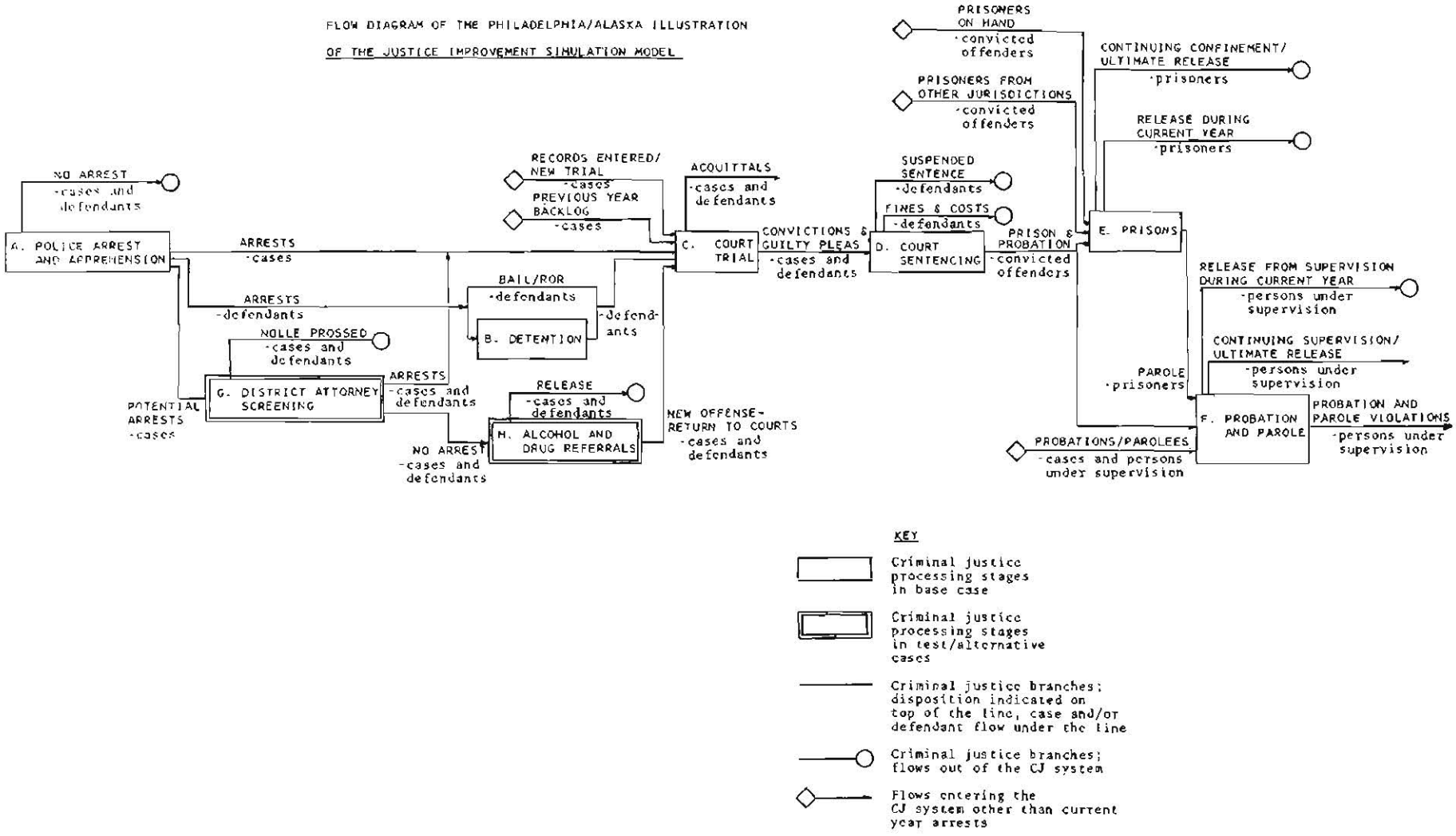
Any comprehensive public planning system must require and allow a governmental entity

- to assess and forecast its environment
- to evaluate its current status
- to set quantified objectives in terms of desired future outcomes with objectives always expressed in terms of indicators
- to predict the feasibility and the expected future outcomes

Chart 1

FLOW DIAGRAM OF THE PHILADELPHIA/ALASKA ILLUSTRATION

OF THE JUSTICE IMPROVEMENT SIMULATION MODEL



KEY

- Criminal justice processing stages in base case
- Criminal justice processing stages in test/alternative cases
- Criminal justice branches; disposition indicated on top of the line, case and/or defendant flow under the line
- Criminal justice branches; flows out of the CJ system
- Flows entering the CJ system other than current year arrests

PHILJIM
PHILADELPHIA JUSTICE IMPROVEMENT MODEL

PREPARED BY

GOVERNMENT STUDIES & SYSTEMS, INC.

FOR THE

PHILADELPHIA REGIONAL PLANNING COUNCIL

JUDGE PAUL N. CHALFIN, CHAIRMAN

RUN: PHILA-ALASKA SAMPLE

GLOSSARY OF SELECTED TERMS USED FOR THE
CURRENT VERSION OF PHILJIM -
A COMPUTER PROGRAM FOR REPRESENTING A SIMULATION MODEL OF
A TOTAL CRIMINAL JUSTICE SYSTEM

PROCESSING STAGE - A BOX ON THE CRIMINAL JUSTICE SYSTEM REPRESENTATION ILLUSTRATING A CRIMINAL JUSTICE FUNCTION THROUGH WHICH INDIVIDUALS (SUSPECTS, DEFENDANTS, ADJUDICATED OFFENDERS, AND PRISONERS) AND CASES (POLICE REPORTS, COURT CHARGES, DISTRICT ATTORNEY FILES, MEDICAL AND OTHER INVESTIGATIONS, AND PROBATION/PRISON PERFORMANCE) FLOW. AN EXAMPLE IS PRELIMINARY ARRAIGNMENT.

PROGRAM - A COLLECTION OF PROCESSING STAGES REPRESENTING MAJOR FUNCTIONAL AREAS OF THE CRIMINAL JUSTICE SYSTEM. EXAMPLES ARE POLICE, MUNICIPAL COURT, COMMON PLEAS COURT, PROBATION, AND PRISONS.

BRANCH - A LINE ON THE CRIMINAL JUSTICE SYSTEM REPRESENTATION ILLUSTRATING A PATH FROM ONE PROCESSING STAGE TO ANOTHER PROCESSING STAGE OR OUT OF THE SYSTEM. BOTH PEOPLE AND CASES MAY BE INVOLVED, AND IT IS ESSENTIAL TO DISTINGUISH THEM. EXAMPLES ARE THE PATHS FROM MUNICIPAL COURT SENTENCING TO PROBATION, AND FROM STATE PRISON OUT OF THE SYSTEM WITH EXPIRATION OF SENTENCE.

BRANCHING RATIO - THE FRACTION OF THE TOTAL CASE FLOW OF A PROCESSING STAGE THAT EXITS ALONG A PARTICULAR BRANCH. AN EXAMPLE MIGHT BE THAT 7.5 PERCENT OF ALL CASES ENTERING MUNICIPAL COURT TRIAL EXIT TO COUNTY PRISON.

KEY MANPOWER - OF ALL THE TYPES OF MANPOWER FOUND AT ANY PROCESSING STAGE, THE KEY MANPOWER IS THAT MANPOWER WHICH HAS THE MOST CONTACT WITH THE CASES OR IS GENERALLY RECOGNIZED AS CONTROLLING THE NUMBER OF CASES PROCESSED IN THE SENSE THAT THE MORE KEY MANPOWER AVAILABLE, THE GREATER NUMBER OF CASES PROCESSED. EXAMPLES ARE POLICEMEN AT POLICE STAGES, JUDGES AT COURT STAGES, AND PROBATION OFFICERS AT PROBATION STAGES.

OTHER MANPOWER - A MANPOWER FOUND AT A PROCESSING STAGE WHICH SUPERVISES OR SUPPORTS THE KEY MANPOWER. EXAMPLES ARE PROSECUTORS WHICH SUPPORT JUDGES, SUPERVISORS OF PROBATION OFFICERS, AND CLERICAL STAFF.

WORKLOAD BASED UPON KEY MANPOWER TIME - THE AMOUNT OF TIME OF A KEY MANPOWER TYPE THAT IS REQUIRED TO PROCESS ONE CASE AT A PROCESSING STAGE. AN EXAMPLE WOULD BE THAT A CASE MIGHT REQUIRE TWENTY HOURS OF A JUDGE'S TIME TO PROCESS AT A COURT STAGE. TOTAL WORKLOAD IS THE TOTAL TIME OF A KEY MANPOWER TYPE THAT IS REQUIRED TO PROCESS ALL CASES AT A STAGE. IF THE COURT STAGE HAD 1000 CASES, THEN, AT 20 HOURS PER CASE, 20,000 JUDGE HOURS ARE REQUIRED.

WORKLOAD BASED UPON TIME SPENT IN A PROCESSING STAGE - IF A PROCESSING STAGE INVOLVES A CASE SPENDING A CONSIDERABLE LENGTH OF TIME IN THE STAGE, THE WORKLOAD MAY BE EXPRESSED IN LENGTH OF TIME A CASE SPENDS IN THE STAGE. FOR EXAMPLE, A CASE MAY SPEND 24 MONTHS IN PROBATION AT A COST OF 100 DOLLARS PER MONTH.

AVERAGE POPULATION PER TIME UNIT - IF A PROCESSING STAGE INVOLVES A CASE

An optional glossary of terms. The audience of a presentation or officials using the model for operational or planning purposes have a ready reference for terminology.

SPENDING A CONSIDERABLE LENGTH OF TIME IN THE STAGE, THE AVERAGE POPULATION PER TIME UNIT IS THE AVERAGE OF THE "SNAPSHOTS" OF NUMBER OF CASES THAT ARE IN PROCESS AT ANY ONE TIME. EXAMPLES ARE THE AVERAGE DAILY POPULATION OF A PRISON AND THE AVERAGE MONTHLY CASELOAD OF A PROBATION STAGE.

NON-SALARY VARIABLE COSTS - COSTS OTHER THAN SALARY COSTS WHICH VARY WITH THE NUMBER OF CASES PROCESSED. EXAMPLES ARE TRAVEL AND PURCHASE OF OUTSIDE SERVICES.

NON-SALARY FIXED COSTS - COSTS OTHER THAN SALARY COSTS WHICH DO NOT VARY PROPORTIONATELY WITH THE CASELOAD. EXAMPLES ARE RENTAL, DEPRECIATION, AND DEBT SERVICE.

CRIME TYPE - A CRIME TYPE IS ONE OF THE 26 - 30 CATEGORIES OF CRIME USED IN THE UNIFORM CRIME REPORTS (UCR) DATA.

CRIME GROUP - A COLLECTION OF CRIME TYPES. IT IS ASSUMED THAT A CRIME TYPE BELONGS TO ONE AND ONLY ONE CRIME GROUP. AN EXAMPLE ARE THE PART I CRIMES: MURDER, RAPE, ROBBERY, AGGRAVATED ASSAULT, BURGLARY, LARCENY, AND AUTO THEFT. INPUT AND OUTPUT DATA ABOUT A PROCESSING STAGE ARE BY CRIME GROUP.

CRIME GROUPING - A COLLECTION OF CRIME GROUPS. DIFFERENT PROCESSING STAGES USE DIFFERENT SETS OF CRIME GROUPS TO RECORD AND DISPLAY THEIR DATA. EXAMPLES ARE THE PART I/PART II CRIME GROUPING USED BY POLICE AND THE INTENSIVE/GENERAL CRIME GROUPING USED IN PROBATION.

RUN: PHILA-ALASKA SAMPLE PAGE 3

LISTING OF ALL THE INPUT DATA CARDS FOR THIS RUN

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   RUN  PHILA-ALASKA SAMPLE          BOTH
 1 CRTY MURDER                         58
 2 CRTY RAPE                          144
 3 CRTY ROBBERY                       208
 4 CRTY AGG. ASSAULT                 1829
 5 CRTY BURGLARY                     2530
 6 CRTY LARCENY                      3495
 7 CRTY AUTO THEFT                   1621
 8 CRTY DRUNKENNESS                 21744
 9 CRTY DRUGS                        3167
10 CRTY OTHER                       17792
 1 CRGP MURDER              1            1
 1 CRGP RAPE                2            2
 1 CRGP ROBBERY             3            3
 1 CRGP AGG. ASSAULT        4            4
 1 CRGP BURGLARY            5            5
 1 CRGP LARCENY             6            6
 1 CRGP AUTO THEFT          7            7
 1 CRGP DRUNKENNESS         8            8
 1 CRGP DRUGS               9            9
 1 CRGP OTHER              10           10
 2 CRGP ALL CRIMES          1            1     2     3     4     5
 2 CRGP ALL CRIMES          1            6     7     8     9    10
 3 CRGP PART I              1            1     2     3     4     5
 3 CRGP PART I              1            6     7
 3 CRGP PART II             2            8     9    10
 4 CRGP VICTIM/VIOLENT      1            1     2     3     4
 4 CRGP VICTIM/NON-VIOLENT  2            5     6     7
 4 CRGP NO VICTIM           3            8     9    10
 5 CRGP FELONY              1            1     2     3     4     5
 5 CRGP FELONY              1            6     7
 5 CRGP MISDEMEANOR         2            8     9    10
 6 CRGP INTENSIVE           1            8     9
 6 CRGP GENERAL             2            1     2     3     4     5
 6 CRGP GENERAL             2            6     7    10
 1 PROG POLICE
 2 PROG COURTS
 3 PROG PROBATION
 4 PROG PRISONS
   BASE BASE CASE DATA
 A STAG POLICE APPRE/ARREST CRES RATO      1     1
 A KYMN POLICEMEN           AVGE HOUR          10200   360
 A OTMN SUPERVISORS         AVGE               13500   .12
 A WORK POLICE HOURS              HOUR   13    13    13    13    13
 A WORK POLICE HOURS              HOUR   13    13     4     4     4
 A NSVR VEHICLE OPERATION   OVAL HOUR 2.84
 A NSEX POLICE LABORATORY           325000
 A BRCH ARRESTS - CASES     C     UCSE  .95   .93   .85   .80   .74
 A BRCH                           .79   .68   .75   .90   .70
 A BRCH NO ARRESTS - CASES        UCSE  .05   .07   .15   .20   .26
 A BRCH                           .21   .32   .25   .10   .30
 A BRCH DETAINED            S     UPLE  .95   .56   .25   .40   .15
 A BRCH                           .15   .05   .03   .30   .05
 A BRCH BAIL/ROR            C     NPLE  .00   .37   .60   .40   .59
 A BRCH                           .64   .63   .72   .60   .65
 A BRCH NO ARRESTS - PEOPLE       UPLE  .05   .07   .15   .20   .26
 A BRCH                           .21   .32   .25   .10   .30
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An optional listing of the input deck card images for debugging. The input cards are formatted to be understandable: card types (columns 4-7) indicate the type of data on the card, the time units used, if any, are on the cards, and titles appear next to the data.

B	STAG	DETENTION	CRES	RATO	4	2		
B	WORK	DETENTION DAYS		DAYS	64.25			
B	NSVR	TOTAL COST/DAY	OVAL	DAYS	4.50			
B	BRCH	COURTS	C	NPLE	1.0			
C	STAG	COURT TRIAL	BFLW	RATO	2	4		
C	ENTF	RCRDS ENT/NEW TRIAL	CRTY		26	35	44	53	111
C	ENTF				65	34	12	83	79
C	BKLG	BEGINNING BACKLOG			500	400	9000		
C	KYMN	JUDGES	AVGE	HOUR	17	25000	1650		
C	WORK	JUDGE HOURS		HOUR	8	3	1		
C	OTMN	MAGISTRATES	AVGE		60	8500			
C	NSVR	PRISONER TRANSPORT	CRGP	CASE	109750	11985	65257		
C	NSVR	WITNESS/JUROR FEES	CRGP	CASE	35000	0	0		
C	NSEX	RENTAL - 3 COURT RMS			21600				
C	BRCH	CONVICTIONS	D	UCSE	.64	.62	.59		
C	BRCH	ACQUITTED		UCSE	.36	.38	.41		
D	STAG	COURT SENTENCING	DFLW	RATO	2	5			
D	BRCH	PRISONS	E	UPLE	.25	.08			
D	BRCH	PROBATION	F	UPLE	.45	.26			
D	BRCH	SUSPENDED SENTENCE		UPLE	.30	.38			
D	BRCH	FINES AND COSTS		UPLE	.05	.33			
E	STAG	PRISONS	CRES	RATO	4	5			
E	ENTF	PRISONERS ON HAND	OVAL		1500				
E	ENTF	OTHER JURISDICTIONS	CRTY		5	0	50	100	200
E	ENTF				0	50	0	0	0
F	WORK	PRISONER-MONTHS		MONS	8.5	5			
F	OTMN	PRISON GUARDS	AVGE		200	9000			
F	OTMN	MEDICAL PERSONNEL	AVGE		10	25000			
E	NSVR	EDUCATION TUITION	OVAL	MONS	1.50				
E	NSVR	FOOD/CLOTHING	OVAL	MONS	85				
E	BRCH	OUTRIGHT RELEASE		UPLE	.20	.65			
F	BRCH	PAROLE	F	UPLE	.35	.30			
F	BRCH	CONTINUING CONFINMNT		UPLE	.45	.05			
F	STAG	PROBATION/PAROLE	CWRK	FLOW	3	6			
F	ENTF	CONTINUING SUPERVSN.	OVAL		2384				
F	KYMN	PROBATION OFFICERS	AVGE	CASE	53	12500			
F	ASGN	PROP. READ IN	PROP		.65	.35			
F	NSVR	PROH. OFF. TRAVEL	OVAL	CASE	106000				
F	NSEX	PSY. CONTRACT SERV.			75000				
F	BRCH	RELEASE		UPLE	210	2450			
F	BRCH	VIOLATIONS		UPLE	450	1200			
F	BRCH	CONTINUING PROBATION		UPLE	2000	940			
	PJTS	PROPOSED PROJECTS							
XX	PROJ	ADD COURT MANPOWER							
C	STAG	COURT TRIAL							
C	KYMN	JUDGES			11				
C	OTMN	MAGISTRATES			15				
C	OTMN	COURT REPORTERS	AVGE		14	9600			
YY	PROJ	SCREENING/REFERRAL							
A	STAG	POLICE							
A	BRCH	ARRESTS - CASES	C	UCSE	-.53	-.43	-.23	-.39	-.25
A	BRCH				-.25	-.09	-.39	-.72	-.15
A	BRCH	DETAINED	I	UPLE	-.53	-.33	-.18	-.25	-.06
A	BRCH				-.06	-.01	-.02	-.12	-.01
A	BRCH	BAIL/ROR	C	NPLE	.00	-.10	-.05	-.14	-.19
A	BRCH				-.19	-.08	-.37	-.60	-.14
A	BRCH	D.A. SCREENING-CASES	G	UCSE	.53	.43	.23	.39	.25
A	BRCH				.25	.09	.39	.72	.15
A	BRCH	D.A. SCREENING-PEPLE	G	NPLE	.53	.43	.23	.39	.25
A	BRCH				.25	.09	.39	.72	.15
G	STAG	DA SCREENING	CRES	RATO	2	4			
G	KYMN	ASST. DA'S	AVGE	HOUR		15500	1400		
G	OTMN	SUPERVISING D.A.	AVGE			18000	.25		

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G CTMN SECRETARY/CLERICAL     AVGE                    7500      .33
G WORK ASST. DA HOURS               HOUR     1.00      .50      .25
G NSFX D.A. TRAVEL                           12500
G BRCH CASES NOLLE PROS             UCSE      .10      .14      .85
G BRCH CASES CONTINUED        C     UCSE      .90      .86      .15
G BRCH PEOPLE DISMISSED             UPLE      .10      .14      .45
G BRCH ALCOHOL/DRUG REFERRL   H     UPLE      .00      .00      .40
G BRCH DETAINED               B     UPLE      .55      .26      .02
G BRCH BAIL/ROR               C     NPLE      .35      .60      .13
H STAG ALCOHOL/DRUG REFERRL CWRK RATO                    6
H KYBN PSYCHOLOGISTS          AVGE HOUR         6    18500     1450
H CTMN MEDICAL DOCTORS        AVGE              2    22500
H CTMN PARA-MEDICAL           AVGE              6     8500
H NSFX FACILITIES RENTAL                     65000
H NSFX LABORATORY COSTS                      80000
H BRCH RELEASE                      UPLE      .90      .15
H BRCH RETURN TO COURTS       C     UPLE      .10      .85
C STAG COURT TRIAL
C BRCH CONVICTIONS            D     UCSE      .14      .16      .12
C BRCH ACQUITTED                    UCSE     -.14     -.16     -.12
0 PLAN BASE CASE              INPJ
1 PLAN ALT. PLAN 1            INPJ              XX       YY
  END

NUMBER OF CARDS:   144
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INPUT FLOWS TO THE FIRST PROCESSING STAGE

NUMBER	CRIME TYPE	INPUT FLOW
1	MURDER	58
2	RAPE	144
3	ROBBERY	208
4	AGG. ASSAULT	1828
5	BURGLARY	2530
6	LARCENY	3405
7	AUTO THEFT	1621
8	DRUNKENNESS	21744
9	DRUGS	3162
10	OTHER	17792
	TOTAL	52582

The input flow to the first stage is the primary entrance to the criminal justice system. The input flows are by crime type. Note the use of the crime type titles. Different stages of the criminal justice system will use different groupings of these crime types to express branching flows, workloads, etc., as is shown on page 7.

DEFINITION OF CRIME GROUPINGS

CRIME GROUPING NUMBER 1

CRIME GROUP 1 MURDER CONTAINS
THE FOLLOWING CRIME TYPES:
1 MURDER

CRIME GROUP 2 RAPE CONTAINS
THE FOLLOWING CRIME TYPES:
2 RAPE

CRIME GROUP 3 ROBBERY CONTAINS
THE FOLLOWING CRIME TYPES:
3 ROBBERY

CRIME GROUP 4 AGG. ASSAULT CONTAINS
THE FOLLOWING CRIME TYPES:
4 AGG. ASSAULT

CRIME GROUP 5 BURGLARY CONTAINS
THE FOLLOWING CRIME TYPES:
5 BURGLARY

CRIME GROUP 6 LARCENY CONTAINS
THE FOLLOWING CRIME TYPES:
6 LARCENY

CRIME GROUP 7 AUTO THEFT CONTAINS
THE FOLLOWING CRIME TYPES:
7 AUTO THEFT

CRIME GROUP 8 DRUNKENNESS CONTAINS
THE FOLLOWING CRIME TYPES:
8 DRUNKENNESS

CRIME GROUP 9 DRUGS CONTAINS
THE FOLLOWING CRIME TYPES:
9 DRUGS

CRIME GROUP 10 OTHER CONTAINS
THE FOLLOWING CRIME TYPES:
10 OTHER

CRIME GROUPING NUMBER 2

CRIME GROUP 1 ALL CRIMES CONTAINS
THE FOLLOWING CRIME TYPES:
1 MURDER
2 RAPE
3 ROBBERY
4 AGG. ASSAULT
5 BURGLARY
6 LARCENY
7 AUTO THEFT
8 DRUNKENNESS

Here are 6 different groupings of the 10 crime types used in the example. The first crime grouping has 10 crime groups--each crime type in its own crime group. The second crime grouping has one crime group: all crime types lumped together. The third, fourth, fifth, and sixth crime groupings have 2, 3, 2, and 2 crime groups, respectively, with the crime types included under each group as shown.

Part of the data about a stage are the crime groupings to be used for input data about the stage and the crime grouping to be used for output reports about the stage. The input data may then be tailored to the level of information detail available from the criminal justice system. Different stages in the criminal justice system may use the same or different crime groups in the same run.

These pages provide a ready reference to the definitions of the crime groupings and their crime groups. Note the use of crime group and crime type titles.

The number of crime groupings employed are a function of (1) the crime aggregations used in the reporting and information systems of the major agencies in the specific criminal justice system, and (2) the level of detail desired by the officials responsible for managing each of the processing stages in the model.

9 DRUGS
10 OTHER

CRIME GROUPING NUMBER 3

CRIME GROUP 1 PART I CONTAINS
THE FOLLOWING CRIME TYPES:
1 MURDER
2 RAPE
3 ROBBERY
4 AGG. ASSAULT
5 BURGLARY
6 LARCENY
7 AUTO THEFT

CRIME GROUP 2 PART II CONTAINS
THE FOLLOWING CRIME TYPES:
8 DRUNKENNESS
9 DRUGS
10 OTHER

CRIME GROUPING NUMBER 4

CRIME GROUP 1 VICTIM/VIOLENT CONTAINS
THE FOLLOWING CRIME TYPES:
1 MURDER
2 RAPE
3 ROBBERY
4 AGG. ASSAULT

CRIME GROUP 2 VICTIM/NON-VIOLENT CONTAINS
THE FOLLOWING CRIME TYPES:
5 BURGLARY
6 LARCENY
7 AUTO THEFT

CRIME GROUP 3 NO VICTIM CONTAINS
THE FOLLOWING CRIME TYPES:
8 DRUNKENNESS
9 DRUGS
10 OTHER

CRIME GROUPING NUMBER 5

CRIME GROUP 1 FELONY CONTAINS
THE FOLLOWING CRIME TYPES:
1 MURDER
2 RAPE
3 ROBBERY
4 AGG. ASSAULT
5 BURGLARY
6 LARCENY
7 AUTO THEFT

CRIME GROUP 2 MISDEMEANOR CONTAINS
THE FOLLOWING CRIME TYPES:
8 DRUNKENNESS

9 DRUGS
10 OTHER

CRIME GROUPING NUMBER 6

CRIME GROUP 1 INTENSIVE CONTAINS
THE FOLLOWING CRIME TYPES:
8 DRUNKENNESS
9 DRUGS

CRIME GROUP 2 GENERAL CONTAINS
THE FOLLOWING CRIME TYPES:
1 MURDER
2 RAPE
3 ROBBERY
4 AGG. ASSAULT
5 BURGLARY
6 LARCENY
7 AUTO THEFT
10 OTHER

Start of the Base Case output reports. The base case represents the current status of the criminal justice system, prior to any changes that may be made through use of Law Enforcement Assistance Administration (LEAA) funds or other funding sources.

RUN: PHILA-ALASKA SAMPLE PLAN: 0 BASE CASE PAGE 11

STAGE A POLICE APPRE/ARREST

THIS STAGE BELONGS TO PROGRAM 1 POLICE

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, AND MANPOWER AND COST RESOURCES REQUIRED ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 1
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 1
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
MURDER	58.0
RAPE	144.0
ROBBERY	709.0
AGG. ASSAULT	1828.0
BURGLARY	2530.0
LARCENY	3495.0
AUTO THEFT	1671.0
DRUNKENNESS	21744.0
DRUGS	3162.0
OTHER	17792.0
TOTAL	52582.0

WORKLOADS

WORKLOAD: POLICE HOURS

KEY MANPOWER PROCESSING TIMES REQUIRED PER CASE WERE READ IN AND MULTIPLIED BY THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL KEY MANPOWER TIME REQUIRED TO PROCESS ALL CASES

CRIME GROUP	KEY MANPOWER PROCESSING TIME REQUIRED PER CASE IN HOURS	TOTAL KEY MANPOWER PROCESSING TIME REQUIRED FOR ALL CASES IN HOURS
MURDER	13.000	754.00
RAPE	13.000	1872.00
ROBBERY	13.000	2704.00
AGG. ASSAULT	13.000	23764.00
BURGLARY	13.000	32890.00
LARCENY	13.000	45435.00
AUTO THEFT	13.000	21723.00
DRUNKENNESS	4.000	86976.00
DRUGS	4.000	12648.00
OTHER	4.000	71169.00
TOTAL	5.692	299284.00

KEY MANPOWER - MANPOWER ASSOCIATED WITH WORKLOADS

This page begins the output reports about the first stage: in the example, Police Apprehension/Arrest. Output reports are grouped by stage in the logical input and computational sequence for each stage. Part of the input data for the Police Apprehension/Arrest Stage is the program to which the stage belongs. After the Base Case or Alternative Plan reports for each stage, costs are grouped by program, by stage, and by cost type.

The way the stage is modelled is next described on the output. As input data for the stage, the user includes one of four possible stage types, coding the way the stage will be modelled. In the case of Police Apprehension/Arrest, the stage type is "all input flows are to be processed and sent to other stages, workloads and costs per case are to be read in, and manpower and cost resources required are to be computed." Other stage types will be illustrated later. In subsequent runs to support different phases of a planning process, a stage may be modelled with different stage types.

The crime groupings for Police Apprehension/Arrest are next shown.

The input flows to Police Apprehension/Arrest are the input flows shown on Page 6. These flows are reported crimes.

Because the stage is modelled as compute resources required and manpower is to be explicitly mentioned, the amount of a policemen's time (the key manpower type) required per reported crime is input by crime group. Which time units (in this case, hours) are to be used is also controlled by the user. An alternative way of inputting the workload per case is to input the number of cases overall, or by crime group, per year a policeman can handle.

Given the number of reported crimes and the amount of a policeman's time required per reported crime, the total policeman's time required to process all cases is computed.

MANPOWER TYPE: POLICEMEN

AVERAGE ANNUAL SALARY PER MAN: 10200.00

ANNUAL HOURS AVAILABLE PER MAN: 360.

The annual hours a policeman is available to handle reported crimes is input and used to compute the number of policemen required, which together with the annual salary gives the required policemen salary costs.

THE TOTAL KEY MANPOWER TIME REQUIRED WAS DIVIDED BY THE ANNUAL TIME AVAILABLE PER KEY MAN TO CALCULATE THE TOTAL NUMBER OF KEY MANPOWER REQUIRED

CRIME GROUP	REQUIRED MANPOWER	REQUIRED PROPORTION	REQUIRED SALARIES
MURDER	2.09	0.0025	21363.33
RAPE	5.20	0.0063	53040.00
ROBBERY	7.51	0.0090	76613.31
AGG. ASSAULT	66.01	0.0794	673313.25
BURGLARY	91.36	0.1099	931883.19
LARCENY	126.21	0.1518	1287324.00
AUTO THEFT	58.54	0.0704	597068.19
DRUNKENNESS	241.60	0.2906	2464319.00
DRUGS	35.13	0.0423	358359.94
OTHER	197.69	0.2378	2016426.00
TOTAL	831.34	1.0000	8479706.00

OTHER MANPOWER - MANPOWER VARYING WITH KEY MANPOWER

Other manpower associated with the stage in a supervising or supporting role to the key manpower type may be input. For a compute resources required stage type, the ratio of the other manpower to key manpower is input and multiplied times the number of key manpower required. Several other manpower types may be used for a stage.

THE RATIOS OF OTHER MEN PER KEY MAN WERE READ IN AND MULTIPLIED BY THE TOTAL REQUIRED KEY MANPOWER TO CALCULATE THE TOTAL OTHER MEN REQUIRED

MANPOWER TYPE: SUPERVISORS

AVERAGE ANNUAL SALARY PER MAN: 13500.00

RATIO OTHER MEN PER KEY MAN: 0.12

TOTAL KEY MANPOWER: 831.3

TOTAL OTHER MANPOWER: 99.8

TOTAL SALARIES: 1346776.00

NON-SALARY VARIABLE COSTS

Both variable and fixed non-salary costs may be used for a stage. Here a non-salary cost variable with the number of key manpower hours is shown. For a compute resources required stage type, the non-salary cost per hour of policemen's time is input and multiplied times the number of policemen hours to compute the non-salary cost. Several non-salary variable cost types may be used for a stage and the costs may also be computed on a case basis. The costs per case may be input by crime group or overall.

NON-SALARY VARIABLE COST TYPE: VEHICLE OPERATION

THE NON-SALARY COSTS PER KEY MANPOWER TIME WERE READ IN AND MULTIPLIED BY THE TOTAL REQUIRED KEY MANPOWER TIME TO CALCULATE TOTAL NON-SALARY COST

CRIME GROUP	NON-SALARY COST PER HOUR OF KEY MANPOWER PROCESSING TIME	NON-SALARY COST
MURDER	2.84	2141.36
RAPE	2.84	5316.48
ROBBERY	2.84	7679.36
AGG. ASSAULT	2.84	67489.69
BURGLARY	2.84	93407.56
LARCENY	2.84	129035.31
AUTO THEFT	2.84	59847.30

DRUNKENNESS	2.84	247011.75
DRUGS	2.84	35920.31
OTHER	2.84	202117.06
TOTAL	2.84	849966.06

NON-SALARY FIXED COSTS

NON-SALARY FIXED COST TYPE: POLICE LABORATORY AMOUNT: 325000.00

Several non-salary fixed cost types may be used for a stage.

TOTAL STAGE COSTS

SALARY 9826485.00

NON-SALARY 1174966.00

TOTAL 11001451.00

The salary and non-salary costs are added together.

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

The Police Apprehension/Arrest stage has 5 exiting branches. The first two branches show the reported crimes leaving Police Apprehension/Arrest as either arrested cases entering stage Court Trial or as no arrest cases dropping out of the criminal justice system. The last three branches show the reported crimes leaving Police Apprehension/Arrest as arrested defendant flows to either Detention Stage or out on Bail/Released-On-Own-Recognizance or as people dropped because of no arrest.

BRANCH: ARRESTS - CASES TO STAGE: C COURT TRIAL

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.9500	55.1
RAPE	0.9300	133.9
ROBBERY	0.8500	176.8
AGG. ASSAULT	0.8000	1462.4
BURGLARY	0.7400	1872.2
LARCENY	0.7900	2761.0
AUTO THEFT	0.6800	1102.3
DRUNKENNESS	0.7500	16308.0
DRUGS	0.9000	2845.8
OTHER	0.7000	12454.4
TOTAL	0.7450	39171.9

Because both cases and people leave Police Apprehension/Arrest on separate branches, twice the flow leaves the stage than enters. Later stages bring this double flow back together again so as not to double count.

BRANCH: NO ARRESTS - CASES TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.0500	2.9
RAPE	0.0700	10.1
ROBBERY	0.1500	31.2
AGG. ASSAULT	0.2000	365.6
BURGLARY	0.2600	657.8
LARCENY	0.2100	733.9
AUTO THEFT	0.3200	518.7
DRUNKENNESS	0.2500	5436.0
DRUGS	0.1000	316.2
OTHER	0.3000	5337.6
TOTAL	0.2550	13410.0

In this example, branching ratios were input and the branching flows were calculated. A later stage will show the alternative way in which actual branching flows are input, the branching ratios are calculated and computed branching flows are compared with actual branching flows in a discrepancy analysis to allow debugging the flow picture. The model will calculate the respective branching ratios when actual branching flows are input and cases and people have separate branches.

BRANCH: DETAINED TO STAGE: B DETENTION

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.9500	55.1
RAPE	0.5600	80.6
ROBBERY	0.2500	52.0
AGG. ASSAULT	0.4000	731.2
BURGLARY	0.1500	379.5
LARCENY	0.1500	524.2
AUTO THEFT	0.0500	81.0
DRUNKENNESS	0.0300	652.3
DRUGS	0.3000	948.6
OTHER	0.0500	889.6
TOTAL	0.0836	4394.3

BRANCH: BAIL/ROR TO STAGE: C COURT TRIAL

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.0	0.0
RAPE	0.3700	53.3
ROBBERY	0.6000	124.8
AGG. ASSAULT	0.4000	731.2
BURGLARY	0.5900	1492.7
LARCENY	0.6400	2236.8
AUTO THEFT	0.6300	1021.2
DRUNKENNESS	0.7200	15655.7
DRUGS	0.6000	1897.2
OTHER	0.6500	11564.8
TOTAL	0.6614	34777.7

BRANCH: NO ARRESTS - PEOPLE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.0500	2.9
RAPE	0.0700	10.1
ROBBERY	0.1500	31.2
AGG. ASSAULT	0.2000	365.6
BURGLARY	0.2600	657.8
LARCENY	0.2100	733.9
AUTO THEFT	0.3200	518.7
DRUNKENNESS	0.2500	5436.0
DRUGS	0.1000	316.2
OTHER	0.3000	5337.6
TOTAL	0.2550	13410.0

Note the use of letters A, B, C, etc. for stage codes. Stages do not have to be numbered sequentially; any alpha-numeric codes may be used. Alpha-numeric coding allows the insertion or deletion of stages in a criminal justice system representation with the minimum number of changes to other stage data cards because other stages do not have to be re-numbered and therefore "to stage" branching codes do not have to be changed. Under the alpha-numeric coding, stages are output in the order in which the output information about them is computed.

