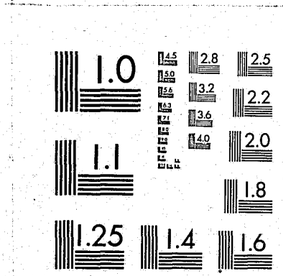

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STUDY OF POLICE MANAGEMENT INFORMATION SYSTEMS

VOLUME II: POLICE MANAGEMENT INFORMATION SYSTEMS DEVELOPMENTS IN THE UNITED STATES: A COMPARATIVE REVIEW

by

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CHAPTER I

INTRODUCTION

In the spring of 1976, Decision Dynamics Corporation was asked by the Ministry of the Solicitor General to conduct a study of police management information systems for Canadian municipal police forces.

The objective of the project is specified as: "develop management information systems specifications that could be used by Canadian police departments to guide future information systems development. Documents developed throught the study would represent source books, handbooks or standards which police forces could use to idendity first, their own information requirements, and second, the general specifications of information systems required to meet these needs".

This volume is the second of five separate reports which together comprise the total documentation arising out of the "Police Management Information Systems" study. They are:

- Volume I: Technological Alternatives and Development Initiatives for Canadian police; in this volume we project current trends in policing for Canadian municipal jurisdictions and their implications on the need for MIS in the future.

- Volume II: Police Management Information Systems Developments in the United States: A Comparative Review; in this report, we review MIS development

in American police jurisdictions and extract a number of basic "lessons" for the Canadian audience.

- Volume III: Police Management Information Systems: The Canadian Experience; here we describe MIS initiatives in a number of Canadian police forces and conclude with comments about the development process in the Canadian environment.

- Volume IV: Targeted Information Processing System (TIPS): A development Program for Police Management Information Systems; this volume contains a conceptual framework for developing a management information system in a Canadian police jurisdiction. The major emphasis in on "why?" and "how?". We view this volume as a "catalogue of procedures" on developing police MIS.

- Volume V: Targeted Information Processing System (TIPS): General Design Specifications; this final volume contains most of the technical design qualities of the TIPS framework presented in the previous Volume, IV. Each TIPS component is described by a general flow chart illustrating inputs, output reports and file interactions. The contents of each file is described in terms of the various record types and data elements.

These five volumes are "stand-alone" in scope. Each can be read without reference to the others. Each contains a perspective on police MIS at a different level of generalization and detail.

In addition to these five major volumes, we have provided a short monograph entitled Police Management Information Systems Study: Summary and Conclusions. This is designed for more extensive distribution to a broader audience which may be interested only in the highlights of the project.

A. The Importance of the United States Experience

Many Canadian police officers have told us that "Canadian and American policing are two entirely different processes". They cite the dramatic differences in the incidence of crime and the texture of urban environments in the two countries. Their assertions have been supported by knowledgeable American police officers. If this is so, why do we devote an entire volume, or one fifth of the police MIS study, to an analysis of the U.S. police management information system situation?

We have a number of reasons for assessing the value of U.S. experience highly, and documenting it in this volume of the police MIS study. They are:

- the historical relationship; historians have often commented on the "lagged" relationship between events that take place in the United States and Canada. Much of Canadian history can, in fact, be described in this fashion. There is no reason to suppose that crime, and other social and political conditions affecting policing in Canada, will not follow U.S. "model" after a suitable interval of time. If so, Canadian police forces should be able to use American

police experience as a "testing ground" for tactics and strategies which may be necessary for use in Canada.

- massive U.S. expenditure on technology; during the past 30 years, the United States has been the technological leader in the world. To some extent, this has resulted from the huge resource commitment to technology in the United States. A great deal of "hardware" has been invented, engineered and implemented. A large portion of this development has arisen from U.S. military R & D budgets. The Canadian economy and, in this case, the police jurisdiction in Canada, does and should make use of this development capacity.

- American productive capacity imposes technical criteria; the United States market for products is more than 10 times the size of the Canadian market. Products produced for American consumption can be purchased by Canadians (not withstanding tariffs) for less than native produced products in Canada. American products, used by Canadians, have American technical standards embodied in them. This is especially true in the police environment, where the Canadian police market for equipment is not large enough to support native Canadian suppliers. For example, the automobile industry produces specially designed automobiles for use as police cruisers. Their specifications are tailored to the American market. Canadian police users have little latitude in requesting unique design specifications. Therefore, Canadian police departments, in equipment procurement, tend to get technical specifications from American standards.

We have argued that there is some "inevitability" to the imposition of U.S. technology on Canadian police users; this is largely based on economics. However, technological similarity should not force Canadian police departments to incorporate technology which both costs a great deal of money and embodies procedures or perhaps a management philosophy which does not make sense in the Canadian perspective. Canadian users of American technology should be able to "pick and choose" between the technological options available and select both hardware and procedures which complement Canadian needs. We need to know how and when to use U.S. technology.

Thus, the value of the U.S. experience to Canadian management information systems development is twofold. On the one hand, U.S. industrial capacity has developed more efficient hardware which has resulted in increased productivity. On the other hand, the American experience in the use of these innovations should help us decide which types of hardware and equipment are suitable for Canadian use.

B. The Objectives of this Volume

This volume of the police MIS study represents a guide to U.S. management information systems technology. We are providing a general, or extensive, state of the

art analysis and do not pretend to provide an intensive analysis of the technology itself. The objective of this volume is to provide a comparative base of understanding of MIS in the United States, to be used by Canadian police forces contemplating similar developments in their own jurisdiction.

CHAPTER II

LESSONS FROM UNITED STATES MANAGEMENT INFORMATION SYSTEMS EXPERIENCES

Our survey of police management information system developments reveal a significant emphasis on MIS technology in the United States. Assuming that Canadian police will go through the same process, what can we learn from the U.S. experience?

First of all, we must develop a greater interest in the technological developments in the United States and the possibility of "technology transfer" from the American experience. In our conversations with Canadian police officers during this study, we were often surprised by the degree of skepticism shown towards American technological initiatives. This attitude can be summed up in one statement made by a senior Canadian police officer: "What good are all of these computers in the United States; the crime rate keeps going up?".

Our own observation about American MIS technology is different. The United States does have a serious crime problem, particularly in its large urban centres; but, we suspect that the incidence of crime, or conversely, the apprehension rate of criminals, would be much more serious without the technological tools developed for American policing over the last decade. Given the volume of crime in large cities, advanced management information systems are necessary, if only to keep track of the volume of occurrences, incidents and arrests.

Our study team has spent a great deal of time observing the U.S. law enforcement environment. We have visited many American police departments and read much of the literature on U.S. policing. We can easily conclude that there is a great deal of potential technology transfer in police management sciences from the United States to Canada. Canadian police officers overlook the American police experience at their own jeopardy; if we do not read this experience carefully, our own attempts to technologically enrich Canadian policing may be seriously impeded.

A. Observations on Police MIS Experiences in the United States

We can draw a number of basic conclusions from our field visits to U.S. police forces and our analysis of the literature on management information systems in the United States. A number of these are simply restatements of comments made about one or more of the five police forces described in Chapter IV or material presented in other chapters of this volume.

Our observations on the U.S. management information systems experience include:

- there is an extensive application of computer technology in U.S. police forces. This is particularly pronounced for police departments serving large jurisdictions. But computer applications also exist in smaller departments. Our analysis of the LEAA Directory indicates that over 160 minicipal police forces of varying size and

geographic location reported the existence of computerized management systems.

- there is a substantial commitment of resources to MIS in American police departments. Between one and two per cent of total annual budgets in the police forces reporting to the LEAA Directory are allocated to the maintenance of MIS. This is significantly more than Canadian police allocations.

- there has been a significant attempt to acquire new skills to satisfy the human resource requirements of MIS. "Civilianization" in the U.S. police departments is taking place at a more rapid rate than in Canadian forces. Also, U.S. police forces are actively involved in upgrading technical skills of police officers. This enhancement of skills takes two forms:

.. external training programs through university, community college and specialized police institute training; and,

.. stable career planning for police officers. This allows for the development and application of particular skills within functional areas such as management information systems. Often, this conflicts with the traditional, somewhat destabilizing rotation between services which occurs in police forces.

- LEAA has played a vital role in developing an environment within which new MIS technology has been developed in municipal police forces and spread over the police sector in the United States.

- there are a variety of systems development strategies feasible for MIS in police forces. There is no single ideal method for implementing police MIS.

- there is a great deal of effort in the United States devoted to building message switching systems to interface with the variety of CPIC-like data bases that exist in local, state and national jurisdictions.

- the more advanced forms of MIS technology, such as Automatic Vehicle Locators, Mobile Digital Terminals, etc., are still in the experimental stage in the United States. Even in Kansas City, where the Mobile Digital Terminals have their longest history, only one third of the patrol vehicles have MDTs installed. There are currently no plans to install them in the remaining patrol vehicles.

- many of the large, successful MIS programs in U.S. police forces were initiated more than ten years ago, and these systems are not yet complete. We can conclude that it takes a great deal of time to install an information system in a police department and that the developement program is never really completed.

Finally, police management information systems are expensive! There is no way to cut corners. If a commitment is made to develop a management information system in a police force, then a commitment must be made to devote significant funds to the exercise.

B. Environmental Differences

There are clearly a large number of environmental differences in police conditions in the United States and Canada. We describe three which we believe have the most profound impact on MIS development criteria in the two jurisdictions. The three differences are:

- violent crime,
- the volume of crime and the need for complex message switching devices to give access to a multitude of data bases on criminal wants and warrants, and
- the existence of LEAA.

In Chapter III we display a set of general statistics which illustrate that the United States is affected by a higher volume of crime per capita and a higher incidence of "serious" or "violent" crime. This situation has made two important contributions to MIS in the United states, i.e.,

- a commitment to technology: the urgency of the U.S. crime situation has directed law enforcement agencies into technological avenues, such as

computers and helicopters;

- an interest in management systems which improve response time on calls for service and the conditions for officer safety; this is a major reason for the development of highly sophisticated computer-aided dispatch, and command and control systems such as those that exist in Dallas and San Diego, and are being planned in Los Angeles.

Canadian police forces should be wary of the U.S. emphasis on CAD and command and control systems. They are expensive. The economies of scale associated with these systems suggest that they either be implemented in large geographic areas or in environments characterized by high crime rates. But most important, these systems involve complex technology which require extensive lead time for the preparation of adequate standards and procedures. A police department which has no experience with MIS cannot easily implement a CAD. In most Canadian police departments there is a more prevalent need for developing components of MIS in the areas of occurrence reporting and crime analysis. The development of a CAD deflects the police department from these more important areas.

The emphasis on message-switching devices in the United States is (to a large extent) derived from the high volume of crime in the United States and the state/federal jurisdictional conflicts which have traditionally affected the administration of justice. High crime volumes increase the need for information data bases on

wants/warrants and criminal histories. It may be physically impossible to have one centralized facility, such as CPIC, acting as the major "utility" and containing all wants/warrants and criminal history information in the U.S.

As a result, many police departments have had to invest a major proportion of their MIS development resources on local wants/warrant systems and message-switching interfaces with regional and national files such as NCIC. San Francisco is an example. This is unnecessary in Canada. CPIC can handle Canadian volumes of information in its own computer facility. The high level of cooperation achieved in Canada in the operation of CPIC insures that this data base will continue as the one, centralized information base of its type in Canada. This is an extremely important facility for MIS development in Canada. Canadian municipal police forces do not have to undergo the expense and agonizing development process involved in building this type of system for themselves.

Finally, LEAA has made a vital contribution to police technological enhancement in general, and police MIS development in particular. There is no parallel in Canada. There is no central agency, endowed with specific law enforcement research appropriations, which has a mandate to "stimulate and promote" technological change in policing. LEAA's major contribution to police MIS development in the United States has been in the following areas:

- establishing a fund of "risk money" to underwrite innovative developments in MIS,

- underwriting a large portion of the development cost of MIS in a large number of municipal police forces,

- establishing an open environment of information exchange which directly and indirectly supports the sharing of technology in U.S. police management systems development, and

- providing an environment of program evaluation for innovative research in police technology which supports objective review of new MIS technology and rational decision on its implementation.

C. The Positive Elements

What positive contributions have been made towards Canadian police MIS development through the development and implementation process in the United States?

The major contribution of the U.S. experience is through the development of advanced "hardware" for management information systems. Without the availability of U.S.-produced computer hardware and other types of MIS "equipment" we doubt that the Canadian police environment could afford to enter into comprehensive MIS developments.

From our brief observations of U.S. management information systems and a number of municipal police departments, we have concluded that the entire range of "state of the art hardware" can be purchased from American sources. Its cost is determined by the economies of scale for producing in a market ten times the size of the Canadian market. There are significant advantages to this situation for Canadians. Police procurement of MIS hardware in the United States is assured of access to a competitive market which is constantly being upgraded by technological advancements. We will review this area again in the following section of this chapter when we consider the question of "Canadian content".

Let us now turn to the more intangible aspects of U.S. management systems development for Canada. In our field survey of American police forces, we observed a large, and rapidly-growing commitment to technology for law enforcement purposes. This commitment is a vital element in the success of American MIS. The sense of optimism which infects senior police officers in police forces which are involved in MIS development programs is a necessary condition to successful implementation. We believe that senior Canadian police officers should meet with their counterparts in the United States to savour this optimism and, at the same time, develop a greater respect for technology and its potential impact on policing. MIS will not work unless senior management is completely convinced that it is vital to the future of the force.

U.S. police departments have made major adjustments

in their human resource philosophies. These are fundamental to the success of MIS. Canadians can learn a great deal from this experience. The two major elements of human resource philosophy which are important to MIS are:

- an adjustment to the civilian/sworn officer ratio; management information systems require expertise that we would not expect to be common among police officers who are highly trained in police science. Systems analysis, computer programming and both hardware and software procurement are technical skills that require a great deal of training and background. U.S. police departments have adjusted to this need by hiring large numbers of civilians and in many instances, successfully integrating them into the administration of the police force.

- an adjustment in police training programs; the major emphasis in Canadian police training programs is on the management of police officers involved in police activities. But, management information systems must be managed so that they can contribute the maximum benefit to police forces. To carry this out, a police MIS must be directed by police officers. To produce a new type of police officer, well versed in both police science and an understanding of technological options, there must be major changes in training programs for Canadian police.

Finally, U.S. police MIS development programs have

been progressing for more than a decade in a variety of different styles and patterns. In the large number of departments which have had some sort of MIS development experience the variety of experiences is very broad. In our own brief review in this volume, we comment on:

- MIS with CAD orientation (Dallas) versus MIS with a field record orientation (Kansas City).

- MIS operating on municipal computers (LAPD) versus MIS operating on a large, general purpose in-house computers (Kansas City) versus MIS operating on a series of in-house mini-computers (Miami).

- MIS which is largely oriented towards providing experimental and evaluation data (Kansas City) versus MIS entirely devoted to providing field management statistics (LAPD).

This, and other U.S. contrasts in the police MIS experience can, and should, provide the major background for development programs in Canada.

D. The Question of Canadian Content

We have been describing U.S. technological innovations in the police MIS. We have suggested that there is much to be learned from the U.S. environment and much technology which is of value to Canadian police. In making this type of comment to Canadian police officers, we have been asked: "What about Canadian content?". The question has

two sides: first, the issue of "how do you build an MIS?", second, the more complex issue of "how much Canadian product should go into a Canadian police MIS?".

The objective of this study is to provide direction for Canadian police involved with MIS development. It answers the "how do you build?" question. It also suggests that each police force, either Canadian or American, should design an MIS structure which satisfies its own development criteria. If Canadian police use elements of U.S. MIS initiatives for their own MIS programs, they must still design and build their own systems. The concept of TIPS suggests that "targeted information procedures" apply uniquely to every Canadian police department. In that sense, Canadian content is satisfied.

Now we look at the other interpretation of Canadian content: How much Canadian product should go into Canadian MIS? This is the political and economic side of"Canadian content".

The issue of "Canadian content" has had an impact on Canadian history since Confederation. The domestic content of goods and services consumed is a major political and economic issue in all countries such as Canada which are essentially under-populated, relative to their primary resource base. In Canada, the "content" issue is primarily raised vis-à-vis materials and goods manufactured in the United States.

The primary aims of "Canadian content" are to

increase the Canadian labour and capital content in manufactured commodities used by Canadians. These are the objectives of national economic policy; they have only a tangential relationship with the actual application of these tools to improve the effectiveness of Canadian policing. How should the police MIS community in Canada cope with this issue?

First, we believe that Canadian manufacturers can never hope to replicate the police MIS "hardware industry" which exists in the United States. There are many reasons for this statement:

- since the American market is approximately ten times the size of the Canadian market, there are obvious economies of scale associated with American manufacture.

- the war in Vietnam has directly promoted the development and manufacture of many components for the police MIS hardware industry. The best examples are military field communications systems involving hand-held voice and digital communications devices. Many of the hardware components used in CAD and AVL technology were first developed for application in Vietnam.

- the U.S. has traditionally maintained the existence of an active military Research and Development industry. Again, like the example of Vietnam, millions of dollars are being spent to develop communications equipment for military uses. Many

components are applicable to police MIS.

The conditions for the development and manufacture of police MIS hardware in Canada are essentially different from the United States. If we wish to take advantage of American technology, much of which is being developed for military purposes, then we must purchase a major portion of the equipment in the United States. Some Canadian content can be achieved through licensing and manufacture in Canada through American subsidiaries. Although this would ensure Canadian employment content, it would certainly not satisfy or stimulate a major Canadian police MIS hardware industry.

However, the existence of an advanced hardware industry in the United States should not lock Canadian police MIS development into U.S. development patterns. We can buy terminals from the United States without buying the entire U.S. concept of policing which is embodied in these terminals, E.G., CAD, AVL and mobile digital terminals.

Let us suppose that we can separate the police MIS industry into two components, i.e.,

- a design component; this would include all aspects of police MIS design beginning with police management scientists who are capable of articulating police information needs, and extending through to computer systems analysts who can both advise on hardware procurement and develop the required software.

- a hardware component; this includes the manufacturing super-structure capable of designing and manufacturing all hardware devices (e.g., computers, communications, etc.) required for police MIS.

If this separation is practical, then we would advocate a maximum "Canadian content" for Canadian police management information systems in the design component. The hardware industry exists in the United States. We cannot replicate its R and D facilities nor can we achieve its economies of scale for efficient production. It is capable of producing the entire range of equipment required for police MIS. We should be able to arrange the police MIS sector so that appropriate decisions can be made by Canadians on the adaptation of American hardware. This would ensure that Canadians are using the most cost-effective equipment in applications that best suit Canadian needs.

There is one significant prerequisite for Canadian police to develop the required "Canadian design content". Police MIS design is highly complex. There are a variety of models and systems being implemented throughout the United States and Canada. Their complexity, and the current state of the art, means that there is not yet a national vehicle for testing and establishing MIS standards. Yet, such a vehicle is an important prerequisite to the application of MIS. The existence of this report is one step towards the development of such a vehicle.