STAGE 8 DETENTION

THIS STAGE BELONGS TO PROGRAM 4 PRISONS

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, AND MANPOWER AND COST RESOURCES REQUIRED ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 2
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 2
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
ALL CRIMES	4394.3

WORKLOADS

WORKLOAD: DETENTION DAYS

REQUIRED TIME DURATIONS TO BE SPENT IN THIS STAGE WERE READ IN AND MULTIPLIED BY THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL REQUIRED TIME DURATION TO BE SPENT BY ALL CASES. THE TOTAL REQUIRED TIME DURATION WAS DIVIDED BY THE NUMBER OF TIME UNITS PER YEAR TO CALCULATE THE AVERAGE POPULATION PER TIME UNIT

CRIME GROUP	REQUIRED TIME DURATION SPENT IN THIS STAGE PER CASE IN DAYS	TOTAL REQUIRED TIME DURATION SPENT IN THIS STAGE BY ALL CASES IN DAYS
ALL CRIMES	64.250	282330.88

CRIME GROUP	AVERAGE POPULATION PER DAYS
ALL CRIMES	773.5

NON-SALARY VARIABLE COSTS

NON-SALARY VARIABLE COST TYPE: TOTAL COST/DAY

THE NON-SALARY COSTS PER TIME DURATION A CASE SPENDS IN THE STAGE WERE READ IN AND MULTIPLIED BY THE TOTAL TIME DURATION FOR ALL CASES TO CALCULATE THE NON-SALARY COSTS

CRIME GROUP	NON-SALARY COST PER DAYS OF TIME DURATION SPENT IN THIS STAGE	NON-SALARY COST
ALL CRIMES	4.50	1270489.00

The next stage, Detention, uses a different crime grouping than Police Apprehension/Arrest. The crime grouping lumps all crimes together. Like the Police Apprehension/Arrest stage, Detention is modelled in this example as a compute resources required stage. However, no key manpower type will be explicitly mentioned in the data. Therefore, the workload is input as time duration a defendant spends in the detention. The model computes the total prisoner-days and the average daily population. A non-salary variable cost per day (really the total cost per day) is multiplied by the total prisoner-days to compute the required total cost.

TOTAL STAGE COSTS

SALARY	0.0
NON-SALARY	1270489.00
TOTAL	1270489.00

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: COURTS TO STAGE: C COURT TRIAL

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
ALL CRIMES	1.0000	4394.3

STAGE 6 COURT TRIAL

THIS STAGE BELONGS TO PROGRAM 2 COURTS

STAGE TYPE: WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, MANPOWER AND COST RESOURCES AVAILABLE ARE TO BE READ IN, AND INPUT FLOWS THAT ARE ABLE TO BE PROCESSED AND SENT TO OTHER STAGES WITHIN THE AVAILABLE RESOURCES ARE TO BE COMPUTED AND THE REMAINING FLOWS, IF ANY, ARE TO BE BACKLOGGED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 4
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 4
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE

DATA ON THE FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE WERE READ IN AND ADDED TO THE COMPUTED INPUT FLOWS FOR THIS STAGE

ENTERING BRANCH: RCRDS ENT/NEW TRIAL

CRIME TYPE	ENTERING FLOW
MURDER	26.0
RAPE	35.0
ROBBERY	44.0
AGG. ASSAULT	53.0
BURGLARY	111.0
LARCENY	65.0
AUTO THEFT	34.0
DRUNKENNESS	12.0
DRUGS	83.0
OTHER	79.0
TOTAL	542.0

BEGINNING BACKLOG

DATA ON THE BEGINNING BACKLOG WERE READ IN AND ADDED TO THE COMPUTED INPUT FLOWS FOR THIS STAGE

CRIME GROUP	BEGINNING BACKLOG
VICTIM/VIOLENT	500.0
VICTIM/NON-VIOLENT	400.0
NO VICTIM	9000.0
TOTAL	9900.0

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
VICTIM/VIOLENT	2486.2
VICTIM/NON-VIOLENT	6345.5
NO VICTIM	40782.7

The Court Trial Stage shows another way a stage may be modelled. The Court Trial stage is a stage in which the capacity to process flow is compared with the input flow to determine how many cases are processed, and establish the ending backlog.

The Court Trial stage shows the use of a flow entering the criminal justice system from outside at the stage. A stage may have several entering flows. A backlogged flow stage may also have a beginning backlog data. The flow from prior stages, the entering branch, and the beginning backlog are combined to get the input flows to Court Trial.

The Court Trial stage uses a different crime grouping than previous stages.

WORKLOADS

WORKLOAD: JUDGE HOURS

KEY MANPOWER PROCESSING TIMES REQUIRED PER CASE WERE READ IN AND MULTIPLIED BY THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL KEY MANPOWER TIME REQUIRED TO PROCESS ALL CASES

CRIME GROUP	KEY MANPOWER PROCESSING TIME REQUIRED PER CASE IN HOURS	TOTAL KEY MANPOWER PROCESSING TIME REQUIRED FOR ALL CASES IN HOURS
VICTIM/VIOLENT	8.000	19889.75
VICTIM/NON-VIOLENT	3.000	19036.58
NO VICTIM	1.000	40782.19
TOTAL	1.607	79708.50

KEY MANPOWER - MANPOWER ASSOCIATED WITH WORKLOADS

MANPOWER TYPE: JUDGES

AVERAGE ANNUAL SALARY PER MAN: 25000.00

ANNUAL HOURS AVAILABLE PER MAN: 1650.

THE TOTAL KEY MANPOWER TIME REQUIRED WAS DIVIDED BY THE ANNUAL TIME AVAILABLE PER KEY MAN TO CALCULATE THE TOTAL NUMBER OF KEY MANPOWER REQUIRED

CRIME GROUP	REQUIRED MANPOWER	REQUIRED PROPORTION	REQUIRED SALARIES
VICTIM/VIOLENT	12.05	0.2495	301359.81
VICTIM/NON-VIOLENT	11.54	0.2388	288433.00
NO VICTIM	24.72	0.5116	617911.88
TOTAL	48.31	1.0000	1207704.00

TOTAL KEY MANPOWER AVAILABLE WAS READ IN

TOTAL KEY MANPOWER AVAILABLE: 17.0

TOTAL ASSIGNED SALARIES: 425000.00

TOTAL KEY MANPOWER REQUIRED LESS TOTAL KEY MANPOWER AVAILABLE: 31.3

RATIO KEY MANPOWER AVAILABLE TO REQUIRED: 0.352

PROCESSED FLOWS

CRIME GROUP	COMPUTED INPUT FLOW	PROCESSED FLOW	ENDING BACKLOG	RATIO PROCESSED FLOW TO INPUT FLOW
VICTIM/VIOLENT	2486.2	874.9	1611.3	0.352

The required judges are compared with the available judges to get an allocation proportion of .352 which represents that .352 of all the input flows are processed and sent to other stages. The .352 applies to all crime groups. As options, the user may assign available judges to the crime groups for different proportions of the input flows to be processed, or the user may specify a priority ordering across the crime groups.

VICTIM/NON-VIOLENT	6345.5	2233.0	4112.5	0.352
NO VICTIM	40782.7	14351.6	26430.6	0.352
TOTAL	49613.9	17459.5	32154.4	0.352

OTHER MANPOWER - MANPOWER VARYING WITH KEY MANPOWER

TOTAL OTHER MEN AVAILABLE WAS READ IN AND DIVIDED BY TOTAL KEY MANPOWER AVAILABLE TO CALCULATE THE RATIO OF OTHER MEN PER KEY MAN

MANPOWER TYPE: MAGISTRATES

AVERAGE ANNUAL SALARY PER MAN: 9500.00

TOTAL OTHER MANPOWER: 60.0

TOTAL KEY MANPOWER: 17.0

RATIO OTHER MEN PER KEY MAN: 3.53

TOTAL SALARIES: 510000.00

NON-SALARY VARIABLE COSTS

Total non-salary variable costs are input and the costs per processed case are calculated.

NON-SALARY VARIABLE COST TYPE: PRISONER TRANSPORT

TOTAL NON-SALARY COSTS WERE READ IN AND DIVIDED BY PROCESSED FLOWS TO CALCULATE NON-SALARY COSTS PER CASE

CRIME GROUP	NON-SALARY COST	NON-SALARY COST PER CASE
VICTIM/VIOLENT	109750.00	125.44
VICTIM/NON-VIOLENT	11985.00	5.37
NO VICTIM	65257.00	4.55
TOTAL	186992.00	10.71

NON-SALARY VARIABLE COST TYPE: WITNESS/JUROR FEES

TOTAL NON-SALARY COSTS WERE READ IN AND DIVIDED BY PROCESSED FLOWS TO CALCULATE NON-SALARY COSTS PER CASE

CRIME GROUP	NON-SALARY COST	NON-SALARY COST PER CASE
VICTIM/VIOLENT	35000.00	40.00
VICTIM/NON-VIOLENT	0.0	0.0
NO VICTIM	0.0	0.0
TOTAL	35000.00	2.00

NON-SALARY FIXED COSTS

NON-SALARY FIXED COST TYPE: RENTAL - 3 COURT RMS AMOUNT: 21600.00

TOTAL STAGE COSTS

SALARY	935000.00
NON-SALARY	243592.00
TOTAL	1178592.00

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE PROCESSED FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: CONVICTIONS TO STAGE: D COURT SENTENCING

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.6400	559.9
VICTIM/NON-VIOLENT	0.6200	1384.5
NO VICTIM	0.5900	8467.4
TOTAL	0.5963	10411.8

BRANCH: ACQUITTED TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.3600	315.0
VICTIM/NON-VIOLENT	0.3800	848.6
NO VICTIM	0.4100	5884.1
TOTAL	0.4037	7047.7

The processed flows are branched to later stages.

RUN: PHILA-ALASKA SAMPLE PLAN: 0 BASE CASE PAGE 21

STAGE D COURT SENTENCING

THIS STAGE BELONGS TO PROGRAM 2 COURTS

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, AND NO WORKLOADS, NO COSTS PER CASE, AND NO MANPOWER AND COST RESOURCES ARE TO BE READ IN OR COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 5
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 5
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
FELONY	1944.4
MISDEMEANOR	8467.4
TOTAL	10411.8

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: PRISONS TO STAGE: E PRISONS

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.2500	486.1
MISDEMEANOR	0.0800	677.4
TOTAL	0.1117	1163.5

BRANCH: PROBATION TO STAGE: F PROBATION/PAROLE

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.4500	875.0
MISDEMEANOR	0.2600	2201.5
TOTAL	0.2955	3076.5

BRANCH: SUSPENDED SENTENCE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.3000	583.3
MISDEMEANOR	0.3800	3217.6
TOTAL	0.3651	3800.9

BRANCH: FINES AND COSTS TO DROP-OUT OF C.J. SYSTEM

The Court Sentencing Stage shows a third way in which a stage may be modelled. Court sentencing is represented as an "only flow" stage; no manpower and costs are used. The Court sentencing stage uses another crime grouping.

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.0500	97.2
MISDEMEANOR	0.3300	2794.2
TOTAL	0.2777	2891.5

*** WARNING: THE TOTAL FLOW OUT IS NOT EQUAL TO THE TOTAL FLOW IN FOR THIS STAGE. CHECK BRANCHING RATIOS. ***

TOTAL FLOW IN: 10411.8

TOTAL FLOW OUT: 10932.4

FLOW IN - FLOW OUT: -520.6

RATIO FLOW OUT TO IN: 1.050

This page illustrates one type of error message. The model checks whether the flow out equals the flow in. If cases and people leave a stage along separate branches (not the case for Court Sentencing), the check is made using the case branches. In the example, the flow out is not equal to the flow in because of an intentional error (an increase in persons receiving a Suspended Sentence) was introduced in the branching ratios.

STAGE 6 PRISONS

THIS STAGE BELONGS TO PROGRAM 4 PRISONS

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, AND MANPOWER AND COST RESOURCES REQUIRED ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 5
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 5
(SEE ABOVE REPORT FOR DEFINITION OF CRIME GROUPINGS)

Prisons is a compute resources stage. There are two entering flow branches. An entering flow is used to input data about prisoners on hand so that prisoners may be combined with new prisoners from prior stages during the current year to yield the total prisoner population. An entering flow is also used for prisoners from other jurisdictions. The entering flow may be input either as an overall total which is allocated by the model or by crime type.

FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE

DATA ON THE FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE WERE READ IN AND ADDED TO THE COMPUTED INPUT FLOWS FOR THIS STAGE

ENTERING BRANCH: PRISONERS ON HAND TOTAL ENTERING FLOW: 1500.0

ENTERING BRANCH: OTHER JURISDICTIONS

CRIME TYPE	ENTERING FLOW
MURDER	5.0
RAPE	0.0
ROBBERY	50.0
AGG. ASSAULT	100.0
BURGLARY	200.0
LARCENY	0.0
AUTO THEFT	50.0
DRUNKENNESS	0.0
DRUGS	0.0
OTHER	0.0
TOTAL	405.0

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
FELONY	1517.8
MISDEMEANOR	1550.7
TOTAL	3068.5

WORKLOADS

WORKLOAD: PRISONER-MONTHS

No key manpower type is explicitly mentioned so the workload is in terms of time duration a prisoner spends in prison in months.

REQUIRED TIME DURATIONS TO BE SPENT IN THIS STAGE WERE READ IN AND MULTIPLIED BY THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL REQUIRED TIME DURATION TO BE SPENT BY ALL CASES. THE TOTAL REQUIRED TIME DURATION WAS DIVIDED BY THE NUMBER OF TIME UNITS PER YEAR TO CALCULATE THE AVERAGE POPULATION PER TIME UNIT

	REQUIRED TIME DURATION SPENT IN	TOTAL REQUIRED TIME DURATION SPENT

CRIME GROUP	THIS STAGE PER CASE IN MONS	IN THIS STAGE BY ALL CASES IN MONS
FELONY	8.500	12901.33
MISDEMEANOR	5.000	7753.48
TOTAL	6.731	20654.80

CRIME GROUP	AVERAGE POPULATION PER MONS
FELONY	1075.1
MISDEMEANOR	646.1
TOTAL	1721.2

OTHER MANPOWER

With no key manpower type explicitly mentioned, other manpower may be used as a fixed manpower type.

TOTAL OTHER MEN AVAILABLE WAS READ IN

MANPOWER TYPE: PRISON GUARDS

AVERAGE ANNUAL SALARY PER MAN: 9000.00

TOTAL OTHER MANPOWER: 200.0

TOTAL SALARIES: 1800000.00

MANPOWER TYPE: MEDICAL PERSONNEL

AVERAGE ANNUAL SALARY PER MAN: 25000.00

TOTAL OTHER MANPOWER: 10.0

TOTAL SALARIES: 250000.00

NON-SALARY VARIABLE COSTS

Non-salary variable costs are illustrated as costs per month per prisoner.

NON-SALARY VARIABLE COST TYPE: EDUCATION TUITION

THE NON-SALARY COSTS PER TIME DURATION A CASE SPENDS IN THE STAGE WERE READ IN AND MULTIPLIED BY THE TOTAL TIME DURATION FOR ALL CASES TO CALCULATE THE NON-SALARY COSTS

CRIME GROUP	NON-SALARY COST PER MONS OF TIME DURATION SPENT IN THIS STAGE	NON-SALARY COST
FELONY	1.50	19351.99
MISDEMEANOR	1.50	11630.21
TOTAL	1.50	30982.21

NON-SALARY VARIABLE COST TYPE: FOOD/CLOTHING

THE NON-SALARY COSTS PER TIME DURATION A CASE SPENDS IN THE STAGE WERE READ IN AND MULTIPLIED BY THE TOTAL TIME DURATION FOR ALL CASES TO CALCULATE THE NON-SALARY COSTS

NON-SALARY COST PER MONS OF TIME DURATION

CRIME GROUP	SPENT IN THIS STAGE	NON-SALARY COST
FELONY	85.00	1096613.00
MISDEMEANOR	85.00	659045.69
TOTAL	85.00	1755657.00

TOTAL STAGE COSTS

SALARY	2050000.00
NON-SALARY	1786639.00
TOTAL	3836639.00

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: OUTRIGHT RELEASE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.2000	303.6
MISDEMEANOR	0.6500	1008.0
TOTAL	0.4274	1311.5

BRANCH: PAROLE TO STAGE: F PROBATION/PAROLE

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.3500	531.2
MISDEMEANOR	0.3000	465.2
TOTAL	0.3247	996.4

BRANCH: CONTINUING CONFINMNT TO DROP-OUT OF C.J. SYSTEM

One of the branches from Prisons is to continuing prison confinement.

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.4500	683.0
MISDEMEANOR	0.0500	77.5
TOTAL	0.2479	760.5

STAGE F PROBATION/PAROLE

THIS STAGE BELONGS TO PROGRAM 3 PROBATION

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, MANPOWER AND COST RESOURCES AVAILABLE ARE TO BE READ IN, AND WORKLOADS AND COSTS PER CASE ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 6
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 6
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

Probation/Parole Stage shows the fourth way a stage may be modelled. All the flows are processed and resources available are read in and workloads and costs per case are computed.

FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE

DATA ON THE FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE WERE READ IN AND ADDED TO THE COMPUTED INPUT FLOWS FOR THIS STAGE

ENTERING BRANCH: CONTINUING SUPERVSN. TOTAL ENTERING FLOW: 2384.0

An entering flow is used to combine new probation/parole cases with cases carrying over from prior years.

INPUT FLOWS

THE ACTUAL BRANCHING FLOWS FROM THIS STAGE WERE READ IN AND ADDED TOGETHER TO CALCULATE THE ACTUAL INPUT FLOWS TO THIS STAGE

CRIME GROUP	COMPUTED FLOW	ACTUAL FLOW	DIFFERENCE
INTENSIVE	2560.5	2660.0	-99.5
GENERAL	3896.5	4590.0	-693.5
TOTAL	6457.0	7250.0	-793.0

A different crime grouping is used.

Actual branching flows from Probation/Parole were read in instead of branching ratios. The actual branching flows were added together to compute the actual input flows to Probation/Parole. A discrepancy analysis is then computed between the computed input flows from prior stages and the actual input flows. The discrepancy analysis is used to debug the flow representation of the criminal justice system.

KEY MANPOWER - MANPOWER ASSOCIATED WITH WORKLOADS

MANPOWER TYPE: PROBATION OFFICERS

AVERAGE ANNUAL SALARY PER MAN: 12500.00

TOTAL KEY MANPOWER AVAILABLE AND PROPORTIONS ASSIGNING KEY MANPOWER TO CRIME GROUPS WERE READ IN AND MULTIPLIED TO CALCULATE KEY MANPOWER AVAILABLE TO PROCESS EACH CRIME GROUP

CRIME GROUP	ASSIGNED PROPORTION	AVAILABLE MANPOWER	ASSIGNED SALARIES
INTENSIVE	0.6500	34.45	430624.94
GENERAL	0.3500	18.55	231874.81
TOTAL	1.0000	53.00	662500.00

Total key manpower available and proportions assigning the total to crime groups are input so a caseload can be computed by crime group. If the assignment proportions were not input, the caseload would be computed overall. If annual time availability were input for the key manpower type, time available per case would be computed.

WORKLOADS

THE COMPUTED INPUT FLOWS WERE DIVIDED BY KEY MANPOWER AVAILABLE TO CALCULATE THE ANNUAL NUMBER OF CASES PER KEY MAN

	ANNUAL CASES PER

CRIME GROUP	KEY MANPOWER
INTENSIVE	74.3
GENERAL	210.1
TOTAL	121.8

NON-SALARY VARIABLE COSTS

NON-SALARY VARIABLE COST TYPE: PROB. OFF. TRAVEL

TOTAL NON-SALARY COSTS WERE READ IN AND DIVIDED BY COMPUTED INPUT FLOWS TO CALCULATE NON-SALARY COSTS PER CASE

NON-SALARY COST: 106000.00

NON-SALARY COST PER CASE: 16.42

Non-salary variable cost is computed per case.

NON-SALARY FIXED COSTS

NON-SALARY FIXED COST TYPE: PSY. CONTRACT SERV. AMOUNT: 75000.00

TOTAL STAGE COSTS

SALARY	662499.75
NON-SALARY	181000.00
TOTAL	843499.75

OUTPUT BRANCHING RATIOS AND FLOWS

THE ACTUAL BRANCHING FLOWS WERE READ IN, AND THE BRANCHING RATIOS WERE CALCULATED AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS. THE COMPUTED BRANCHING FLOWS ARE THE FLOWS THAT ENTER OTHER STAGES.

BRANCH: RELEASE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW	ACTUAL FLOW	DIFFERENCE
INTENSIVE	0.0789	202.1	210.0	-7.9
GENERAL	0.5338	2079.8	2450.0	-370.2
TOTAL	0.3534	2282.0	2660.0	-378.0

BRANCH: VIOLATIONS TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW	ACTUAL FLOW	DIFFERENCE
INTENSIVE	0.1692	433.2	450.0	-16.8
GENERAL	0.2614	1018.7	1200.0	-181.3
TOTAL	0.2249	1451.9	1650.0	-198.1

One branch is to continuing supervision. Actual branching flows were read in. The model computes the branching ratios from the actual branching flows and then multiplies the ratios times the computed input flows to calculate the computed branching flows. A discrepancy analysis is then computed showing the difference between the computed and actual branching flows for each branch. These discrepancy analyses help debug the flow representation of the criminal justice system. After an adequate flow picture is obtained, the branching ratios are used as input to test alternative plans.

BRANCH: CONTINUING PROBATION TO DROP-OUT OF C.J. SYSTEM PAGE 28

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW	ACTUAL FLOW	DIFFERENCE
INTENSIVE	0.7519	1925.2	2000.0	-74.8
GENERAL	0.2048	798.0	940.0	-142.0
TOTAL	0.4217	2723.1	2940.0	-216.9

RUN: PHILA-ALASKA SAMPLE PLAN: 0 BASE CASE PAGE 39

PROGRAM COSTS DETAILED BY PROCESSING STAGE AND COST CATEGORY

PROGRAM 1 POLICE

STAGE	SALARY	NON-SALARY	TOTAL
A POLICE APPRE/APREST	9826485.00	1174966.00	11001451.00
PROGRAM TOTAL	9826485.00	1174966.00	11001451.00

PROGRAM 2 COURTS

STAGE	SALARY	NON-SALARY	TOTAL
C COURT TRIAL	935000.00	243592.00	1178592.00
D COURT SENTENCING	0.0	0.0	0.0
PROGRAM TOTAL	935000.00	243592.00	1178592.00

PROGRAM 3 PROBATION

STAGE	SALARY	NON-SALARY	TOTAL
F PROBATION/PAROLE	662499.75	181000.00	843499.75
PROGRAM TOTAL	662499.75	181000.00	843499.75

PROGRAM 4 PRISONS

STAGE	SALARY	NON-SALARY	TOTAL
B DETENTION	0.0	1270489.00	1270489.00
E PRISONS	2050000.00	1786639.00	3836639.00
PROGRAM TOTAL	2050000.00	3057128.00	5107128.00

	SALARY	NON-SALARY	TOTAL
TOTAL CRIMINAL JUSTICE SYSTEM	13473984.00	4656686.00	18130656.00

Costs are grouped by program by stage by cost type.

ALTERNATIVE PLAN: 1 ALT. PLAN 1

THE PROJECT CODES OF PROJECTS TO BE INCLUDED IN THIS ALTERNATIVE PLAN WERE READ IN

THE FOLLOWING PROJECTS ARE INCLUDED IN THE ALTERNATIVE PLAN:

PROJECT CODE	PROJECT NAME
XX	ADD COURT MANPOWER
YY	SCREENING/REFERRAL

Alternative Plan #1 will combine two projects with the above Base Case. The first project, entitled "Add Court Manpower", will add 11 judges and 15 magistrates to the existing manpower types at Court Trial and will add a new other manpower type, Court Reporters (14 at 9600 each). The second project, "Screening/Referral", will divert part of the Arrest cases and Bail/ROR and Detained defendant flows from Police Apprehension/Arrest to a new stage, D.A. Screening. The D. A. Screening Stage will send cases (1) to Court Trial, (2) to a new stage, Alcoholic/Drug Referral, and (3) to release from the criminal justice system. D. A. screening also changes the Court Trial branching ratios because weaker cases are removed from the system.

RUN: PHILA-ALASKA SAMPLE PLAN: 1 ALT. PLAN 1 PAGE 31

STAGE A POLICE APPRE/ARREST

THIS STAGE BELONGS TO PROGRAM 1 POLICE

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, AND MANPOWER AND COST RESOURCES REQUIRED ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 1
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 1
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
MURDER	58.0
RAPE	144.0
ROBBERY	208.0
AGG. ASSAULT	1828.0
BURGLARY	2530.0
LARCENY	3495.0
AUTO THEFT	1621.0
DRUNKENNESS	21744.0
DRUGS	3162.0
OTHER	17792.0
TOTAL	52582.0

WORKLOADS

WORKLOADS: POLICE HOURS

KEY MANPOWER PROCESSING TIMES REQUIRED PER CASE WERE READ IN AND MULTIPLIED BY THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL KEY MANPOWER TIME REQUIRED TO PROCESS ALL CASES

CRIME GROUP	KEY MANPOWER PROCESSING TIME REQUIRED PER CASE IN HOURS	TOTAL KEY MANPOWER PROCESSING TIME REQUIRED FOR ALL CASES IN HOURS
MURDER	13.000	754.00
RAPE	13.000	1872.00
ROBBERY	13.000	2704.00
AGG. ASSAULT	13.000	23764.00
BURGLARY	13.000	32890.00
LARCENY	13.000	45435.00
AUTO THEFT	13.000	21073.00
DRUNKENNESS	4.000	86976.00
DRUGS	4.000	12648.00
OTHER	4.000	71168.00
TOTAL	5.692	299284.00

KEY MANPOWER - MANPOWER ASSOCIATED WITH WORKLOADS

Police Apprehension/Arrest is modelled as in the Base Case except the branching ratios for Arrests-Cases, Detained, and Bail/ROR have been reduced and two branches have been added to feed the cases and defendants to D. A. Screening Stage. (see pp. 34-35)

AVERAGE ANNUAL SALARY PER MAN: 10200.00

ANNUAL HOURS AVAILABLE PER MAN: 360.

THE TOTAL KEY MANPOWER TIME REQUIRED WAS DIVIDED BY THE ANNUAL TIME AVAILABLE PER KEY MAN TO CALCULATE THE TOTAL NUMBER OF KEY MANPOWER REQUIRED

CRIME GROUP	REQUIRED MANPOWER	REQUIRED PROPORTION	REQUIRED SALARIES
MURDER	2.09	0.0025	21363.33
RAPE	5.20	0.0063	53040.00
ROBBERY	7.51	0.0090	76613.31
AGG. ASSAULT	66.01	0.0794	673313.25
BURGLARY	91.36	0.1099	931883.19
LARCENY	126.21	0.1518	1287324.00
AUTO THEFT	58.54	0.0704	597068.19
DRUNKENNESS	241.60	0.2906	2464319.00
DRUGS	35.13	0.0423	358359.94
OTHER	197.69	0.2378	2016426.00
TOTAL	831.34	1.0000	8479706.00

OTHER MANPOWER - MANPOWER VARYING WITH KEY MANPOWER

THE RATIOS OF OTHER MEN PER KEY MAN WERE READ IN AND MULTIPLIED BY THE TOTAL REQUIRED KEY MANPOWER TO CALCULATE THE TOTAL OTHER MEN REQUIRED

MANPOWER TYPE: SUPERVISORS

AVERAGE ANNUAL SALARY PER MAN: 13500.00

RATIO OTHER MEN PER KEY MAN: 0.12

TOTAL KEY MANPOWER: 831.3

TOTAL OTHER MANPOWER: 99.8

TOTAL SALARIES: 1346776.00

NON-SALARY VARIABLE COSTS

NON-SALARY VARIABLE COST TYPE: VEHICLE OPERATION

THE NON-SALARY COSTS PER KEY MANPOWER TIME WERE READ IN AND MULTIPLIED BY THE TOTAL REQUIRED KEY MANPOWER TIME TO CALCULATE TOTAL NON-SALARY COST

CRIME GROUP	NON-SALARY COST PER HOUR OF KEY MANPOWER PROCESSING TIME	NON-SALARY COST
MURDER	2.84	2141.36
RAPE	2.84	5316.48
ROBBERY	2.84	7679.36
AGG. ASSAULT	2.84	67489.69
BURGLARY	2.84	93407.56
LARCENY	2.84	129035.31
AUTO THEFT	2.84	59847.30

DRUNKENNESS	2.84	247011.75	
DRUGS	2.84	35920.31	
OTHER	2.84	202117.06	
TOTAL	2.94	849966.06	

NON-SALARY FIXED COSTS

NON-SALARY FIXED COST TYPE: POLICE LABORATORY AMOUNT: 325000.00

TOTAL STAGE COSTS

SALARY 9826485.00

NON-SALARY 1174966.00

TOTAL 11001451.00

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: ARRESTS - CASES TO STAGE: C COURT TRIAL

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.4200	24.4
RAPE	0.5000	72.0
ROBBERY	0.6200	129.0
AGG. ASSAULT	0.4100	749.5
BURGLARY	0.4900	1239.7
LARCENY	0.5400	1887.3
AUTO THEFT	0.5900	956.4
DRUNKENNESS	0.3600	7827.8
DRUGS	0.1800	569.2
OTHER	0.5500	9785.6
TOTAL	0.4420	23240.8

BRANCH: NO ARRESTS - CASES TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.0500	2.9
RAPE	0.0700	10.1
ROBBERY	0.1500	31.2
AGG. ASSAULT	0.2000	365.6
BURGLARY	0.2600	657.8
LARCENY	0.2100	733.9
AUTO THEFT	0.3200	518.7
DRUNKENNESS	0.2500	5436.0
DRUGS	0.1000	316.2
OTHER	0.3000	5337.6
TOTAL	0.2550	13410.0

Branching Ratio Changes to the

Branches Leaving Police Apprehension/Arrest

Due to the Screening Project

Crime Group	Arrest Cases	Detained Defendants	Bail/ROR Defendants	D.A. Screening Cases	D.A. Screening Defendants
1. Murder	-.53	-.53	.00	.53	.53
2. Rape	-.43	-.33	-.10	.43	.43
3. Robbery	-.23	-.18	-.05	.23	.23
4. Agg. Assault	-.39	-.25	-.14	.39	.39
5. Burglary	-.25	-.06	-.19	.25	.25
6. Larceny	-.25	-.06	-.19	.25	.25
7. Auto Theft	-.09	-.01	-.08	.09	.09
8. Drunkenness	-.39	-.02	-.37	.39	.39
9. Drugs	-.72	-.12	-.60	.72	.72
10. Other	-.15	-.01	-.14	.15	.15

BRANCH: DETAINED TO STAGE: B DETENTION

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.4200	24.4
RAPE	0.2300	33.1
ROBBERY	0.0700	14.6
AGG. ASSAULT	0.1500	274.2
BURGLARY	0.0900	227.7
LARCENY	0.0900	314.5
AUTO THEFT	0.0400	64.8
DRUNKENNESS	0.0100	217.4
DRUGS	0.1800	569.2
OTHER	0.0400	711.7
TOTAL	0.0466	2451.6

BRANCH: BAIL/ROR TO STAGE: C COURT TRIAL

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.0	0.0
RAPE	0.2700	38.9
ROBBERY	0.5500	114.4
AGG. ASSAULT	0.2600	475.3
BURGLARY	0.4000	1012.0
LARCENY	0.4500	1572.7
AUTO THEFT	0.5500	891.5
DRUNKENNESS	0.3500	7610.4
DRUGS	0.0	0.0
OTHER	0.5100	9073.9
TOTAL	0.3954	20789.2

BRANCH: NO ARRESTS - PEOPLE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.0500	2.9
RAPE	0.0700	10.1
ROBBERY	0.1500	31.2
AGG. ASSAULT	0.2000	365.6
BURGLARY	0.2600	657.8
LARCENY	0.2100	733.9
AUTO THEFT	0.3200	518.7
DRUNKENNESS	0.2500	5436.0
DRUGS	0.1000	316.2
OTHER	0.3000	5337.6
TOTAL	0.2550	13410.0

BRANCH: D.A. SCREENING-CASES TO STAGE: G DA SCREENING

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.5300	30.7
RAPE	0.4300	61.9
ROBBERY	0.2300	47.8

The branching ratios (same for cases and persons) show the proportion of cases, by crime group which are assumed to be handled by the District Attorney screening project in Alternative Plan #1.

AGG. ASSAULT	0.3900	712.9
BURGLARY	0.2500	632.5
LARCENY	0.2500	873.8
AUTO THEFT	0.0900	145.9
DRUNKENNESS	0.3900	8480.2
DRUGS	0.7200	2276.6
OTHER	0.1500	2668.8
TOTAL	0.3030	15931.1

BRANCH: D.A. SCREENING-PEPLE TO STAGE: G DA SCREENING

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
MURDER	0.5300	30.7
RAPE	0.4300	61.9
ROBBERY	0.2300	47.8
AGG. ASSAULT	0.3900	712.9
BURGLARY	0.2500	632.5
LARCENY	0.2500	873.8
AUTO THEFT	0.0900	145.9
DRUNKENNESS	0.3900	8480.2
DRUGS	0.7200	2276.6
OTHER	0.1500	2668.8
TOTAL	0.3030	15931.1

STAGE 6 DA SCREENING .

THIS STAGE BELONGS TO PROGRAM 2 COURTS

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, AND MANPOWER AND COST RESOURCES REQUIRED ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 4
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 4
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
VICTIM/VIOLENT	853.4
VICTIM/NON-VIOLENT	1652.1
NO VICTIM	13425.6
TOTAL	15931.1

WORKLOADS

WORKLOAD: ASST. DA HOURS

KEY MANPOWER PROCESSING TIMES REQUIRED PER CASE WERE READ IN AND MULTIPLIED BY THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL KEY MANPOWER TIME REQUIRED TO PROCESS ALL CASES

CRIME GROUP	KEY MANPOWER PROCESSING TIME REQUIRED PER CASE IN HOURS	TOTAL KEY MANPOWER PROCESSING TIME REQUIRED FOR ALL CASES IN HOURS
VICTIM/VIOLENT	1.000	853.42
VICTIM/NON-VIOLENT	0.500	826.07
NO VICTIM	0.250	3356.40
TOTAL	0.316	5035.89

KEY MANPOWER - MANPOWER ASSOCIATED WITH WORKLOADS

MANPOWER TYPE: ASST. DA'S

AVERAGE ANNUAL SALARY PER MAN: 15500.00

ANNUAL HOURS AVAILABLE PER MAN: 1400.

THE TOTAL KEY MANPOWER TIME REQUIRED WAS DIVIDED BY THE ANNUAL TIME AVAILABLE PER KEY MAN TO CALCULATE THE TOTAL NUMBER OF KEY MANPOWER REQUIRED

CRIME GROUP	REQUIRED MANPOWER	REQUIRED PROPORTION	REQUIRED SALARIES
VICTIM/VIOLENT	0.61	0.1695	9448.57
VICTIM/NON-VIOLENT	0.59	0.1640	9145.77

Alternative Plan #1 includes a new stage, D. A. Screening, which is modelled as a compute resources required stage. Workload is in terms of Assistant D. A. time required per case in hours.

NO VICTIM	2.40	0.6665	37160.11
TOTAL	3.60	1.0000	55754.45

OTHER MANPOWER - MANPOWER VARYING WITH KEY MANPOWER

THE RATIOS OF OTHER MEN PER KEY MAN WERE READ IN AND MULTIPLIED BY THE TOTAL REQUIRED KEY MANPOWER TO CALCULATE THE TOTAL OTHER MEN REQUIRED

MANPOWER TYPE: SUPERVISING D.A.

AVERAGE ANNUAL SALARY PER MAN: 18000.00

RATIO OTHER MEN PER KEY MAN: 0.25

TOTAL KEY MANPOWER: 3.6

TOTAL OTHER MANPOWER: 0.9

TOTAL SALARIES: 16186.77

MANPOWER TYPE: SECRETARY/CLERICAL

AVERAGE ANNUAL SALARY PER MAN: 7500.00

RATIO OTHER MEN PER KEY MAN: 0.33

TOTAL KEY MANPOWER: 3.6

TOTAL OTHER MANPOWER: 1.2

TOTAL SALARIES: 8907.72

Other manpower and non-salary fixed costs are added as shown.

NON-SALARY FIXED COSTS

NON-SALARY FIXED COST TYPE: D.A. TRAVEL AMOUNT: 12500.00

NON-SALARY FIXED COST TYPE: PROJECT EVALUATION AMOUNT: 22500.00

TOTAL STAGE COSTS

SALARY 80843.88

NON-SALARY 35000.00

TOTAL 115843.88

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: CASES NOLLE PROS TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS CASE FLOW.