There is currently no cohesive and coherent mechanism in Canada for sharing information on police management information systems. LEAA in the United States has provided such a mechanism. LEAA's contribution in this regard includes:

- a great deal of documentation and publication of information on MIS, and
- risk financing for large scale development projects which can act as "development stimulants" for police MIS.

Even though there is no LEAA in Canada, we have a number of national agencies such as the RCMP and the National Research Council, as well as a number of innovative police departments that are investing resources in police MIS. A major effort is required to disseminate the results of these development programs.

Before "Canadian design content" can have a major impact on the development of Canadian management information systems for police, we must learn to talk with each other, compare ideas and document successful results. This is a crucial condition for Canadian police departments entering the next stage of active management information systems development. We will describe this condition, and its related implications for Canadian police departments in Volume III of this report.

CHAPTER III
A BRIEF PERSPECTIVE ON POLICING IN THE UNITED STATES

This chapter examines some basic issues in U.S. policing. It is not intended to provide a rigourous statistical analysis of policing in the United States. Indeed, we are only interested in displaying a few aggregate statistics to support a number of simple claims about the difference between Canadian and American policing.

We will conclude that some of the elements of policing in the United States are fundamentally different; they arise from basically different conditions of crime. These conditions suggest a need for management information systems in the United States which satisfy subtly different needs. Although the aims and objectives of law enforcement in the United States are basically the same, the tactical and strategic "preoccupations" in American police departments are different from those in Canada.

These facts should affect the way we look at American management information systems and their potential application in Canadian municipal jurisdictions.

A. The Incidence of Crime

American crime problems are world renowned. They have been described, condemned and lamented by literally thousands of interpreters. We do not repeat the chronicle in this report.

We are interested in comparing the most outstanding features of crime in the United States and Canada.

However, different standards for reporting and categorizing crime statistics in Canada and the U.S. make it difficult to make exhaustive, reliable comparisons.

Consequently, we have selected only four "serious crime" categories: murder, rape, assault and robbery. Differences in reported categories of murder or assault, for example, were overcome by including all murders or assaults. Data was collected from three large American and Canadian cities visited by the writers, for which data was available. Table III-1 displays the incidence of these serious crimes in these six jurisdictions.

The data show that serious crimes are much more prevalent in U.S. urban jurisdictions. The differences are particularly apparent for murder. In 1975, stated on a per 100,000 population basis, the murder rate was 197 for Los Angeles, 250, for Dallas and 331 for San Francisco. This is compared with 45 for Toronto, 75 for Edmonton and 99 for Winnipeg.

The same distinctions, but at different orders of magnitude, exist for the crimes of rape, assault and robbery. Only in the case of assault is any Canadian jurisdiction at all similar to any American jurisdiction. Our data show that Metropolitan Toronto had 3,877 assaults per 100,000 population compared to 3,630 per 100,000 population in Dallas, Texas. However, the category of "assaults" in crime reporting is subject to the most variation in reporting procedures. We suspect that the reality of the "assault" situation between Metropolitan Toronto and Dallas would show that the actual incidence of assaults in Dallas is much higher than in Metropolitan Toronto.

Peculiarities in crime reporting in the United States may well <u>understate</u> the difference between the incidence of violent crime in the United States and Canada. For example, Table III-2 shows information taken from U.S. crime victimization studies which describe the degree to which selected types of crimes are being "reported to police" in the United States. The data suggests that 55 per cent of all assaults are not reported to police. Although similar types of analysis have not yet been carried out in Canada, we would be surprised if the proportion of unreported crime in

Canada was as high as the American performance.

The varying degree of violent crime between Canada and the United States has one malign corollary to police officers; it is more dangerous to be a police officer in the United States. This is confirmed by the following research:

- in 1965, four out of every 10 U.S. police officers received some form of personal injury from an assault. Between 1960 and 1965, 278 U.S. police officers were murdered while performing their duty. (J.S. Creamer, "Assaults on Police", in Samuel Chapman, ed., Police Patrol Readings, Springdale, Ill. 1970).

- between 1961 and 1970, there were 37 Canadian police officers murdered (C.H. Jayewardene, "The Death Penalty and the Safety of Canadian Policemen", Canadian Journal of Criminology and Corrections, Volume 15, 1973).

The incidence of violent assaults against police officers is much higher in the United States than in Canada. This is a reflection of the difference in the nature of crime in the two countries; the volume of violent crime, in term of both absolute numbers and as a ratio of population, is much higher in the United States than in Canada. This has two implications for management information systems design, i.e.,

- as the proportion of police time devoted to "serious crime" is so high, then crime-oriented information (e.g., field statistics, occurrence reports, arrest reports, etc.) is more important to American police.

- the incidence of violent crime defines the safety environment for American police officers. Hence, the United States information system design has stressed field safety.

U.S. management information system development has clearly been affected by both "the critical need for field information" and "officer safety considerations". This has led to an emphasis in MIS technology on the areas of computer aided dispatch, mobile digital terminals and automatic vehicle location devices. Officer safety has

provided a greater impetus to MIS development in the U.S. than appears to be the case in Canada.

B. A Comment on the Economics of Policing in the United States

Table III-3 provides some comparative statistics on police services and associated economic factors in Los Angeles, Dallas, Kansas City, San Francisco, Edmonton and Metropolitan Toronto. This data suggests that there are some significant parallels between the economic conditions affecting policing in large urban centres in both Canada and the United States.

The top half of the table describes some "basic data" about the conditions of policing in these six urban centres. The bottom half of the table contains a set of "ratios" which provide a better basis for comparing the demographic and economic conditions of policing in these six jurisdictions.

Our narrative focusses on the ratios. First we look at cost of police services per capita. The data varies between $36 and $102 in the four American centres, Edmonton and Toronto on the other hand had costs per capita of $48 and $55. With the exception of San Francisco, whose costs seem entirely out of line with the American norm, the U.S. and Canadian per capita cost figures do not vary significantly.

Next, we turn to "population served per police personnel". Again, in this instance, the Canadian and

American statistics do not vary drastically.

There is a major difference between Canadian and American jurisdictions in terms of the ratio of sworn to civilian personnel. Los Angeles has two times as many civilian employees, at a ratio of 2.2:1, as Edmonton, at a ratio of 4.5:1. U.S. police departments have made a major commitment to civilianization.

The statistics on calls-for-service per sworn officer provides some insight into the "intensity of patrol resources utilized" for police services in the six jurisdictions. Statistics vary significantly, and much of this variation can probably be explained by reporting characteristics. However, Metropolitan Toronto with 424 calls-for-service per sworn officer, closely approximates the experiences of Los Angeles and Dallas, with 415 and 428 calls respectively.

The statistic of cost per call-for-service gives us another insight into resource utilization in police departments. Again, Metropolitan Toronto has a ratio which is not dissimilar to large U.S. jurisdictions.

Finally, we calculated the "cost per arrest" in the six jurisdictions. Again, San Francisco seems out of proportion with the other examples. However, both Edmonton and Metropolitan Toronto exhibit cost profiles which are significantly higher than Los Angeles, Dallas and Kansas City.

Some of the variation in the economic data can be explained by differences in the incidence of crime in the United States and Canada. The higher the incidence of crime, the more intensively are patrol resources being utilized. Also, some of the statistics vary between Canada and the United States because of fundamental differences in police philosophy. Canadian police, who must cope with less serious crime, play a more predominant social role as part of their "order maintenance" function. They provide a wide range of services such as: assisting stranded motorists, adjucating in minor domestic disputes, and simply assisting citizens who need direction. These services have costs associated with them, which are not represented in crime-oriented service ratios.

However, this data provides some interesting general insights which distinguish between Canadian and U.S. policing and comment on the need for MIS. First, we have confirmed the "crime fighting" nature of American policing, at least relative to the Canadian pattern of police services. Second, we have shown that the resources committed to policing in Canada on a per capita basis in selected urban jurisdictions are in the same order as that of the United States. Although policing may have a different flavour in the United States, we are devoting similar and significant public resources to police purposes. Finally, given the relative complexity of crime and non-crime police purposes in Canada, there is a strong case in favour of management information systems which assist police management with resource allocation and other administrative functions.

CHAPTER IV

STATE OF THE ART MIS DEVELOPMENTS

In this chapter, we provide a detailed description of selected management information systems programs in U.S. police departments. The material in this chapter focusses on five specific police departments. Our major intention is to carry out an "intensive" review of a selected number of MIS installations. The study team has visited each of the jurisdictions described in this chapter. We were most interested in documenting the "implementation experiences" in these five departments. Since policing in the United States has had at least a 10-year start on Canadian MIS development, the American "experience" provides a laboratory for anticipating problems which could occur in Canada. Throughout our interviews in the United States, we were constantly reminded that American experiences should be interpreted for Canadians with care.

We describe five police departments. They are in the following U.S. cities:

- Kansas City, Missouri
- Los Angeles, California
- Dallas, Texas
- Miami, Florida
- San Diego, California

From our reading of the literature on MIS in the United States and preliminary conversations that we had with police MIS experts in both countries, we were able to anticipate some of the information we would collect in these five police

departments. Our selection was based on an interest in describing the widest range of MIS experience for the Canadian audience. Selection of U.S. police departments was based on the following criteria:

- Geographic Representation; there is a significant difference in the style of law enforcement and crime conditions among the various regions of the United States.

- Size; there are different law enforcement problems affecting jurisdictions of different size. We selected departments ranging in size from the very large, such as Los Angeles with over 4,000 sworn officers, to medium size such as Dallas, Texas and Miami, Florida.

- Success; we were not only interested in looking at police departments with management information systems which were nationally acclaimed, but also in sampling departments that had significant problems with their management information system.

- Age of MIS Development; police departments which began MIS development 10 years ago have a fundamentally different view on their systems than do departments which have only recently begun the process. Accordingly, we selected departments demonstrating different levels of maturity in systems development.

- Major Commitment; it was important to visit American police departments that had committed substantial resources to the implementation of a major or comprehensive MIS. In that respect, we were interested in

U.S. police departments that represented "the state of the art" in MIS.

Our U.S. field visits consumed approximately 25 man-days of time. These resources were devoted to U.S. field visits because we felt that there was much in the American experience which will be of practical use to future Canadian MIS development.

In our descriptions of MIS in these five U.S. police departments, we have attempted to avoid anecdotal descriptions and have adopted a consistent format for the descriptions of these jurisdictions to enable the reader to make comparisons between the jurisdictions. Each jurisdiction is described in a separate section of this chapter. Each contains the following catalogue of material:

- Description of the Jurisdiction; since the peculiar design of each MIS development is, in part, related to peculiarities in the police jurisdiction we include a short section describing the police department and its environment. We have considered:

  .. the city that the police department is located in and its special police problems;

  .. expenditures on policing,

  .. the manpower complement as distributed between sworn and civilian members;

  .. the organization of the department;

.. the type of prevalent crime;

.. special enforcement concern (e.g., traffic);

.. the relationship between the police department and other municipal authorities.

- Background of the Systems Development; here we address the question of why and through which medium the police department implemented its systems. We review special requirements for MIS, the degree of leadership support, the degree of LEAA and state participation, and other special problems which have promoted the development of MIS in this jurisdiction.

- The Systems; this section contains a description of the systems we examined in each of the jurisdictions. It includes:

.. an overview;

.. the system's functions;

.. the operating mode;

.. cost (development and operating);

.. organization of systems support groups;

.. use of computers; and

.. problems.

- Future Directions; most of the departments we visited claimed that their current state of MIS development was only part of an evolving systems configuration. In this section we describe any extensions to the development programs being planned and anticipated problems which would impede their application.

Finally, we focus on five separate police departments and descriptions of their systems activities. The chapter does not contain a synthesis or generalized commentary on "systems development in U.S. police departments".

A. Kansas City, Missouri

The Study Team visited the Kansas City Police Department on November 1 and 2, 1976. Our primary contact in this department was Lieutenant Colonel Norman Caron, the senior officer responsible for the Administration Bureau. Through Colonel Caron we were able to interview personnel responsible for Data Processing Services, Communications and Dispatch Operations review, Crime Analysis and Records and Information.

1. Description of Jurisdiction

Kansas City is the major centre of commercial and service activities supporting Missouri's economic base of agriculture and light industry. St. Louis is the only other city of comparable sized in the state.

The immediate geographic area of Kansas City is dominated by a plethora of smaller, incorporated

municipalities. This complexity is accentuated by the proximity of Kansas City to the state border of Kansas; the state line runs through what may properly be called the metropolitan area of Kansas City. The closest neighbouring community is Kansas City, Kansas.

The police jurisdiction of Kansas City, Missouri contains 1,307,800 citizens. The land area of Kansas City extends over 317 square miles. The larger metropolitan area extends over 3,341 square miles.

Kansas City is blessed by its stable mid-western environment. It contains no major ghettos and their associated virulent crime conditions. Its population is homogeneous and is not markedly differentiated by racial or ethnic groups. The downtown core seems unaffected by urban disease.

The Kansas City Police Department has a personnel complement of 1,698. This is composed of 1,035 sworn officers and 463 civilians, a sworn officer to civilian ratio of 2.7:1. This ratio is typical of U.S. police departments and is smaller than most Canadian police departments. The total budget of the Kansas City Police Department in 1975 was 25.6 million dollars. This represents a cost per capita of $50.59, a ratio which is much lower than most large U.S. departments, but comparable to Canadian police departments of similar size.

Despite its calm, peaceful, mid-western exterior, Kansas City has a significant crime problem. In 1975,

it experienced 91.7 reported Part 1 crimes per 1,000 population; during the same period, Los Angeles had 79.9 reported Part 1 crimes per 1,000 population. Given this crime situation, Kansas City police officers are quite busy; Part 1 arrests per sworn officer were at 12.0 and calls-for-service per sworn officer at 290.6. This compares with 6.1 and 415.2 for Los Angeles during the same interval. There were 5,656 robberies and aggravated assaults in Kansas City during 1975, compared to 6,871 similar crimes in Dallas, Texas, during the same interval. Yet, Dallas, Texas, is almost twice the size of Kansas City, Missouri.

The two major high priority law enforcement concerns at the time of our visit were:

- a reduction in crimes against persons, especially those involving physical violence, and,

- clearing charges associated with traffic citations.

To summarize, Kansas City is a medium-sized mid-western city which is apparently faced with a serious crime problem. The police department is highly mobile, quite professional, and has a substantial degree of public support. A relationship of mutual confidence between police and other public agencies is demonstrated by the fact that the police department is not yet unionized.

2. Background on Systems Development

Development of Kansas City, Missouri, police infor-

mation systems began in 1966. From that point on, the Kansas City Police Force was launched on a total, comprehensive and integrated systems development program that is still being refined and extended. Kansas City has demonstrated a great deal of faith and commitment to MIS development. The key contributing elements are:

- strong support of senior management,
- emphasis on experimentation,
- early commitment to automation,
- active participation by related regional law enforcement agencies, and,
- successful solicitation of external funds.

One of the most important factors in the success of the Kansas City MIS development program must be considered the active support of the former Chief, Clarence Kelley, for management systems and information. The Kansas City Police Department has long been known as the home of experimentation in law enforcement techniques. Many of the experiments seem designed to challenge conventional wisdom in this area. For example, the now-famous Preventative Patrol experiment conducted in Kansas City, is considered by some reviewers as a direct challenge to the entire concept of policing as we know it today. There are two new, related experiments going on in Kansas City at the present time. They are:

- Response Time Study; this study is directed at the question: Will an improvement in response time affect law enforcement performance?

- Directed Patrol Experiment; this is an extensive program implemented at the level of patrol precinct. Patrolment are given substantial responsibility to develop crime prevention programs in their own jurisdictions.

Emphasis on experimentation in Kansas City provided a major stimulus to MIS development. Police managers were aware of the need for information to support field studies such as the preventative patrol experiment. Many officers told us that the entire MIS development was cost-justified merely by its contribution to the experimental programs mentioned above.

The Kansas City Police Department purchased its own computer facility in 1967. In the past ten years, there have been numerous improvements made to this computer configuration. Kansas City is now making use of some of the most advanced computer hardware available. The decision to go with dedicated, internal hardware has made a positive contribution to the department's commitment and interest in MIS.

Since 1966, a number of related law enforcement and criminal justice agencies have participated in the Kansas City MIS development. The system now serves 51 different agencies. Kansas City P.D. operates a computer and systems utility for virtually the entire region surrounding Kansas City. This has

necessitated the formation of many advisory and steering committees. Although this has encumbered MIS development somewhat, it has had a positive effect on the police department's commitment to large scale development programs associated with automation.

Kansas City's total commitment to management systems is represented by the fact that five per cent of the total 1976-77 budget was used to support the Computer Systems Division. Since all MIS services are funded through the internal budget, this ratio is an accurate expression of total recurring systems costs in Kansas City.

3. The Systems

Management information systems development in the Kansas City Police Department has been going on for more than a decade. The current systems are "mature". They are reasonably well documented. Systems personnel are highly articulate, in the sense that they understand their systems and the evolutionary process through which they have been created. The Kansas City police information system is called ALERT II.

(a) Systems Development Philosophy

In this section, we are concerned with the actual development philosophy expressed by systems personnel. In other words, we describe the technological philosophy. The systems development philosophy in the

Kansas City Police Department has four major elements, i.e.,

- systems development begins with the establishment of strong, operationally-oriented (transactional or record-oriented) information systems. The emphasis is on providing field officers with information to both improve field effectiveness and officer safety.

- throughout the systems development process, there has been a consistent attempt to embody the "state of the art" in systems technology. For example, an "on-line" capacity was built into Kansas City information systems from their inception. This philosophy has led to a constant interest in "upgrading" hardware and software.

- both the hardware and the software in Kansas City have been modified constantly. These changes have been accomplished, in part, due to the emergence of new equipment and procedural technology; many occurred because of new interpretations of police needs. Kansas City has a major commitment to an "evolutionary" information system. A variety of "advisory" and "systems management" committees monitor the progress of MIS development in Kansas City.

- since inception, the Kansas City MIS has been characterized by the use of in-house computer facilities and systems development personnel.

> Unlike other police agencies, which have had to depend on municipal and state agencies for development support, Kansas City programmers and computer power have supported developments for other criminal justice agencies in the region. The KCPD has acted as the major systems development agency for all types of law enforcement agencies in both the States of Missouri and Kansas.

The development program has been expensive. Fortunately, Kansas City has been a preferred target for national funding through both LEAA and the Police Foundation. Possibly, few other police departments in North America could have gone through the Kansas City process.

(b) Major Systems Functions

KCPD systems documentation manuals provide general overview descriptions of their MIS. They define a management information system as a three-level pyramid. We will follow their approach in this description (see Table IV-1 below).

Let us first consider the "transactional" or record-keeping base of the KCPD information system. The table show that five separate "police operations" files are created by the system. These are: arrests, offences, vehicle accidents, traffic tickets, and detective workloads. In addition, four administrative files are created. These are: property, payroll,

fleet vehicles and personnel.

At the operating level, the Kansas City police information system is a set of procedures for creating and providing access to information on the nine above-mentioned files. To illustrate, let us focus on the offence file.

When a KCPD police officer is called to an "incident" he follows certain fules and procedures to create an offence record. The rules are derived from regulations governing police procedure. After the primary investigation, the officer completes a comprehensive "offence form". This form is submitted to the officer's patrol sergeant at the end of the shift.