D. A. Screening drops cases/defendants, send cases/defendants on to Court Trial, and Detention. Cases/defendants are also sent to an Alcoholic/ Drug Referral stage.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.1000	85.3
VICTIM/NON-VIOLENT	0.1400	231.3
NO VICTIM	0.8500	11411.7
TOTAL	0.7362	11728.4

BRANCH: CASES CONTINUED TO STAGE: C COURT TRIAL

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.9000	768.1
VICTIM/NON-VIOLENT	0.8600	1420.8
NO VICTIM	0.1500	2013.8
TOTAL	0.2638	4202.8

BRANCH: PEOPLE DISMISSED TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.1000	85.3
VICTIM/NON-VIOLENT	0.1400	231.3
NO VICTIM	0.4500	6041.5
TOTAL	0.3991	6358.2

BRANCH: ALCOHOL/DRUG REFERRL TO STAGE: H ALCOHOL/DRUG REFERRL

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.0	0.0
VICTIM/NON-VIOLENT	0.0	0.0
NO VICTIM	0.4000	5370.2
TOTAL	0.3371	5370.2

BRANCH: DETAINED TO STAGE: H DETENTION

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.5500	469.4
VICTIM/NON-VIOLENT	0.2600	429.6
NO VICTIM	0.0200	268.5
TOTAL	0.0733	1167.4

BRANCH: BAIL/ROR TO STAGE: C COURT TRIAL

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.3500	298.7
VICTIM/NON-VIOLENT	0.6000	991.3
NO VICTIM	0.1300	1745.3
TOTAL	0.1905	3035.3

STAGE H ALCOHOL/DRUG REFERRL

*** WARNING: IMPROPER PROGRAM CODE (0). THE COSTS OF THIS STAGE WILL NOT BE ASSIGNED TO ANY PROGRAM. ***

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, MANPOWER AND COST RESOURCES AVAILABLE ARE TO BE READ IN, AND WORKLOADS AND COSTS PER CASE ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 6
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 6
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
INTENSIVE	4302.7
GENERAL	1067.5
TOTAL	5370.2

KEY MANPOWER - MANPOWER ASSOCIATED WITH WORKLOADS

MANPOWER TYPE: PSYCHOLOGISTS

AVERAGE ANNUAL SALARY PER MAN: 18500.00

ANNUAL HOURS AVAILABLE PER MAN: 1450.

TOTAL KEY MANPOWER AVAILABLE WAS READ IN

TOTAL KEY MANPOWER AVAILABLE: 6.0

TOTAL ASSIGNED SALARIES: 111000.00

WORKLOADS

ANNUAL TIME AVAILABLE PER KEY MAN WAS MULTIPLIED BY KEY MANPOWER AVAILABLE TO CALCULATE TOTAL KEY MANPOWER TIME AVAILABLE TO PROCESS CASES. TOTAL TIME AVAILABLE WAS DIVIDED BY COMPUTED INPUT FLOWS TO CALCULATE THE KEY MANPOWER TIME AVAILABLE TO PROCESS EACH CASE

TOTAL KEY MANPOWER TIME AVAILABLE TO PROCESS ALL CASES IN HOURS: 8700.00

KEY MANPOWER TIME AVAILABLE PER CASE IN HOURS: 1.620

OTHER MANPOWER - MANPOWER VARYING WITH KEY MANPOWER

TOTAL OTHER MEN AVAILABLE WAS READ IN AND DIVIDED BY TOTAL KEY MANPOWER AVAILABLE TO CALCULATE THE RATIO OF OTHER MEN PER KEY MAN

MANPOWER TYPE: MEDICAL DOCTORS

Alternative Plan A1 also adds an Alcohol/Drug Referral stage. The costs of this stage are not to be added to the criminal justice system costs, so no program code was given to the stage. Failure to allocate the manpower and non-salary costs added resulted in the warning message shown. Alcoholic/Drug Referral stage is modelled as a compute workload stage. Key manpower available is input and the time available per case is computed. Other manpower and fixed costs are shown.

AVERAGE ANNUAL SALARY PER MAN: 22500.00

TOTAL OTHER MANPOWER: 2.0

TOTAL KEY MANPOWER: 6.0

RATIO OTHER MEN PER KEY MAN: 0.33

TOTAL SALARIES: 45000.00

MANPOWER TYPE: PARA-MEDICAL

AVERAGE ANNUAL SALARY PER MAN: 8500.00

TOTAL OTHER MANPOWER: 6.0

TOTAL KEY MANPOWER: 6.0

RATIO OTHER MEN PER KEY MAN: 1.00

TOTAL SALARIES: 51000.00

NON-SALARY FIXED COSTS

NON-SALARY FIXED COST TYPE: FACILITIES RENTAL AMOUNT: 65000.00

NON-SALARY FIXED COST TYPE: LABORATORY COSTS AMOUNT: 80000.00

TOTAL STAGE COSTS

SALARY 207000.00

NON-SALARY 145000.00

TOTAL 352000.00

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: RELEASE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
INTENSIVE	0.9000	3872.4
GENERAL	0.1500	160.1
TOTAL	0.7509	4032.6

BRANCH: RETURN TO COURTS TO STAGE: C COURT TRIAL

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW

As a result of the referral program, some persons are shown as released from the Alcoholic/Drug Referral stage; others, for whom the program was not successful, are returned to Court Trial.

INTENSIVE	0.1000	430.3
GENERAL	0.8500	907.4
TOTAL	0.2491	1337.7

STAGE 8 DETENTION

THIS STAGE BELONGS TO PROGRAM 4 PRISONS

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES. WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, AND MANPOWER AND COST RESOURCES REQUIRED ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 2
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 2
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

Detention is modelled as before, but the impact of the diversion projects resulting in fewer defendants in the input flow.

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
ALL CRIMES	3619.1

WORKLOADS

WORKLOAD: DETENTION DAYS

REQUIRED TIME DURATIONS TO BE SPENT IN THIS STAGE WERE READ IN AND MULTIPLIED BY THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL REQUIRED TIME DURATION TO BE SPENT BY ALL CASES. THE TOTAL REQUIRED TIME DURATION WAS DIVIDED BY THE NUMBER OF TIME UNITS PER YEAR TO CALCULATE THE AVERAGE POPULATION PER TIME UNIT

CRIME GROUP	REQUIRED TIME DURATION SPENT IN THIS STAGE PER CASE IN DAYS	TOTAL REQUIRED TIME DURATION SPENT IN THIS STAGE BY ALL CASES IN DAYS
ALL CRIMES	64.250	232524.25

CRIME GROUP	AVERAGE POPULATION PER DAYS
ALL CRIMES	637.1

NON-SALARY VARIABLE COSTS

NON-SALARY VARIABLE COST TYPE: TOTAL COST/DAY

THE NON-SALARY COSTS PER TIME DURATION A CASE SPENDS IN THE STAGE WERE READ IN AND MULTIPLIED BY THE TOTAL TIME DURATION FOR ALL CASES TO CALCULATE THE NON-SALARY COSTS

CRIME GROUP	NON-SALARY COST PER DAYS OF TIME DURATION SPENT IN THIS STAGE	NON-SALARY COST
ALL CRIMES	4.50	1046359.81

TOTAL STAGE COSTS

SALARY	0.0
NON-SALARY	1046359.81
TOTAL	1046359.81

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: COURTS TO STAGE: C COURT TRIAL

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
ALL CRIMES	1.0000	3619.1

STAGE C COURT TRIAL

THIS STAGE BELONGS TO PROGRAM 2 COURTS

STAGE TYPE: WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, MANPOWER AND COST RESOURCES AVAILABLE ARE TO BE READ IN, AND INPUT FLOWS THAT ARE ABLE TO BE PROCESSED AND SENT TO OTHER STAGES WITHIN THE AVAILABLE RESOURCES ARE TO BE COMPUTED AND THE REMAINING FLOWS, IF ANY, ARE TO BE BACKLOGGED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 4
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 4
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE

DATA ON THE FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE WERE READ IN AND ADDED TO THE COMPUTED INPUT FLOWS FOR THIS STAGE

ENTERING BRANCH: RCRDS ENT/NEW TRIAL

CRIME TYPE	ENTERING FLOW
MURDER	26.0
RAPE	35.0
ROBBERY	44.0
AGG. ASSAULT	53.0
BURGLARY	111.0
LARCENY	65.0
AUTO THEFT	34.0
DRUNKENNESS	12.0
DRUGS	83.0
OTHER	79.0
TOTAL	542.0

BEGINNING BACKLOG

DATA ON THE BEGINNING BACKLOG WERE READ IN AND ADDED TO THE COMPUTED INPUT FLOWS FOR THIS STAGE

CRIME GROUP	BEGINNING BACKLOG
VICTIM/VIOLENT	500.0
VICTIM/NON-VIOLENT	400.0
NO VICTIM	9000.0
TOTAL	9900.0

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
VICTIM/VIOLENT	2400.9
VICTIM/NON-VIOLENT	6114.2
NO VICTIM	30708.1

WORKLOADS

WORKLOAD: JUDGE HOURS

KEY MANPOWER PROCESSING TIMES REQUIRED PER CASE WERE READ IN AND MULTIPLIED BY THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL KEY MANPOWER TIME REQUIRED TO PROCESS ALL CASES

CRIME GROUP	KEY MANPOWER PROCESSING TIME REQUIRED PER CASE IN HOURS	TOTAL KEY MANPOWER PROCESSING TIME REQUIRED FOR ALL CASES IN HOURS
VICTIM/VIOLENT	8.000	19207.01
VICTIM/NON-VIOLENT	3.000	18342.68
NO VICTIM	1.000	30708.08
TOTAL	1.740	68257.75

KEY MANPOWER - MANPOWER ASSOCIATED WITH WORKLOADS

MANPOWER TYPE: JUDGES

AVERAGE ANNUAL SALARY PER MAN: 25000.00

ANNUAL HOURS AVAILABLE PER MAN: 1650.

THE TOTAL KEY MANPOWER TIME REQUIRED WAS DIVIDED BY THE ANNUAL TIME AVAILABLE PER KEY MAN TO CALCULATE THE TOTAL NUMBER OF KEY MANPOWER REQUIRED

CRIME GROUP	REQUIRED MANPOWER	REQUIRED PROPORTION	REQUIRED SALARIES
VICTIM/VIOLENT	11.64	0.2814	291015.31
VICTIM/NON-VIOLENT	11.12	0.2687	277919.44
NO VICTIM	18.61	0.4499	465273.63
TOTAL	41.37	1.0000	1034207.88

TOTAL KEY MANPOWER AVAILABLE WAS READ IN

TOTAL KEY MANPOWER AVAILABLE: 28.0

TOTAL ASSIGNED SALARIES: 700000.00

TOTAL KEY MANPOWER REQUIRED LESS TOTAL KEY MANPOWER AVAILABLE: 13.4

RATIO KEY MANPOWER AVAILABLE TO REQUIRED: 0.677

Court Trial has fewer new cases and more manpower (17 to 28 judges, 60 to 75 magistrates, and 14 court reporters) so that .677 of the cases will be processed, up from .352 in the Base Case.

PROCESSED FLOWS

CRIME GROUP	COMPUTED INPUT FLOW	PROCESSED FLOW	ENDING BACKLOG	RATIO PROCESSED FLOW TO INPUT FLOW
VICTIM/VIOLENT	2400.9	1625.0	775.9	0.677

VICTIM/NON-VIOLENT	6114.2	4138.4	1975.8	0.677
NO VICTIM	30708.1	20784.6	9923.4	0.677
TOTAL	39223.2	26548.1	12675.1	0.677

OTHER MANPOWER - MANPOWER VARYING WITH KEY MANPOWER

TOTAL OTHER MEN AVAILABLE WAS READ IN AND DIVIDED BY TOTAL KEY MANPOWER AVAILABLE TO CALCULATE THE RATIO OF OTHER MEN PER KEY MAN

MANPOWER TYPE: MAGISTRATES

AVERAGE ANNUAL SALARY PER MAN: 8500.00

TOTAL OTHER MANPOWER: 75.0

TOTAL KEY MANPOWER: 28.0

RATIO OTHER MEN PER KEY MAN: 2.68

TOTAL SALARIES: 637500.00

MANPOWER TYPE: COURT REPORTERS

AVERAGE ANNUAL SALARY PER MAN: 9600.00

TOTAL OTHER MANPOWER: 14.0

TOTAL KEY MANPOWER: 28.0

RATIO OTHER MEN PER KEY MAN: 0.50

TOTAL SALARIES: 134400.00

NON-SALARY VARIABLE COSTS

NON-SALARY VARIABLE COST TYPE: PRISONER TRANSPORT

TOTAL NON-SALARY COSTS WERE READ IN AND DIVIDED BY COMPUTED INPUT FLOWS TO CALCULATE NON-SALARY COSTS PER CASE

CRIME GROUP	NON-SALARY COST	NON-SALARY COST PER CASE
VICTIM/VIOLENT	109750.00	67.54
VICTIM/NON-VIOLENT	11985.00	2.90
NO VICTIM	65257.00	3.14
TOTAL	186992.00	7.04

NON-SALARY VARIABLE COST TYPE: WITNESS/JUROR FEES

TOTAL NON-SALARY COSTS WERE READ IN AND DIVIDED BY COMPUTED INPUT FLOWS TO CALCULATE NON-SALARY COSTS PER CASE

CRIME GROUP	NON-SALARY COST	NON-SALARY COST PER CASE
VICTIM/VIOLENT	35000.00	21.54
VICTIM/NON-VIOLENT	0.0	0.0
NO VICTIM	0.0	0.0

TOTAL 35000.00 1.32

NON-SALARY FIXED COSTS

NON-SALARY FIXED COST TYPE: RENTAL - 3 COURT RMS AMOUNT: 21600.00

TOTAL STAGE COSTS

SALARY	1471900.00
NON-SALARY	243592.00
TOTAL	1715492.00

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE PROCESSED FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: CONVICTIONS TO STAGE: D COURT SENTENCING

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.7800	1267.5
VICTIM/NON-VIOLENT	0.7800	3227.9
NO VICTIM	0.7100	14757.1
TOTAL	0.7252	19252.6

BRANCH: ACQUITTED TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS CASE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
VICTIM/VIOLENT	0.2200	357.5
VICTIM/NON-VIOLENT	0.2200	910.4
NO VICTIM	0.2900	6027.5
TOTAL	0.2748	7295.5

The D. A. Screening project also changes the branching ratios from Court Trial because the screening removes the weaker cases from the system. The following branching ratio changes were input:

Crime Group	Convictions	Acquitted
Victim/Violent	+.14	-.14
Victim/Non-Violent	+.16	-.16
No Victim	+.12	-.12

STAGE D COURT SENTENCING

THIS STAGE BELONGS TO PROGRAM 2 COURTS

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES, AND NO WORKLOADS, NO COSTS PER CASE, AND NO MANPOWER AND COST RESOURCES ARE TO BE READ IN OR COMPUTED.

Court Screening has more cases in its input flow because of the added manpower at Court Trial.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 5
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 5
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
FELONY	4495.5
MISDEMEANOR	14757.1
TOTAL	19252.6

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: PRISONS TO STAGE: E PRISONS

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.2500	1123.9
MISDEMEANOR	0.0800	1180.6
TOTAL	0.1197	2304.4

BRANCH: PROBATION TO STAGE: F PROBATION/PAROLE

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.4500	2023.0
MISDEMEANOR	0.2600	3836.8
TOTAL	0.3044	5859.8

BRANCH: SUSPENDED SENTENCE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.3000	1348.6
MISDEMEANOR	0.3800	5607.7
TOTAL	0.3613	6956.3

BRANCH: FINES AND COSTS TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.0500	224.8
MISDEMEANOR	0.3300	4869.8
TOTAL	0.2646	5094.6

*** WARNING: THE TOTAL FLOW OUT IS NOT EQUAL TO THE TOTAL FLOW IN FOR THIS STAGE. CHECK BRANCHING RATIOS. ***

TOTAL FLOW IN: 19252.6

TOTAL FLOW OUT: 20215.2

FLOW IN - FLOW OUT: -962.6

RATIO FLOW OUT TO IN: 1.050

STAGE 6 PRISONS

THIS STAGE BELONGS TO PROGRAM 4 PRISONS

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES,
WORKLOADS AND COSTS PER CASE ARE TO BE READ IN, AND MANPOWER
AND COST RESOURCES REQUIRED ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 5
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 5
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE

DATA ON THE FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE WERE READ IN
AND ADDED TO THE COMPUTED INPUT FLOWS FOR THIS STAGE

ENTERING BRANCH: PRISONERS ON HAND TOTAL ENTERING FLOW: 1500.0

ENTERING BRANCH: OTHER JURISDICTIONS

CRIME TYPE	ENTERING FLOW
MURDER	5.0
RAPE	0.0
ROBBERY	50.0
AGG. ASSAULT	100.0
BURGLARY	200.0
LARCENY	0.0
AUTO THEFT	50.0
DRUNKENNESS	0.0
DRUGS	0.0
OTHER	0.0
TOTAL	405.0

INPUT FLOWS

CRIME GROUP	COMPUTED FLOW
FELONY	2260.4
MISDEMEANOR	1949.0
TOTAL	4209.4

WORKLOADS

WORKLOAD: PRISONER-MONTHS

REQUIRED TIME DURATIONS TO BE SPENT IN THIS STAGE WERE READ IN AND MULTIPLIED BY
THE COMPUTED INPUT FLOWS TO CALCULATE THE TOTAL REQUIRED TIME DURATION TO
BE SPENT BY ALL CASES. THE TOTAL REQUIRED TIME DURATION WAS DIVIDED
BY THE NUMBER OF TIME UNITS PER YEAR TO CALCULATE THE AVERAGE POPULATION PER
TIME UNIT

	REQUIRED TIME DURATION SPENT IN	TOTAL REQUIRED TIME DURATION SPENT

Prisons has more new prisoners because of the increased number of cases being processed at Court Trial and Sentencing stages, with an associated increase in costs.

CRIME GROUP	THIS STAGE PER CASE IN MONS	IN THIS STAGE BY ALL CASES IN MONS
FELONY	8.500	19213.49
MISDEMEANOR	5.000	9745.10
TOTAL	6.879	28958.59

CRIME GROUP	AVERAGE POPULATION PER MONS
FELONY	1601.1
MISDEMEANOR	812.1
TOTAL	2413.2

OTHER MANPOWER

TOTAL OTHER MEN AVAILABLE WAS READ IN

MANPOWER TYPE: PRISON GUARDS

AVERAGE ANNUAL SALARY PER MAN: 9000.00

TOTAL OTHER MANPOWER: 200.0

TOTAL SALARIES: 1800000.00

MANPOWER TYPE: MEDICAL PERSONNEL

AVERAGE ANNUAL SALARY PER MAN: 25000.00

TOTAL OTHER MANPOWER: 10.0

TOTAL SALARIES: 250000.00

NON-SALARY VARIABLE COSTS

NON-SALARY VARIABLE COST TYPE: EDUCATION TUITION

THE NON-SALARY COSTS PER TIME DURATION A CASE SPENDS IN THE STAGE WERE READ IN AND MULTIPLIED BY THE TOTAL TIME DURATION FOR ALL CASES TO CALCULATE THE NON-SALARY COSTS

CRIME GROUP	NON-SALARY COST PER MONS OF TIME DURATION SPENT IN THIS STAGE	NON-SALARY COST
FELONY	1.50	28820.23
MISDEMEANOR	1.50	14617.65
TOTAL	1.50	43437.89

NON-SALARY VARIABLE COST TYPE: FOOD/CLOTHING

THE NON-SALARY COSTS PER TIME DURATION A CASE SPENDS IN THE STAGE WERE READ IN AND MULTIPLIED BY THE TOTAL TIME DURATION FOR ALL CASES TO CALCULATE THE NON-SALARY COSTS

NON-SALARY COST PER
MONS OF TIME DURATION

CRIME GROUP	SPENT IN THIS STAGE	NON-SALARY COST
FELONY	85.00	1633146.00
MISDEMEANOR	85.00	828333.81
TOTAL	85.00	2461479.00

TOTAL STAGE COSTS

SALARY	2050000.00
NON-SALARY	2504916.00
TOTAL	4554916.00

OUTPUT BRANCHING RATIOS AND FLOWS

THE BRANCHING RATIOS WERE READ IN AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS.

BRANCH: OUTRIGHT RELEASE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.2000	452.1
MISDEMEANOR	0.6500	1266.9
TOTAL	0.4084	1718.9

BRANCH: PAROLE TO STAGE: F PROBATION/PAROLE

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.3500	791.1
MISDEMEANOR	0.3000	584.7
TOTAL	0.3268	1375.8

BRANCH: CONTINUING CONFINMNT TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW
FELONY	0.4500	1017.2
MISDEMEANOR	0.0500	97.5
TOTAL	0.2648	1114.6

STAGE F PROBATION/PAROLE

THIS STAGE BELONGS TO PROGRAM 3 PROBATION

STAGE TYPE: ALL INPUT FLOWS ARE TO BE PROCESSED AND SENT TO OTHER STAGES,
MANPOWER AND COST RESOURCES AVAILABLE ARE TO BE READ IN, AND
WORKLOADS AND COSTS PER CASE ARE TO BE COMPUTED.

THE CRIME GROUPING USED TO SPECIFY THE INPUT DATA IS CRIME GROUPING NUMBER 6
THE CRIME GROUPING USED FOR OUTPUT REPORTS IS CRIME GROUPING NUMBER 6
(SEE ABOVE REPORT ON DEFINITION OF CRIME GROUPINGS)

FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE

DATA ON THE FLOWS ENTERING FROM OUTSIDE THE C.J.S. AT THIS STAGE WERE READ IN
AND ADDED TO THE COMPUTED INPUT FLOWS FOR THIS STAGE

ENTERING BRANCH: CONTINUING SUPERVSN. TOTAL ENTERING FLOW: 2384.0

INPUT FLOWS

THE ACTUAL BRANCHING FLOWS FROM THIS STAGE WERE READ IN AND ADDED TOGETHER TO
CALCULATE THE ACTUAL INPUT FLOWS TO THIS STAGE

CRIME GROUP	COMPUTED FLOW	ACTUAL FLOW	DIFFERENCE
INTENSIVE	2853.0	2660.0	193.0
GENERAL	6766.7	4590.0	2176.7
TOTAL	9619.6	7250.0	2369.6

KEY MANPOWER - MANPOWER ASSOCIATED WITH WORKLOADS

MANPOWER TYPE: PROBATION OFFICERS

AVERAGE ANNUAL SALARY PER MAN: 12500.00

TOTAL KEY MANPOWER AVAILABLE AND PROPORTIONS ASSIGNING KEY MANPOWER TO CRIME
GROUPS WERE READ IN AND MULTIPLIED TO CALCULATE KEY MANPOWER AVAILABLE
TO PROCESS EACH CRIME GROUP

CRIME GROUP	ASSIGNED PROPORTION	AVAILABLE MANPOWER	ASSIGNED SALARIES
INTENSIVE	0.6500	34.45	430624.94
GENERAL	0.3500	18.55	231874.81
TOTAL	1.0000	53.00	662500.00

WORKLOADS

THE COMPUTED INPUT FLOWS WERE DIVIDED BY KEY MANPOWER AVAILABLE TO CALCULATE
THE ANNUAL NUMBER OF CASES PER KEY MAN

ANNUAL CASES PER

Probation/Parole has more cases because of the increased number of cases being processed at Court Trial and Sentencing stages, with the associated increase in caseload.

CRIME GROUP	KEY MANPOWER
INTENSIVE	82.8
GENERAL	364.8
TOTAL	181.5

NON-SALARY VARIABLE COSTS

NON-SALARY VARIABLE COST TYPE: PROB. OFF. TRAVEL

TOTAL NON-SALARY COSTS WERE READ IN AND DIVIDED BY COMPUTED INPUT FLOWS TO CALCULATE NON-SALARY COSTS PER CASE

NON-SALARY COST: 106000.00

NON-SALARY COST PER CASE: 11.02

NON-SALARY FIXED COSTS

NON-SALARY FIXED COST TYPE: PSY. CONTRACT SERV. AMOUNT: 75000.00

TOTAL STAGE COSTS

SALARY 662499.75

NON-SALARY 181000.00

TOTAL 843499.75

OUTPUT BRANCHING RATIOS AND FLOWS

THE ACTUAL BRANCHING FLOWS WERE READ IN, AND THE BRANCHING RATIOS WERE CALCULATED AND MULTIPLIED BY THE ABOVE COMPUTED INPUT FLOWS TO CALCULATE THE COMPUTED BRANCHING FLOWS. THE COMPUTED BRANCHING FLOWS ARE THE FLOWS THAT ENTER OTHER STAGES.

BRANCH: RELEASE TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW	ACTUAL FLOW	DIFFERENCE
INTENSIVE	0.0789	225.2	210.0	15.2
GENERAL	0.5338	3611.8	2450.0	1161.8
TOTAL	0.3989	3837.1	2660.0	1177.1

BRANCH: VIOLATIONS TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW	ACTUAL FLOW	DIFFERENCE
INTENSIVE	0.1692	482.6	450.0	32.6
GENERAL	0.2614	1769.1	1200.0	569.1
TOTAL	0.2341	2251.7	1650.0	601.7

BRANCH: CONTINUING PROBATION TO DROP-OUT OF C.J. SYSTEM

THIS BRANCH HAS PEOPLE FLOW.

CRIME GROUP	RATIO	COMPUTED FLOW	ACTUAL FLOW	DIFFERENCE
INTENSIVE	0.7519	2145.1	2000.0	145.1
GENERAL	0.2048	1385.8	940.0	445.8
TOTAL	0.3670	3530.9	2940.0	590.9

PROGRAM COSTS DETAILED BY PROCESSING STAGE AND COST CATEGORY

STAGE H ALCOHOL/DRUG REFERRL WAS NOT ASSIGNED TO A PROGRAM.

The Alcoholic/Drug Referral stage costs were not assigned to any program because they are considered outside the criminal justice system.

PROGRAM 1 POLICE

STAGE	SALARY	NON-SALARY	TOTAL
A POLICE APPRE/ARREST	9826485.00	1174966.00	11001451.00
PROGRAM TOTAL	9826485.00	1174966.00	11001451.00

PROGRAM 2 COURTS

STAGE	SALARY	NON-SALARY	TOTAL
C COURT TRIAL	1471900.00	243592.00	1715492.00
D COURT SENTENCING	0.0	0.0	0.0
G DA SCREENING	80843.88	35000.00	115843.88
PROGRAM TOTAL	1552743.00	278592.00	1831335.00

PROGRAM 3 PROBATION

STAGE	SALARY	NON-SALARY	TOTAL
F PROBATION/PAROLE	662499.75	181000.00	843499.75
PROGRAM TOTAL	662499.75	181000.00	843499.75

PROGRAM 4 PRISONS

STAGE	SALARY	NON-SALARY	TOTAL
R DETENTION	0.0	1046359.81	1046359.81
F PRISONS	2050000.00	2504916.00	4554916.00
PROGRAM TOTAL	2050000.00	3551275.00	5601275.00

	SALARY	NON-SALARY	TOTAL
TOTAL CRIMINAL JUSTICE SYSTEM	14091727.00	5185833.00	19277552.00

Table 1

Comparison of Key Indicators of the Operation

of the Sample Philadelphia/Alaska Criminal Justice System

in the Base Case and Alternative Plan I

Indicator or Operating Characteristic		Status in the Base Case	Status in the Alternative Plan	Analysis and/or Evaluation
1. Input flow, average population of detentioners, and costs associated with detention		Detentioners held of 4,394, average daily population of 773.5, total cost of $1,270,489 (pp. 15-16)	Detentioners held of 3,619, average daily population of 637.1, reduced total cost of $1,046,359 (pp. 42-43)	-Change results from District Attorney screening, subsequent transfer of defendants screened to Alcohol/Drug Referral, with no return of referral cases to detention
2. Proportion of reported crimes dropped prior to Court Trial as a result of Police decision, District Attorney screening, and subsequent Alcohol/Drug Referral, by crime grouping #4 (see p. 8)	Victim-Violent	10.76%	23.49%	-This computation involves the cases dropped without arrest by Police (pp.13-33) cases/persons screened by District Attorney (pp. 34-35), cases dropped from the system or referred to Alcohol/Drug Referral (p.38), and cases/persons not returned to the Courts from the Referral stage (p.40).
	Victim-Non-violent	25.00%	28.00%	
	No Victim	25.98%	49.57%	
3. Input flow, (from previous stages) to Court Trial, ratio of key manpower available to the manpower required to process the total flow, total backlog, and associated salary/non salary costs	Flow In	49,614	39,223	-Changes are the result of reduction in flows for all crimes (but particularly victimless crimes), and the project to add court manpower
	Ratio	.352	.677	
	Backlog	32,154	12,675	
	Salary Cost	$935,000	$1,471,900	
	Non-Salary Cost	$243,592	243,592	
		(pp. 17-20)	(pp.44-47)	

Indicator or Operating Characteristic		Status in the Base Case	Status in the Alternative Plan	Analysis and/or Evaluation
4. Conviction rate at Court Trial	Victim-Violent	64%	78%	-Improved conviction rate is assumed to result from District Attorney screening of major crimes that are defective for serious reasons, and diversion of less serious alcohol and drug offenses
	Victim-Non-Violent	62%	78%	
	No Victim	59%	71%	
	Overall	59.63%	72.52%	
		(p.20)	(p.47)	
5. Input flow to Court Sentencing, Prisons, and Probation (from previous stages)	Court Sentencing	10,412(p.21)	19,253(p.48)	-Change results from shift in conviction rates resulting from District Attorney screening, and the increase in case/defendant flow processed by the Courts
	Prisons	3,068(p.23)	4,209(p.50)	
	Probation	6,457(p.26)	9,620(p.53)	
6. Prisons average daily population, and non-salary variable costs	ADP	1,721.2	2,413.2	-Continuing result of changes in branching ratios from projects added in Alternative Plan #1
	Non-Salary Cost	$1,786,639	$2,504,916	
		(pp.23-25)	(pp.50-52)	
7. Probation caseload, by general and intensive supervision	General	210.1	364.8	-The high general caseload results from the assignment proportion of probation officers to general (only 35%) and a considerable number of "non-reporting" probationers in that category. Nevertheless the results of the projects included in Alternative Plan #1 suggest the need for augmentation in Probation operations.
8. Overall and Stage Costs	Police	$11,001,451.00	$11,001,451.00	-The budgetary increases are the result of both the (1) projects added to the Base Case and (2) new costs calculated which vary with the cases/defendants moving through the CJ system
	Courts	1,178,592.00	1,831,335.00	
	Probation	843,500.00	843,500.00	
	Prisons	5,258,335.00	5,601,275.00	
	Total	$18,283,352.00	$19,277,552.00	
		(p.29)	(p.56)	

under its current policies, programs, and projects, which we call the "base case"
- to design new projects and modify or discontinue old policies, programs, and projects – in order to close the gaps between desired and expected outcomes
- to predict the feasibility and the expected future outcomes under current policy, programs, and projects as modified by a combination of new projects, which we call the "test case" or alternative plan
- to select from among all the combinations of new projects that feasible set of projects which comes as close as possible to meeting desired future outcomes

Program and project structures are used to express the content of the base case or alternative plan. Revenue and manpower structures are used to express the feasibility of the base case or alternative plan. Indicators are used to express current status, desired future outcomes, and expected future outcomes of a base case or alternative plan; objectives are stated in terms of the gaps to be closed between desired and expected outcomes. A computer simulation model is used to predict the feasibility and expected indicator levels of the base case and alternative plans.

The PHILJIM model was only one part of the total work effort of Government Studies & Systems in developing a comprehensive criminal justice planning system for the City of Philadelphia. (Only work on the model was undertaken for the State of Alaska).

Designing and installing a comprehensive planning system is more complex and time consuming than designing a simulation model. The planning system concept is essential because present simulation models of social systems cannot predict all the indicators that are of concern to planning. The planning system must combine the simulation model's prediction of some indicators with the subjective prediction of other indicators.

The planning system concept is necessary because such a system manages the way data is gathered and assembled for the simulation runs: first, the current status assessment and base case simulation runs; then, the project design steps and alternative plan simulation runs. Data gathering is conducted periodically and systematically to run the model. The planning system concept is necessary because the planning system controls the way the simulation output is used: the output, together with subjective estimates, is judged against desired indicator levels for feasibility, and re-run until the best "test case" or plan is found.

To refer back to the major benefits of a simulation model and put them in the context of a total planning system:

1. achieving an understanding of the status of the system by simulation model is one element of the "base case" analysis that includes, for instance, evaluation of all existing LEAA projects;
2. diagnosing the problems of the system with the model is one element in priority decisions that includes, for instance, analysis of the current level of such criminal justice indicators as offenders with drug problems which are *not* incorporated in the model;
3. testing alternative proposals with the model is one element of a funding decision that includes the merits of the evaluation component and the availability of funds from other sources.

The use of the PHILJIM model as part of a criminal justice planning process is graphically illustrated on Chart 2.

RELATIONSHIP OF COMPREHENSIVE CRIMINAL JUSTICE PLANNING TO CRIMINAL JUSTICE INFORMATION SYSTEMS

More resources have been put into criminal justice information systems than into planning systems and simulation modelling. These information systems have tended to focus more on inter-jurisdictional arrangements than on the management of single state or metropolitan criminal justice systems. In addition, when present in a single jurisdiction, information systems more frequently support police, court, and correctional operations than they do planning efforts. Clearly, criminal justice information systems must support both operations and planning.

Simulation models for planning and criminal justice information systems for criminal justice have several common concerns and preoccupations:

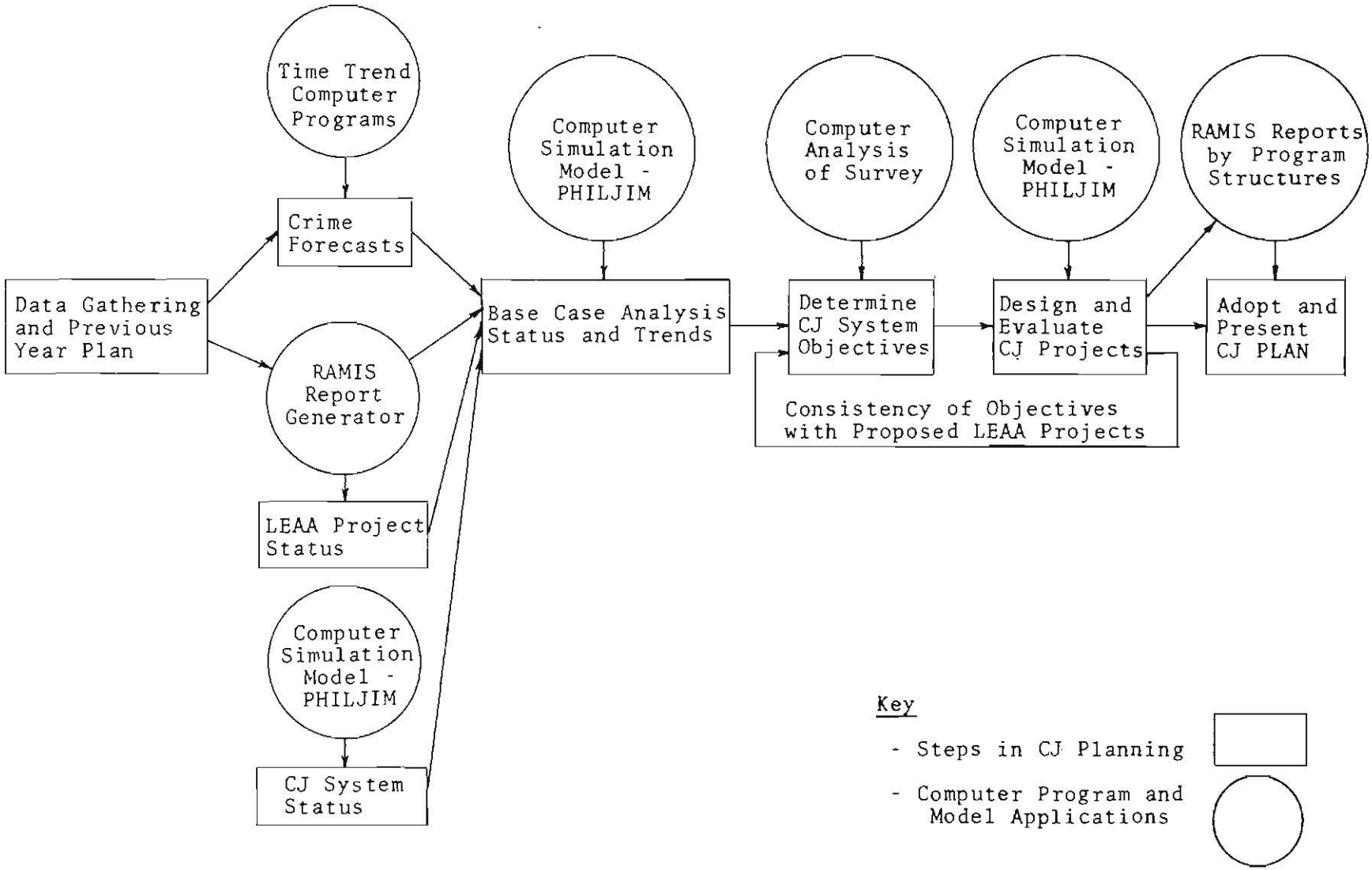
- both must proceed from a complete representation of the particular criminal justice system
- both must examine case management, defendant and offender tracking, and information interchange
- both must deal with feedback – the planning system by incorporating recidivism data which represents one of the few overall outcome measures, the information system by providing a reverse flow of information from one subsystem (corrections to courts, courts to police) to another so that there is some longitudinal analysis of performance

In experience with Philadelphia and the State of Alaska, we have found differing patterns of development.

The planning system and the information systems for a criminal justice system may be developed in parallel, with limited coordination. Where the information system precedes the CJ planning system, two things occur: initially the planning system attempts to use the existing information system for support and later tries to expand the information base to provide data more useful to planning. A third variation is where the planning system has been installed, survived at least one annual planning cycle, and is used to guide the information file development and retrieval pro-

Chart 2

Use of Computer-Based Technology
At Key Stages in a
Comprehensive Criminal Justice Planning Process



cedures. Technical considerations are important, but frequently the agency sponsorship of the two efforts determines the level of cooperation.

Integrated development of both a planning and information system for a criminal justice system is eminently desirable. Yet to develop a simulation model, utilize indicators as the basis of criminal justice objectives, and proceed through other formal planning steps does not require a full management information system. For example, with relation to court backlog, a simulation effort requires only aggregate statistics and a programming decision; a full management information system would require data on specific cases/individuals that make up the backlog, their current status, time the case has been pending, the impediment to bringing it to trial, and other factors. As indicated above, a planning system with a full simulation model will produce far more sharply defined specifications for the management information system.

SIMULATION MODELS, CRIME SPECIFIC IMPACT PLANNING, AND CONSTITUTIONAL GUARANTEES

With the new focus of the Law Enforcement Assistance Administration on crime oriented and crime specific planning, simulation models should become an even more significant tool for criminal justice planners both within operating agencies and in separate planning units.

The PHILJIM model, both in the sample printout and in the more detailed runs with actual Philadelphia data, uses a considerable variety of crime groupings. In the detailed Philadelphia 1970 run the PHILJIM model utilized groupings of 29 Police Charge Codes and 22 Court offense codes, with a crosswalk between police and court charges worked out to permit the data from each agency's reports to be linked at the processing stages where arrests turn into court charges for further processing.

There is no practical limit in the PHILJIM program on the crime groupings that may be employed; to date, distinct groupings have been used to accommodate the different ways that police, court, corrections, and juvenile agencies report their statistics. Groupings have already been introduced to accommodate crime specific planning, such as a separation of narcotics offenses from all other charges to determine the workload for various Philadelphia drug processing and referral stages. The model thus helps to overcome a major problem in the tracking of individual offenders, which is the lack of consistency among the reporting and data elements of separate criminal justice agencies. But the use of simulation models would still be greatly enhanced by more uniformity among charge and offense reports of individual agencies.

There are several other ways in which a PHILJIM type model fosters crime oriented planning. The model enables planners to generate manpower and total costs associated with the processing of a specific crime type, such as homicides, narcotics offenses, or robberies; data of this type is seldom available, but the model generates useful analyses by crime type when it can be obtained. Projects or system changes can also be analyzed by the model in terms of the system-wide impact on specific crime types; the District Attorney screening and Alcohol/Drug referral unit built into the sample output illustrates this possibility. Another possibility is the model's option to assign personnel by crime type; thus from the available judges, a higher proportion could be assigned to victim-violent crimes to reduce the backlog of cases for the crimes of homicide, rape, robbery, and aggravated assault.

Finally, and perhaps most important, a simulation model can prevent possible excesses that might result from crime specific planning. A preoccupation with violent crimes should not be such that we lose sight of property crimes, or of narcotics offenses. The model assists positively in efforts to balance planning across crime types.

A final and vital point – the type of total effort required to make a criminal justice simulation model operational leads to a direct focus on a variety of constitutional guarantees. We are part of an era in which the Federal and State judiciaries are beginning to operationally define numerous constitutional guarantees. The Sixth Amendment right to a "speedy and public trial" is being defined in terms of a fixed number of days from arrest for major crimes, where the delay is not the fault of the defendant. The guarantees of counsel have been defined in terms of which court processing stages require counsel, and these tend to reach further back toward the arrest stages. Similarly, what constitutes an effective defense by such counsel is now pending adjudication.

Constitutional guarantees affect the effort at modelling, while the model may be used to evaluate some of the impact of crucial changes in criminal procedures. Court standards and requirements were crucial in developing the system representation or flow diagram; conversely the model can be

used to evaluate the operational – but not the legal – impact of elimination of grand jury or an earlier holding of a probable cause hearing.

Against the backdrop of the demands which will fall on state and local criminal justice systems to achieve the objectives implicit in such operational definition of basic freedoms, the best of court management techniques will be required. The type of simulation model described here has enormous possibilities for crime oriented planning and the response to standards of performance drawn from constitutional requirements.

APPENDIX A

RUNNING CHARACTERISTICS

The PHILJIM computer program is written in IBM Model 370 FORTRAN IV - G Level, and is to be run as in a batch mode. Table II lists the present core storage allocations by type of data. Under these allocations, PHILJIM requires approximately 260K bytes, including system overload. PHILJIM requires four data sets for external storage. The example run used 3.6 seconds of CPU time and 13 seconds of channel time on an IBM 370 Model 165 with a cost of $4.25, including printing costs. Typical Philadelphia runs with 28 stages, 29 crime types, and many manpower, workloads, and cost types used cost approximately $11.00 per run and Alaska runs with 36 stages and 12 crime types and only flow data cost approximately $5.60 per run.

Table II

Present Storage Allocations for PHILJIM

Data Type	*Maximum Number Presently Allowed*
Crime types	30
Crime groupings	10
Programs	20
Stages	40
Entering flows	20
Beginning backlogs	20
Key Manpower types	40
Other Manpower types	150
Workloads	40
Average Populations	20
Non-salary Variable Costs	40
Non-salary Fixed Costs	40
Assignment Rules	40
Branches	125
Projects in an Alternative Plan	100

(Number of Projects limited only by external storage)

SESSION III

MAJOR ISSUES IN CRIMINAL JUSTICE INFORMATION AND STATISTICS SYSTEMS

O. J. HAWKINS, SESSION CHAIRMAN
ASSISTANT DIRECTOR
CALIFORNIA DEPARTMENT OF JUSTICE

48318

PANEL – THE ISSUE OF SECURITY AND PRIVACY

Dr. Robert R. J. Gallati, Panel Moderator
Director
New York State Identification and
Intelligence System

We all recognize that the issue of security and privacy is controversial. We (the SEARCH Security/Privacy Committee) have been controversial since the day we began. What is interesting, however, is that some of the things that were highly controversial just about three years ago have already been pretty much accepted today by everybody as the way to go. And I hope that some of our far out suggestions on this panel today will be received in the light of our previous experience.

I was very impressed by Congressman Wiggins' keynote speech as I am sure we all were. He mentioned that our quest in a democracy is for a free and orderly society, and the challenge of democracy is determining how much of each we can accept. The justices, of course, are a matter of dynamic equilibrium, balancing personal liberties against individual control. Into this delicate balance we in SEARCH, and we in law enforcement and in criminal justice, have recently added the weight of technology, largely to increase the effectiveness of our control. We need to do that to be sure, but by the same token, we need to extend our concerns to political, legal and social efficiency of the counter-balancing concern for individual liberty and particularly personal privacy. And it is within this context that we would like to offer to you the wisdom of our panelists today.

The panel was designed with the logic of providing an international oversight in terms of the view from the United Kingdom, the perspective of the state and local governments, perspective of the Federal Government, and, finally, the perspective of the United States Congress.

MICROFICHE

PANEL – THE ISSUE OF SECURITY AND PRIVACY

PANELISTS

MARK GITENSTEIN
ASSISTANT COUNCIL OF THE COMMITTEE OF THE
JUDICIARY SUBCOMMITTEE OF CONSTITUTIONAL RIGHTS

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THE ISSUE OF SECURITY AND PRIVACY

Mark Gitenstein
Assistant Counsel of the Committee of the
Judiciary Subcommittee on Constitutional Rights
Washington, D.C.

It is a great honor for me to have the opportunity to address you today and to represent the Subcommittee on Constitutional Rights at this symposium.

At the outset, I would like to relay Senator Ervin's deepest regrets that he is unable to be with you. It is indeed unfortunate that he cannot be here to participate in this dialogue on the critical issue of personal privacy and computerized criminal justice information systems.

Dr. Gallati has asked me to address myself to the recent activities of the Subcommittee and of Senator Ervin in the area of criminal justice information and intelligence systems. I will attempt to be as brief as possible for I am more anxious, as a representative of a Senate Subcommittee which may have a real impact on the future of such systems, to provoke questions and discussion from the audience on what we have been doing and what you think we should or should not do in the future.

There are three specific subjects which should be of interest to this panel and the symposium. First, there is the Subcommittee's government-wide survey of Federally-operated and sponsored criminal justice information and intelligence systems.

The second point is the pending legislation, S. 3834 and S. 2546, which Congressman Wiggins talked about yesterday. And a third area, which should be of great interest to you, is Senator Ervin's controversial rider to the Federal Bureau of Investigation's appropriations bill which restricts FBI dissemination of arrest records to non-criminal justice agencies.

I will cut short my discussion of the survey because I think Dave has really highlighted our work in that area. We are surveying everything the Federal Government is doing in the automated data processing area, not just in the criminal justice field – everything. The survey has already resulted in a 2,000 page hearing record which is available at the Government Printing Office and I suggest that you get a copy of it if you are interested.

This study will result in at least two important developments in the near future. First, the committee is preparing a report summarizing its findings and recommending Federal legislation. The legislation will cover all data banks operated by the Federal Government, not just criminal justice data banks. But second, and I think of greater importance to you, is the fact that Senator Ervin is also interested in separate legislation in the criminal justice field as it concerns privacy and data banks. I think you can expect to see, in the next few months, the introduction of a bill and hearings on arrest records; and, possibly, it will also address itself to other questions such as: Who shall maintain management control over criminal justice identification record systems and the more fundamental question of whether to computerize criminal justice intelligence systems.

This leads to the second general subject I would like to discuss with you and that is other legislation which is already pending. As I have suggested, I am going to restrict my comments to two bills introduced by the Administration. But before going into that I would just like to review for you the present state of Federal law on this question. For all practical purposes, NCIC and the LEAA sponsored state systems are not subject to strict Federal statutory regulations. While, of course, in some states state information systems are covered by state law, the nation-wide exchange of state information contemplated by NCIC cannot be controlled by one state statute.

The only Federal statute which is related to criminal justice information systems established by the Justice Department is Section 534, Title 23, of the U.S. Code. This statute, however, is not designed to cope with new computerized information systems, much less a system which spans the entire nation and contains, potentially at least, all the criminal justice information held in files anywhere. Indeed the central problem with the provision is that it delegates all responsibility for establishing privacy guidelines for such systems to the Attorney General. As Senator Ervin has remarked so often, "The questions of civil liberties and personal privacy simply should not be left to the self-restraint of the Executive branch."

Of course, pursuant to the authority of Section 534, the FBI has established a number of automated and manual criminal justice information systems which have been invaluable to Federal, state and local law enforcement officials around the country. For example, the Bureau's huge fingerprint identification service was established pursuant to this provision, as was NCIC. Of course,

the Bureau has made a serious effort via regulation to control the dissemination of the information it gathers and to protect the personal privacy of the subjects in its files.

However, two events in the past few years have prompted interest on Capitol Hill in Federal legislation which would establish a national personal privacy policy in regard to criminal justice data banks. The first was Project SEARCH, of which you are all aware. Through the work of Dr. Gallati and the members of the Privacy and Security Committee of SEARCH, Congress and the public have become aware of the potential threat to personal privacy posed by such systems. So in 1970, when the authorization for LEAA came up in the Senate, Senator Mathias from Maryland proposed an amendment, which was ultimately adopted, requiring the Department of Justice to submit to Congress legislation which would articulate a national privacy policy for LEAA sponsored data banks. This provision prompted the Department to introduce S. 2546, the bill that Congressman Wiggins talked to you about yesterday.

I won't go into the details of the bill because I assume that the Congressman referred to them. In general, it sets out regulations as to the type of information that may be contained in these data banks. While it does not restrict the dissemination of information to criminal justice agencies, it does only permit dissemination for law enforcement purposes. The bill also contains provisions for allowing the subject to view and challenge. It also requires updating and purging of the system and creates a civil remedy against state and local officials for misuse of criminal justice information.

The second development, which has prompted legislation, was the decision of *Menard* v. *Mitchell* by the District Court for the District of Columbia. On June 15, 1971, that court handed down an opinion which, as many of you know, has had a very significant impact upon the FBI and the whole criminal justice community. The court issued a ruling prohibiting the FBI's dissemination of arrest-fingerprint records to non-law enforcement agencies. The decision, based upon an interpretation of Section 534 almost brought the Bureau's huge fingerprint operation to a standstill. However, within a few months Senator Bible succeeded in attaching a rider to a supplemental appropriations bill reversing the *Menard* decision. This year a similar rider was attached to the Justice Department's appropriations bill by Committee. Senator Ervin convinced the Senate to amend the rider when the bill reached the Senate floor, thereby re-instating the *Menard* rule. So the second administration bill, S.3834, was introduced this summer in response to *Menard* and would amend Section 534 to place certain constraints upon dissemination of criminal records by the FBI. This bill, which has been referred to our Subcommittee, clarifies the Attorney General's authority under 534 to establish in the FBI criminal record, information and identification systems. It also establishes important limitations on the dissemination of this information as well as creating a civil cause of action.

I have pointed out these two bills because they touch upon almost every issue involved in the criminal justice data bank-privacy areas and, second, because the bills enjoyed the prestige of Administration endorsement and support.

Since our Subcommittee will probably at some time have to make a decision on these or similar bills, it would be invaluable for me to get opinions of the members of the panel and the audience on these bills and the issues they raise. For example: Do these bills still leave too much discretion on the part of the Attorney General and in LEAA to formulate policy guidelines? Can more specific standards for privacy be articulated in Federal legislation? Should Federal legislation which articulates more specific guidelines only relate to Federal agencies or should it also apply to Federally sponsored systems on the state level?

One final subject which I would hope to hear discussed today is Senator Ervin's rider to the FBI appropriations bill. For purposes of discussion it might be easiest for me just to read to you the language of the rider and to explain to you the status of the legislation and Senator Ervin's reasons for proposing it. As you might have already guessed, Senator Ervin agrees with the decision in the *Menard* case. In his view arrest records gathered by the FBI should not be disseminated to non-law enforcement agencies. Indeed, Senator Ervin has stated on a number of occasions that he can see no valid use whatsoever for an arrest record which does not contain a disposition. In that context, when the FBI appropriations bill came out of Committee this year with the Bible rider which had the effect of reversing *Menard*, Senator Ervin moved to have the rider stricken. However, he and Senator Bible reached a compromise which was adopted unanimously by the Senate.

The first part of the rider simply re-authorizes the FBI to disseminate arrest records to banks or officials of state or local governments. Senator Ervin's amendment simply limits dissemination to

these organizations by forbidding the FBI from furnishing, and I quote: "Any identification or other record indicating that any person has been arrested on any criminal charge or charged with any criminal offense, unless such record discloses that such person pleaded guilty, or *nolo contendere,* or was convicted of such charge or offense in a Court of Justice."

The FBI appropriations bill with this amendment is still pending in House-Senate conference and no one knows whether the conference will drop the provision. But there is a decent chance that it will become the law of the land and, even if it does not, I would not be surprised to see Senator Ervin propose a similar provision in future Congresses and convince the Senate to pass it again. What I am saying is, that people in the criminal justice data bank business are eventually going to have to contend with a provision like this and I am anxious to hear your reaction to this provision so that I might communicate it to the Subcommittee and to Senator Ervin.

Before concluding, I would like to make one very important clarification about the Senator's position on privacy and computers. He is aware that many of the decisions that he makes on these issues are not exactly well received by those involved in establishing governmental data banks and by the technologists who design and operate them. He realizes that privacy and security safeguards undermine the efficiency and increase the costs of computer systems. But, as Senator Ervin is fond of saying, "If we want to have a free society we must take some risks."

THE ISSUE OF SECURITY AND PRIVACY

David B. H. Martin
Special Assistant to the Secretary of
Health, Education and Welfare and
Executive Director of the Secretary's
Advisory Committee on Automated Personal
Data Systems
Washington, D.C.

I am going to tell you a bit about the origins and purposes of the Secretary's Advisory Committee on Automated Personal Data Systems because I think it is not the most notorious activity that is happening under the banner of HEW.

The single social phenomenon that can be most credited with having given impetus to the creation of the Committee was the hearings of U.S. Senator Sam J. Ervin's Subcommittee on Constitutional Rights in the winter of 1971, which, as I am sure most of you realize, provided a forum for many institutions and individuals of America to express their concern about certain forces that seem to be at work in our society. Although most of us would probably agree that we do not well understand what these forces may be, we would also agree that there does seem to be considerable malaise about these forces – a malaise that was manifest in much of the testimony which Senator Ervin elicited through those hearings; a malaise that has also been stirring in England, France, West Germany, the Scandanavian countries, Canada, Japan and Australia. Something is tickling the discomfort button of citizens in all these countries about the onset of a technology which they do not well understand and whose social implications are far from clear to them.

The Secretary of Health, Education and Welfare, Elliot L. Richardson, was invited among many other persons to testify before the Ervin Subcommittee. The subject matter that the Subcommittee was especially interested to have the Secretary address was the use of the Social Security number, an element of technology that was created in 1936 to facilitate the administration of the social insurance program enacted on August 14, 1935, in the Social Security Act. The Social Security number started out being an element of technology for the sole use of the Social Security Administration. Its utility, however, as a means of helping to sort information accurately to the records of a large number of persons, many of whom have identical or similar names, became evident to many others. On the initiative of the Civil Service Commission in 1943, President Roosevelt was prompted to issue an executive order mandating that the Social Security account number should be used by all other Federal agencies as the means of organizing individual account records. The executive order was not instantly carried out and has not been fully adhered to. But gradually most agencies of the Federal Government that have had large-scale individual record-keeping requirements have come to use the Social Security number. So have many other organizations in society, both in the private sector and in State and local governments. And citizens have become aware of the fact that this element of technology has spread and as a consequence have been led to wonder about the significance of its spreading. Many have assumed that there is some kind of harm or disadvantage lurking in the weed-like spreading of the Social Security number.

So the Secretary went to the Ervin Subcommittee hearings and discussed the Social Security number and the ways in which the Social Security Administration has administered its data bases, both its computerized and non-computerized data bases. In the course of his exchange with the Subcommittee members, the Secretary indicated his intention to establish an advisory committee for himself and the Department. It was not clear at the time he testified what the task of such a committee would be. In March, 1970, the Social Security Administration, in part to respond to a proposal made by the American National Standards Institute (ANSI) that the individual's name and Social Security number be made the standard form of identification of individuals for purposes of data interchange, had established a task force of its own officials known as the Social Security Number Task Force. This group was charged with reviewing the policies and practices of the Social Security Administration relating to the Social Security number and making recommendations about them to the Commissioner. The Task Force concluded that there were several social policy issues relating to use of the number by organizations outside of the Government that are beyond the reach of the Social Security Administration and recommended that the Secretary create a public advisory body to examine and advise about these issues.

The officials of the Social Security Administration were primarily interested in issues of Social Security number policy. It took many months of discussion by a number of us who were considering what tasks such an advisory committee should undertake to conclude that it would not serve any very useful purpose to commission a group to advise the Department solely on what to do about the Social Security number. We recognized that if one thinks of the Social Security number as an element of technology useful in the mangement of records, and adopts the most conservative policy with respect to the use of the Social Security number – that only the Social Security Administration should use the number – one would not even begin to address the problems that people are concerned about relative to the application of computer technology to record-keeping. We concluded that the Social Security number is just a proxy for other sources of concern and that there is very little you can say about the use of the Social Security number itself that addresses those other sources of concern. With the recognition that the task had to be broader than Social Security number policy, we developed terms of reference for the Advisory Committee as follows:

1. to analyze what the potentially adverse consequences are of applying automated data processing technology, coupled with communications technology, to data bases that include identifiable personal information;
2. to analyze what safeguards might be developed to protect against those adverse consequences; and
3. how one might implement such safeguards.

The task, as the Advisory Committee has been discovering since it started work last April, is much broader than individual privacy.

The Advisory Committee is scheduled to deliver its report to the Secretary by the end of this year. It has not fully decided how it feels about the issues with which it has been dealing and it has not yet crystalized fully its recommendations, but even if it had it would not be appropriate for me to be the person to share these with you at this time. Speaking personally, I would like to suggest that undue concentration on the issue of individual privacy, or of confidentiality of information, however important it is, leaves us at peril of ignoring some much broader, more substantial, perhaps, more troubling issues. Records and record-keeping have been with us for centuries and the problem of individual privacy is a function of how one maintains records, how one shares records, how well one secures them or does not, and what incentives there are for dishonest or malevolent people to make inappropriate use of records. This problem has been with us for as long as we can remember in history; for as long as we have been able to make records in whatever form for whatever purposes. The computer does certainly add a new dimension to this problem. It is not clear whether there is a net loss or a net gain. There are lots of ways in which the new technology makes it possible, more easily than without the technology, to assure certain states of privacy and there are other aspects of the application of the technology that enhance the risks to privacy.

I would like to appeal to you all as individuals to consider the broader issues. First, as it seems to many of us who have worked in this area, the combined application of computer and communications technology to record-keeping holds potential for some effects, whether for good or bad is for someone else to say, on institutional autonomy and institutional pluralism. Many members of this particular audience nourish the hope, maybe the belief, and surely indulge in the rhetoric, that the National Crime Information Center is a State-controlled system and that the State participants in the system are losing no autonomy out of the arrangements that are facilitated or necessitated by the technology. I have heard Inspector Roderick, who is in charge of NCIC at the F.B.I., say from his standpoint that the F.B.I. does not really run the NCIC; it is just a kind of holding company for the States.

Now, whatever the accuracy of these perceptions may be today, whatever the merit of such hope may be today, it seems to me that one can predict with some confidence that one consequence of applying computer technology to that kind of a system is going to be to erode bit-by-bit the autonomy of its participants and to fuse them increasingly under central direction from Washington. Whether that would be good or bad is another question, but as an outcome, if my hunch proves correct, it would be an effect of the technology that some people might be very concerned about.

A presentation by Harold Greene, Chief Judge of the Superior Court of the District of Columbia, was made at the September meeting of the Advisory Committee in which he spoke firmly and eloquently for the proposition that if the courts are going to have computerized information systems they had better be owned and managed by the courts. They should not be in the control or management of the Executive Branch. He was making a plea for institutional autonomy. He made it very clear. He said the judiciary is an indepen-

dent operating branch of government and it will either lose a degree of autonomy and capacity for impartiality in doing the job expected of the courts or it will *appear* to lose it in the eyes of litigants if court computerized information systems are set up under the control and management of the Executive – in the case of Judge Greene's court, the Justice Department. Under such circumstances, said Judge Greene, criminal defendants would believe that the courts are part of a monolithic enterprise involving the prosecution and correctional institutions.

Those of you who read the papers currently may have noted that BART, the new public transportation system for the San Francisco Bay Area in California, within a few weeks of its inception in operation, had a failure in its computerized controlled braking system. The newest and "safest" mass transportation system has already, within a few weeks of coming on the line, had an accident in which five people were hurt. The comment on the first wave of the story, and I haven't seen more, was, "We don't know what happened." People who are students of large-scale systems say about them that by the time a system has been designed and implemented through a year or two or three of work, there are very few people, if any, that understand how it works, what it is all about, or how to adjust or change it readily if something goes wrong.

If our social operations become significantly dependent on large-scale computerized systems, we are building a new source of risk of their discontinuity of function. This may be all right. We are going through this sort of risk every day, but we ought to be aware of it and it is a risk that I think we can only overcome by enormous attention to questions such as: What is the objective of the system? Is it worth doing? Is it worth making so big? How should we design it? What sort of safeguards should we build in?

Technology has a way of just coming on. Technologists are not going to stop. They are "doing their thing" every day. We are on a computer binge in this country and throughout the free world and top management isn't watching. Today's management is by and large ignorant of and a bit put off by computers. It doesn't understand them. It doesn't want to have to get involved with them. And so the technologists are effectively in charge. The history of man's use of technology is that it takes the rest of us, who are not technologists, to put social controls on technology to curb its potential for harm. I don't say this in any way unkindly about the technologist – the rest of us agree, we wouldn't be able to do a lot of the things we are able to do now without technology in all sorts of fields. But the rest of us typically don't wake up to the significance and social implications of a technology until its adverse effects are so much with us that we just can't escape noticing. And then we have a very difficult task of undoing or modifying or correcting the effects of technology that we don't like.

Perhaps there will be a chance for discussion to add a few more comments about broader dimensions of concern about the application of computers to personal record-keeping that aren't encompassed by what we understand by "individual privacy," and that will not be addressed by settling issues of data security and access.

THE ISSUE OF SECURITY AND PRIVACY

James P. Miller
Director of the United Kingdom
Police National Computer Project
London, England

It has been said that the greatest divisive force between the American and the British people is that they both speak the same language. On the assumption that this could apply to what we are doing on the other side of the Atlantic as compared to what you are doing on this side (and we have learned a great deal of what you are doing in the United States at this very excellent seminar), I think it might not be wasting too much time if I were to give you a very quick rundown of some of the differences between our two societies in the law enforcement field.

First of all we, are very much smaller than you. We have about 55,000,000 population as opposed to your 200,000,000 plus and we are very much smaller geographically too. We are a Unitary State and have not the problems that go with a Federal constitution. So, basically, there is only one layer of law enforcement in the United Kingdom – the local police forces of which there are something like 55 in the country. There are approximately 100,000 policemen in these 55 police forces. The only small exceptions to this general rule are a few specialized agencies such as the Railway Police, the Post Office, Customs and Excise Department and, of course, the armed forces.

The role of the Secretary of State for the Home Department (and it is not unlike the Department of Justice's role here although there are differences) in relation to law enforcement is that the Secretary of State for the Home Department has a general responsibility for law and order in the country. He pays fifty per cent of the cost of local police forces and because of this has certain rights of inspection and provides certain central services. He provides for central services in the forensic field, the police training field, and in the operational computer field. I use the word "operational" to make a distinction from the normal batch processing type of computer system which we are content to leave to the local authorities, associated with local police forces.

There is the complication of the special role of Scotland Yard which basically is the police force for the metropolitan area of London which contains about 9,500,000 people. It also has a number of national functions. For a long time it has kept the national records of crime and criminals. It provides assistance in important crime cases at the request of local police forces and it provides the anti-subversive, the special branch element, which I gather is mainly done by the FBI in this country.

Law enforcement record systems – just a very quick and rough background would be of some interest perhaps. The first law enforcement record systems in the UK probably goes back to the days of Henry II when the governors of prisons were given the responsibility for producing lists of prisoners to the traveling justices (at the beginning of the development of the common law in fact).

The first serious attempt to record what happened to persons at trials occurred in an Act of 1821, when really the basis of the first criminal statistics, and the first central record, of criminals came about. This is still produced. It is known as the After Trial Calendar and it refers only to convictions at Assizes and Quarter Sessions. It doesn't refer to convictions in lower courts.

The first comprehensive national record of crime (offenders rather, not of crime) started 101 years ago in 1871 when the Prevention of Crimes Act was passed giving the Secretary of State power to keep a national record of offenders. He delegated this job to the Commissioner of Police for London (or to "Scotland Yard"). Scotland Yard has held this record ever since. It was, first of all, a record of the names and descriptions of people with criminal histories and then when Commissioner Henry invented the system of fingerprint classification in the early part of this century, it became the national fingerprint record office as well.

The development from there to the computer systems has taken a long time. We are not as far advanced as many of you are in this country in this field but we have reached the stage of a complex Burroughs B6700 twinned processor system. The equipment has been delivered, is ready for action, and is being used at present for program development. It will have something like a thousand terminals attached to it – mostly, by the way, VDU (CRT's) and not dataprinters. The first operational application will be going live by about March next year. I won't go into this further at present because this is obviously not the time nor the place.

But I think you might be interested in our approach to the security of the system and, therefore, its degree of privacy. They are connected very closely, and they are not really significantly differ-

ent in the computer system from what they already are in manual systems. For a start, there are records of about 2,000,000 people in the National collection and these are, may I emphasize, of convicted persons only. An arrested person does not find his way into that collection until he has been convicted in front of a court and is regarded as a convicted person. It is only the more serious forms of offenses that are in the National Record and, without going into details, those offenses for which there is legal authority to fingerprint the offender on arrest (for what I think you would call felonies on this side of the Atlantic and the more serious misdemeanors.) Minor offenses (drunks, traffic violation, etc.) are not included in the record.

The computer installation is in a secure building in a training estate surrounded by several hundred policemen in various stages of training. Across the road from it is a Royal Air Force Base with many air force personnel. The building itself is built almost like a fortress so the actual physical security is very high indeed. The terminals that will allow access to this computer system are also in secure buildings which are manned 24 hours a day and usable only by police officers or civilian staff who have been specially cleared security-wise for this purpose.

The network is entirely, what we call, a "private" one. I think you would call it a leaseline network here. The first standby is another exclusive use network, and then, in emergencies only, the public network is used for interrogation and up-dating. Finally, of course, every single person concerned with this system is covered by what we call the Official Secrets Act. In other words, if he discloses any information he receives in the course of his official duty he is liable to penalties under the criminal law. I won't bother going into the considerable software checks that we are also putting into the system. It's for another day, probably.

Getting to the more general issue of privacy in the United Kingdom (having left the privacy and confidentiality and security of the police law enforcement computer record system) the history is a fairly recent one. It is feared in some quarters that computers will menace privacy in general.

Around 1968 the National Council of Civil Liberties produced a publication which raised the issue and at roughly the same time a group of Conservative lawyers expressed much the same fears as the National Council of Civil Liberties had done. Two Bills found their way fairly quickly on to the floor of Parliament and there were several debates. As a result of all of this a committee was set up under the chairmanship of Sir Kenneth Younger and that committee has, in fact, just reported.

The Younger Committee by its terms of reference did not look in detail at Central Government computer aspects but instead the Government set up a separate internal committee which is, I gather, about to report. The two committee reports will be considered by the Government and I would guess that fairly soon there will be a considered document, we call it a White Paper, which will no doubt be debated in Parliament and may be followed by legislation, possibly late in 1973 or in the beginning of '74. I must emphasize that this is a private citizen's view only. I have no official information on the point.

The findings of the Younger Committee are interesting in many respects. They considered first of all the philosophical issue of whether there was in fact a general right to privacy. If I may quote one paragraph from it, I think this sums up a good deal of its final attitude. It says:

> "If there were to be a right of privacy under the law it should not, in our opinion, be synonymous with a right to be let alone. An unqualified right of this kind would in any event be an unrealistic concept, incompatible with the concept of society, implying a willingness not to be let entirely alone and a recognition that other people may be interested and consequently concerned about us. If the concept were to be embodied into a right, its adaptation to the dominant pressures of life in society would require so many exceptions that it would lose all coherence and hence any valid meaning. We have concluded therefore that the type of conduct against which legal protection might be afforded on the ground of intrusion on privacy should be confined to injurious or annoying conduct deliberately aimed at a particular person or persons where the invasion of privacy is the principal wrong complained of."

The reverse of this concept (in other words, of an abstract right to privacy) hasn't been followed, I know, in other cases, and in other places in the United States too, I understand. There was a minority within the Younger Committee who took the line that there should be a general right of privacy, with the ability to sue if it were breached.

The report itself is lengthy and it ranged over a whole series of fields through broadcasting, the press, the rest of the media, the private detectives, credit rating agencies, etc. I don't think this is the time or place to go through it in its own detail.

I am reminded at this point of a story going around the United Kingdom. It is of two Irishmen who found themselves in front of St. Peter at the gates of Heaven and St. Peter asked them who they were.

They gave their names as Pat Murphy and Shamus O'Leary.

St. Peter said, "Tell us more about yourselves."

They said, "Well, we are members of the I.R.A."

So St. Peter said, "Members of the I.R.A. aren't allowed in here."

Pat said, "It's all right, your Reverence. We don't want to get in. All we are saying is that you've got ten minutes to get out."

It is clearly important, therefore, to see things from the other fellow's point of view. I think I will conclude by saying that this is the other fellow's point of view (holding up report). The cost is about two pounds. I haven't seen the *Wall Street Journal* for the closing rate today but I suppose its equivalent is about $5.00. I think if any of you are interested it might be well worth investing in it just to get the general U.K. background of thought to this most important question.

THE ISSUE OF SECURITY AND PRIVACY

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Continuous population growth coupled with rising crime rates have increased the complexity and control of information-handling activities in local, county and state criminal justice agencies. In the last seven years, various criminal justice agencies have perceived the need to apply the computer to a variety of tasks, ranging from automating the administrative records of an individual agency and scheduling court activities, to such sophisticated applications as the Los Angeles Police Department's Pattern Recognition and Information Correlation System – or PATRIC as it is called – and Santa Clara County's Offender Based Criminal Justice Information Control System. As Table I indicates, the development of computerized information and communication systems in criminal justice agencies in California has assumed major proportions as indicated by the numbers of systems already operational or being planned.

Approximately 139 computerized information and communication systems are either being planned, being implemented or are currently operational in criminal justice agencies in the state. Of these systems, 8 are in various stages of development at the state level. The same is true of some 71 systems at county levels and 58 at city levels, with 2 computerized information systems serving multi-county or multi-city needs. Such totals are fluid as a result of the continuous mushrooming of new systems and the absorption of existing operations into more comprehensive entities. An example of the latter phenomenon has been the planned consolidation of some 20 different systems in Los Angeles county into a regional justice information system. Our figures then show a close approximation of what is currently in existence, and more important, what is being planned.

The development of systems is consistent with the concentration of population with the largest cities and counties initiating the more extensive and sophisticated applications. As Table II indicates, offender-based criminal justice information systems have been planned or developed in 5 counties. On the other hand, in the larger cities, priority has been given to development of what are considered to be either police information systems or partial applications such as want-warrant, arrested persons, command and control or traffic record systems. In the superior or municipal courts, the more numerous applications have been in the case indexing, jury services, and scheduling functions. The case following function is a relatively late application and has generally emerged with the offender-based criminal justice information systems. In the corrections area, systems development is less advanced except for the California Department of Corrections and Youth Authority's plans for a correctional information system and the Los Angeles County Probation Department's management and information systems.

The costs of all these applications are not as yet estimable. No one seems to know how much all this is costing the state or individual cities and counties which are bearing the major share of such costs. Ever-changing hardware, software and personnel requirements make even an educated guess hazardous. Because of the decentralized manner in which systems have developed in the state, there are no accurate figures concerning how much the statewide criminal justice information system really costs if one expands, for a moment, one's definition of such an information system to include not only the state justice department's own criminal justice information system, but also the related and, in many cases, interfacing local and county systems.

The federal contribution to systems development in California is shown in Table III. These federal funds are authorized by the Omnibus Crime Control Bill program and the Highway Safety Act program.

Since the Omnibus Crime Control Bill program began in 1968, federal funds disbursed by the California Council on Criminal Justice have totaled some $13 million with another $1 million added through discretionary grants from the Law Enforcement Assistance Administration (LEAA) to various criminal justice agencies in the state. It should be pointed out, however, that we do not know nor, so far as we can tell, does anybody know what the total costs of these systems have been. What individual agencies have provided in the way of matching funds to receive the federal grants represents only a portion of what has actually been

spent on any one system's design and implementation. Federal monies have served to accelerate the existing momentum to develop new and more extensive systems, while the California Council on Criminal Justice has been able to provide but limited direction in terms of coordinated system planning and development. The Council itself is aware of the need for greater coordination as indicated by its action at the April '72 meeting. It then resolved to be extremely critical of any new information systems at either the state or local level. In addition, any refunding of information systems would be contingent on their compatability with neighboring or state systems and further would be contingent on assurance that there would be no file duplication by any agency of information maintained within the state level criminal justice information system. Only recently has the Council sought to limit the proliferation and duplication of systems and has initiated surveys to determine how many court, police and offender-based systems exist and to further develop plans for consistent and controlled growth.

Since 1965 some $3.5 million of federal traffic safety money has supported the development of about 29 systems, primarily concerned with traffic court and traffic record systems. Although these are related to criminal justice information and police information systems, little coordination exists between either state planning agency. While the Council on Criminal Justice and the Office of Traffic Safety have liaison persons, systems development has occurred independently.

Federal funds then have contributed substantially to the criminal justice system development picture in California. Some $17.5 million have been allocated with larger grants yet to come. If coordinated and planned efforts are necessary, they must be initiated soon if further proliferation and duplication of systems is to be curtailed effectively.

Administrative policy concerning the use of electronic data processing and the protection of privacy and security in California has gone through various stages. California has shifted its administration for EDP use several times during the last seven years. Although masterplans for the utilization of EDP have been issued, the organizational structures have not as yet been stable and enduring enough to implement them. Responsibility for the management of EDP at the state agency level has been shifted from the Office of Management Services under the general supervision of the Lt. Governor to the Systems Control and Development Section of the Department of Finance. While the state has consolidated all its EDP services into 4 data centers, it does not now control and coordinate the uses of EDP by criminal justice agencies at the city or county levels.