After the offence form has been vetted by patrol supervisors, and possibly other information pertaining to UCR Code and follow-up information has been added, it is submitted to computer systems personnel. Data entry into computer files is carried out by civilian clerical personnel, directly into the computer via on-line terminals. The computer automatically assigns an "offence number". Follow-up information, collected by either detectives or other personnel involved in a particular case, is entered into computer files using the offence number, through the same method.

The other four police information files, i.e., arrest, vehicle accident ,traffic ticket and detective workload files, are created in the same manner as the offence file. Collectively, these files act as the "transactional base" of the entire Kansas City police information system.

The entire information base in these files may then be used by field personnel for field support purposes. There are two principal modes of access for the police information, i.e.,

- on-line CRT, or other types of terminal media. These are used primarily by:

  .. detectives carrying out investigations,
  .. patrol officers requiring further information about arrest suspects, and,
  .. police supervisors requiring field activity information.

- mobile digital terminals (MDT); approximately half of the Kansas City patrol cars have mobile digital terminals. In addition, a number of other police jurisdictions in the immediate area (e.g., Kansas City, Kansas) have an MDT interface with ALERT II.

ALERT II also acts as a message switching device to reach other types of law enforcement systems for field support purposes, such as the National Crime Information Center (NCIC), the State of Missouri Crime Information System (MULES), and the State of

Kansas Crime Information.

At the "operating management" level (the second level of the pyramid on Table IV-1) it is difficult for us to draw up a cogent description, We cannot define or list the variety of reports being generated by ALERT for management purposes. By the end of 1975 there were more than 600 standard reports regularly generated by ALERT for the 51 agencies on the system. However, two aspects of the management reporting system are worth mentioning:

- At the present time, Kansas City PD is carrying out a study, through LEAA funding, of the use of "computerized mapping" for crime analysis. The computer has been programmed to generate an acetate overlay map showing the frequency of particular crimes as they occur in the various patrol divisions and other geographic areas within the city jurisdiction. When we visited Kansas City, a study team was actively developing a Tactical Response program for using this information in specialized crime prevention and apprehension activities. The KCPD geomapping program is similar to the atom mapping work currently being carried out in Canada, at the National Research Council.

- The systems division of the Kansas City PD has been converting ALERT to the MIS Data Base System. The new software will streamline automated procedures for sorting information so that management reports requiring an

integration of files can be generated more effectively. The need to make this conversion reflects an increased interest in Kansas City in the operating management information component of the system.

At the top level of the Kansas City Policy management information system pyramid are systems designed for policy management and planning. At the present time, this level of the information system contains one major application. It is called the "computerized police resource allocation system".

The resource allocation system is designed to operate on input data contained in the transactional and statistical components of the information pyramid. The primary data input is the offence report. Based on historical data captured from the offence report, this system will forecast the distribution and volume of patrol service requirements by hour of day, day of week, geographic area, week of year and type of crime.

The functions of the resource allocation system are:

- to provide a capability to realign beat boundaries based on equitable distribution of workload,

- to determine the availability of manpower and allocate it to its greatest potential for crime prevention, and,

- to schedule administrative activities during the lowest level of patrol activity.

In its typical application, the resource allocation system is used by patrol sergeants whose patrol officers are operating in a "team policing" environment. At the beginning of the shift, the sergeant runs a forecast of patrol activities, for his shift, in the geographic area of responsibility. The system will forecast the number of "service hours" required in the field. The sergeant will then be able to deduce the amount of excess time available for other kinds of activities.

The major current use of the resource allocation system in Kansas City is on the "directed patrol project". This is a team or community patrol project which involves a distribution of diverse responsibilities to patrol officers in the area of crime prevention, regular patrol and community services.

(c) Computer Power

ALERT currently operates on dedicated IBM 370 equipment which is resident at the KCPD. Through ALERT, the police department is operating a major computer utility (like CPIC) serving 51 criminal justice agencies in the states of Missouri and Kansas. The stability of this service, and the relative satisfaction of 51 "external users", suggests that the ALERT system is a highly mature MIS which has passed the test of time and will continue to be refined for use in an extended geographic area.

4. Relevance of the Kansas City MIS Development for Canadian Police Forces

A visit to Kansas City and some sort of analysis of ALERT should be necessary for every Canadian police force contemplating an MIS development program. There are two major benefits from a visit of KCPD.

First, Canadian police managers could benefit from discussions with members of a police department where there has been a major, long-standing managerial emphasis on research, development and evaluation. MIS has more relevance to management when information is constantly in demand for research, development and program evaluation. For example, the KCPD data base was used in the last four years to provide information for a RAND study on "The Effectiveness of Criminal Investigation". Information from the Detective Workload file was provided to enable researchers to study the success of follow-up investigations. Few other police departments in the U.S. could have provided this data as efficiently. From the availability of such data, and its active use in research and evaluation, the KCPD has developed an "open" managerial style. It should be of great interest to Canadian police managers.

Second, ALERT *per se* is worth examining in an on-site visit. It has the following features:

- it is well documented;

- the ALERT team is accustomed to visits from other jurisdictions;

- a large portion of the ALERT development team is still with the police force and is available for discussions about the implementation experience; and finally,

- there is an excellent interface between police and civilian personnel involved with ALERT. This would provide Canadian police managers with direct experience in an area which we believe is of vital importance to the success of police MIS.

To conclude our discussion of ALERT we make one final comment: Canadian police travelling to jurisdictions such as KCPD should arrive well prepared and expect to take home valuable general insights about police MIS. They should not expect to bring home a total package of procedures and programs.

B. City of Miami, Florida

We visited the City of Miami Police Department on December 1-3, 1976. Our invitation came through Major MacLaughlin, the Director of Management Systems. We carried out extensive interviews with Mr. Keith Bergstrom, the project manager of the Headquarters Project, and Lieutenant Stearns, who is responsible for Records and Identification. During our visit we spoke with numerous

police and civilian personnel responsible for functions such as communications, strategic planning, operations review and inspections, computer systems development, facilities security, and administration.

1. The Jurisdiction

The Miami region is a well known winter vacation centre. A large portion of the economic base in this region is dependent on transient populations such as tourists and semi-retired residents who spend up to six months of the year in the semi-tropical climate.

The demographic patterns of the Miami region are dominated by a number of unique factors. Miami has:

- an age distribution heavily skewed in favour of older age groups;

- a large black population, many of which have recently emigrated from other southern states in search of jobs in the tourist industry;

- a large Cuban population.

Since the Cuban and black racial groups are characterized by relatively high fertility rates, the age distribution of the population is skewed at both ends of the scale; there are relatively large numbers of old and very young people in the population. The demographic patterns of Miami, featuring a disproportionate number of potential crime victims and perpetrators and the depressed economic conditions in the

Miami region, combine to create a major crime problem. The crime situation in Miami for 1975 is reflected in the following factors:

- 320,000 calls for service; on a per capita basis, this is significantly higher than Kansas City and approximately the same as that for Los Angeles and Dallas;

- 46,500 reported Part I crimes in 1975; on a per capita basis, this is significantly higher than any other U.S. jurisdiction which we visited;

- 6,900 felony arrests; on a per capita basis, this is higher than every other jurisdiction except Kansas City.

The City of Miami contains 350,000 people; it is in the middle of a variety of incorporated and unincorporated municipal jurisdictions whose total, regional population would consist of approximately two million people. Although there is a regional "metropolitan" government, Dade County, it is responsible for policing only in the unincorporated areas. This leaves 27

incorporated cities, including Miami, with separate police departments. These range in size from 10 officers to Miami's 900 sworn officers. There is a serious law enforcement coordination problem.

To conclude: the entire Miami region and particularly the City of Miami, has been beset by major demographic, social and economic change during the past three decades. Public institutions have had to make major adjustments to cope with these changes. The number and variety of police forces in the Miami region suggests that the changes are still proceeding.

In 1976, the City of Miami Police Force contained 900 sworn officers and approximately 300 civilian personnel. By North American standards, this is a relatively large police department. Yet, it is a department which has grown rapidly, and under significant social pressure. Of all the departments which we visited, only Los Angeles and San Francisco have approximately the same number of sworn officers per capita. Dallas, Kansas City and San Diego have significantly fewer police officers per capita. The City of Miami Police Department has been making a conscious

transition from a small town southern police force to a big city professional police department.

To understand systems development in the Miami Police Department, we must be aware of the deliberate transition. Systems development has taken place within a broader context of "modernization" which began in 1969. The process has been dubbed "the Miami Modern Police Department".

2. Backgound of Systems Development

The development of the Miami Modern Police Department (MMPD) began in 1969 with a public plebiscite on a major bond issue for municipal improvements. The citizens were asked to vote on a number of capital projects ranging from sewer construction to new educational facilities and the construction of a new, "modern" police headquarters facility. The total request was for 120 million dollars. A number of the proposals, including the new police headquarters facility, were accepted by the public.

Two significant decisions were made soon after the bond issue gained public acceptance and the MPD program began, i.e.,

- the $20 million appropriation would be managed through regular municipal administrative channels.

- a team of external consultants would be retained to define the concept and theme of the modernization program.

The team of consultants hired to develop the MPD "concept" came from the Stanford Research Institute (SRI). The SRI study team focussed its conceptual work on three different functional areas:

- Functional Specifications for Architectural Design; this element of the study addressed the question of "how do you design a police headquarters facility to match the anticipated needs of the next 30 years?".

- Management and Organization; this component of the study attempted to develop the specifications

for a police organization that could adapt to the changing social and economic conditions of the Miami environment.