In 1968, the Intergovernmental Board on Electronic Data Processing received statutory authority to coordinate the development of intergovernmental information systems and to establish guidelines and criteria to safeguard privacy and security. Since its initiation, the Board's resources have fluctuated from a high in 1969-70 of $63,000 to a low in 1971-72 of about $10,000. Just recently, the Board reacquired an executive secretary and is ready to begin again with a 1972-73 allocation of some $30,000.

Thus, lacking statewide guidance and with independent responsibilities, the city and county criminal justice agencies have initiated their own systems to meet their specific needs. From the perspective of systems operation, the California experience may be characterized as follows: state level systems have developed with limited coordination with city and county applications. City and county systems in turn often reflect parochial planning or duplication with limited interface capabilities between state or similar city and county systems. The result is uncoordinated growth of numerous systems at immense and incalculable public expense.

What, then, of privacy and security considerations in California? At the state level there has been coordination and consolidation for the use of EDP. Privacy and security considerations have been left generally to the individual state agencies, including the state Department of Justice. These agencies all have management control over their systems, including responsibility for development of privacy and security regulations. These, in turn, are subject to review by the Department of Finance. To date, privacy and security considerations have received limited attention or official agency commitment. While security regulations have, for example, been developed for the State Justice Department's criminal justice information system, privacy and confidentiality considerations have not as yet been formulated.

Two county systems, Santa Clara and Los Angeles county, have used project SEARCH guidelines and adopted codes of ethics. Apart from such individual efforts, little more has been done. The intergovernmental board on electronic data processing, to date, has contributed very little to the development of intergovernmental guidelines.

No research efforts or studies have attempted to treat the problems peculiar to California's immense criminal justice information system.

As far as legislative initiatives concerning privacy and security go, several bills have been proposed which have tried either to adopt the project SEARCH model state act or selected sections of it to the California situation.

In April, 1971, an assembly bill was drafted to create a security and privacy council, appointed by the Governor, in order to "conduct a continuing study and review of questions of individual privacy and security in connection with the collection, storage, dissemination and usage of criminal offender record information." The bill proposed to adopt the project SEARCH model state act to fill the apparent gap in the state Justice Department's handling of privacy and confidentiality concerns. The bill was opposed by the State Department of Finance on the grounds that it was premature and a too literal application of the model act to the California situation. It died in committee.

In March, 1972, a second assembly bill proposed creation of a criminal record dissemination board to conduct continuing study regarding the dissemination of criminal offender records information to non-criminal justice agencies. The bill also defined what minimal data elements constitute a criminal offender record, stipulated that intelligence and investigative reports not be included, that access to such records be limited to criminal justice personnel on a need-to-know basis and that reporting of such information be made more uniform and efficient throughout the state. The bill is currently pending before a state senate committee.

In addition, a third assembly bill also proposed in March, 1972, required the attorney-general to assure the security of criminal offender record information from unauthorized disclosure at all levels of operation in the state; to make sure that such a record be disseminated only on a need-to-know basis; to coordinate the latter activities with interstate systems; and to initiate a personnel educational program concerning the use and control of criminal offender records information. Also, the bill would require each agency holding or receiving criminal offender record information to maintain a listing of the agencies to which it has been released: this bill is pending before the same committee.

If the latter two bills are passed, California will have taken a first and much needed step. In the absence of such legislation, existing state regulations are a patchwork of state codes applicable to public, juvenile and adult criminal records. In November, 1971, the Governor signed into law a bill providing for the individual the right to review his record contained in the State Justice Department's information system for errors and omissions. While this is a step forward at the state level, no equivalent legal right is available at the county and city level where the issue is contingent upon the option of system management.

The problems are indeed complicated. Our legislature is just beginning to grapple with the issues. For example of unresolved problems: interfacing requirements and safeguards among intergovernmental systems; standards regarding data maintenance and dissemination; and difficult policy questions concerning whether, when and how to close, seal or purge records.

To summarize: the California experience is a dynamic and multifaceted one. Presently, the development of adequate privacy and security safeguards has been outpaced by the development of computerized information and communication systems in the criminal justice agencies in California. The two processes, in my estimation, must be compatible and become one. California, as a leader in the field of automated criminal justice information systems, shows consistency in this area of growth as in other aspects of its development. We have more of everything than we are currently able to keep track of, account for, or regulate. How large a gap in timing before coordination and development of essential safeguards takes place is at this time uncertain.

TABLE I

STATE OF CALIFORNIA

COMPUTERIZED CRIMINAL JUSTICE INFORMATION AND COMMUNICATIONS SYSTEMS:

CUMULATIVE LISTING

STATEWIDE	8
MULTI-COUNTY	1
COUNTY	71
MULTI-CITY	1
CITY	58
TOTAL SYSTEMS	139

TABLE II

STATE OF CALIFORNIA

COMPUTERIZED CRIMINAL JUSTICE INFORMATION AND COMMUNICATIONS SYSTEMS:

APPLICATIONS

	Offender-Based Systems	*Law Enforcement Systems*	*Court Systems*	*Corrections Systems*
STATE	1	6		1
MULTI-COUNTY		1		
COUNTY	5	27	32	7
MULTI-CITY		1		
CITY		54	4	

TABLE III

STATE OF CALIFORNIA

COMPUTERIZED CRIMINAL JUSTICE INFORMATION AND COMMUNICATIONS SYSTEMS:

FEDERAL CONTRIBUTION

I. OMNIBUS CRIME CONTROL BILL PROGRAM

A ACTION GRANTS (California Council on Criminal Justice)

TOTAL SYSTEMS FUNDED 30 — TOTAL ACTION GRANTS $13,091,700

B. DISCRETIONARY GRANTS (Law Enforcement Assistance Administration)

TOTAL SYSTEMS FUNDED 6 — TOTAL DISCRETIONARY GRANTS $ 998,508

TOTAL CONTRIBUTION THROUGH OMNIBUS CRIME CONTROL BILL PROGRAM $14,090,208

II. HIGHWAY SAFETY ACT PROGRAM
Business and Transportation Agency, Office of Traffic Safety)

TOTAL SYSTEMS FUNDED 29 — TOTAL CONTRIBUTION THROUGH HIGHWAY SAFETY ACT PROGRAM $ 3,426,576

III. SUMMARY FEDERAL CONTRIBUTION

A. OMNIBUS CRIME CONTROL BILL PROGRAM	$14,090,208
B. HIGHWAY SAFETY ACT PROGRAM	3,426,576
COMBINED TOTAL FEDERAL CONTRIBUTION	$17,516,784

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PANEL – THE ISSUE OF DEDICATED AND SHARED SYSTEMS

James R. Donovan, Panel Moderator
Chief of Information Systems
Maryland Department of Public Safety and
Correctional Service

The issue of dedicated versus shared computer systems in criminal justice is being debated, frequently passionately, across the country. We would probably *all* agree that the discussion of the issue is frequently producing more heat than light.

There are many aspects of this problem which must be considered by all of us if we are to arrive at a reasonable solution. We all recognize that our own parochial interests play a part in this, but we are at a point where solutions *must* be developed, as was pointed out yesterday by Congressman Wiggins and Mr. Velde.

Our panelists will attempt to address many aspects of the problem this afternoon. *They are not going to debate,* but rather to put before you some of the views currently prevalent, and hopefully generate some reasoned inputs from the audience.

It is doubtful that we can resolve issues here today, but perhaps we can, by openly reviewing concepts, viewpoints, and real problems, determine how best to proceed to solve the problem. Obviously, a major issue such as this deserves a systematic approach toward its solution.

I submit to you, therefore, that if the systems professionals – including all of us here – do not soon arrive at *workable* solution steps – then the solution will be dictated to us by whomever we abdicate our responsibility to.

All is not gloomy, however. As you've noted in several of the papers presented today, both shared *and* dedicated systems are in being in various locations. Perhaps we can have some enlightening inputs this afternoon from people who have been over the path of implementing such systems.

MICROFICHE

PANEL – THE ISSUE OF DEDICATED AND SHARED SYSTEMS

PANELISTS

MAJOR C. J. BEDDOME
ASSISTANT CHIEF, ADMINISTRATION
ARIZONA DEPARTMENT OF PUBLIC SAFETY

THOMAS R. GROSS
RJIS PROJECT MANAGER
COUNTY OF LOS ANGELES

KENNETH T. ORR
DIRECTOR
DATA PROCESSING SERVICES, KANSAS

SCOTT W. HOVEY, JR.
DIRECTOR, COMPUTER CENTER
ST. LOUIS METROPOLITAN POLICE DEPARTMENT

THE ISSUE OF DEDICATED AND SHARED SYSTEMS

Major C. J. Beddome
Assistant Chief, Administration
Department of Public Safety
Arizona

Our panel chairmen and the lateness of the hour have taken all the fun out of this. I can think of some times gone by when we have had some real fun and some real table-pounding sessions regarding this subject.

The SEARCH Project published "Technical Report No. 2" which deals primarily with systems' security and individual privacy rights. The previous panel, of course, discussed one of the publications that Dr. Gallati alluded to. It barely touches the hotly contested area of who should own and operate the computer. However, the book has weathered many, many storms since we started committee work on it in 1969 and finally published it in the summer of 1970. It seems so long ago and the subject is still stirring around.

In this book one of the things that was printed and alluded to as sort of a guide (not God, but a guide) was the rule of access and the use of system data. I'm going to make a direct quote here:

> "Direct access to the system should continue to be restricted to public agencies which perform as their principal function, crime prevention, apprehension, adjudication, or rehabilitation of (criminal) offenders.
>
> And secondly, In order to limit access, the following restrictions should be made:
>
> a. Participating states should limit closely the number of terminals within their jurisdiction to those they can effectively supervise.
> b. Each participating state should build its data system around a central computer, through which each inquiry must pass for screening and verification. The configuration and operation of the center should provide for the integrity of the data base.
>
> And thirdly, Participating agencies should be instructed that their rights to direct access encompass only requests reasonably connected with their criminal justice responsibilities."

We further found after terribly long hours of heated debate that the system should remain fully independent of non-criminal justice data systems and should be exclusively dedicated to the service of the criminal justice community.

Recently introduced legislation, which has been referenced several times in the last couple of days, in the United States Senate, has a bill provision to the effect that all criminal justice information systems funded in all or in part of the Law Enforcement Assistance Administration be dedicated to law enforcement purposes and be under the direct management and control of a law enforcement agency. LEAA didn't draft that bill. The FBI didn't draft that bill. SEARCH didn't draft that bill. The bill sponsors and their research staff did their home work and studied the many resources for information on this subject. The man with the keys to the computer and its operating personnel has power. We can use little subtle phrases, nice phrases to say other things, but the truth is: he has power.

Now, should one administrator have tax billing, water billing, revenue producing systems, highway engineering calculations, in every conceivable computerized operation in the state under his control, or not? This question is so fraught with political and emotional implication it has completely obliterated rational communication in many quarters today. I feel quite strongly about this subject and when I was a little younger and perhaps a little less able to believe I could be wrong about anything I took a position on, I would probably be pounding on the table about it to prove I knew the bills proposed were dead wrong; and I think some of you who have known me a good many years know that that is the truth. Today I have mellowed considerably and I have found that the world works with compromise all the time. It's the only way we get anything done at home or any place else; somebody has to make a decision, sooner or later, whether it is right or wrong, we can move on.

Today I am going to take a position of dedication to the criminal justice system rather than to a strong dedicated criminal justice computer. I don't want to get into an "Agnew-type" controversy about the fairness of the news media but I will state that many computer-oriented publications have taken a stand that appears to be opposite my "conservative policeman" type stands on many issues regarding the present subject matter. On many occasions I have been opposed to some stands taken by the editors of *Computerworld*. I know we've got *Computerworld* personnel in the audience today. Yet, in January this year they stated in a full column editorial that they are in full disagreement with the concept of centralized data processing facilities; i.e. the criminal history records being managed by consolidated systems people. They agreed emphatically with the late J. Edgar Hoover's contention that law enforcement or criminal justice agencies are held responsible for the confidentiality of information and the computerized version of their criminal records; there-

fore, they should exercise full management control over the system. Earlier I mentioned concern over the dedication rather than the dedicated system. Our personal observation over the years has been that the revenue production, payroll generation, and other types of administrative functions seem to take a priority over the management and the operational needs of the police and the courts.

I want to conclude this in just a minute but I feel strongly about a subject I heard a few days ago, and I must relate this to you. I don't feel as if I have the liberty and the license to reveal the state – but in a major State, an industrialized State in this country, a state police chief told a gathering in Washington a few days ago that he couldn't get service from the State data processing section. There are 1700 programs ahead of him! The policemen doing the dirty work on the dark deserted streets or lonely stretches of the highway need tools to function properly all day long and all night long. They don't take their leisure when you and I do. A court administrator, who is taking more and more heat today trying to get the courts unplugged, needs to have managment data "real time," not "some time." Sheer bulk of management problems gives similar headaches to the corrections people.

The price of small effective systems today puts computers into the economic ball park of all states, no matter how restricted they are for resources. Maybe one of the reasons they are poor is because they aren't effectively doing the job they are commissioned to do, and the use of a small computer system consolidating the data and resources of their criminal justice community would actually effect great economies or at least level off their budget in this area.

I'm for total dedication to a consolidated system servicing the criminal justice community, and for the business functions of the State being done in a business-oriented government data center elsewhere. I do not advocate the integration of criminal justice matters with other government business.

THE ISSUE OF DEDICATED AND SHARED SYSTEMS

Thomas R. Gross
Project Manager – RJIS
the Regional Justice Information System of
Los Angeles County

INTRODUCTION

My position is one of shared computer systems as opposed to dedicated computer systems. The person who invited me to speak pointed out that I would be the only person on the panel appearing to endorse the shared approach; also the only panelist to speak for courts and corrections as well as for law enforcement; and further, the only panelist to represent the regional, county and municipal input. Well, I thought that was a very nice blank check to be given, but some eavesdropping cynic quickly pointed out that I had just been given enough rope.

BACKGROUND

However, as I have listened to the speakers over a period of time, especially on the first day, I became quite comfortable. Although the panelists may not support the position I do, I feel that many of the prior speakers have. Perhaps my function is more to summarize and to bring into focus some of the view points that have already been presented.

More specifically, Charles Wiggins, the keynote speaker, recognized the need for sharing data. However, he stated that management control must be exercised by law enforcement; but also stated that access would be by law enforcement and criminal justice agencies. I think this is a fairly accurate paraphrase. Here we have an encounter with a terminology problem – perhaps with more than just a terminology problem. Many people interpret law enforcement as meaning a police agency. Other people interpret law enforcement agencies as meaning the prosecution, sometimes the defense, the adjudications and the corrections people. I would suggest that when you study the issue of shared vs. dedicated systems, and when you hear people speak about management control that you listen closely to whether they say law enforcement management control or criminal justice management control. And, if it is criminal justice control, attempt to ascertain what agencies they might be talking about.

Paul Wormeli spoke on SEARCH's "Identity Crises." I would suggest that on this panel we are discussing one of the identity crises of SEARCH. I am addressing, not the Federal position on dedicated systems or shared systems, nor the State position. I am addressing the local input. I would suggest that local input to the SEARCH and to NCIC has been minimal considering the overall efforts to date. Paul referenced Toyfler's book on *Future Shock* and its discussion of Adhocracy and it seemed to shock the future out of Pete Velde. Mr. Velde went on and indicated the basic control lies with the State and its locality which I interpret as municipalities and regional government. He also pointed out that Shared vs. Dedicated Systems is a luxury we can no longer afford. He probably looked ahead on the program because he did suggest that we sit down immediately and discuss this issue hoping that a compromise could be reached.

Thomas J. Madden also raised the issue of Shared vs. Dedicated Systems referring to his *National Goals and Standards* publication, which is expected in the spring of next year.

Charles Friel stated that the traditional approach can never tell you just what, where, when, who and what is happening; however, all agencies should be involved in the situation.

Ron Beatty pointed out in one of his retirement speeches (I am sure, knowing Ron, we will have many retirement speeches from him) that the utilization is the whole issue. Who is going to use this type of data? In referencing "Utilization" I think he was talking about the combined "OBTS-CCH" approach.

Donald F. King pointed out that cities and counties must be included in OBTS; that fundamentally the system of justice is for the locals to manage.

George E. Hall endorsed the CCH-OBTS combined approach. He also referenced crime and delinquency, which is one of the first times during this symposium that we have heard delinquency mentioned. In Los Angeles, we are developing a combination system addressing the adult felon, minor misdemeanors, and juveniles. Further, George also recognized that it is the local government's problem to address.

Now I know that I have paraphrased speakers in such a way that it fits my particular context. I hope that any speaker will take issue with me if I haven't been fair to him.

SPECTRUM OF PARTICIPATION

My basic position is that the Dedicated vs. Shared Systems topic is very inappropriate. I do not believe that this is a *binary* issue, but rather is one of a spectrum of participation regarding a spectrum of ingredients. There are a set of alternatives beyond the two choices of "dedicated" or "shared." This is but one issue in a set of security and privacy issues. And the security and privacy issues are but one set of issues relative to the improvement of justice. We should not lose perspective of this technological issue in perhaps compromising our overall strategy for improving the system of justice.

DISCUSSION OF THE ISSUES

I'd next like to, very briefly, cover what are the real issues and what might be some hidden agendas or tangential arguments. Perhaps in the question and answer time we might be able to address what are some suggestions or what might be a strategy for addressing the issue. Someone pointed out that California was a very rich state and that if any place in the country can afford a dedicated computer system at the local level it is in the Los Angeles area. Yet we have not taken a purely dedicated approach. We are taking a shared approach, as opposed to a *strictly* dedicated approach. Actually, it is an economic compromise; various things are shared; various things are dedicated. I would also point out that the two biggest cities in the county have justice applications that are non-dedicated computer systems right now according to what I believe is the current NCIC interpretation.

I would point out that when we talk about dedicated vs. shared computer systems much of the talk is centered around the computer criminal history. As if we all don't know, there are many, many other applications. You have only to appreciate the many functions of the system of justice to realize the number of other computer applications: booking, intake investigation, complaint, petition, arraignment, detention hearing, preliminary hearing, indictment, arraignment, trial, adjudication, sentence disposition. In following the case-following approach, probation is not at the tail end of the system. Probation is involved throughout that system, not only for juveniles but also for adults. The prosecutor is involved throughout the system. The court is very much interested in receiving disposition data back, as is law enforcement. The justice agencies have many applications underway throughout the United States besides the criminal history effort. Making a "shared vs. dedicated" decision based on one area of computer application may unnecessarily limit our options in other areas.

We in Los Angeles look at the state as being responsible for maintaining offender history but do not look at the state's self-imposed constraints as being necessarily beneficial at the local level regarding the issue of Shared vs. Dedicated Systems. It may sound a little pedantic to point out that crime in the street occurs within the city limits, the parish, and the county borders; that local elected officials have as their responsibility the solution of the problems of their electorate. Crime is one of their problems to solve. To inhibit local government by undue constraints having a financial impact appears at this time to be unnecessary.

In way of providing a perspective in the overall issue of "Shared vs. Dedicated" systems, this appears to be a security-oriented approach. The security approach has several other aspects besides just the issue of Shared vs. Dedicated systems. There is the approach of disperse and confound, which is very much a non-dedicated approach; move things around, don't publicize to people where facilities are. Another approach is encode, incript, and camouflage. Take the name off the building is one of the simplest forms. To insure, having somebody else to do the work for you, is yet another security measure. The fortress approach was discussed by the man from Scotland Yard who pointed out they have a very secure installation today. There are many other approaches for the security of the system rather than dedicating it under the management control of a single organization within the many organizations at the local level. There are also many information priorities, improved crime reporting, arrest and disposition data, sentencing and disparity and correction programs. In maintaining a perspective on this issue of Dedicated vs. Shared computer systems, remember that to improve one part of the system, law enforcement and/or the police agencies, is to unbalance the entire system, that to improve the system of justice we need to improve the overall system. All justice agencies should be involved in the management of mutually dependent systems.

What is the real issue? I think the real issue could be addressed by trying to answer the question, "What is the objective of a dedicated computer system at the local level?" Some of the tangential arguments against sharing are specious and get the people off the track of what are the real issues in the Shared vs. Dedicated. We are not

talking about a national data bank. I haven't heard anyone advocating this except one gentleman from the audience. The argument of using property files and local data is not an essential argument to deciding whether we should have Shared or Dedicated computer systems at the local level. Response time is a function of hardware and software, not a function of dedication. Frequently we hear that law enforcement is not getting enough service. Miss-set priorities giving a law enforcement poor service is a management problem that will not be solved by resolving the Shared vs. Dedicated computer systems question.

Asking for an effective cost benefit analysis is a very germane question to ask, although some people think that is inappropriate. Your local legislators as well as state and Federal people are going to ask you, "How much does everything cost? Is there a way to reduce costs?"

SUMMARY

In summary, I would suggest first define the objectives of a criminal history system relative to other applications; then generate the solutions, one of which may be the Shared or the Dedicated approach. Then adopt one particular approach or, perhaps, a spectrum of approaches from a spectrum of participation.

THE ISSUE OF DEDICATED AND SHARED SYSTEMS

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For those of you who don't quite understand what my title means, I am a State DP Czar, or at least that's what some people call me. In addition, I also represent Kansas on the National Association for State Information Systems, (NASIS), which is a counterpart to SEARCH in the area of general information systems for the States. As a matter of fact, when I was first appointed to SEARCH, because of my prior association with NASIS I felt a little bit like somebody's ugly, unmarried sister at a party for swingers. I didn't know if I really belonged, but I was sure that I was having some impact.

As everyone who knows me is aware, I have two abiding interests: one is in privacy and security and the other is in getting rid of the question of dedicated computers. With respect to the former, I think that Project SEARCH and, in particular the Privacy and Security Committee, is to be commended. The four documents that have been produced by SEARCH represent the most substantial work available anywhere in identifying significant issues in confidentiality and security areas, and I would highly recommend them to you.

There are really three separate issues involved: privacy, confidentiality and security. These questions, in turn, lead into the subject of dedicated and non-dedicated systems. But privacy is largely outside this discussion, since privacy has to do with whether or not you collect the information in the first place. Given that you don't collect it, it cannot be mishandled, but given that it is collected, Murphy's law holds with information as it does with other things. Confidentiality and security, on the other hand, deal with the issues of once having collected information (1) who is allowed to use it (confidentiality) and (2) how do you protect it from improper access or loss (security).

The rules that are proposed by the NCIC Advisory Policy Board really deal with confidentiality and security. There are *two requirements particularly important to the discussion of dedicated vs. shared computers: (1) that equipment, personnel, and facilities must be dedicated to the criminal justice system and (2) that management control – the ability to hire and fire personnel – be vested in a criminal justice agency.* Of the two, the latter seems to be the most important, since in those instances where people have been disallowed access to computerized criminal histories, lack of management control by criminal justice has been the principal stated reason. However, I feel strongly that the questions of dedicated systems and management control (especially as defined by NCIC) are really overly simplified approaches to a very complex management and technical question. In fact, if we are not careful, the software and hardware technology may do us out of a good fight. It appears likely that we may be able to develop what I call a Virtually Dedicated System, to which I will not attach an acronym. (We won't explore virtually dedicated systems here. They may be the ultimate answer, but I haven't yet been able to put their definition in terms that the FBI will rule on).

As a member of the administrative arm, as contrasted to a representative of a functional group in the criminal justice area, I try to point out in discussions such as this that many people, including governors, budget officers and legislators, still consider criminal justice as an integral part of government and not a fourth separate branch. And I also try to stress that those of us in NASIS are not unaware of the problem of security and privacy. In fact, we have many extremely sensitive areas: in revenue, in welfare, in employment data, and in civil rights to name but a few. Nor are we insensitive to the problems of service or responsiveness.

Oftentimes when we get into discussions regarding who should do what to whom, we end up comparing our ideals with somebody else's practice. We say on the one hand if we have control it is going to be great, but on the other hand, look what a terrible job that guy with the Model 20 and two keypunch operators did running the central service bureau. I once asked a friend of mine who was opposed to shared computers how many times someone who had a computer ever came up and explained what a crummy job he was doing in his own data processing shop. I think the unwillingness to look critically at ourselves explains in many respects why the questions get so heated. Having tried to work on both sides of that counter, I recognize how difficult it can be to be fair, but on the other hand, I also observe that there are very few large police agencies which will allow the patrol division or the records division or any other

individual division to have its own computer system.

You might ask, considering all the questions which have been raised over whether anyone else can really service an operational group, "Isn't that imposing a shared approach?" To which the answer would be, "Yes! We can't afford everyone's having his own." Well, state and local government administrators feel the same way. They must be shown why they cannot share their expensive computer resources for the good of all agencies as long as they meet the security requirements.

Along that line, there are some basic questions that we administrators have:

1. Is criminal justice data more sensitive than other kinds of data? (e.g., income tax, employment security, welfare?)
2. Where do you draw the line between criminal justice and non-criminal justice systems? For example, how much highway safety should be included in a criminal justice system, or how much civil justice has to be included in any court system? Some court administrators say; if you are not going to help me with civil cases, don't help me with the criminal justice portion alone, because I cannot afford to run two systems.
3. Are the current NCIC rules consistent with the most economical, efficient, and responsive solution to today's and tomorrow's technology? To paraphrase Jerris Leonard in a recent letter, does dedication insure privacy and security? Does management control? Can a system be self-policing? If your real concerns are confidentiality and security then you are probably better off putting everything in a shared environment with a lot of people watching it than you are by putting it in a dedicated environment behind lock and key and assuming that the problem will go away. Additionally, we must deal with the most serious problems first, namely, the terminal and terminal operator. A number of people have admitted that in the NCIC/CCH System security and confidentiality starts with the terminal and the terminal users. The terminal presents by far the greatest opportunity for breakdowns in the systems security.
4. Is NCIC policy being used to frustrate the organizational goals of local government in general? This question is often part of the hidden agenda at meetings such as this. It would be nice to help our friends have their own computer systems but that's not the function of national rules and regulations nor does it go unnoticed at home.
5. Is giving data to a third party equivalent to giving it away? It has been said that there is a difference in interstate transmission of criminal history over other systems because we are sharing our data with someone we don't know or trust. However, other Federal agencies who deal with consolidated or centralized data processing operations don't seem to feel this way. They hold the agency to whom they gave that information responsible, but the owner can process it as he pleases as long as he insures that the basic guidelines are met.

In the last half dozen years, I have been convinced that other branches of government are every bit as serious as law enforcement about security and privacy; the question is whether or not we all, including those in criminal justice, can come to believe that.

THE ISSUE OF DEDICATED AND SHARED SYSTEMS

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Last summer a gentleman approached me at a state meeting in Jefferson City. He was obviously a government sort, probably from the Highway Department, and he asked me for my views on shared vs. dedicated systems. I was very quick to point out that criminal justice agencies ought to have their own system in order to preserve privacy, and to retain control over their information data base, etc. He looked a bit skeptical at first, but finally nodded in agreement and said, "Yes, I guess you're right. I'm with the Supreme Court and we are presently debating having our own system independent from your police system."

I think most people here are quite familiar with the arguments for and against shared systems and I'll wager that many of you have used both arguments on different occasions, depending on just whose system was at stake. It is a little more difficult to take a position in the abstract. Nevertheless I believe in dedicated systems over shared systems in almost all instances. My reasons are privacy and certain inevitable events.

Alan F. Westin has written considerably about privacy. His *Privacy and Freedom* is probably the best scholarly work on the different types of privacy. In it he tells about the need for individuals to have privacy in order to drop their public image, to relax, and to be themselves without having to put up a public front. He also identifies the need of privacy for free association and discussion with other individuals, and the individual's right to control the disclosure of information about himself. A little further on Westin talks about the need of privacy for organizations, both private and public organizations. He observes, and I very much agree, that the same privacy requirements are necessary for organizations as well as for individuals – the right to have other than the public self, the right to control disclosure, etc.

I think Larry Beddome stated the problem very succinctly when he noted that computers represent power. I believe that the capabilities of a dedicated system should exist at every level of government. By a dedicated system I mean the ability to sort, retrieve, manipulate, and communicate information without operational dependency upon any other governmental organization with, perhaps, the exception of IBM or AT&T.

I predicate the development of dedicated rather than shared systems on several things that will come to pass. One of them is organizational. It is the disappearance of agency heads and administrators who prefer, or are willing, to leave computers and "all of that technical stuff" to data processing specialists or computer "czars." There has been a long-standing conspiracy between governmental heads and ambitious "technicrats" such as myself and my peers. The administrators, in fear of technology, have been overly quick to say "All that technical stuff is too complicated for me. You take care of it." And we have been overly quick to oblige with the knowledge that computer support for any function will be increasingly important and a centralized data processing organization will become increasingly powerful. I believe that this is going to pass. The ability to manipulate information for internal purposes is going to be so vital to every organizational level that it is going to get its own data processing capability. The data center with overly centralized systems control will disappear and the pure information system specialist will also disappear much like the letter writers in ancient Egypt who wrote for the illiterate.

The other conditions for widespread dedicated systems are technical in nature and rapidly approaching. One is a marked decrease in the cost of information systems and software. A second is an increased ability by small systems to access bulk disinterested processing power on a utility basis. By disinterested, I mean something comparable to a commercial time sharing system or service bureau. The third is the development of the necessary standards, communication procedures, and equipment for providing secure authorized dial-up interface to data banks of privileged information.

With respect to the present world where money and information processing skills aren't as available as we would have them, the issue is criminal history and access to it over shared or dedicated criminal justice computer systems. This goes right back to the issue of privacy and the rights of individuals and organizations to control the disclosure of information. There are a lot of criminal history records that were provided to the federal government by the states on the assumption that they would be used solely for criminal justice pur-

poses and remain under the control of criminal justice agencies. As Director Plants of the Michigan State Police has put it, "I don't care what Kansas or California does with its own criminal history records, but we are talking about criminal histories of Michigan citizens collected on the assumption that they would only be accessible to criminal justice personnel. We want to keep it that way." I agree with Director Plants but also see the restrictive policy as another step in the proper move to dedicated systems.

SESSION IV

DEVELOPING TRENDS IN INFORMATION AND STATISTICS

O. J. HAWKINS, SESSION CHAIRMAN
ASSISTANT DIRECTOR
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48320

THE DEVELOPMENT OF A JUVENILE JUSTICE AND YOUTH SERVICES INFORMATION SYSTEM IN THE REAL WORLD

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One of the greatest obstacles to the nation's progress in the field of delinquency prevention and the problems of neglected children has been the absence of valid and reliable information concerning (1) client characteristics, (2) systematic aggregate data related to their behavior before, during and after treatment, and (3) the effects of measures taken to improve their environment and increase their chances of adjustment.

To supply this basic need for accurate, timely and complete quantitative information concerning delinquent and neglected children; state, county and local law enforcement, juvenile justice and youth services program administrators must seriously consider the development of a juvenile justice information system. This system is designed to identify problems and provide specific facts for youth program planning, development and operation. This recommendation is primarily motivated by the recognition that youth needs programs of better quality directed more specifically to their needs.

It is important to point out in this context that special efforts must be taken in the development of a youth information system for juvenile offenders and neglected children. A strict security and confidentiality structure must be maintained during the planning and developmental phases so that these individual rights can be strictly observed and enforced. In this way, a juvenile justice information system which is intended to serve youth will not be distorted in its use to jeopardize the rights of youth on whom information is collected.

Planning a juvenile justice and youth services information system means considering the mechanization of information services for juvenile offenders and neglected children receiving any type of formal regular attention from state, county or local youth serving programs, juvenile courts and law enforcement agencies. The term mechanization incorporates computerizing selected statistical data and juvenile program information. Included in the planning for the system should be the standardization of reporting requirements for state, county and local agencies; the preparation of usual oriented statistical records; the creation of a controlled access communication system with procedure for handling intra-state, and eventually inter-state, sharing of information on children and youth on a "need to know" basis. The scope of the plan should also include the conceptual and operational development of a program evaluation and research information capability within the agencies responsible for education, identification, law enforcement, adjudication, treatment and delivery of protective services to delinquent and neglected children.

This paper will describe the problems which necessitate the development of juvenile justice and youth services information systems and a realistic approach to begin planning detailed design and operation of such a system.

The need for the use of common sense on the part of program administrators who contemplate the planning and development of a juvenile justice and youth services information system cannot be overstressed. This paper will attempt to explain not only what a finished system should look like and what factors should be considered in its development, but more importantly, how to go about realistically establishing communications, gaining understanding, and putting the juvenile justice and youth services information system together in a rational, sensible manner which will not overwhelm the potential users of the system and which will make realistic demands of the programs and agencies which must supply the input.

NATURE OF THE PROBLEM AND NEEDS TO BE MET

Information is perhaps a human service organization's single most important resource in attempting to achieve its goals. Without the proper information, in the proper form, at the proper time, it is impossible for any agency to determine how to serve its clients, set goals for itself, or determine how well it is doing.

The "information problem" is more important today than ever. Decisions tend to affect more children, and the effects of a poor decision may be

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so costly – in both dollars and human terms – as to be irreversible. Add to this the fact that, usually, a complicated network of organizations is involved with each child, and the urgency of the need for vastly improved information systems is dramatically illustrated.

This paper describes a plan to address this problem at the state level. Here, in capsule form, is the nature of the problem.

Although most states have an extensive network of youth serving organizations, currently there exists only a partial basis for making coordinated and comprehensive efforts at meeting the needs of children and youth. A youth services information system must have the long range goal of providing a statewide system for collecting, processing and disseminating information needed for the delivery, evaluation and improvement of youth services.

THE PROBLEM

The problems statement is presented in two parts. The first part explains the problem in terms of impact on the clientele of the youth services network. The second focuses on specific information-oriented problems.

A. Youth in Need of Service

The problem can be understood properly only in the context of your state's youth services system. There usually exists an intricate network of organizations, governmental and private, all of which perform functions related to the entry, processing, treatment and discharge from the youth services system. The quality of the actions of any one of these organizations has a critical effect on the success or failure of each youth with whom the agency comes in contact.

Furthermore, the quality of the relationships among these youth services organizations has just as critical an effect. Inadequate management of inter-organizational relationships results in uncoordinated and fragmented service efforts, premature closure of services, overlapping services and other malfunctions. Unfortunately, the detrimental effects are borne primarily by the youth that the system is intended to help. Not only does the system often fail to help, it may do more harm than good to its youthful clients.

Perhaps the single most important factor in service delivery is information. Unless good information is available for clients and program administrators, adequate service, evaluation, program management and research are impossible.

In the final analysis, then, the problem which this paper addresses is that of how the youth service network provides SERVICE TO YOUTH. For purposes of this discussion, "service" is defined as the matching of available resources to clients' needs in such a manner that the need is adequately met. A number of problems exist which prevent the occurrence of service at the local, regional, state (and national) levels. Here are the major ones on which the system is expected to have significant impact.

1. Availability of Service Resources

   Two distinct aspects of "availability" are worthy of consideration because of their relevance to helping children and youth and their relationship to the need for adequate information.

   The first aspect of availability concerns the extent to which the pattern of resource allocation within the youth services system reflects the actual needs and priorities of children and youth. Crucial policy makers at all levels lack information required for those decisions. For example, although there is general agreement on the desirability of delinquency prevention, there is very little information to indicate the point at which intervention in a community would have the desired effect, or which type of service resources should be applied. The system, by collecting information on contacts between youth and youth-related organizations, will supply information needed to make decisions on program priorities.

   Secondly, the extent to which the service resources are accessible to the youth is very important. Three factors have a major influence on this.

   (a) *Agency policy and mandate* determine what kinds of services are available to what kinds of youth.

   (b) *Interagency communication and exchange of information* affect how integrated the services will be. The continuum of services may have many gaps in it with the result that cases are "lost" in those gaps or that needed services are prematurely terminated.

   (c) *The degree of community awareness* that services are available and how they may be obtained effects the accessibility. The system would provide client-oriented information needed to identify and correct inadequate accessibility of services to youth.

2. The Level and Quality of Services

   In addition to the problem of availability of services, problems due in part to the inadequacy of information exist at the point of service provision.

   Case plans are not made in accord with the best professional practice. Often case dispositions are made more out of habit and pragmatic considerations rather than out of the review of adequate information on similar cases.

   Related to this is "resource location by shopping." That is, since information on service resources is only partial and inconsistent, there is no systematic way of securing services for a case at hand. The result is service tokenism, regardless of the intent of the agency.

   Another problem has to do with how the agencies define functions, procedures and philosophies. The primary factor in making case dispositions, is often the agency's self-concept rather than the youths' needs and the likelihood that the treatment placement will provide the required services. Information on the last two factors is needed by organizations if the youth is to benefit.

   Treatment planning, both in institutional and community settings is hampered by the lack of statistics related to success/failure rates, based on client characteristics and effects of services delivered. Best guesses and

professional convention must be relied upon in the absence of valid and reliable evaluative data.

The situation can be summed up by the phase "service discrepancy." That is, youth who need services the most are the least likely to receive them at the appropriate time; the services which are provided represent, as often as not, a *mismatch* of resources to needs.

Although provision of the proper statistics and case feedback in an efficient manner will not completely remedy the situation, it will substantially enhance the increase of service and, conversely, reduce service discrepancy. It will do this by providing, in many instances for the first time, the information necessary for functional decision makers at all levels. And that, in general terms, is the goal of a youth services information system.

B. Services in Need of Information

The first section presented the problem in terms of how inadequate information affects the youth client population and the youth service system. This section will discuss the problem in terms of the quality and utility of the information itself. First, the problems are described in overview form. Then a detailed breakdown is given.

1. Many Facts, Little Information

   A great deal of time is used for collecting, processing, storing and retrieving information. Only a limited amount of it is accessible or relevant for use. Most of the data concerns case records; little is available for administrative planning evaluation and research purposes, especially on an interagency basis.

2. Lack of Uniform Processing Procedures

   There are a variety of methods of collecting and generating information. As a result, information is often inaccurate, untimely, unreliable and in irregular supply. This is true not only of behavioral science type data, but also of basic population reporting.

3. Lack of Provision for Adequate Administrative Monitoring

   Administrators frequently have to rely on either their own observations or on sketchy information of questionable quality. This makes it virtually impossible to assess the progress of a program and to adjust the program during operation. This problem exists in virtually all youth programs.

4. Lack of Standard Program Information on Which to Base Program Evaluation and Comparative Evaluation Among Agencies

   There currently exist no standardized forms, definitions of terms or procedures for interagency information collection, handling and dissemination.

   Information relevant to ongoing service/treatment is generated from many dispersed sources and in a way which prohibits systematic and meaningful collection of the data for use in service/treatment.

   Information on the clients after termination of jurisdiction is important for program evaluation and improvement. This information and legal guidelines for its collection and use are lacking.

These problems may be organized under three pertinent categories of information: (1) information on client characteristics and the delivery of services, (2) information on organizational performance, and (3) information on inter-organizational relationships.

1. Problems Related to Information on Client Characteristics and Delivery of Services
   - (a) There is no uniform way of collecting basic biographical and diagnostic information on youth when they first come in contact with the law enforcement, judicial, or youth services system.
   - (b) There are no uniform, statewide procedures and standards for making dispositional or placement decisions.
   - (c) The method of collecting and using information about the client in the program is inadequate.
   - (d) There is no agreement on what information should be collected on youth, how it should be used, or by whom.
   - (e) There is a dearth of information on total client characteristics (and projections of same for future possible populations) which allows the organization to evaluate the scope and content of its major programs.
   - (f) There is very little systematic follow-up information on the youths once they return to the community.
   - (g) There is considerable fragmentation of services and uncoordinated proliferation of services which cannot be documented in quantitative terms.

2. Problems Related to Information on Organizational Performance
   - (a) There are severe limits on comparative evaluation of program performance, both among youth services programs and between youth services programs and those of state and local law enforcement and juvenile justice programs.
   - (b) Evaluation of programs for both efficiency and effectiveness must rely on information which, when available at all, is of questionable reliability.
   - (c) The planning of major programs is hindered by the inability to assess the current scope and effect of the existing programs on the youth population.
   - (d) There is a flood of facts, but a deficit of information.
   - (e) The procedures for processing information are inadequate, resulting in information which is too late, partial, or of varying reliability.
   - (f) There is little accessible information on the availability of service resources for use by law enforcement and judicial officials or social services staff.
   - (g) Duplication of collection by multiple collections of the same item of information is frequent and extends to most organizations.
   - (h) There is a lack of capability to utilize information well due to both the nature of the existing information and the lack of adequate procedures for interpretation utilization.

3. Problems Related to Information on Interorganizational Relationships
   - (a) Standards and procedures are lacking for interjurisdictional sharing of terms, definitions and information; this need is currently critical.
   - (b) Record sharing is hindered by the lack of standardization of formats.
   - (c) There is considerable redundancy in information collection, storage and use among youth serving agencies in different jurisdictional areas.
   - (d) There is no comprehensive, statewide system for collecting and sharing information on youth and youth services through the use of summary statistics.

(e) Many cases are "lost" between agencies because of lack of a uniform identification method.
(f) Standards of confidentiality for sharing client information are lacking; there is no statewide code of ethics.

The problems and the anticipated impact of a youth services information system on them can best be described using a system model.

The youth services delivery system is an adaptive system and the success of an information system depends on its ability to support such better service delivery. Since the "adaptive system" concept is crucial for determining the functions of the system and since systems related terminology is not uniform and consistent, the "adaptive system" is succinctly explained in Figure I.

The essential features of the youth service delivery system, as an adaptive system, are that the system receives inputs (youth, dollars, resources, etc.), acts upon them in some way (e.g., matches resources to youth needs), and produces an output (a rehabilitated youth). The process is controlled by feedback about the results of the organizations' operations and about the impact of programs on the clients. A change in one agency within the system affects the operations of other agencies in some way.

Thus, for example, a juvenile court may decide that one of its programs is not effective and begins a different one. (i.e., feedback has led to a program change.) As a result youth with certain kinds of characteristics will not be committed to the state. As the youth clients' makeup changes, the state will have to make changes in its programs. This in turn will affect the jobs of police officers, courts, other agencies, etc. In short, because of a change in one part of a system, the entire system, over time, has to adapt to a new set of conditions. Figure I shows the points in the youth services delivery system where information will help the system adapt in a manner that will make that adaptation one which is of optimum benefit for the youth clientele.

SETTING APPROPRIATE PRIORITIES FOR THE DEVELOPMENT OF A JUVENILE JUSTICE AND YOUTH SERVICES INFORMATION SYSTEM AT THE STATE LEVEL

Communicating a basic understanding of the problem showing where a youth services information system can help is a critical antecedent to planning for the development of such a system.

Equally important in the early planning stages is the establishment of an agreed upon priority for the development of a new information system to serve juvenile delinquents and neglected children and youth. A juvenile justice and youth services information system does not have to be sold as a concept. It rather must be explained in a way which is understandable to the people with responsibility for setting priorities and establishing funding programs needed to support such a system's development effort on an inter-disciplinary basis.

It is not difficult to see that the basic goal of such a youth services information system is to ultimately prevent delinquency. This includes both prevention of future delinquency on the part of those youths who have been adjudicated delinquent and the prevention of delinquency on the part of youth who are "potentially delinquent."

For analytical purposes this basic goal has been broken down into eight sub-goals:

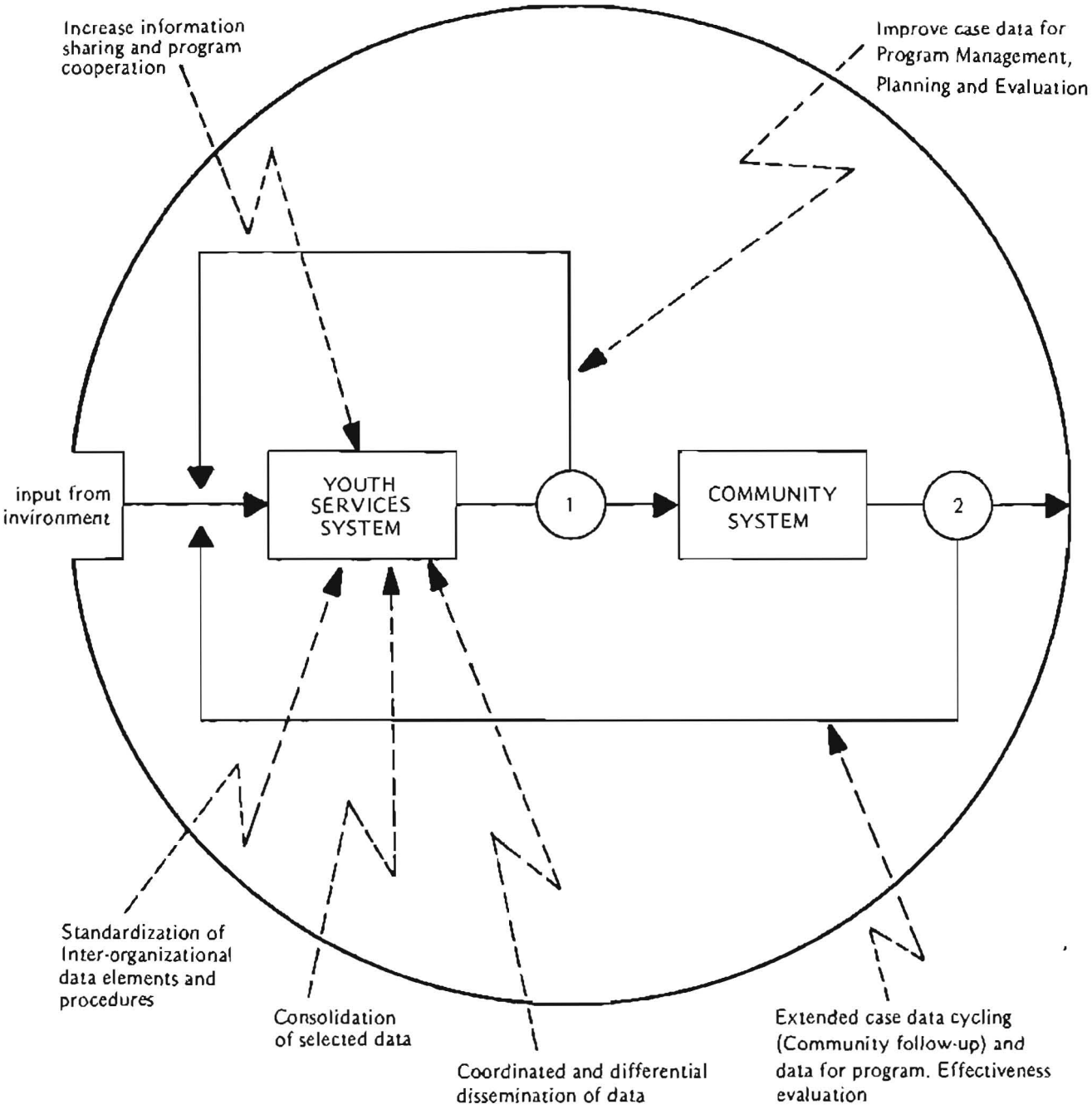
1. To identify and prevent potentially delinquent behavior.
2. To provide community alternatives to arrest and to official court processing of apprehended juveniles.
3. To provide alternatives to the institutionalization of adjudicated youth.
4. To implement new programs and expand existing programs in the community and in institutions which will prepare resident youth for reentry to their normal life style.
5. To mobilize local communities and existing educational, vocational and employment facilities to aid youth returning from state custody and care.
6. To improve the effectiveness of existing juvenile law enforcement, juvenile justice and youth services facilities and to provide for the creation of needed community-based resources.
7. To increase the skill and effectiveness of juvenile law enforcement, adjudication and youth services staff.
8. To identify and coordinate existing and potential public and private financial resources for the prevention and control of juvenile delinquency based on relevant facts related to the success and failure of existing programs and the needs for future expansion and or resources development.

In determining the relative priorities of development of a juvenile justice and youth service information system the benefits of such a system for its function and the persons to be served by it should be carefully assessed.

Some examples of the benefits which will be provided to participating agencies by such a system are:

Benefits for Youth

A responsible, efficient system of information should allow for the provision of effective treatment and at the same time protect youth from being lost or abused by the juvenile justice law enforcement or youth services delivery system. A juvenile justice and youth services information system will also provide for the rights of youth to



MAJOR BENIFITS IN RELATION TO YOUTH SERVICES SYSTEM

FIGURE I

public accountability and will result in more juvenile officer and social worker time being spent directly in delivery of services to clients. The youth information system will eventually allow for the collection of standardized interdepartment and inter-agency information extending over the entire law enforcement, juvenile justice and youth services process at the state level. In addition to benefitting each participating agency, the disruption currently caused in many instances by a lack of inter-agency communication should be minimized. With the youth services information system, accurate measurement of processing time and numbers of juveniles served will also be achieved. Meaningful program management reports for individual agencies and a summary of jurisdictional results will also be made possible.

Most important, the plan to develop a juvenile justice and youth services information system will create a concrete product which will stimulate long range financial support after the information systems capabilities have been developed, designed and demonstrated.

One caution should be considered: In its early stages of operation the benefits cited above will not be as dramatic or visible as those of a medium sized response system, such as an accounting system or production management system within a single department. The advantages of a total "juvenile justice and youth services process" coverage must still be demonstrated and the local acceptance of the concept stimulated through such a demonstration. In a long run, however, direct payoff from the operating system will become most evident to the user agencies who must be eventually counted on for their financial and political support. Therefore, the planning process is the critical period, and should be supported directly by funds from outside the user agencies particularly at the county and local level. Once the system begins to operate funding priorities may shift to accommodate direct payment by the user group for the use of the information system.

This shift will occur principally because of agency response to awareness of how well they are doing to meet their established objectives. Consequently, delinquent and neglected children and youth will begin to receive direct benefits from the programs.

BENEFITS FOR STATE AND LOCAL LAW ENFORCEMENT

A juvenile justice and youth services information system will provide police with access to case police history information. This will allow for improved decision making for the child at the first discretionary stage of the official process.

An information system will allow police access to listings of available placement and services resources which can be used to divert juveniles from official police processing whenever appropriate.

Information will be available on the relative success of direct agency referrals and other alternatives to arrest. This information may help to determine the future policies and procedures for their local law enforcement agencies.

Information will improve enforcement capabilities through the analysis of patterns of juvenile offenses, police contacts, and apprehensions. Aggregate data available on police contact trends with juveniles by precinct area can facilitate the determination of manpower allocation and policy adjustments to deal effectively with the juvenile population on a "neighborhood" basis.

Case history availability will provide a reduction in administrative time and expense required to maintain juvenile records.

Case reference information will provide a direct source as to possible whereabouts of juveniles (hold orders).

BENEFITS TO THE PROSECUTION FUNCTION

The availability of uniform information resources for attorneys will be useful in preparing petitions for juvenile courts and recommending alternatives to formal court processing. Available information on police case histories will aid prosecutors in decision to prosecute, release or seek a waiver to an adult court where advisable.

BENEFITS TO JUVENILE COURTS

A uniform information resource for data and case history information will provide valuable assistance in preparing pre-sentence reports and recommendations prior to initial hearings and formal proceedings.

Uniform statistics will increase the probability of success on dispositions and placement decisions based on accurate quickly available information on how similar children and youth responded to treatment in a similar situation.

The availability of a data base will provide the capability to evaluate and predict measures of probation success and failure.

Access to current information on individual children's involvement with other official agencies will allow probation officers and juvenile court workers to adjust treatment and supervision needs.

Statistical information on the types of clients being handled by the court will give direction to staff training in order to facilitate better staff client matching and subsequent caseload adjustments.

Resource information on existing placement alternatives will reveal gaps in available services and offer direction for program development at the state, county and local levels where new services are actually needed to fill those gaps.

BENEFITS TO STATE SOCIAL SERVICES AND YOUTH SERVICES DEPARTMENTS

Computerized information will: Provide fast, easily accessible management information on the entire spectrum of state level programs for delinquent and neglected children operated out of the major state department.

Provide the capability to update information used to monitor behavioral progress of individual youth and to detect any inappropriate delays or interruptions in the treatment process.

Provide data for systematic evaluation of programs, policies and personnel in relation to the performance and achievements of treatment goals based on reasonable expectancies which can be established on a statewide basis.

Provide increased access to, and awareness of placement alternatives within state programs as bedspace occurs or new program alternatives are developed.

Provide information on trends and commitments which will indicate target areas for prevention programs and point out immediate needs for increased treatment resources.

Create a data base on which to develop predictive measures of success in different treatment programs leading to the validation of a delinquent classification system which is flexible and can accommodate program changes.

Provide aggregate statistical information on a statewide basis to facilitate long and mid-range planning efforts using quantitative resources as a basis for judgments.

Develop (in cooperation with law enforcement and the juvenile courts) information surveys on patterns of child neglect which might indicate targets for prevention and intervention at the community level.

Provide "case record abstract" information for review by parole and review boards and caseworkers in order to facilitate systematic evaluation of individual children's progress toward systematically derived goals.

Develop a data and sampling base which will encourage the cooperation of major universities to conduct research conducive to program modifications, evaluation and innovation.

Create the capability to update continually previously gathered social history and diagnostic information on individual children and youth in order to prevent duplications and wasted time on the part of line staff hired to provide direct services.

Review the decision making criteria currently in use in an attempt to revise decision making patterns in line with the functional needs of the delinquent and neglected youth population. Through the use of this decision making, data treatment teams and program administrators may begin to understand emerging patterns of adjustment in order to make intelligent and timely case changes or program modifications during the course of an individual treatment or group treatment process.

BENEFITS FOR PRIVATE AND PUBLIC YOUTH SERVING AGENCIES

A youth services information system will provide for direct tie-in and statistical compatability with the total youth services network so that even the smallest agency can review its client outcomes in relation to statewide reasonable expectancies.

Use of a common data storage base will:

Provide access to information on case history involvement with other agencies, plus previous treatment and social histories for individual children and youth which will avoid duplication of information gatherings and foster more appropriate handling of private agencies' current treatment responsibilities.

Create a statewide data base for private agency reference on the types of clients who need services and the gaps in these services. This data base for private agency use will give emphasis to the development of programs to meet clients' needs and to fill gaps in the existing services network.

Provide comparative data to serve as a basis for coordination among private agencies with similar goals and objectives.

Provide agency directors with information on their agencies' effectiveness in dealing with different types of clients which they have been licensed to serve.

BENEFITS TO STATE LEGISLATIVE AND GOVERNMENTAL BODIES

The development of a juvenile justice and youth services information system will provide an effec-

tive, comprehensive, and complete information resource to allow for an increased level of high quality facts and figures. This will enable the individual state to discharge its responsibility and more fully provide for the needs of its youth.

The availability of data with complete statistical compatibility across traditional agency lines and jurisdictions will provide comparative information to generate budget reports and justify expenditures based on the actual need for services within the total juvenile justice and youth services network at the state level. At the same time, this same comparative data will reflect changing trends and individualize local needs which exist in metropolitan and rural areas since the data will be based on the actual movement and flow of cases through the law enforcement adjudicative and youth services process.

THE OBJECTIVES OF A JUVENILE JUSTICE AND YOUTH SERVICES INFORMATION SYSTEM

Any planning effort geared to the development of a juvenile justice and youth services information system at the state level should investigate the feasibility and possibility of computerizing juvenile case record information and aggregate statistical data. The scope of the plan should include: establishing standardized reporting formats for state, county and local education, law enforcement, adjudication and youth services agencies and programs; the preparation of "user-oriented" statistical records; the definition of information reporting criteria; the development of criteria for a controlled access communications plan with guidelines for handling intra-state sharing of information on delinquent and neglected children and youth; and the development of a "code of ethics" establishing security policies for the use of the information system.

The plan should also establish detailed guidelines for the development of a program evaluation and research generating capability within the agencies involved in the program.

The information systems plan should be part of a total effort divided into four or five phases, each of which should be successfully completed and approved by a statewide system applications advisory group before the next phase is undertaken. Only the first phase (the planning phase) should be undertaken initially. The continuation into subsequent phases should be based entirely on the capability of producing a plan which has statewide acceptance and is feasible to implement on a test basis.

Examples of how to phase the development of a juvenile justice and youth services information system are listed here:

Phase 1: The presentation of an information systems plan for approval to a statewide applications advisory group.

Phase 2: After approval by an advisory group, the performance by a detailed prototype systems design based upon the plan including the development, testing and demonstration of that design.

Phase 3: The implementation of a prototype system in four to six counties throughout the state.

Phase 4: The expansion of this prototype system after successful demonstration and evaluation to 15 additional counties.

Phase 5: The installation of a tested system in the remaining counties throughout the state.

The advisory group should continue to function throughout each phase of the project to guarantee continuity, and support the fiscal obligations necessary for development and installation of a statewide system.

SPECIFIC OBJECTIVES

Since the entire development of a statewide system is based pragmatically on the successful completion of a comprehensive systems plan the remainder of this paper will deal with the specific objectives to be covered in that plan.

The information systems plan must delineate current and planned operating program relationships among youth services network functions in the state. It is recommended that a minimum of the following functions be included in the initial planning effort: education, juvenile law enforcement, juvenile courts, treatment and youth services programs at the state, county and local levels.

The plan should describe in a conceptual context the information system design and its use by these functions of the youth services network. The plan must include a description of information requirements for each function that is cited above and a description of systems performance requirements which will meet the needs of each individual function. The plan must furnish a statement of criteria which would outline the requirements for the use of a common information base by the functions cited above.

A separate chapter of the plan should be devoted to describing the relationship of any proposed juvenile justice and youth services information system to the major budgeting and data processing systems plans which are currently operating at the state level. The information and performance requirements for the youth informa-

tion system would be developed in a manner which will provide for the direct use of data elements contained in the youth information system to provide information requirements for these budgeting and management information systems.

The following is a detailed explanation of specific objectives which should be addressed by any state developing a youth services information systems plan.

1. Determine specific information requirements in relation to the decision making processes which currently operate in the law enforcement, juvenile justice and youth service network.
2. Determine how the youth services information system performance requirements will relate to the total state budget and/or management information system and data processing plan if one exists.
3. Describe and document systems performance requirements and general parameters and constraints which will affect the detailed systems design to take place during Phase 2.
4. Establish guidelines which describe how systematic evaluation of overall program efficiency within individual law enforcement, juvenile justice and youth services programs can be provided by the availability of data on juvenile offenders' and neglected children's movement through the decision points of the youth service system. Examples of these decision points include:
   - the decision to arrest and/or to prosecute;
   - dispositional decisions in the juvenile courts;
   - the decision to place on probation;
   - placement decisions by a state department of social services or a youth service;
   - institutional treatment patterns and the daily case events which occur during the individual ward's treatment;
   - the decision to release or discharge from the youth services system.

   An analysis of decision points such as the above must be fully discussed in the information systems plan and documented in terms of related information requirements and how the proposed system would perform to make needed facts available to the users. This documentation as a minimum should include major decision points within each function showing complete alternatives for decision making at each decision point together with the information which is used to make each decision.
5. Establish guidelines for processing juvenile justice and youth services statistics based on accumulation of individual case event transactions which occur at decision points as delinquent offenders and neglected children move through the system toward eventual release or discharge into their respective communities.
6. Provide information to the advisory group which will enable them to determine whether an inter-disciplinary statewide juvenile justice and youth services information system has sufficient value and utility in relation to providing more effective services to youth, to justify the expense of statewide development, implementations and maintenance of such a system.
7. Explore the suitability of your state potentially using an automated limited access data file and describe how systems security can be achieved on this file as it is entered, maintained and updated on an inter-agency basis within the functions of a youth services delivery network.
8. Work directly with the systems user groups at state, county and local levels to determine which data elements should be contained within the information file of each program or function.

After completing all of these specific objectives the plan should recommend a set of standardized data elements to be drawn from the master files of each function for use on an inter-disciplinary basis. These standardized data elements in a common data base will constitute a portion of the information requirements from each function. They will represent data to be used by inter-agency personnel within a law enforcement, juvenile justice and youth services system for the purposes of tracking and processing individual cases and providing adequate treatment based on the information contained in the master files.

The systems plan must also set forth what data elements for each function which are outside of the common data base will be shared by each respective program or program function involved in the youth information system project. Access to these data elements outside of the common data base will be a major task to be determined by the advisory group.

THE END PRODUCT DESIRED AS A RESULT OF THE PLANNING EFFORT

The information systems plan to develop a juvenile justice and youth services information system should enable state, county and local educators; law enforcement juvenile officers and administrators, county prosecutors, juvenile court judges, court administrators and probation officers, Department of Social Services and Youth Services agency staff, and private agency program administrators to make direct use of documentation for the purposes of detailed design.

The plan should provide a separate chapter or section for each function of the state youth services system:

A. Which describes the existing information systems operation and information requirements.
B. Which provides a determination of standardized information requirements and record formats for each of the functions and programs of the juvenile justice and youth services network.
C. Which provides the determination of system performance requirements including the allowance for inter-agency exchange of data elements and aggregate statistics derived from case record abstracts.
D. Which provides the state with the necessary documentation needed to develop the detailed systems design configurations including recommendations for implementing and maintaining a limited access case record file.
E. Which describes the guidelines for a security and confidentiality system which will provide safeguards for individual's records contained in the system and protect the rights of children and youth.
F. Which describes the development of a transaction based statistical information resource and a program evaluation capability.

THE TYPES OF DATA TO BE CONSIDERED IN THE DEVELOPMENT OF A JUVENILE JUSTICE AND YOUTH SERVICES INFORMATION SYSTEM

Two types of data should be reviewed for inclusion in the systems plan: A. Individual identifiers and client characteristics; B. Case event data which occurs as children and youth move through the functions of the law enforcement adjudicative and youth service network.

THE IDENTIFIERS AND CLIENT CHARACTERISTICS

These information elements track the movement of delinquent and neglected children and youth through the network of services for youth. They are static in the sense that they do not change during the course of the process, nor are they generated by the operation of the individual agency involved with the case. These data elements are recorded as initially reported and the only corrections to the original entry will result when errors are detected in the master file.

THE CASE EVENT DATA

This type of information provides progress data created by the agencies that handle or process cases on an individual basis as youth move from agency to agency or are involved with a single agency. In this sense these data elements are dynamic since they constitute what may be referred to as "subject in process" or "case incident reporting."

TYPES OF DATA

These data elements related to the detailed series of defined events which occur within the juvenile protection law enforcement, adjudicative, treatment and community services facilities must be recorded routinely as children and youth move through the decision points within each functional process.

Each record in the data base should reflect the history and current status of the neglected child or juvenile offender as long as he or she is within the network of services. Each record should also be updated as he or she moves through the process from the original record of contact and positive identification to a point of exit from the network.

As aggregate data, the total file should reflect at any time a dynamic inventory of the youth services network. This aggregate statistical file should be used to study any aspect of the youth network or for management information to evaluate the effectiveness of any individual or group of services components.

SECURITY AND PROTECTION OF INDIVIDUAL CASE RECORD INFORMATION

A separate chapter or volume of any planning process for juvenile justice or youth services information system must describe a method to pre-test and evaluate the success of a "security-privacy" juvenile history records procedure, and a method to develop guidelines for the state to use potentially such a "security-privacy" procedure.

This documentation must outline a dependable proven method for controlling access to information stored in automated data centers. (It may be advisable to indicate the stipulation that access to any particular piece of information must be limited to legitimate users of the information based on a predetermined set of entry requirements agreed upon by an inter-disciplinary group composed of systems users and administrative personnel representing every local, county and statewide access point.)

The security plan should also describe how a "limited access criteria" could be translated into an automated set of determinants describing who can be given what information.

OTHER IMPORTANT AREAS TO BE COVERED IN AN INFORMATION SYSTEMS PLAN FOR JUVENILE JUSTICE AND YOUTH SERVICES

The plan should describe how workable standards for a statewide record numbering system compatible with adult law enforcement, courts and corrections systems can be developed to minimize the need for many separate client case numbers. This description should take into account all existing systems now operating at the state level in the following areas:

1. law enforcement
2. education
3. social services
4. criminal justice
5. corrections
6. youth services
7. metropolitan data centers

The plan should outline methods which create the capacity for intra-state record conversion storage and recovery of client case history abstracts between and among target programs and agencies. In this section particular emphasis should be given to record conversion in the counties used to demonstrate the first operation of the juvenile justice and youth services system.

The plan should discuss in detail a proposal to conduct a special analysis in order to identify and eliminate duplicate or redundant records which would interfere with efficient management of a statewide juvenile justice and youth services data base.

It may be important to involve university personnel in developing a description of how an analytical model could be used to provide the analysis of behavioral data and test the reliability of the information identified as necessary to make individual client placement and treatment decisions throughout the youth services network.

An important aspect of detailed systems planning which will be necessary to gain support and acceptance of a new information system at the state level is a discussion of the process to be used to insure that current operating information systems which may already handle portions of the youth services data requirements are included in the plan, and will be integrated into the development of the new system. This description should include a description of how the people who now run the existing systems would be involved in the planning and detailed design process. Needless to say, this should be worked out in advance of its publication in a systems plan.

THE MAIN THEME OF THE PLAN – STANDARDIZED JUVENILE RECORDS AND STATISTICS

Blended throughout the entire juvenile justice and youth services systems plan should be the detailed description of how the information needs analysis would be conducted within and among the functional areas of the network. As mentioned earlier in this paper this description must include the development of inter-departmental and inter-agency integrated records in a form capable of producing complete juvenile justice and youth services network wide statistics from the case record abstracts. These statistics should be designed for direct use by administrative personnel and as a research base. The discussion should also include detailed plans to create one standardized set of data elements with uniform definitions for each data element. These standardized data elements would be used as a basic requirement for inter-agency master files and as a point of departure for beginning to describe agreements to share information across traditional jurisdictional lines.

The plans should also describe methods to be used to establish individual sub-files for each function of the juvenile justice and youth services network described in the plan. These sub-files must also be standardized within each discipline or function. Once again standardization means the development of uniform definitions for each data element (development of these definitions is an area which has been virtually untouched in the juvenile justice and youth services domain.)

ORGANIZATION, STAFFING AND PLANNING STRATEGY

The above portions of this paper have specified the ingredients necessary to develop an information systems plan in the juvenile justice and youth services network. The degree to which any plan using these ingredients will be successful depends entirely on how the ingredients are combined and presented by the systems development team to the many people at the state, county and local levels who must accept, understand and eventually use the information system as an aid to completing their daily work assignments.

If an information system in the juvenile justice and youth services area is to be successful it means major changes in existing procedures and policies within law enforcement, courts, social services and private agencies. Furthermore, it means that these agencies and programs must, for the first time, become sincerely and seriously involved in the problems of sharing information across jurisdictional and agency lines. They must develop a detailed plan for doing so which is specific enough to use in a computerized set of directions.

Tackling both the policy and procedural changes and the interdisciplinary information sharing requirements at the same time can be overwhelming to an operations supervisor or department administrator who has many more important things to worry about than developing an information system for the juvenile portion of his program.

Realizing these constraints, persons on the systems development team for a juvenile justice information system would do well to follow these simple rules as they begin the planning effort: (1) Walk before you run! Develop and implement a simple tracking system on an inter-agency basis within a reasonable number of functions (courts, social services, law enforcement. (2) Don't overwhelm the people who have to support and approve your operation with tons of documentations and reams of flow charts and other technical data. (3) Establish a statewide applications advisory group to supervise and control the planning effort. (The members of this group should represent top agency personnel and directors of user functions as well as legislative and judicial repre-

sentatives. Citizens groups with human rights and resources as their major objective and civil rights groups should also be involved from the standpoint of security and confidentiality of development and approval.) (4) Don't short circuit the effort; involve the users all the way in the planning process. Use as much feedback from the users as possible. (This can be done by providing the users at the local and county level with the basic structure and ideas and asking them to comment on what is missing and what would make the ideas more useful and functional to them in their daily work.) (5) Establish formal local task forces in each of the counties where the systems will be demonstrated or tested. Have the task force involved in the demonstration and testing process and responsible for coordinating portions of the systems development effort. (6) Establish a formal project management team to provide the arms and legs necessary to do the daily work of developing the plan. This step is critical since plans do not materialize out of thin air and cannot be developed by a small group of interested personnel located in one agency. The project management team must also be interdisciplinary and should represent some of the people who will actually operate the system at the state level as well as some of the metropolitan counties. Members of the project management team could be appointed by their bosses who sit on the statewide advisory group. (7) Staff the project adequately with management systems analysts, data systems analysts and people who understand the youth services network. This will insure that the planning ideas and concepts developed by the management team and supported by the advisory group can be turned into a realistic document that makes sense and is reasonable to user organizations and programs. (8) Know exactly what you want and exactly how it will be structured before you write a request for proposal or a request for quotation to solicit the support services of a consulting firm. Don't let a consulting firm put in its system! It won't work. Hire a contracting firm, if necessary, to install a system you have defined with the user communities involved in planning. (9) Go out in the field and talk to the people who will have to support the concept and later the system as an operating entity. Do this early in planning phase, help them to understand what you want to do, help them to think of good reasons for doing it or not doing it and gain their personal support even though it may delay the planning process as much as 6 months to a year. (10) Meet with legislatures, executive office budget personnel, data processing control groups, etc. within the state government and metropolitan planning bodies to discuss the possibility of developing a plan before you surface a request for funds to do so, or announce that the plan will be developed. Have these people involved early in the process in advance of detailing the major scope of the planning operation. (11) During the early stages of the plan, conduct an analysis of the decision making points on a functional basis to determine information requirements. By looking at functional relationships between programs that serve children and youth you will avoid mechanizing a manual system and you will substantially reduce the cost of records conversion and the size of the data base which will in turn minimize yearly maintenance costs. (12) Build a small portion of the information system first in one function and use it as a building block for continued systems development. Although the plan must describe the comprehensive interrelationship among the various functions and the agencies and programs within those functions this does not preclude the building or the moving ahead in one area or another where the political climate or agency readiness will accept such a departure from the total planning schedule. When this is possible, install a client data base or a client tracking system and use it to demonstrate the validity of the concept and usefulness of the operation.

Don't overlook project evaluation and in particular an evaluation design for testing the effectiveness of the plan once it is developed and demonstrated. Remember! A management information system of any type to be worth its salt must produce a change in its users' program output, and must produce a positive impact of existing programs. Any evaluation system must take impact measurement into consideration and test agencies with the information system against similar agencies without it in order to determine the success potential of an information system and justify its continued expense.

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DATA REQUIREMENTS FOR CRIME ORIENTED PLANNING

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INTRODUCTION

In order to effect a reduction of crime, the planning effort must be specifically directed toward that end. Non-directional programs to simply produce improvement in parts of the criminal justice system will not effectively reduce crime. The improvement of the criminal justice system is not in itself a reasonable goal, but it will inevitably result from comprehensive methodical crime oriented planning simply because the criminal justice system is the available tool for the reduction of crime and delinquency. However, crime oriented planning may suggest solutions outside of the traditional criminal justice system. Thus, there is a great deal more flexibility than exists in system oriented planning.

The concept of crime oriented planning is receiving its first major test with the "High Crime Impact Program" sponsored by LEAA in eight cities. Under this program the cities were required to develop a crime reduction program based on relevant, high quality data. The purpose of this paper is to describe the kinds of data required to adequately implement this kind of planning.

INCIDENT DATA

Most major police agencies are currently producing statistics on crimes known to the police, arrests and related information. However, these statistics are generally inadequate for effective crime oriented planning. In almost every case the necessary information exists on two basic source documents, the incident report and the arrest record. However, the raw information must be organized differently and in more detail than is generally done by police agencies.

It is recognized that different kinds of crimes require different data. This document will limit itself to stranger-to-stranger crimes and burglary, those crimes which have been shown to generate the most fear in the general public. However, the principles can be applied to any specific crimes or to crime in general. Burglary presents no conceptual problem since the Uniform Crime Report definition can be used without change. Stranger-to-stranger crime on the other hand is not a defined UCR offense. The first requirement for identifying a stranger-to-stranger offense is that the victim-offender relationship be determined. Where the victim was well known or related to the offender, the crime is not relevant to the program. Stranger-to-stranger offenses thus ban be described as including any of the following offenses (UCR defined) which occur between persons unknown to each other: murder, forcible rape, robbery and assault. It is clear that it will not always be possible to determine the relationship between the victim and the offender, (an unsolved murder, for example). However, there is adequate evidence to show that in an extremely high percentage of cases the information is available.

With the target crimes adequately identified, the distribution and characteristics of the criminal events should be determined in order to design programs which adequately address the problem. The distribution of offenses must be examined in terms of both time and space. This examination will provide the basis for an effective allocation of resources. In the time dimension it is important to know the times of day when the target offenses occur as well as the days of the week. To some extent seasonal differences must also be considered.

The importance of knowing when offenses occur is matched by the need to know where they occur. Thus it is useful to have data available for small geographic areas such as beat, Carney block, block face or census tract. Data by precinct or police district is the minimum acceptable for reasonable planning although subtotals reflecting these larger areas are desirable. Response tactics and strategies will also vary by whether the crimes occur on the street or elsewhere; by the type of place in which off street crime occurs, e.g., liquor stores, filling stations, apartment buildings, public transit, etc.

The type of area or neighborhood in which "on street" crimes occur is similarly important. Shopping centers, other commercial areas, main streets and side streets will produce different crime patterns. Details such as population density as deter-

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mined by census data or zoning regulations should not be overlooked. In specific situations a city should consider them in determining its overall data requirements and analytical needs. Detailed data from the decennial census and other census surveys should be considered in statistically identifying and characterizing neighborhoods and other geographic areas.

In order to achieve this kind of geographic selectivity, the crime data derived from law enforcement sources should contain as much geographic detail as is feasible. Geographic coding to provide this level of detail should be integrated into the crime reporting system.