- Technological Change; in this area, the SRI team developed notions of technology in areas such as communications, information systems, and personnel training. Their objective was to examine technological alternatives available to policing and to recommend the most appropriate framework for Miami over the next 30 years.

The SRI study team submitted its preliminary report on these three areas of the MPD program in 1974. Three components of the study met with varying degrees of success. First, the architectural specifications were accepted and incorporated into the design of a new headquarters facility which was opened to the public in May 1976.

The management and organization component did not have any immediate success. No major organizational changes were made as a result of SRI recommendations.

The technological environment recommended by SRI for Miami is of greatest relevance to this report. We will review it in some detail in the following section. At this point, we wish only to highlight the basic "philosophy" of the SRI comments on technological environment for police departments. They are:

- Technological Change,
- Anticipate the Future,
- Strategic Planning,
- Multi-Disciplinary Task Forces,
- On-Site Teams.

SRI submitted a number of reports to Miami which were designed to establish an over-all managerial and technological environment which could adapt to changing conditions. The MIS must be viewed in that context; it is only part of a managerial superstructure in a "modern" police force.

3. The Systems

Of the five U.S. cities which we visited for this study, only Miami was currently in the process of installing a total information system which represents the state of the art of this technology. The other cities reviewed had developed their systems over a much broader time span. Miami's system development represents the most modern technology and was built with a view to the successes and failures of other police system developments in the United States.

One final point: although Miami's systems have been built and are operative, they have not yet passed the test of time, acceptance and use in standard police operating procedures. Therefore, although we use the present tense in describing the characteristics of the Miami system, their actual operating characteristics after the next two years may change significantly.

(a) Systems Development Philosophy

The main purpose of the MPD information systems

project is to support the line officer and increase his service to the public. Law enforcement affectiveness is expected to result because of:

- better response to citizen calls for service due to greater dispatch efficiency and more units in the field, through a reduction in administrative workloads.

- faster and better crime analysis capability utilizing investigative data that has been available, but could not be efficiently accessible without modern information process techniques.

- better resource allocation by commanders who have more information on crime trends and resources (e.g., manpower, patrol vehicles). The assumption is that accurate crime information can lead to proper geographic deployment of manpower to both prevent specific criminal activities and/or apprehend criminals.

- more efficient police activity in the field due to enhanced information support for more rapid

decision-making in the field.

- increased managerial coordination and planning through better information targeted to the needs of MPD commanders. Commanders should be able to anticipate events over a longer time horizon and prepare strategic and tactical plans to cope with occurrences.

Like many other police management information systems in the United States, the MPD systems development began with the needs of field officers. These requirements are threefold. First, when responding to a call for service, or dealing with a particular criminal activity in the field, an officer should have information to assist him in dealing with the situation at hand. Second, when carrying out a field investigation, he should have access to a broad set of information about cases with possible similar characteristics. Finally, through managerial coordination, field officers should be most advantageously deployed relative to crime occurrences, as they are happening.

Finally, one comment on the operational philosophy fo the Miami information system. It is Computer Assisted Dispatch (CAD) oriented. The communications section of the Miami Police Department, and its associated hardware, plays a fundamental role in the operations of the entire information system.

(b) Major Systems Functions

From our examination of the Miami systems specifications, we have selected eight functional areas for review. They are:

- computer assisted dispatch;
- field support system;
- message switching system;
- mobile digital terminals;
- record systems, particularly computer indexed microfiche record media;

- computer assisted report entry;
- investigative support systems, particularly the prior offender descriptive file, the field interview reports and the local data base system;
- crime resource allocation mapping system or field deployment and tactical planning.

Computer Assisted Dispatch (CAD); the function of CAD is to record and maintain all relevant status data on the computer by entry and review. When a complaint operator receives a telephone call for service, he keys information taken from the citizen onto the screen. The computer program creates a preformatted screen mask and only relevant data is keyed in. The computer will validate the information, especially address, alert the complaint operator to special situations, where known, then transmit the information to the screen of the dispatcher responsible for that sector of the city. The dispatcher will examine the list of available units and will assign the call to the most appropriate unit in the field.

The CAD system is of the highest priority. It is therefore fully backed-up by another computer that is dedicated to non-priority applications when not used in the back-up mode. An automatic failover is activated when the primary system goes down. If the automatic failover fails to work, then a manual process can be implemented in a few minutes.

Upon purchase of the mobile digital terminals (MDT) in 1977, the CAD system will be upgraded to digitally route dispatch messages to the MDT's and status messages to the dispatcher. These measures will reduce air traffic and increase transmission security, allowing more air time for non-routine traffic.

Message Switching System; the message switching system provides the capability for users to communicate point-to-point. Remote terminals are able to send messages to other remote terminals. This will include MDTs, i.e., and MDT will be able to transmit a message to the computer and back to another MDT.

The message switching system also provides for interagency communication from the remote terminals.

Interfacing agencies include the Florida Crime Information Center (FCIC), the National Crime Information Center (NCIC), the Dade Criminal Justice Information System (DCJIS), News and Wire Services, the Florida Department of Highway Safety and Motor Vehicles (DHSMV), and, the National Law Enforcement Teletype System (NLETS).

Message switching, when operative, will provide field officers with virtually all of the itemized, transactional information they require when interviewing suspects and checking out suspicious persons and vehicles in the field.

Field Support System; this is essentially an automated indexing system, enabling field officers to obtain information out of "local records" on the basis of the following characteristics:

- names,
- addresses,
- vehicles,
- establishments (theatres, etc.)
- categorial identification, and
- nicknames.

Each of these indexes is contained within a file which also provides room for codes and comments to denote information that is hot and should be of interest to the enquirer. The name file can be reached by a "soundex" technique which does not require exact spelling of the name for a hit. All FSS files are designed for immediate access to information. Pointers are embedded in the information that suggest other files to examine for more detail on the same subject. A large portion of the supplementary information is embedded in the records system which will be described below.

Mobile Digital Terminals; in Miami, mobile digital terminals are considered essential to the total information system. At present there are only three MDTs installed in patrol vehicles. These have been loaned to the MPD on a trial basis; they are called the Digicom-800 units.

In a sense, the MDT is the "ultimate application" of new technology for the MPD information system. Its application will ensure that interface between all field-oriented components of the information

system is totally automatic.

Computer Assisted Report Entry (CARE); the CARE system represents a unique attempt to facilitate incident (occurrence) report writing most cost-effectively, with the use of the most modern technology available.

Record entry at the MPD is initiated in the CAD system. When a call for service is received by the communications section, an incident file (case file or dispatch file) is automatically created by the computer. The complaint clerk inputs the first few pertinent data elements through the complaint CRT. When the dispatcher receives the "message", he inputs a number of other data elements, primarily on the deployment of primary and back up patrol units. At that point, an incident number is automatically generated by the computer and communicated to the primary patrol vehicle.

The CARE system comes into effect at the conclusion of the primary investigation. It provides the means for inputting additional incident of occurrence

information by the patrol officer(s) primarily responsible for the call. The patrol officer telephones his information to data entry technicians who, in turn, input the incident information into the computerized records through the CARE system.

In the CARE system, the computer is programmed to ask specific questions pertaining to the type of crime and criminal so that computer-based profiles of offence/offender activity can be developed to serve as leads to investigators. The collection of crime specific information will be implemented via reporting guides and check-off coding forms to insure that it does not adversely affect the reporting time.

We will describe this crime specific feature of the CARE system in more detail in our section on the investigation support system.

The CARE system represents a new departure in record entry for police management information systems. Its most valuable features are:

- it will reduce the number of times a particular

data element must be entered into the file. For example, time and place information collected at the time of dispatch will not have to be re-entered.

- data will be validated as entered,

- programmed cross-references will insure the integrity of the information provided. For example, the number of items stolen will be cross checked against the total number listed and described.

- additional reports on the same subject, such as Arrest Reports, need not repeat the same data that has already been recorded.

- the system will capture all data necessary for standard end-of-the-month uniform crime reports. Pertinent information will be extracted from records and loaded into the proper files for automatic report production, at appropriate times.

The Records System; this system, currently being developed for the MPD, is possibly the most esoteric component of an information system which is already well in advance of the state of the art in police management systems.

The record system that the MPD expects to implement and upgrade sometime in 1977, is a totally computerized, or electronic system for creating, storing and retrieving all of the information that is typically kept in the Central Records section of police departments. Its characteristics are:

- incident files on all active cases, including supplementary reports, are kept on-line for access through CRTs on hard copy printers, as long as these cases are active.

- as soon as the incident file is created, a set of indexes (described above under the field support system) are created to facilitate entry to the incident records via six pointers.

- once a case is judged "inactive", it will be

"purged to microfilm". This is carried out automatically. It uses hardware which converts magnetically coded (on-line) data to microfilm so that it can be inexpensively stored over a lengthy period of time and reduce unnecessary use of computer storage and processing.

- a data base management software package has been purchased to enable users to mix, match and analyze complex information sources from a variety of disparate files stored in the computer.

- a set of microfilm and microfiche readers and readers/printers will be made available at numerous work stations throughout the police building. Reports that are not available on-line in the computer, will be available through this medium and can render a hard copy of either on-line or off-line reports at a moment's notice.

Currently, the MPD is going through a conversion process to create the initial records system. This conversion includes the key punching of the current central name index, the microfilming of all paper

records now on file, the screening of out-of-date and irrelevant data from the index and the loading of the index to the on-line file. This conversion process is expected to last a total of six months.

Investigative Support System (Local Data Base Files); MPD local files are maintained on the backup computer system and are indexed by the six field support system files described above. The ISS represents a method of access to these local files contained in the Records Unit, to support investigative functions as follows:

- to provide convenient access to historical data for research by police investigators;

- to provide statistical summaries and predictions for the deployment of forces;

- to provide generalized and rapid computer search capabilities;

- to collect and make available "crime specific" information for investigators;

- to provide an analytic capability to assist in the solution of crimes.

Through the ISS, field officers have two different ways of access to local files, i.e.,

- using pointers embedded in the field support indices. This involves access to one of the six ISS files, for example by name, and retrieving a list of local file references. On any particular name, there can be a number of file references. For example, the named individual could have field interview records and could be listed as having had a recent arrest in the Arrest and Disposition File. Investigators can retrieve these records, individually or together, either on CRT or printed on a hard copy device. In cases where the data is no longer maintained on-line, the investigator can retrieve the desired records from microfilm.

- alternatively, investigators can use direct on-line data base searches to retrieve local file information. Through any local file, the

investigator will merely list a set of the record characteristics desired for retrieval; in a sense, he will write his own program. For example, he may call for all red haired individuals with the first name Henry. Again, the computer will search all records in local files for references to these characteristics. The files will either be reached through CRT or hard copy keyboard terminals.

Crime Resource Allocation and Mapping System (CRAMS); this system is designed to analyze historical and predict patterns of crime in the Miami jurisdiction.

The CRAMS software will provide the officer, investigator or supervisor with the capability to visually review patterns of crime on a CRT. Maps will be stored on-line in each geographic area in the city, and will be overlayed with actual historical or predicted crime statistics to be presented on the screens, Printouts of the analysis will be available.

Three sets of parameters must be selected by the investigators to delimit the statistics of interest.

These are:

- GO-Area, including any set of contiguous atoms;
- crime types, defined at a greater level of detail than the UCR designations;
- time, ranging from one hour to a full year of operation.

Crime statistics are "smoothed" from one area to another by use of "cluster" techniques. Therefore, the statistics of a reporting area are adjusted by the statistics of adjacent reporting areas.

(c) Computer Power

The MPD management information system features a totally dedicated police computer configuration, resident in the police headquarters and applied to no other purpose than police systems. Unlike any other police MIS systems we viewed in the United States, it is entirely based on mini-computer hardware.

The MPD operational system configuration involves four computers. Two PDP-11/45 terminal concentrators are used to "front end" two PDP-11/70 main frame computers. The system has ten disc drives, six of which are shared between more than one CPU. Three magnetic tape drivers are attached to each of the main frame computers. Similarly, each main frame has a card reader and a high speed printer.

The concentrator CPUs are dedicated to driving the CRTs, remote printers, and (at a later date) the MDTs. An automatic switch allows CAD terminals to displace local data base terminals in an emergency. Similarly, a manual switch allows CARE to displace all terminals being used for program development.

The system is designed to handle 94 internal CRT terminals and approximately 100 MDTs when they are added in 1977. To support this workload, each concentrator has 124 K words memory, one-third of which is used by the operating system. In addition to the computer hardware described above, there is a device to automatically convey magnetically encoded (on-line) data to microfilm. This is expected to save significant

manpower resources. In addition, there are a large number of microfilm reader/photocopying devices for use throughout the police headquarters facility.

(d) Costs

The MPD information system development program has been divided into four phases. The first three phases are essentially complete. At present, MPD project teams are evaluating various options for Phase 4. In this section of our report on the MPD information system, we provide three different types of cost estimates, i.e.,

- the hardware and development cost of Phases 1, 2, and 3 which are already completed.

- the recurring or maintenance costs (not covered by the headquarters bond issue) estimated for the maintenance of systems developed during Phases 1, 2 and 3.

- the proposed options of Phase 4 and their associated costs.

Phases 1, 2 and 3 cost approximately 2.5 million dollars. One point five million dollars of the total was spent on hardware acquisition; one million dollars supported the development effort.

Distribution of expenditure in Phases 1, 2 and 3 on major components of the system were as follows:

- CAD; $600,000

- Field Support Systems; $460,000

- Records System; $770,000

- Criminal Investigation System; $345,000

- Additional Software Development Support; $374,000

Members of the MPD Information Systems Study Team estimate that the annual recurring maintenance cost for information systems will be approximately $750,000.

This includes all clerical personnel required for systems support, computer operators, computer hardware maintenance costs, and all other associated expenditures.

All activities proposed for Phase 4 are expected to cost an additional 2.4 million dollars. The major components of that expenditure are: dual access disc drives, $250,000; MPD Development Staff, $225,000; additional microfiche/microfilm equipment, $55,000; Mobile Digital Systems Development, $100,000; Mobile Digital Terminals, $1 million; Automatic Vehicle Locators, $250,000; and, Graphic Displays and Plotters, $150,000.

4. Relevance of the MPD Development for Canadian Police Departments

First of all, the Miami development program represents the "state of the art" in management and information systems. It embodies a technological environment second to none, possibly, in the world. Its technological environment is represented in the hardware selected for MIS purposes and the thoroughgoing qualities and expertise of the individuals and

firms involved in the development program.

Second, Miami information systems development took place within a broader framework of "deliberate modernization" of the police department. Therefore, the program was a comprehensive one, designed to satisfy needs which were, in turn, defined in a lengthy, formal analysis. Miami personnel view each component of their information system as satisfying a well-defined law enforcement need.

Although the MPD is a large police department by Canadian standards, its size is small enough to avoid the complexity of analysis that would be associated with a review of, say, the New York City Police Department. Yet, the department is large enough to economically support a comprehensive systems development. This is a useful model for Canadian systems development over the next 10 years.

Although Miami systems were designed in the first instance to satisfy field information requirements, the total development program is cognizant of the needs of management. The development program did not

fall short of its total potential by being satisfied with a message switching and wants and warrants query capability; this is the case of the San Francisco Police Department which we visited but do not describe in this report. Instead, the Miami systems development recognized that a total, comprehensive management information system designed to serve police officers will also create a huge data base which can cost-effectively deliver management information for strategic planning and tactical review.

Finally, Miami systems development represents an attempt to come to grips with social and economic changes in a geographic jurisdiction facing massive transitions. The time frame on this development is extensive. This matches our own intuitive understanding of successful management systems development. Management information systems in any environment are not just a collection of hardware and software. They must be vitally incorporated into the basic processes of policing and must respond to the challenges of the future as identified by senior management.

However, the Miami development is not yet "out of

the woods". It is just beginning to operate in the physical sense. Hardware has been installed and test programs are being run. The Miami systems must still face many potential operational problems.

At a recent conference attended by Decision Dynamics Corporation consultants, one of the participants stated, "in the day of electronic computers, there is no need to use paper for virtually any documentation purposes. The computer should be responsible for all communications and documentation.". We agree with the sentiment, but wonder whether that day has dawned. The physical capacity does exist, but is the human infrastructure properly trained and willing to accept electronic impulses instead of the tried and proved methods of the past? Making the transition from paper to electronics may involve a painful transition!

The Miami information system development program represents such a transition. It is a bold attempt to move into a totally new level of technology. We hope that Miami will not have to pay too heavily, the price of the innovator. One fact remains clear:

Miami did not rush headlong into sophisticated technological development without lengthy analysis and review. Systems development programs, from concept to final shakedown, will have taken over five years to complete. That should be an important lesson for Canadian police managers.

C. Los Angeles, California

The Decision Dynamics Corporation Study Team visited the Los Angeles Police Department (LAPD) on November 9-10, 1976. Our visit was arranged through Captain David Burney, the officer responsible for the Computer Systems Division. During our two day stay in Los Angeles, we interviewed members of the Computer Systems Division, the Master Plan Unit, external consultants working on a project to develop a streamlined data base, officers responsible for the development of a new Emergency Control Communications System, and a number of other individuals active in the development and maintenance of MIS at LAPD.

1. The Jurisdiction

The most obvious aspect of the LAPD is its size.

The department contains 7,500 sworn officers and 3,400 civilian employees. It serves a city of 2.8 million people in an area of 466 square miles. The Greater Los Angeles County which contains the City of Los Angeles has a population of more than eight million people. There are more than 50 criminal justice agencies in the Greater Los Angeles area; most of these make some use of elements of the LAPD information systems.

LAPD's 7,500 officers handle 3,120,000 calls for service and investigate 224,800 Part I crimes a year. A large proportion of these crimes are "serious" and either involve violence or some threat to officer safety.

The size of the jurisdiction and prevalence of violent crime has had a major impact on police management philosophy in Los Angeles. Some of the basic elements are:

- a predominant interest in maintaining a "professional" police department. This is represented, in part, by a complex formal organization and

management structure.

- a preoccupation with formal training of police officers. The LAPD has invested substantial resources in the development of a police college with a highly sophisticated, technologically advanced police training curriculum.

- a "big city" patrol car oriented style of policing. Two man police patrols are the order of the day in Los Angeles. There are very few walking beats. Also, a Team Policing system operates throughout the jurisdiction; consequently, there is a great emphasis on the command and control functions of policing.

- highly specialized police functions and a general absence of personnel rotation policies. LAPD is so large, and its management infrastructure for each police function is so deep, that career paths tend to follow the lines of major police functions. For example, a young officer may specialize in "computer systems" and expect to spend his entire career advancing

through various levels of the systems management organization.

The LAPD could not be managed without fairly sophisticated management information systems. The department is too large, its self-imposed mandate of professionalism is too pronounced, and its physical jurisdiction is too extensive not to encourage the development of MIS. Senior management in LAPD have recognized this. (As early as 1964, the LAPD began making major investments in the MIS area.)

2. Backgound of Systems Development

Growth of information systems has been based on management faith that they are essential to the successful operation of the police department.

LAPD is divided into three offices: The Office of Operations, the Office of Special Services and the Office of Administrative Services (OAS). The OAS provides a variety of support services for the

department's line operations. One of these services is the development and implementation of automated information systems.