Beyond the dimensions of time and space, data on the characteristics of the event can often provide tactical direction. Information about the number of offenders, their apparent age, weapons, etc., can prove useful.

For planning purposes, the complete reliance on the usual hierarchical classification of offenses can also be counterproductive. For example, a rape which takes place during a burglary or robbery must be considered quite differently, in terms of criminal justice response, from a rape which occurs for its own sake. In the former case, a reduction of the kinds of robberies and burglaries in which there is a rape risk should see a reduction in the overall number of rapes. Similarly an assault which takes place during a robbery situation should have a different response pattern from other stranger-to-stranger assaults.

This suggests the need to attempt to determine for statistical analysis, the intended offense, as well as the most serious offense which occurred during the criminal incident.

ARREST DATA

The primary source of information about offenders is the arrest record. While there is no way of being certain that the characteristics of persons arrested are representative of all of those committing similar offenses, we have little choice but to use arrest statistics as a surrogate for true offender statistics.

Age, sex, race, school or work status, and other arrestee characteristics should be examined along with the offense for which the person was arrested. These characteristics along with information about prior offenses when examined in aggregate can provide useful insights about the characteristics of the target population.

Arrest data when used in conjunction with incident reports can be used to produce area crime specific estimates of the characteristics of offenders. Arrest rates must be used with extreme care. For example, an arrest is largely irrelevant for the deterrence of serious offenders if the arresting officer fails to make an adequate enough case to warrant prosecution. Thus, our primary measure should be "effective arrests" – those which result in prosecutable cases. Arrests which do not result in having the defendant "bound over" should probably not be used to evaluate the effectiveness of the police.

QUALITY CONTROL

Data on arrests and incidents can only be useful if the records from which they are drawn are of high quality and if they are aggregated carefully. In addition to crime specific planning, these data will probably be used by a city and the criminal justice agencies involved, to provide for program evaluation. Therefore they must be beyond reproach. In order to assess the quality of the data and determine where improvement or correction is needed, an independent audit of the incident and arrest statistics should be carried out routinely. This is essential for the maintenance of the integrity and credibility of the crime statistics developed for this effort. However, an independent contractor or auditor should be used to carry out the audit itself. In those states in which the state is the focal point of UCR collection, the responsible state agency may arrange for or conduct the audit. Interstate agreements to audit each other's reports may also be a viable possibility.

USE OF EXISTING INFORMATION

In order to establish the baseline information needed to develop specific plans, it may be necessary to reclassify existing data using recent incident and arrest reports. This can be done with little technical difficulty. However, it would be useful to utilize scientific sampling techniques to reduce the workload. Relevant sampling techniques are generally available, however, there is a great deal of misunderstanding of statistical sampling, and to prevent committing serious errors, care should be taken in sampling to insure that the sample is representative and that the resulting data are reliable.

PROCESSING DATA

In order to gain maximum utility for incident and arrest data, they should be presented in a way which will facilitate problem solving.

To provide maximum flexibility, modern data processing techniques should be utilized. If individual incident and arrest records are maintained in a machine-readable format, changes in the data displays can be effected easily. Most police statistics are collected by using tally sheets from which summary statistics are drawn. The alternative method, that of keeping machine-readable individual records, would visualize for example information about each offense being maintained on a separate punch card or consisting of a separate record in a computer tape file. All of the usual summary data can be generated as well as new displays.

By utilizing modern data processing techniques, direct input can be made into such areas as resource allocation and command and control.

DATA ELEMENTS

In order to maximize the interpretive potential of offense and arrest data, great care should be taken in the selection of the data which will be collected and the detail in which it is stored. The identification of such data should reflect the needs of criminal justice operating agencies and planners.

THE INCIDENT REPORT

The incident report utilized by the police agency must take into account the needs of both police and other planners. The first and most obvious need is to have a description of the offense. All UCR offenses should be included in any data system. All crimes of violence should be constructed in such a way as to identify separately stranger-to-stranger crimes and crimes among friends and acquaintances. Thus the offense data elements would appear as follows:

Offenses
- Stranger to Stranger Personal Crimes
  - Murder
  - Forcible Rape
  - Robbery
  - Assault
- Other Personal Crimes (Relatives, Friends, etc.)
  - Murder
  - Forcible Rape
  - Robbery
  - Assault
- Burglary

THE TIME DIMENSION

One of the most critical elements in determination of deployment and resource allocation involves the question of when crimes occur. The concern includes but is not restricted to the time of day. A knowledge of the hours in which crimes tend to happen should obviously be a critical ingredient in the patrol deployment decision.

Similarly the day of the week is important, as in most areas the weekend pattern is far different from the weekday pattern.

Similarly there are significant seasonal changes in crime patterns. School vacations, holidays (especially the Christmas season) change the ordinary living patterns and thus the crime patterns.

All of the time considerations can be coded for maximum detail – single hours or specific day of the week for example. However, for analysis it would be more reasonable to examine them in more summary fashion. One alternative would be the following:

Hours:
- 12:00 PM-3:00 AM
- 3:00 AM-9:00 AM
- 9:00 AM-4:00 PM
- 4:00 PM-8:00 PM
- 8:00 PM-12:00 PM

} One possible alternative – The actual selection of time periods would depend on the activity patterns in a particular city

Days:
- Monday-Thursday
- Friday
- Saturday
- Sunday

Months or seasons: Develop independently for cities, but take into consideration school sessions, holidays, e.g., Christmas, etc.

LOCATION

The importance of time is matched and perhaps surpassed by the importance of the location at which crimes occur or do not occur. Geographically, data should be recorded for the smallest practical area, preferably down to "block face." Information at this level of detail can always be aggregated into larger areas for analytical purposes. The detail adds to the flexibility by making it possible to recode the data in any way to represent different area definitions.

In addition to the geographic location, it is valuable to know the characteristics of the specific location. It is sometimes possible to develop strategies for target hardening or manpower deployment if patterns can be detected. The following data elements should be viewed only as examples, they can and should be modified to reflect the realities in a particular locality.

Specific Location
- On the Street
  - Shopping Center
  - Other Commercial Area
  - Residential - high density
  - Residential - Other
  - Other
- Off Street
  - Liquor Store
  - Filling Station
  - Grocery Store

Bar or Restaurant
Apartment Building
Transit Vehicle
Other

CHARACTERISTICS OF THE INCIDENT

Statistical analysis can be thought of as the investigation of relationships and patterns: criminal incidents examined in terms of the type of offense: when and where it occurred and the other characteristics of the incident. Again the socio-economic realities of the city will determine the actual data elements to be collected. For example a city which is a transportation hub might be more interested in theft of certain kinds of materials from warehouses, etc. Another city with a large financial industry would be concerned with thefts of securities.

The following set of data elements again should be considered as examples and not a definitive list.

Characteristics of the Incident
Single Offender
Multiple Offenders
Age of Offender(s) (Apparent)
- Juvenile
- Young Adult
- Other

Weapons
- None – Strongarm
- Gun
- Knife
- Other - club, etc.

Stolen Property
- Cash
- Electronic equipment
- Clothes - furs, etc.
- Liquor
- Cigarettes
- Etc.

Other Relationships (Record as many as apply)
Drug Related
- User
- Pusher
- Distributor

Alcohol Related
Juvenile Gang Related
Apparent Organized Crime Relationship

THE ARREST REPORTS

Although the arrest report is an inaccurate reflection of the characteristics of offenders it is the best guide we have for the development of crime reduction strategies based on the characteristics of offenders. When data on the offender are combined with data on events the targets for crime reduction programs can be identified. Obviously similar data are needed to address the problem of offenders.

It must be kept in mind that the characteristics described here should be maintained as individual records, but are not meant to substitute for the criminal histories. Complete criminal histories, which should be maintained at the state level, require many more data elements*. The data elements described here are for the purposes of crime oriented planning, not for general criminal justice purposes. Offender Based Transaction Statistics (OBTS) should provide all of the additional data needed for program planning.

The value of arrest data can be significantly augmented by tying the arrest information to crime data. This is not an easy task. The clearance rate on crimes in general is quite low (and of course this is the area most in need of improvement) therefore, reducing the value of the integrated records. Nonetheless the integrated arrest/incident record can provide new and valuable insights.

The arrest record should provide sufficient data for planners to identify relevant population for crime prevention and control programs. The age of the arrestee for example will determine whether juvenile or adult programs are indicated and further whether programs should be focused on the schools or outside of schools.

The sample data elements which follow are generally self-explanatory and their utility is obvious.

Arrestee Characteristics
Age *
- Less than 14
- 14-15
- 16-18
- 19-21
- 22-24
- 25-34
- 35-54
- 55+

Race
- White
- Black
- Etc.
- Etc.

} As relevant in a particular city

Prior Record
1. Prior felony arrest
2. Prior misdemeanor arrest
3. Juvenile status offense* only
4. No prior

Criminal Justice Status at Time of Arrest
- Awaiting Trial or Appeal
- On Probation
- On Parole
- Not Under Supervision

* See SEARCH Technical Report No. 4, *Implementing Statewide Criminal Justice Statistics Systems – The Model and Implementation Environment*, California Crime Technological Research Foundation, Sacramento, January 1972.

* This should reflect the state's statutory juvenile "cut-off" age if different.

* Those offenses, such as truancy, which would not be offenses if committed by adults.

Job or School Status at Time of Arrest
1. Employed
2. In school
3. Not employed

Characteristics of Arrest

Most Serious Offense Charged

- Stranger-to-Stranger Crime
  - Murder
  - Rape
  - Robbery
  - Assault
- Burglary

Primary Offense Intended
- Murder
- Rape
- Robbery
- Assault
- Auto Theft
- Other

Subsequent Disposition
- Released by police
- Released by prosecutor
- "Bound-over" by prosecutor

} As appropriate

Identifying meaningful data elements is an essential first step in the development of meaningful statistics but this is obviously not enough to satisfy crime specific planning data needs. These data elements must be cross classified in such a way as to provide the kinds of data that can be used for planning purposes. The following tables, while not definitive, are examples of the kinds of tables which can be most useful to criminal justice planners.

The first table shows detailed crimes by geographic area. The second should provide some insight into the effectiveness of police arrest procedures. The third tables combines temporal and spatial characteristics with a description of different kinds of targets. Finally, Table 4 shows the relationship between crimes and arrests.

Many other relationships can and should be developed in each specific area to support the local planning process.

Table 1. CRIMES BY GEOGRAPHIC AREA – SUMMARY

Area of reported incident	*Number of incidents*					
	Stranger-to-stranger crime					*Burglary*
	Total	*Murder*	*Rape*	*Robbery*	*Assault*	
Total city						
Total Precinct A.						
Area 1						
Area 2						
.						
.						
.						
Area n'						
Total Precinct B.						
Area 1						
Area 2						
.						
.						
.						
Area n''						
.						
.						
.						
Total Precinct N (etc.)						

COMMENT: This table will show on a summary basis the distribution of crime in the city, and should provide an initial guide to the allocation of resources.

Table 2. ARRESTS AND PROSECUTION

Area	*Stranger-to-stranger crime*										*Burglary*	
	Total		*Murder*		*Rape*		*Robbery*		*Assault*			
	Number of arrests	*Percent bound over*	*Number of arrests*	*Percent bound over*	*Number of arrests*	*Percent bound over*	*Number of arrests*	*Percent bound over*	*Number of arrests*	*Percent bound over*	*Number of arrests*	*Percent bound over*
Total												
Area 1												
Area 2												
.												
.												
.												
Area N												

COMMENT: This table will provide insights into the real effectiveness of police activities.

Table 3. AREA PROFILES – STRANGER-TO-STRANGER CRIMES
(Prepare separately for each geographic area)

Time dimension	Robbery — Strongarm													
	On Street						Off Street							
	Total	Shopping center	Commercial area	Residential high density	Residential (other)	Other	Total	Liquor store	Filling station	Grocery store	Apartment building	Transit vehicle	Bar	Other
Total														
Mon.-Thurs.														
12-3 AM														
3-9 AM														
9 AM - 4 PM														
4-8 PM														
8-12 PM														
Repeat for:														
Friday														
Saturday														
Sunday														

Repeat entire table for Robbery-Armed.

Repeat table for all other stranger to stranger crimes combined.

COMMENT: The area and time variables for this table should be reflective of crime patterns and general activity patterns in the specific target area.

Table 4. AREA PROFILE ARRESTS
(Tabulate separately for each area)

Area profile	Stranger-to-stranger crime										Burglary	
	Total		Murder		Rape		Robbery		Assault			
	Number of arrests	Percent bound over	Number of arrests	Percent bound over	Number of arrests	Percent bound over	Number of arrests	Percent bound over	Number of arrests	Percent bound over	Number of arrests	Percent bound over
White total												
Under 14												
14-16												
16-18												
19-21												
21-24												
25-34												
35-54												
55+												
Black total												
(Repeat Age)												
Other												
(Repeat Age)												
Job or School Status												
Employed												
In school												
Not employed												
Prior Record												
Prior felony arrest												
Prior misdemeanor arrest only												
No prior - or juvenile only												

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PLANNING AND IMPLEMENTATION OF COMPREHENSIVE CRIMINAL JUSTICE INFORMATION SYSTEMS

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The development of Information Systems for Criminal Justice Agencies began in earnest with the passage of the Omnibus Crime Control and Safe Streets Act in 1968. Early funding emphasis at both the State and Federal level was in the police area. Project SEARCH, with its original focus on the police sector, is an illustration of major funding activity beginning in 1969. Other LEAA and State Planning Agency funding during 1969, 1970 and 1971 was sporadic, and principally for a variety of police applications; occasionally including projects in the courts' and corrections' area. My reference to the early funding pattern of information systems is meant to illustrate the lack of coordinated planning. There were, of course, many sound subsystems developed, but with few exceptions they were fragmented from the needs of the total criminal justice system.

In conjunction with the statewide plan required by LEAA, some states started planning projects to define Comprehensive Criminal Justice Information Systems. To date, however, only about eight states have definitely followed such an approach; and currently, there are five states which have made definite commitments in systems development. Utah is one of these and the one with which I am most familiar. I will discuss the Utah approach later in this paper.

The Computerized Criminal Histories project started by SEARCH in 1969 was designed for operational police use. In the course of implementing the CCH project it was recognized that communication with courts and corrections was essential. Consequently the evolution of SEARCH has been from strictly police application to the criminal justice system in its entirety. The agencies which house the computerized criminal histories are gradually branching out to include the needs of the total criminal justice system, regardless of their orientation.

The Comprehensive Data Systems Program announced by LEAA in May of 1972 provides a major impetus toward establishing a coordinated planning approach. The funding requirements for the CDS Program should encourage a trend for Comprehensive Criminal Justice Information System Planning. The CDS Program was previously described in detail at this Symposium by Mr. George Hall of LEAA.

Twenty-one state CDS plans have been prepared and others are currently in progress. This does not mean that the *Planning Process* has been completed in 21 states. In my view, the success of implementing these plans will be directly related to the manner in which the planning process occurred. Specifically, if the planning process did not provide for decision-making within the political process the success of actual implementation will be questionable.

In a Comprehensive Criminal Justice Information System, the mechanisms for obtaining local inputs to a central file as well as meeting local management information needs must be included in the total planning process. The Comprehensive Data Systems approach stops short of accomplishing this objective. For example, the Uniform Crime Report is dependent upon data elements that support local systems, consequently, a comprehensive criminal justice information system approach would include a mechanism to obtain Uniform Crime Report data as a by-product of the local system.

The rationale for this approach may be illustrated by reference to the Uniform Crime Report. In order to meet the data requirements for the UCR there are two basic options: One is to add to the existing system which results in duplication; the second is to integrate it into one data capture process to satisfy local, state and federal requirements. Since a Comprehensive Criminal Justice Information System effort should be equipped to provide for the design of an integrated system, it naturally follows that local level management information needs should be anticipated and incor-

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porated into the over-all system.

In my view, planning and implementing information systems for criminal justice agencies is now moving toward a coordinated, comprehensive approach. By Comprehensive Criminal Justice Information System, I mean a system, that at the operational level, has jurisdictional authority and provides services to all agencies in the criminal justice system. For example, such a system would maintain central files to meet the needs of police, courts, and correctional agencies.

There is increasing support for such an approach; the National Governors' Conference in its policy positions of June 1972 stated:

> [Agencies should implement the . . .] "Development of mandatory statistical data collection and analysis for all components of the criminal justice system including Polke Administration, court caseload, correctional data, and expenditures of state and local governments for criminal justice institutions."[1]

Other agencies and organizations, such as LEAA, the National Association of State Information Systems (NASIS), the FBI, the International Association of Chiefs of Police (IACP), and SEARCH, also recognize and support this trend. I shall briefly discuss major considerations pertinent to the preparation of a Comprehensive Criminal Justice Information Systems Plan, and highlight principal issues associated with this implementation.

Planning, all to frequently, is equated with the formal steps of a research activity and creation of written documents. To view planning in this way, i.e., to make it distinct and remote from the managing process, severely limits the potential benefit to those with operational responsibility. Planning should be seen as a total management strategy, not as a separate scientific process. I wish to suggest that the planning process, to be successful, must relate to the political process at every stage of development. The planning, implementation and operational process is not as symetrical as we might wish. The very best criminal justice information system is not susceptible to being arbitrarily constructed, nor can it be constructed on an exclusively scientific basis. The failure to recognize this fact is not unique to those who are involved in designing criminal justice information systems. In a world in which everything is allegedly scientific, planners in all areas of endeavor fall victim to this approach.

Do not succumb to the temptation to imagine that you can invent an ideal criminal justice information system without involving the principal beneficiaries and subjecting the design to thorough review within the political arena where you propose to operate. In this regard, the point I wish to emphasize is that implementation is a difficult task only if decision-making has not been modified by the planning process. If the major issues have not been resolved in planning, plan implementation will be difficult if not impossible. Where complex issues are involved, as they are in a Criminal Justice Information System, implementation can only be assured through extensive analysis, tedious dialogue, and decision-making. Such an approach will help clarify the issues, as well as to focus attention on matters upon which real differences exist; it is in this context that political judgments are necessary.

To address the specific subject of interest to this audience, I shall outline some major considerations in the development of a Comprehensive Criminal Justice Information System Plan. My observations result from actual experience in developing the Utah plan. Systems planning is the process by which potential projects are identified, evaluated, and placed in priority for later development. A completed systems planning report should include such items as:

1. Definitions of goals and objectives for approved information systems.
2. Identification of the developmental projects with suggested priorities.
3. Segmentation of large projects into workable modules or sub-projects which can be implemented individually and later integrated into a larger system.
4. Provisions for coordination of multiple projects as well as provisions for individual project monitoring and control.
5. Estimates of equipment, software, and personnel required to complete development of approved projects.
6. Estimates of the time and costs required to complete the activities identified in the plan.
7. Identification of expected benefits from each project.
8. Legislation and procedures to insure system privacy and security.
9. Mandatory reporting legislation.
10. Provisions for the on-going funding of the system.

I wish to emphasize that the completed plan represents a snapshot in time and should be continuously updated and revised as additional information is gathered.

The initial step in preparing a systems plan is a thorough examination of existing capabilities. Such an examination should include:

1. The status and current operational costs for existing sub-systems.
2. Document manual files being used.
3. Document automated files being used.
4. Document sub-systems currently under development.
5. Identification of problem areas.

I will briefly summarize the major problems identified in Utah. In all probability these prob-

lems will also exist in other jurisdictions.

– There was a definite lack of planning coordination among the various law enforcement agencies throughout the State. This problem appeared to stem from the lack of an interagency coordinating mechanism rather than from a lack of interest in planning and coordination by the various agencies.

– In too many instances, the individual agencies were not familiar with the functions performed by other law enforcement agencies which would have contact with a criminal or suspect. The result was production of incomplete and inaccurate records, a lack of continuity in correctional programs, and action decisions being made on data which was imperfect.

– Such information as socio-economic data was frequently collected by several different correctional agencies. An effective plan did not exist for the sharing of data files by the agencies.

– An effective process for program evaluation did not exist within most agencies.

– Legal constraints existed relative to the dissemination of historical information. For example, a large portion of the information relative to juveniles was regarded as confidential and thus release of it was highly restricted.

– Many of the existing manual processes were frequently inadequate because of incomplete definition of the systems and existence of little, if any, documentation describing the processes and decision requirements, and because of files which contained forms which were not compatible with files in other agencies and automated data capture requirements.

– Existing systems had frequently been designed and developed without considering the needs of other agencies which might benefit from the capabilities of the systems.

A thorough examination of existing sub-system capabilities will assist in determining new system requirements. Goals and objectives should be carefully defined during this phase of the planning process. The scope of the new system should address the needs of planning, evaluation, research, operations, and administration.

Following identification of system goals and objectives, the details of development must be determined. This should include a careful delineation of priorities. Establishing priorities is extremely important at this point in order to insure development continuity.

MAJOR DESIGN AND IMPLEMENTATION CONSIDERATIONS

A Comprehensive Criminal Justice Information System should be conceptually designed, with an initial emphasis on user management requirements, in order to function as an integrated complete system, rather than a fragmented series of smaller systems. One could not describe any state's Criminal Justice System as a well-organized integrated system capable of a rapid, coordinated response to a stimulus. However, an operationally integrated information system for criminal justice permits decision-makers to examine the system as a complete unit, in spite of its traditional fragmentation.

In addition to a knowledge of goals, objectives, and information requirements, design of the integrated system involves key considerations which deserve careful evaluation to insure the feasibility and flexibility of the system's implementation.

– While the potential of systems cost savings and the value of an integrated information system are undeniable, the total system must be, to the maximum extent possible, capable of providing service to individual agencies without infringement upon the management rights of those agencies. Information intended only for specific agencies must be produced for, and be available to, only those specific agencies.

– Further, detail system design activities should have as a priority objective service to individual (especially local) agencies in terms of administrative aid and workload reduction, with local agency participation emphasized in the definition of the specific nature of such service.

– Such a system will transcend organizational boundaries and governmental levels, and will therefore require a high degree of cooperation among the participating agencies. During the detailed development phases the requirements of each agency must be carefully researched, and although some compromises will necessarily occur, the mandatory requirements of each agency must be provided for within the limitations of cost/benefit analyses.

– The goals and objectives imply a complex and justifiably costly system which will require significant development time prior to final implementation and total integration.

– Funding capabilities must be considered and should include state and local government commitments from their own sources as well as State Planning Agency funding priorities.

– The fields of criminal justice and information

systems technology are dynamic by their nature, and it should be expected that the Omnibus Crime Control and Safe Streets Act will accelerate the pace of change. An attempt to implement this complex system as a single unit might result in significant system obsolescence prior to completion of implementation.

– Manpower and skill-level resources appropriate to a project of this nature are severely limited, both nationally and locally. Particular care should be taken not to underestimate the extremely vital requirement for project management, control and monitoring skills as these relate to the complexity, scope, magnitude, and cost of the implied development effort, including the requirement to effect the interagency cooperation and coordination essential to the success of the effort.

Considerations pertaining to the ongoing operations of a Comprehensive Criminal Justice Information System are frequently overlooked in the planning process. I want to emphasize that failure to address key operational issues early in the planning process will jeopardize future success. Key areas that must be considered are:

A. Organizational placement and structure of development staff:

1. Should not be attached to operational criminal justice agency;
2. Should be funded by State legislative appropriation;
3. Should have legislative authority to operate; and
4. Should have a governing board represented by all segments of the system.

B. Staff configuration should:

1. Insure that the development staff has the capability to:
   a. Execute and coordinate development;
   b. Analyze and interpret statistical data;
   c. Provide technical assistance to user agencies; and
   d. Provide on-going support for the system.

Experienced systems support is critical to the design and implementation of systems of this complexity. Not only must team members have the technical and state-of-the-art skills in systems design and advanced computer concepts, but certain team members must also have interagency and intra-agency knowledge so that considerations from all aspects are evaluated and designed properly. The lack of technical expertise in the design of such a complex system would probably result in an inefficient and costly system, and one that does not produce the final products dictated by the system's objectives. On the other hand, a lack of expertise in the various criminal justice areas would allow development of systems which, although technically correct and efficient from an electronic data processing point of view, would in all probability not satisfy the actual information needs of criminal justice agencies.

C. Privacy and security:

1. Adequate privacy and security legislation should be passed.
2. Administrative regulations should be developed and enforced.
3. Physical security should be examined and upgraded if necessary.
4. Management control of the system must be maintained.
5. Software and hardware should have built-in safeguards.

D. Funding

1. Insure that users are aware of future funding that the system will require.
2. Develop a funding plan for current and future support of the system. (Necessary regardless of whether Federal funds are used or not.)
3. Obtain commitments on future funding support from appropriate funding sources.

REFERENCES

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CRIME SPECIFIC PLANNING AS THE FRAMEWORK FOR EVALUATION OF COMPUTER SYSTEMS

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During the course of this conference, we have had the opportunity to hear, discuss and understand the problems related to computerized criminal histories, offender based transactional statistics and many related developments and functional subsystems. I would like to continue on the line of the points raised in earlier sessions and suggest that crime specific planning can provide a valuable framework for evaluation of information systems.

One of the dangerous fascinations in the use of technology is the ease with which one can lose sight of goals and begin to develop technology for its own sake. We must *not* begin to develop ideas into systems for the same reasons that people climb mountains – because they are challenging.

It is a demonstratable fact that much of the Safe Streets money has been used to improve system efficiency without our being able to show a corresponding increase in system effectiveness. I would like to suggest that the notion of crime specific planning can keep our focus on the reduction of crime, as the single overriding reason for our systems efforts and as the ultimate criterion against which the effectiveness of our systems must be measured.

To explore this idea with you, I will first encapsulate the process of "crime specific" planning. The basic notion, and perhaps the greatest benefit of this approach, is its starting place with criminal acts. Crime specific planning is an attempt to develop strategies and tactics to overcome known crime problems and rapidly identify emerging ones. Thus, the determination of what crimes are occurring, when and where they are occurring and against whom they are being perpetrated is necessary to establish what the law enforcement response will be.

Because of this initial requirement to determine the type of crime, "crime specific" planning often appears to be "specific crime" planning. In fact, the specific crime is of primary analytic importance only until the offender is identified. Upon identification, there is a gradual change in emphasis that requires the offender to become the focus of crime specific planning. In other words, for criminal justice agencies to identify with certainty who is committing the crime, they must start with the complaint or report of the crime itself. Once the perpetrator of a crime is identified, the system response will be focused on changing the behavior of that individual. The gradual shift in emphasis from the crime as the unit of analysis to the offender as the unit of analysis comes about over the period of time from when the police identify a suspect to when that person is actually convicted in a court of law.

A "crime specific" approach recognizes this transition and attempts to develop strategies and tactics at all points in the system to overcome crime problems. The crux of crime specific planning is in considering the crime, the offender, the victim, the circumstances and determining what changes can be made in the offender, in the law, in the community, and in the criminal justice system response that will reduce the probability that similar additional offenses will occur.

Some rapid examples of the types of activity that might be undertaken by criminal justice agencies following a "crime specific" approach are as follows:

Police would be responsible, as they are presently, for collecting and analyzing crime occurrence information; determining locations, times of occurrence, types of structures or category of victim, kinds of articles taken, availability and use of protective devices by the victim and so on. Compilation and analysis of such basic information about the crime can suggest both strategies and tactics which may be applied.

Police strategies based on such information typically take the following appearances:

First, increase the knowledge of crime occurrence.

Second, reduce the probability of crime occurrence.

Third, increase the risk of apprehension.

Tactics, based on each of the above, can be brainstormed easily. They might take the following forms.

1. Encourage reporting of suspicious events and observed or known crimes.
2. Reallocate patrol strength based on crime incidence.
3. Improve information capture and analysis capability of specific MO's used for crimes such as method of entry, transportation and disposal of stolen items in burglary cases; types

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of victims, locations and method of attack in rapes and robberies; and so on.
4. Analyze arrests to determine specific contributing factors in offenders such as drug use or dependence, member of juvenile gang or organized ring, ease of disposal of stolen goods and so on.
5. Improve training of men in investigative techniques, such as interrogation, evidence collection and preservation and so on.

For the prosecutor:

1. Insure greater flow of information on persons re-arrested while on bail, or parole or probation for earlier offenses.
2. Maintain files permitting easy cross reference for investigative purposes.
3. Make greater use of physical evidence in case preparation.
4. Provide priority calendaring or docketing in serious crime cases.
5. Use more experienced personnel in serious crime cases.
6. Provide greater inservice training to staff.
7. Analyze acquittals and nolle prossed cases to aid police and prosecutorial staff in determining where information was weak, evidence was lacking, testimony unconvincing, etc.

For the courts:

1. Require indepth presentence investigations in all felony and serious misdemeanor cases.
2. Develop rapid retrieval capability for pretrial release concerning status of the accused, e.g. charged in another case, warrant outstanding, previous record, under supervision, escaped, AWOL, etc.
3. Staff at levels that provide time for research into case law.
4. Require prosecution and defense to attend pretrial conference and adhere to court docket.
5. Develop more efficient methods of jury selection and use.
6. Demand greater sentencing alternatives.

For the rehabilitation agencies:

1. Institute case management and special supervision for violent offenders.
2. Increase capability of providing greater court services, e.g. screening, presentence investigation.
3. Provide intensive treatment capability for juvenile and youth offenders.
4. Provide more senteneing alternatives.

Any reasonably qualified person could continue listing potential programs. However, what the most qualified among us would have trouble doing is indicating which programs will bring about the greatest benefit. This is where we must turn to our information systems for support. If we accept the notion that our primary goal is crime reduction, then our information system can be evaluated on criteria that are related to the achievement of crime reduction.

Going to the goal of crime reduction, the next step is to specify the criteria by which the information delivery system will be evaluated. Generally, they may be listed as:

Accuracy
Completeness
Timeliness
Economy
and, because of the special constraints of criminal justice, Security and Privacy

Accuracy and *completeness* interact with each other to a considerable degree but real differences exist between them. To give an example, complaint reports may exist in a department for every actual complaint made, but many of them could be systematically upgraded or downgraded in seriousness so that their accuracy is seriously compromised, although they are complete. Alternatively, complaint reports in another department might be lacking in cases of minor violations, but where reports exist they are accurate. To clarify any problem in distinguishing between the two, completeness is the measure of existing records as a percentage of total records while accuracy is the measure of the correctness of the information that does exist. (I use the term record, but I might as easily talk about data element.)

Timeliness measures whether this information was available in time for a decision to be made based on it.

Economy does not necessarily measure direct dollar cost and should not be interpreted that way. A major reason is that our goal has been specified as crime reduction, not installing a computer. Or, to put it a little differently, if we have established a goal of crime reduction which requires the support of an information system, the question must be what is the most economical information system required to support the goal.

The criterion of economy must take into account such questions as the potential for routinization of data collection versus one-time or a periodic collection; the question of using sample data versus attempting to capture a universe and perhaps most importantly, the manner in which the information is delivered.

To elaborate on that point for a moment, a well-planned program of crime reduction requires a multitude of decisions to be made. In some cases, we know or can judge ahead of time what the effects of a particular decision will be. Decisions at this level might be termed operational; they have known parameters and a low probability of risk. At the next level, greater judgment or prudence must be exercised because the parameters or effects of the decision have not been fully identified or elaborated. We generally term these management decisions. In the most extreme cases, the effects are admittedly unknown and we generally decline any decision and call it "research."

Part of the economy of a system depends on proper identification of decision/risk potential and of insuring the delivery of information in an appropriate manner. For example, if we can specify the

parameters or effects of decisions ahead of time to a point where risk is negligible, then the computer can make the "decision." Where we cannot make this definition to an acceptable level of risk, the information system must deliver what information exists to the lowest ranking person who can make the decision at what we regard as an acceptable level of risk.

For Security and Privacy, I commend to you the SEARCH publication.

The methodologies for examining information systems in the light of the criteria suggested are constantly being refined. What we should be careful to avoid is failure to distinguish between the evaluation of a computer system, for which very detailed specifications and standards exist, and the evaluation of a statewide criminal justice information system, which only recently has become a necessity.

The methodologies of the latter must be developed in far greater detail, but some current work deserves wider publicity.

Accuracy of the very first data to enter the system – the complaint and the police response to it – requires a systematic type of audit. The St. Louis Police have been undertaking such an audit, utilizing personnel from their internal inspection unit in conjunction with knowledgeable auditors from outside of government since the late 1950's. Their program deserves to be copied throughout the country.

Completeness of crime data can be measured in part through victimization studies similar to the one being undertaken by the Census Bureau for LEAA.

The much discussed OBTS will contribute tremendously to our knowledge of data completeness even if, as has been predicted, it doesn't provide us with its full potential of data for several years to come.

Measuring economy of information systems, as well as security and privacy will remain a largely judgmental effort since decision levels in the former case will be organizationally specific and the shifting tides of opinion will be a heavily weighted factor in the privacy area. As an aid in the setting of appropriate levels of performance, the work of the National Advisory Commission or Criminal Justice Standards and Goals should prove invaluable.

While each of these segments will aid in the development of better evaluation of information systems, the key point that cannot be neglected is that the information system is a tool, whether computerized or not, and as such should be judged or evaluated against its usefulness and productivity in the reduction of crime.

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PANEL — ACTION PRIORITIES OF THE FUTURE

O. J. Hawkins, Panel Moderator
Assistant Director
California Department of Justice

It is my pleasure to introduce our final panel.

The plan for the symposium has been indicated by the titles given to the session. We began with the review of recent progress in Project SEARCH and other national efforts. The sessions on the state of the art and major issues were designed to indicate the present status of work in those fields.

Today then we have begun to address the future. The papers given so far have illustrated some of the developing areas of activity in information and statistics in criminal justice. Juvenile justice information systems, improved crime data, and planning and evaluation models, are all receiving wide attention as we move forward.

These are not the only indicators of the future, however. The sessions yesterday provided evidence of the substantial work underway in courts and corrections as well as total criminal justice information systems.

The purpose of our final panel then, is to explore the next set of priorities from the perspective of the various parts of the criminal justice system. Our distinguished speakers represent police, courts, corrections, as well as planning for the entire criminal justice system. We have asked each speaker to outline briefly what he believes to be the highest priorities for the future in his field. Now to add a little emphasis on the short term, we have suggested that priorities should be related to the expending of funds. That is, what should we pay for next as we try to apply information and statistics to making the criminal justice system more productive and successful.

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PANEL – ACTION PRIORITIES OF THE FUTURE

PANELISTS

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ACTION PRIORITIES OF THE FUTURE

Thomas F. McBride, Staff Director
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The last time I attended a meeting in this city was a few months back at a meeting of chiefs of police, and I recall we were about half way through the main course of the dinner when one of the chiefs came in and apologized for his lateness by explaining that they had had a jail break, and seven dangerous felons were wandering around creating a crime wave in the city from which he came. Another chief, from a city noted for its innovative criminal justice programs, said, "Oh, we have that, too. We call it work release."

I think, perhaps, that shows that we sometimes have to get behind the labels of whatever we are doing in our tinkering around with changes in the criminal justice system and really look at the true effects of what is being done. In a word, we need to *evaluate*. Like the Ancient Mariner telling his oft-told tale, I have been preaching the need for evaluation for several years now. I got turned on to this topic when I served as a Peace Corps Director in Latin America and I looked at the programs and projects and questioned whether the Peace Corps was having much impact. It was suggested that some hard, quantifiable evaluation might be called for in place of the impressionistic and often sentimental accounts that then passed for evaluation. That idea caused anguish in the Peace Corps. People went up and down corridors saying, "But you can't measure love." Well, I was of the view that you probably could and I am still of that view.

So, I finally had my chance to try it. The Police Foundation was set up, with a generous grant from the Ford Foundation and a board of directors who shared this commitment to evaluation and were willing to put the money behind that commitment. So we find that a large part of our program money is invested in *evaluating* some traditional police practices – preventive patrol or field interrogation, for example – and experimenting and evaluating new police practices – team policing, for example. In the criminal justice agencies, police or any other, the more the leadership of those agencies subscribe to an absolute commitment to objective evaluation, the more we can free ourselves from the dead-hand of some traditional practices and the more we can avoid adopting innovative practices that will become the ineffective traditional practices of the future.

There is a lack of clarity as to just what evaluation means. I don't consider myself expert enough to attempt an all-purpose definition but do have some observations based on the Police Foundation's experience to date in evaluating policing operations. There is no one methodology or design that can be applied to measuring the effectiveness of innovations or experiments. There is no "template" that can be laid on to a project. Evaluation requires adaptability. First off, real objectives and measures must be defined, and rarely are. Somebody, hopefully the head of the agency, must sit down at the very beginning and say, "Well, what do we want this thing to do? If we want to buy a helicopter, why are we buying it? If we want to institute a store front center program, what do we expect to be the outputs? And when will we know? How will we know? And by what measures will we know whether it's a success or failure and to what degree?" That kind of hard work is almost never done. One can talk to police administrators about a particular practice, field interrogation, for example. Commonly they will say, "That is, in my judgment, the greatest preventer of burglary there is." When asked, "Where is your data?" "Well, we don't have it but everybody knows that field interrogation prevents crime. Every cop knows that." To use a more significant illustration consider the whole idea of "more cops" as the answer to better crime control. Ninety-nine percent of both the profession and the population seem convinced that "more cops" is going to reduce crime but I have yet to see any evaluative data that is very convincing on that score.

A failing of many reports and studies in the police field, which purport to be evaluations, is the lack of threshold objectivity. So many of these "evaluations" that have been conducted, printed and disseminated about various police innovations have been evaluations conducted by *proponents* of the change. They are not evaluations. They are *promotions* of particular innovations in too many cases. As one police chief remarked to me, "They only tell you the good parts."

But evaluation implies something more than simply the objective measurement of an activity in terms of meeting stated objectives. Evaluation implies a posture, a willingness for self-examination, of both what you are doing and what your agency is doing. It means a sort of pervasive questioning climate. Why are we doing what we are

doing? If we try something new, let's try it so it is *genuinely experimental* and we can measure whether it is working better or not.

Well, we have tried to translate this commitment to evaluation into some practical activities of the Police Foundation. In one city, for example, we are taking preventive patrol – that vast allocation of manpower and activity that consumes so much police time and so much police budget, and is one of the most respected and honored traditions of policing – the idea of random patrol. The idea is that you catch more thieves that way, that you scare them because they don't know where you are going to be, so they don't commit crimes, and that preventive patrol makes the citizen feel more secure. We are testing this practice by working with police departments which are designing controlled experiments that, for the first time, will provide police administrators with some hard data about the effectiveness of preventive patrol.

We are trying to develop a good evaluation model of field interrogation. I was in a major city police agency recently that conducts some 240,000 field interrogations a year. Obviously it takes a lot of manpower. Obviously it could have potentially great impact on crime prevention and apprehension. Obviously it could have great impact on levels of citizens' security and levels of citizens' satisfaction or dissatisfaction with the police. These are the kinds of fundamental operational practices that need to be tested and based on the results of those tests, modified, abandoned or improved.

In Cincinnati evaluations are being conducted by the Police Division, The Urban Institute and the Police Foundation (at a cost of several hundred thousand dollars) regarding the effectiveness of "team policing." Does neighborhood-based policing with different operational modes, emphasis on non-arrest alternatives, use of community service officers in integrated functions with the sworn officers, make a difference in volume of crime? Do these things make a difference in levels of citizens' satisfaction? And, obviously, given the prevailing unrealiability of reported crime figures, the evaluations must go behind the usual crime reporting mechanisms and do victimization surveys.

In the District of Columbia the police department is testing the effectiveness of women as police officers. Many police departments have either been sued or face the possibility of law suits alleging that their selection and promotion practices are discriminatory, not only on the basis of race but on the basis of sex. The Metropolitan D.C. police department has had the courage to take 100 policewomen and put them on general patrol, riding with male officers, handling all calls. That experiment is being evaluated very closely with observers taking a look at field performance, with attitude surveys of male officers, the female officers, citizens, families and spouses of the officers, and we hope to have enough data so that the chief of police can make a decision sometime next year as to whether the Civil Service lists should be merged or whether there are substantial proven differences in field performance of male and female officers.

This is a symposium about information systems and the group in this room represents a national fraternity which controls one of the essential ingredients of evaluation. You control the *data*. And in all these evaluation efforts that the Police Foundation, LEAA and local agencies have undertaken, one immediately runs head-on into the absence of some kinds of key data. Things are in much better shape now than they have been in the past. More data is more readily available. Data which can be manipulated in more ways is coming out, but there are still some very large data gaps.

We tried to look recently at what the cops do in that big category called "disturbance," or "other" or "disputes." Different departments have different labels for it and it always constitutes a substantial proportion of the police work load. But there is virtually no data. You can't find out how many of those are husband-wife fights, how many of those are father-son fights, how many of those are quarrels between neighbors, how many are barking dogs, and how many are mental cases. They are just all lumped there together. Not only can you not break them up that way but you can't figure out what the cops do. If you say, "How do you handle a particular type of behavior, a rowdy gang of kids?", you are going to have to go to street officers and get seven different answers as to how that situation is handled. And yet it's as important a part of policing as the traditional law enforcement or crime control aspects. It is the part that brings them in contact with more citizens and in potentially helpful or potentially abrasive contexts, and we simply have no idea what goes on. And I think police management has traditionally sort of not focused on how these calls were being dealt with. Progressive police leadership today is saying, "We must get a handle on this."

I had a chief of a major city say to me recently, "I need a management information system that feeds back to me what is happening on the street. I need to know whether there is harassment. I need

to know whether there is adherence to due process. I need to know whether there is fictitious report writing. And I need to know this, not in a sense of punishing officers and disciplining officers, I need to know this in the sense of having what a management information system is supposed to provide, the data for management decisions, so that I can shape my training programs, my selection programs, my assignment practices, etc., to improve street performance." And it is a plaintive note that here the guy sits at the head of a police agency, a very able police administrator, and he can't find out what's happening on the street. That's a big data hole.

Another data hole we have run into is one that is well known to all of you and that is, the adequacy of the present crime reporting systems. The District of Columbia has recently been a much-publicized example of this problem. Ernst & Ernst came in and conducted an audit of a three year period of D.C.'s crime statistics and found, according to newspaper accounts, that in one year there were 67,000 offenses reported by the department but there were actually 84,000 that should have been reported. And this is in a department that has made a really serious effort to ensure the integrity of its crime statistics. The audit, however, did find that the rate of decrease over the three year period was about the same as the department had reported. Other newspaper reporters and statistical experts have kind of taken a look at the D.C. situation and have come out with very conflicting views on the accuracy of the figures. One cannot help but feel sorry for the chief of police who bears the burden of an inadequate national crime reporting system. We just can't be sure anywhere in the United States under the existing system whether crime is up or down and certainly we can't be sure why, and that's where evaluation comes in. With LEAA's emphasis on crime specific projects, with the High Impact Program, with a lot of increasing money going into saturation patrol efforts, street lighting efforts, etc., it makes evaluation and the assembling of new data bases essential. Millions will be spent on street lights alone, and somebody better be finding out pretty soon what difference that makes. I should note that LEAA has taken the commendable step of funding major victimization surveys and other evaluative efforts which will begin to help fill this data gap.

The final big hole in data is the citizens' viewpoint. Very rarely do we go out and ask the guy who got arrested, or the wife who called the cops to break up the family fight, or the kid who was picked up for violating curfew, or just John Q. Citizen, whose only contact with the police is to see him at the downtown intersection, what he thinks about the police, what his experience has been, and to try to get some feed-back to improve police performance. And I think that that should be almost a standard part of any criminal justice agency operation – and yet it is rarely done.

I know Donald Pomerleau, the Police Commissioner in Baltimore, did some citizen surveys and found them very helpful. I know Mike Canlis, the Sheriff in San Joaquin County, conducts surveys of citizen attitudes on a sampling basis fairly routinely. But those tend to be the exception rather than the rule. In our evaluation activities we have had to spend a great deal of money on citizen survey work. Some of the LEAA's sponsored victimization survey work, which also has some citizen attitude questions in it, will begin to provide some needed insights. But I think it is an unavoidable and primary responsibility of the police agency or the criminal justice agency head to make sure that citizen feedback is regularly obtained.

Many times the question is asked, "Well, what if the evaluation says a particular activity or project 'works' or 'doesn't work'," and one must answer that evaluations don't make your decisions for you. Almost nothing is that clear. If it is that clear you can kind of evaluate it with your eyeballs – and your intuitions – you don't need all this data. What evaluation does provide is much greater analytical insights into what is working and what is not working and by what measures and toward what goals things are working and not working, and improves immensely the quality of decision making as a result. For example: the so-called "24-hour car" plan was subjected to an objective and high-quality evaluation. The police depaftment's primary program goal was crime reduction. The evaluation suggests that the 24-hour car plan did not have great impact on crime, except perhaps on auto theft, but one of the spin-off benefits uncovered by the evaluation was that the program had strong effects on improving officer morale. Other cities which have considered adopting the program have been able to assess objectives not set forth in the original goals but objectives which are, nevertheless, valid. Evaluation contributes to this kind of flushing out what you are doing as matched with what you are trying to do. Many police agencies have bought helicopters, again presumably as a crime control device, but I suspect that if you got at the true objectives and impact of these agencies you would find that improved

public relations, giving the citizens a greater sense of security, the pride and morale in the department itself in being innovative and progressive, are objectives – and legitimate objectives – which are equally as important as crime control.

I will just add one final word about money. The Police Foundation, with its limited resources, has committed, thus far, substantially more than $1,000,000 to evaluation. That may give some idea of the magnitude of expenditure required by a commitment to evaluation. It is not cheap. But, on the other hand, if we take something like preventive patrol and look at the resources presently allocated to it then one can say the evaluation is indeed cheap. So I simply bring my Ancient Mariner's tale to you and say, "Please, please, make sure that changes in present operations in the agencies in which you are working or with which you are dealing are subjected to this kind of searching inquiry, that you are alert to the need to develop new data elements that can serve these purposes, and that we may finally begin to have an atmosphere in the criminal justice system in which rationality rather than tradition prevails."

ACTION PRIORITIES OF THE FUTURE

Dr. Don M. Gottfredson, Director
National Council on Crime and Delinquency
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Davis, California

I was asked to focus on information systems in the area of Corrections, which I would take to refer, at least, to jails, probation, prisons, and parole. I would like to raise three questions with you and to attempt to give my answers to those three questions. I am not too confident of the adequacy of my answers but I trust they are the right three questions and will serve for later discussion.

The three questions are:

Where are we?
Where do we want to be? and
How do we know that we are getting there?

These are simple questions, but the answers may be quite complex.

Before talking about "Where are We?" I'd like to reveal some of my own bias with respect to the topic of information systems. Also, I must admit my trepidation in talking about them with a group of experts on the topic, since I am not one. Giving some definitions will show my bias and at least set the focus for my remarks.

The words, "information" and "systems," are used with a variety of different meanings. The experts don't always agree on them. So I'd like to mean by "information" that which reduces uncertainty with respect to decisions, and by the word "system" I'd like to mean simply a set of procedures to provide information to decision makers in a reliable, timely fashion. By "reliable" I would simply mean that independent observers agree in providing the same data from the same observations. By "timely" I mean that the information is provided in advance of the decision.

It would be useful to look at what is meant by "decision." I would like to use that term to refer to a choice among alternative strategies on the basis of information (as defined previously) with respect to some goal or goals. If you look at a decision this way it seems clear that any decision has three aspects. A decision does have a goal or set of goals. There are alternatives. There is, presumably, some information that is relevant to the achievement of the goals by the choice among the alternatives.

In Corrections we talk about making large expenditures for information. But we certainly do not have a large expenditure for information as just defined. We have a lot of data collection in Corrections, but we have very little investment (in energy or resources) in trying to relate the data collected to the goals that we wish to achieve. We invest little in alternative strategies. As a result, we have very little information.

Decisions generally are of two types. There are program decisions and there are individual decisions. Our first speaker this morning, I think, conveyed that he is interested in developing a dual purpose information system to serve both program decision needs and individual decision needs. Program decision questions in Corrections could refer, for example, to whether there is a need to build new institutions, whether there is a need to augment or curtail the use of work-release type programs, or half-way house programs, or whether there is a need to increase or decrease resources going into vocational training programs in institutions. Each case involves a general program and a class of people, or a group of people. But what really gives the word "system" meaning, in the larger sense of the term, as so many speakers have indicated in the last two days, is that decisions also are made about individuals. Many of these, in Corrections, are placement decisions such as the decision whether to place the individual on probation or not; whether he goes to jail or not; if he does go to probation, whether he goes to an intensive case load or some specialized case load, or to a minimal supervision case load and so on. Many examples of individual placement decisions could, of course, be given.

Now, within this framework we may ask, "Where are we?" The short form answer has to be that we have bits and pieces and we have good starts and useful models – but that is all. For example: We now know how many jails there are in the country. If it boggled George Hall's mind, as he said this morning, to realize that police departments do not have data on arrests by census tracts, I wonder what he thought when he came to LEAA and found that no one could tell him how many jails there were in the United States! Through his efforts, those of his staff, and of the United States Census Bureau there is now a Directory of Jails. This certainly is a start, and also there are places in the United States where people have developed beginnings of information systems for jails.

There is no national data collection program for the area of probation. There are, of course, useful starts – such as the program of the California Bureau of Criminal Statistics. There is also a start, in the LEAA funded "Bay Area Counties Probation Research Program," conducted by the Research Center of the National Council on Crime and Delinquency and Public Systems, Inc.

For data on prisons, nationally, there is no adequate resource. Among the states where there is a statistical department, different definitions are used, and different data elements. As with probation, there is a lack of uniform reporting to enable an interfacing of these programs. We have had in this country for many years a National Prisoners' Statistics Program providing what data there is concerning prisoners. It has always been inadequately funded; it always apparently has had a low priority. There are many problems within that system. It was discouraging to read the National Institute's priority list and find that it was not included as having, in that planning document, any priority for the future. There is a very great need for furthering the development of that program, and also for achieving an interfacing across the different prison systems of this country. It is encouraging, on the other hand, to know that there is concern about that in the Statistics Division of the National Institute, and that they are planning toward improving the NPS program.

We have a uniform parole reports program now which includes collaboration of all the paroling authorities of the United States. The contribution of data has been developed over the last seven years by the Research Center of NCCD through collaboration with paroling authorities. The system, supported for six years by NIMH and this year by LEAA, contains data collected uniformly across jurisdictions. There is some evidence that the data is reasonably reliable. The system includes some opportunity to follow up people while they are under parole supervision, to determine outcomes.

We have no facility in this country to provide the resource for following people uniformly across the United States either after completion of parole or upon discharge from institutions.

We have very little information concerning juvenile detention, juvenile probation, or youth institutions in the United States. Thus, little is being done in these areas although again it may be said that useful models are developing in some jurisdictions which can be helpful to others in developing juvenile information.

We have now the Project SEARCH model for a Statewide Criminal Justice Statistical System based on an Offender-Based Transaction Model. This surely is a model needed if the system is ever to serve needs for both program decisions and individual decisions; but that system can only be described now as an extremely bare-bones model. I am sure it is regarded that way by its authors and by the Statistics Committee that guided that work. It is extremely bare-bones, especially, in Corrections. As an illustration of this there is no code within the field for people leaving prison to indicate parole as the method of release. I would ask, at least, for a code, if not an entire field; and certainly you can get into a considerable complexity of data that you would want to have if you were to attempt seriously following up people on parole to determine their outcomes.[1] Although I describe the SEARCH model as "bare-bones," it is, of course, an extremely useful beginning.

Let me ask then, "Where do we want to be?" I would hope that the answer is implied by my definitions of information and systems and that brief discussion of decisions. The question could be discussed in terms of the two categories of decisions. For program decisions the need is for a greatly expanded transaction-based tracking system, expanded in terms of data elements with respect to each transaction which will permit the examination of system rates. The need additionally is to permit a search for determinants of changes in those system rates. This should be pursued so that we can look at those system rates and their determinants at each decision point that seems of special pertinence throughout this continuum and with respect to measurements of each of the objectives that might be defined. Then, for individual decisions, we need the same kind of thing. The major problem confronting Corrections and decision makers in Corrections (and I suspect this is likewise true of law enforcement and the courts) is the lack of information for rationally answering the general question of what kind of placement, treatment or control measure works best with respect to specified kinds of objectives with demonstrably different kinds of offenders. That's very quickly said but rapidly can differentiate into a very complex set of issues.

There is a myth current in the field of Corrections that we now know that nothing works. Actually the situation has not been adequately studied, because we have never had the resource that readily can be envisioned from a greatly expanded offender-based transaction system.

Now, the third question was, "How do we know that we are getting there?" and I don't know that we do know that. Generally, there are two great needs with respect to Corrections and the future of informational systems. The first is the need for an overall plan to coordinate and integrate the progress that has been made and is now being made in order to expand the transaction-based system to include information development for decision making. As an example, consider taking the SEARCH model, the National Prisoner Statistics, the Uniform Parole Reports model, and the various probation statistics programs and seriously look at the problem of interfacing these, one within another, eventually to provide the larger, more complete system that can be envisioned. The second general need is for expanding that model, certainly to include youth, and then to expand it to include misdemeanants. A good case might be made that we have begun with adults and with felons, because that's easier. It probably is. But it might be even more important to develop that system for youth; and it might be a very important thing to develop for misdemeanant offenders.

In summary, where are we? We have a good start, but nowhere do we have the expanded, complete system that we can envision. We can only dream about information systems that truly provide guidance to decision making, concerning both program decisions and individual placement decisions. That's where we want to be. If we ask how we know we are getting there, we immediately will be confronted with what may seem to be an overwhelming, complex task. If we are ever to approach the system we can envision, it is clear that many of the people who will have to do the work are in this room. That work will be extremely costly, not only in money but in hard work and dedication. Clearly, envisioning the system in this way might seem impractical and not at all feasible.

So I ask you to remember a story of the Emperor of China centuries ago. He was wandering in the woods and came upon a beautiful, sturdy oak tree. He looked at that tree and thought, "I need one of those in the center of the courtyard back at the palace. It will be a beautiful thing. It will provide many benefits to the people. I must have that in my courtyard." So he went back to the palace, called his senior advisors together and told them about this. "I want that tree, that beautiful, big, sturdy oak tree in the center of the courtyard." They looked at one another almost in disbelief and finally one ventured to say, "Your Highness, we understand it would be tremendous to have that; but, you know, it takes hundreds of years to grow a tree like that." And the Emperor said, "Oh, it takes that long? Then we had better plant it right away."

1 This, inadvertently, was an exaggeration. There is a code showing parole as the system entered by the offender.

ACTION PRIORITIES OF THE FUTURE

Peter R. Gray, Deputy Director
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I do not intend to rank-order priorities for SEARCH in the future, but I would like to indicate one area which, I think, could use a good deal more attention on the part of SEARCH and all of its participants. I think this attention could be given without diminishing SEARCH efforts in other areas. As indicated by my introduction, I speak with the bias of a planner, but the need I wish to describe should be of equal concern to those who have responsibility for operating criminal justice agencies.

The best way to introduce my topic is by using as an example the current program in Offender Based Transaction Systems, OBTS, but the point I wish to make goes far beyond this example as I shall try to illustrate.

Many states are counting on deriving the criminal justice statistics that they are going to use for a variety of purposes from the very comprehensive data systems that they are developing for other purposes, particularly the maintenance of accurate criminal histories. The argument for adopting this strategy was explained very clearly by the representative from Florida when the SEARCH statistics project was presented to this Symposium. He pointed out that most of the data elements of interest are the same whether you are discussing computerized criminal histories or offender based transaction systems. It follows, therefore, that it is only economically sensible to derive those statistics from a system that is being developed anyway for the purpose of providing computerized criminal histories.

Mr. Beattie suggested in the same session that there are serious problems with this approach, and that he is very skeptical as to whether it will work. I must admit I share some of his skepticism, but that is not my point today. Assuming this strategy will work, most speakers conceded that it would be quite some time until the kinds of statistics that one desires from an OBTS system will be available. In the meantime, many of us will continue to make decisions concerning criminal justice policy without the benefits of these data. My point is that some of these needs for criminal justice statistics could be met sooner if we were not concentrating entirely on the development of very comprehensive systems. The strategy I am suggesting is fairly obvious, and commonplace (at least outside of criminal justice), and that is the use of sample studies. I suggest that Project SEARCH consider stimulating a good deal more of the sample-study kind of effort, even while it is concentrating the majority of its resources in its longer-term development efforts.

In the last three days, we have heard over and over again all the wonderful things that we could learn, if only we had adequate statistics systems. But we have heard almost nothing about statistics that have been made available, analyses that have been performed with them, or policies which might have come as a result of having better criminal justice statistics.

I have used OBTS as an example since it has been discussed so much at this Symposium. But there are many other examples that would be equally valid. I will cite a couple. In New York City two years ago, we did a sample study of the 1968 arrest population in order to examine the release-on-recognizance (ROR) criteria then in use, and to explore the consequences of alternative criteria. Many professionals in Probation have suggested that they should have a very complete information system which would handle among other things the data that are obtained in the ROR interview. Once they had such a system they would be able to derive the kind of statistics necessary to do the study we did on a sample basis. All of this would be fine, and perhaps it will come to pass some day, but in the meantime it makes sense to go ahead with sample studies that can provide statistically valid information for policy decisions that need not await the development of the ultimate system. The same comments would apply to studies of sentencing practice or even to studies of alternative calendaring systems. In these and numerous other examples, a comprehensive information system might allow the data of interest to be spun-off with relatively little effort. But in many circumstances it does not make sense to wait until the comprehensive system is functioning.

There is another reason for moving ahead with sample studies even while we are developing comprehensive systems, and that is that we could use the experience of trying to use the results of these studies. If I may return to the OBTS example, speaker after speaker in this symposium lauded the

OBTS concept, but almost none of them has yet had the opportunity to utilize OBTS in any of the virtuous ways he has described. In fact, most concede that this will not be possible for some years.

One speaker yesterday, in the session on criminal justice planning, spoke at length of the virtues of OBTS and cited a number of interesting questions that a criminal justice administrator or planner should be able to answer. He went on to allege that these questions would be answerable once an OBTS system is functioning, and could not have been answered before OBTS. He was wrong on both counts. Some of his sample questions could not be answered by an OBTS system as it has been defined in this Symposium. Others of his sample questions were answerable by traditional aggregate statistics that have been available for some time. Of course, some of his sample questions could only be answered by OBTS, as he alleged.

My point is simply that while we talk a lot about the potential benefits of the criminal justice statistics we are trying to develop, we still have relatively little experience in actually using them. We would learn a great deal if some of the people who are in the position of making decisions, creating plans, or running agencies, were confronted fairly soon with the kinds of data and analyses that we look forward to having in the future. They would learn a lot about what they could and could not expect to get from such systems, and surely this experience would have a beneficial impact on the design and implementation of the systems we are now developing.

I recognize that this proposal is a little different from many of the SEARCH projects, but I think there are some similarities. We have had a number of projects in which we have demonstrated the feasibility of this or that. In many cases there was not really any question about whether or not it was feasible. We knew before we started that you could get criminal histories out of a computer, and that you could send them to another computer, but with the SEARCH effort we learned a lot about the problems that go with this exchange, about user needs and policies, and about data capture problems. The first SEARCH statistics project taught us much about the problems of merging data from different criminal justice agencies, and that experience was a useful one. What I am suggesting is that we should also experiment with giving criminal justice statistics, and the ability to do some analyses, to planners and administrators now, while we are still in the developmental stages with all of these projects. I think this would be quite consistent with the overall spirit of SEARCH, and, indeed, would enhance many of the other SEARCH efforts.

Succeeding in that, I would hope that the next time this Symposium is convened there will be some papers in which we will hear about policy changes that have been made and programs that have been started as a result of the analysis of criminal justice statistics.



ACTION PRIORITIES OF THE FUTURE

Colonel John R. Plants
Director
Michigan State Police

What I'm going to discuss with you today, very briefly, is the final report of the Task Force on Information Systems and Statistics of the National Advisory Commission on Criminal Justice Standards and Goals.

Those of you who were here the first day remember that Tom Madden talked to you about the Commission in general, its goals, and how it was organized. I was fortunate enough to be named Chairman of the Task Force on Information Systems and Statistics. It's a field in which I am very interested. I have been in it now for seven years. One of the first things that we did after the Task Force was established was to meet in Washington, like all good Federal Task Forces, and the Commission was broken up into four major task forces, police, courts, corrections, and prevention. I don't like to be called a minor task force, but there were also some eight minor task forces, of which Information Systems and Statistics was one.

We met with our task force in Washington and tried to design a horse by committee which, obviously, began turning out as a camel. As a result, we hired a consultant with a great deal of background in information systems. That was PSI. I am sure you have all heard the story of the consultant, the doctor and the minister who were out fishing and they were catching a lot of fish but the wind kept blowing them offshore. After about an hour, it came to them that they were a mile and a half from shore, so they tried to start the engine and it wouldn't start. It became obvious that one of them was going to have to swim to shore. After some discussion, it was decided that the consultant would swim for shore so he dove overboard and started swimming. He got about 80 yards from the boat when some sharks appeared. The sharks were swimming around him and he was swimming toward shore, and the sharks were circling and he was swimming, and the sharks were circling. Finally, he got out of sight and the two remaining fishermen got the binoculars out. To shorten the story, he made shore and stood up on shore and waved back at the boat. The minister said, "By golly, that's a miracle!" and the doctor said, "No, that's just professional courtesy!" That's being facetious, really. I use consultants quite a bit. PSI did a very good job for us.

The committee has met twice since then to review its work, and what you see now is a final draft. I'm sorry that I'm not a little better prepared, but I did not get this until day before yesterday and it's not annotated, so all these little pieces of paper are my notes which I am trying to skim for you to elicit what I think would be most interesting for this group.

I want you to understand that when I go through some of these standards you ought to have the benefit of the commentary that goes with, and sometimes modifies, them. You are given a kind of synopsis of these standards, but, I think, before you make any real decisions as to whether you think they are good or bad, you ought to read the commentary. Another point is that these are not final. They will be presented to the National Commission at a meeting in San Diego in November, again providing that the Task Force does agree with all of them. I feel we have met enough times that there would not be any major disagreements regarding what is in here. So in November, we propose to offer them to the Commission as the report from the Task Force. But until that time, they are not final and it is our hope that if LEAA accepts the findings of the Commission that this will then become the funding policy for Information Systems and Statistics for LEAA.

The report is broken up into some eleven chapters which include something just under sixty final standards. I think the ones that would interest you the most are the chapters on judicial responsibility, which lay out standards for a state, local, and national interface of systems. The report also breaks down what the state standards would be. Among them it says that each state should establish a criminal justice information system that provides the following services on: line files; computerized criminal history files; interfaces with other state files such as driver and vehicle records; interface with national systems such as NCIC. It goes on in that category.

Local standards – every locality should be served by a local criminal justice information system which, and I think this is important, supports the intra-agency needs of criminal justice agencies. Let me say that when I talk about local, state and national, we are suggesting that this is a maximum decentralization and not necessarily a standard for every state to follow. We are suggesting that if you do set these up that they be the

maximum decentralization that you allow in your states. The local criminal justice contains information concerning every person arrested within that locality from the time of arrest until no further criminal justice transactions can be expected within that locality. In other words, we are saying those kinds of criminal justice activities with which the local governments are still concerned ought to be held at that local level.

Below the local level – I'm giving you a very, very quick run through on some of these. We are suggesting that larger local areas may have need for what we call a component information system or CIS. The component information system should provide the rationale for the internal allocation of personnel and other resources for components of the criminal justice agency in that area. The CIS is designed to support the intra-agency needs in that local area, such as courts, corrections, and police. We are not suggesting that every area needs this. We are saying that in some large metropolitan areas it may be feasible. If it is established then we are suggesting some standards for establishment; there are standards in here that suggest what kinds of files should be kept at the state level and at the local level and in the CIS components.

There are some eight major standards in the police area dealing with crime analysis capability, manpower resource allocation, UCR participation, the quality of crime data geo-coding. There are some additional eight standards in the courts area dealing with decision making, case counting, or suggesting a method of counting cases so that all courts can be counting the same way (so that we are not comparing apples and oranges), research and evaluation in court procedures, case management for prosecutors, transactional data elements. There are nine suggested standards in the corrections area, such as the development of a corrections data base, an inmate statistical data system, and institutional experience data. One of the things that will be of interest, I think, to many people here is the section that deals with the data collection system for the offender base transaction system in each state. I think that it goes, in some cases, into a great deal of detail. I believe the detail is necessary in many cases because states and local areas struggling for standards then will have a design for at least some large parameters that they can hold their systems up next to and decide whether they do or whether they do not fit.

The chapter on the offender base transaction system has such non-controversial items as a separation of computer files, the dedication of computer systems, the availability of criminal justice information, who should or should not get criminal justice information. These are all non-controversial.

One of the major chapters which we have deals with security and privacy, and a great deal of the information in there comes from sources that you have already been discussing here through the seminar, that is, the SEARCH Project and other related documents. I have yet to find more definitive and expository types of reports on privacy and security in this information system area than those SEARCH has done. And let me say that I was in SEARCH from the beginning and there were some great controversies inside the SEARCH Committee as to what that report should be. I differed with Bob Gallati quite a bit on some of the things that were written into that report. Let me say that I was wrong. That privacy and security committee did a tremendous service to all of us in this public information business.

One of the standards I might read for you in this area, because it is somewhat controversial, is one of the principles that the committee follows in developing some other standards, that is, the principle of information holding. Let me read it:

> "The first principle of system integration holds that identical records should not be contained within two separate repositories unless there are strongly overriding considerations of total system efficiency to be gained thereby."

And what that means is that we do not believe in our committee that there should be, for instance, historical criminal histories kept at the local level unless there are some overriding reasons, such as the inability of the state to provide the services.

We get down into suggesting common identifiers, that is, common data elements, in those areas requiring common data elements where a record goes through several components of a criminal justice system, so that a man does not come into the state system or the national system with thirty-five numbers, none of them cross-referenced to the other. We are suggesting that they have, to the extent possible, single sources of data collection so that there are not a dozen separate data collection reports following the subject through the central data-base transaction system. Therefore, when a man leaves the police component he doesn't suddenly acquire a whole new set of identifiers and statistics when he goes into the court component. I think these are things that those of you who have been in this information business for some years will not disagree with.

One of the things that I think will please the planners is that there is a chapter which deals with

evaluation. We agree with a great deal of what was said here as far as evaluation and planning is concerned.

I somewhat agree with Dr. Gray. I worked once in the governor's office dealing with pollution and we had an expert on pollution from Washington who was in the office, and he said, "There are two kinds of people who look at these programs and there is an analogy in the police business." He said, "One type of person looks at a piece of raw sewage floating down the river and he gets out a pencil and he says, 'Now I wonder what that's composed of, and I wonder where it came from, and I wonder how long it will take to break down, and I wonder when it breaks down how long will it take to dissolve, and I wonder when it dissolves what the impact would be on the community.' " He said, "The second type of man will look at it and see that raw piece of sewage and say, 'Get it the hell out of there." So there are two kinds, really, and I think I agree with Dr. Gray in that we have to have both kinds. We have to have in some of these cases the ability to "Get it the hell out of there", but we also have to have evaluation techniques and planning techniques to determine really what we are doing.

One of the things in this particular report is a process for suggestions for standards for monitoring what you are doing before you start a system, monitoring what you do while you are implementing it, and then evaluating its impact on the community or the crime problem after you have this implementation in process. We think that one of the most important things in this report is the evaluation technique.

ACTION PRIORITIES OF THE FUTURE

Ernest H. Short
Chief of Systems and Technology
National Center for State Courts
Washington, D.C.

I received a call a few weeks ago, and was asked to present the courts' perspective as part of this panel presenting "Action Priorities for the Future." In order to permit audience interaction at the conclusion of my comments, I will keep my remarks brief and try to stay within the allotted ten minutes. I'll not tell you anything about the National Center for State Courts since I'm sure you all know what a great operation it is, anyway.

For the last two and a half days I've been listening to sessions in which the speakers talked about information and statistics systems in the criminal justice area. I've almost come to the conclusion that no matter which agency you're connected with, unless you have an innovative, automated, interactive, predictive, crimes specific information system, then you can't be called a criminal justice agency. The future of information and statistics systems in the courts is the implementation of presently designed state-of-the-art information systems and of presently designed state-of-the-art equipment.

I will present four priority items, numbered one through four; but these numbers are for identification purposes and do not signify any ranking of the priorities. For each of these priorities I'll approach a few considerations of the suggestion I'm making.

Priority I. Design, development and implementation of operational management information systems for the courts. In making this suggestion, I do not suggest in any manner that you approach a court system simply to automate existing information systems. In many cases you don't need to automate. I think the approach should be to, first of all, define the specific information needs within that particular court system. These information needs should take into account the requirements of the people within the system, people who use the information in collected form, and the public. The information needs of all users need to be defined and standardized to the greatest extent possible.

There is a tremendous need for programs to define and standardize terminology. Exactly what does everybody mean when he says "statistic?" What is a statistic? Does a statistic in one jurisdiction vary from a statistic in another jurisdiction? If I give a judge in Portland, Oregon, a statistic I got from the Washington, D.C. court system, can he make the same interpretation of that statistic that I intended when I got it from the Washington D.C. system?

Furthermore, I think there is a tremendous need, when developing these court management information systems, to determine the "expected pay-off" of the system and to develop future systems in light of these "expected pay-offs". Some may wish to call this a cost/benefit analysis. I think that once the funding, if ever it does, begins to slow down or maybe even, in the farthest stretches of our imagination, ceases; then there will be a shock in many criminal justice agencies when they realize that these systems really do cost all that money that they have been spending.

Priority II. Based on efficiency and effectiveness, strong consideration should be given to designing future courts' information systems on a regional basis. Again, this approaches the widely accepted concept of what pay-off you expect to receive from a system. This probably puts us right in the middle of the argument between dedicated and shared systems, and points up the lack of definition of exactly what we mean by dedicated and shared. I, personally, see no problem with the sharing of equipment and, to some extent, software between criminal justice agencies. I do, however, see an extreme problem in the sharing of entire data banks across criminal justice agencies. I suggest that anytime regional criminal justice information systems are set up, strong consideration be given to the need for, at least, the appearance of judicial independence. The immediate picture of the criminal justice system, which comes to the mind of the individual on the street when he suddenly finds himself involved in it, is that of a monolithic operation. He thinks the system has a predetermined outcome no matter what he does when he gets involved, and criminal justice information systems or regional justice information systems, whatever you wish to call them, would tend to increase this conception and degenerate the concept of a supposedly independent judiciary. I would suggest you take this point into consideration.

Priority III. Immediate and expanded attention should be given to issues of security, privacy, and individual rights as they relate to criminal justice information systems. I have heard the comment several times this morning that the issues of secur-

ity and privacy have been discussed enough. At the risk of being controversial, I will take the position that they have not. This is not to slight, in any way, previous efforts in this area. I think that previous efforts have been outstanding and moving in the right direction. In the absence of legislative guidelines, I recommend that our courts take the initiative in developing guidelines for criminal justice information systems within their respective states. These guidelines should consider, not only which agencies can collect various types of information about a person, but to whom this information can be distributed and in what form. Given that the information is to be kept anyway, what are acceptable manipulations of that data and what caveats should be distributed with that data whenever it is distributed. I'll leave that issue for further discussion later.

Priority IV. An intensive training program in probabilistic models for members of the judiciary, the bar and some of us, should be initiated. What are probabilistic models? What do they do? How do they do it? What does the result really mean? There is a potentially serious problem in the lack of understanding when we tell a judge that this individual has a .5 probability of not being able to respond to a particular method of rehabilitation. I think that the judge and everyone who is participating in the discussion of an issue should be aware of what the model predicted and what the prediction is based upon. I suggest that the Congress be encouraged to assign the task of conducting a complete assessment of information technology, as applied to the criminal justice area, to its Office of Technical Assessment, when and if it is created. I suggest that in creating any criminal justice information system we begin to look at the whole area from the perspective of how each other agency and the public are affected.

SYMPOSIUM CONCLUDING REMARKS

O. J. Hawkins
Assistant Director
California Department of Justice

This concludes the Project SEARCH International Symposium on Criminal Justice Information and Statistics Systems.

We hope that you have found the symposium program to your satisfaction, and I hope that we have been successful in meeting our intended objectives in conducting the symposium.

As I mentioned in my opening remarks on Tuesday, a major effort by SEARCH is to disseminate ideas, experiences and knowledge that have been gained by your and our activities.

The intent of the symposium, however, goes beyond this by providing an opportunity for many people, with similar criminal justice problems and needs, to meet face-to-face. We are providing a necessary forum to exchange ideas. We have tried, by holding this symposium, to encourage all of you to express your ideas, describe your problems and recommend solutions to each other and to Project SEARCH. We are then better able to focus on these problems and move toward better action.

The symposium is of course for you, and if, when you leave, you can say that your time spent here was worthwhile, then we *have* been successful in our efforts.

I would like, at this time, to give recognition to several individuals and agencies that contributed to the symposium. First and foremost, I thank all of you for attending. I thank all of the speakers and panel members. We appreciate the fact that Congressman Charles Wiggins was able to take time to present the Keynote Address. I thank the session chairmen and panel moderators – Mr. Howard Bjorklund, Colonel John Plants, Mr. Larry Polansky, Dr. Lawrence Bennett, Mr. James Donovan, Mr. Gary McAlvey, Mr. Robert Gallati and Mr. Robert Crew. Appreciation is extended to Mr. Jerris Leonard, Mr. Richard Velde, Mr. George Hall, Mr. Wayne Holtzman and the many other representatives of the law enforcement assistance administration who made it possible to hold the symposium.

Our thanks to the City of New Orleans and to the New Orleans Police Department.

Most important, thanks to all of you who attended and contributed to the spirit of the occasion and to the spirit of criminal justice improvements in our country and in the world.