Within the OAS, the Advance Planning Division has direct responsibility for systems development activity. This division is organized into project teams who oversee the development of each particular automated system. At present, there are 13 computer-based systems operational or under development.

The number and complexity of the 13 automated systems determines a need for strict inter-project communication and coordination. This function is performed by a Master Plan Unit. To maintain co-ordination, the Master Plan staff conduct bi-weekly meetings of all project coordinators to review project activities and schedules.

Unlike Kansas City, the LAPD develops information systems through a complex interaction with city agencies. It does not employ most of the programmers and systems analysts which develop its programs. Nor does it own the computer hardware and utility software

used to operate its systems.

3. The Systems

The information systems at LAPD are complex and extensive to complement the size and scope of the police department. We can enumerate only the highlights of these systems in this report.

(a) Systems Development Philosophy

For more than 10 years, the LAPD has "believed" in computer systems. They have developed extensive information systems which they felt were necessary to manage the large, complex police force in Los Angeles. They have not been reluctant to spend money on this area. They have managed the development process in a highly professional, systems-oriented manner.

The "systems management" philosophy for the development of systems in LAPD is illustrated in two ways:

- early in 1976, the LAPD hired a consulting firm to carry out an "integration" study of their systems. The consultants are carrying out a detailed analysis of all computer applications at LAPD. Their object is to reduce duplication and construct a common data base dictionary around six or seven "logical groupings" of data.

- since the beginning of systems development at LAPD, the relationship with city and county data processing agencies has contributed to a process of logical and rational resource allocation within the systems function. Before any new development can take place, LAPD must submit a formal and comprehensive proposal to city management. The "new application" must be justified on rigid cost benefit criteria. Each step of the development process is carefully monitored. Before the development can go on-line, a formal evaluation must be carried out. This evaluation is rigourous and must satisfy the most skeptical systems auditor.

Both of these issues confirm one basic quality of LAPD systems development: the development process is professionally managed.

(b) The Systems

There are three major components of the total LAPD management information system. They are: systems support, operations support, and management support.

(1) The systems support component includes two sub-systems, i.e.,

- the Front End Communication System (FECS), and,

- the Data Entry System (DES).

The Front End Communication System is a message switching computer complex that provides access to a network of law enforcement data bases. Some of these data bases are located within the LAPD systems. These will be described separately at a further point in this section. They are:

- Automated Want Warrant System,
- Automated Field Interview System,
- Automated Worthless Document Index, and,
- Pattern Recognition and Information Correlation (PATRIC).

In addition, the Front End Communications System is designed to have access to a number of California wide criminal justice systems through the California Law Enforcement Telecommunications System (CLETS). These are Automated Wanted Person System; Stolen Vehicle System; Automated Property System; Automated Firearms System; Criminal History System; Automated Bicycle System; National Crime Information Center (NCIC), which is located outside of California but reached through California message switching devices; and, a number of drive and vehicle files through the California Department of Motor Vehicles.

A comprehensive Data Entry System is now being developed at the LAPD to provide centralized data capture for the department's automated systems. Information from crime reports, arrest reports, and other source documents will be entered into the system

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via terminal devices. This data will be keyed to magnetic tape and then entered into a dedicated data entry computer system. It will be edited on-line and subsequently sent to the computer where final editing will be accomplished. This component of the LAPD management information system is quite similar to the data entry system of Kansas City.

(ii) The Operations Support System is designed to provide data for field personnel and respond directly to investigations and other field support needs. The key components or sub-systems of this system are:

- Automated Want/Warrant System;
- Automated Field Interview System;
- Pattern Recognition and Information Correlation System (PATRIC);
- Automated Record Management System, including automated index and automated booking information;
- Automated Worthless Document Index System;
- Emergency Command Control Communications System.

The Automated Want/Warrant System was designed to

improve the effectiveness of law enforcement by centralizing want and warrant records to provide more rapid and efficient processing of want and warrant information requests. Field officers and investigators use the system to check for outstanding wants or warrants for persons under investigation.

The system was implemented in 1969. In the following year, the system was expanded county wide. Approximately 850,000 wants and warrants from 40 police agencies are currently contained on the system data base. Fifty police agencies in Los Angeles County have access to the system via terminal keyboard or teletype. The system is flexible in that it allows four searching methods: name and description, system identification number, warrant number or vehicle licence number. The ability to have access to a warrant by warrant number has proved to be useful for court systems and other law enforcement agencies.

The AWWS was developed by the City of Los Angeles at the cost of three million dollars. Ongoing systems maintenance and operating costs are approximately $1 million per year.

The Automated Field Interview System is an investigative tool designed to assist in clearing crimes and apprehending suspects. Its data base contains information about persons and vehicles collected from Field Interview Reports completed during officer/citizen contacts. This system has been an integral part of the LAPD automated systems since 1967. Inquiries to the system are made through terminal devices in the following ways:

- vehicle suspect search, based on vehicle description, licence plate number (full or partial), suspect's name and suspect's description;
- licence plate search, full or partial;
- name search;
- incident search, based on date, time and location.

In addition to responding to queries, the system provides weekly administrative reports listing field interview reports by date, time and patrol sector. These reports indicate where field officers are concentrating their efforts and assist area commanders in evaluating the over-all effectiveness of their operations in reducing criminal activity.

Eventually, this system will be merged with PATRIC which, in turn, is being designed to utilize the field interview file for isolating suspects and their vehicles. PATRIC will provide technical information derived from crime and crime-related reports for use by investigators and uniformed personnel of the department. The basic information to be provided by PATRIC includes: suspect's trademarks, physical descriptions, and personal oddities; premises attacked; weapons used; date, time and day of week of occurrence; and any vehicle description.

PATRIC is designed to extend the criminal investigator's access to computer files. Crime-event components will be correlated to isolate crimes that appear to have been committed by the same person. Possible suspects will also be identified. Investigators will be provided access to automated files containing field interviews, burglaries, robberies, sex offenders, information from sex offender registrations, investigator's final reports and other crime data.

PATRIC will also assist in deployment planning

based on crime patterns detected through the data management programs. Uniformed officers will be provided with a detailed description of crime problems in their particular areas and attention will be directed to problems in surrounding areas. In addition, commanding officers of operation divisions will be given more statistical information on both specific and over-all crime problems.

Data for the PATRIC system is gathered from crime reports. It uses sets of descriptors such as physical oddities, trademarks, premise and method of entry. As such, PATRIC is an extended MO system.

In 1969, LAPD created a task force to evaluate the department's criminal history file and incident record file management system and to recommend necessary changes. The Task Force recommended that the department's record index be automated and in specific areas consolidated within a computerized form. This has resulted in two computer sub-systems: the Automated Index System and the Automated Booking Information System. These projects are currently being developed as segments of the total information system

development program.

The Automated Index is designed to consolidate criminal history and event records of the LAPD and the Los Angeles Sheriff's Department. This file is comprised of two different indices: the personal history index and the event index. The personal history index which will ultimately contain data on more than two million persons with criminal records, will identify an individual by name or alias, date of birth, sex, fingerprint classification, and standard agency number. The event index will contain data related to traffic accidents and crime incidents: names (criminals, victims, witnesses), dates, times, locations, and vehicle licence numbers.

Both of these indices will be automatically created by programs which have access to the data entry system.

The Automated Booking Information System is designed to maximize the use of data captured as the result of the formal booking process of arrested persons. This system will not only be available on a

query basis, but will also provide a base for statistical data and supply information for other automated systems.

The Automated Worthless Document Index is a regional file of forgery-related information that allows investigators selective search access to all pertinent forgery-related data. This system employs current computer technology to correlate information from forgery-related crimes. It indexes all pertinent names and identifying numbers that appear on worthless document reports and allows a wide variety of searches. It replaces a manual file of index cards which contains names only.

The index will be implemented through a police communication system with terminals located throughout the Los Angeles area. Queries related to different identification papers, credit cards or cheques suspected as stolen or involved in forgery cases are also possible. The index will also automatically check all persons booked in the Los Angeles County against the file of forgery suspects. Ultimately, the system will check all persons arrested

in Los Angeles County against active files of forgery cases and notify forgery investigators of the results.

The City of Los Angeles is currently engaged in a program to establish a comprehensive Emergency Command Control Communications System (ECCCS). This effort began in September 1973 and is financed through a grant provided by the Law Enforcement Assistance Administration.

The ECCCS will allow a centralized dispatch unit to instantaneously provide the location and status of field units. With computer aided dispatching, the present manual functions will be automated to determine jurisdiction, select the closest available field unit, and digitally transmit the dispatch message. This system is expected to result in the reduction in dispatch time and increase the capacity to handle calls for service.

The development of the ECCCS is a massive undertaking by the LAPD and related agencies. The project is expected to develop to following capacities:

- automatic vehicle locators;

- a completely computer-assisted dispatch system;

- two-way radio and digital links between field units and command centres;

- major increase in radio channels and rationalization of radio communications;

- an automated mobile command centre;

- hand held radio equipment for all field officers which is interfaced with the entire computer system. This will have a number of state of the art features such as an "automatic officer in trouble signal". The radios are expected to cost $1,400 per unit;

- consoles will be installed at all divisional facilities to allow watch commanders to monitor the actions and progress of their field units and manage available manpower within the broader CAD framework.

(iii) The Automated Management Information System (AMIS) provides management with data about crime, arrests, personnel and vehicle fleet. The data is used for planning, evaluation and the control of operations in LAPD. Included in AMIS are special sub-systems which provide the department with information about deployment, modus operandi, field interviews, worthless documents, and wanted persons.

AMIS is comprised of four systems: Crime Statistics Modus Operandi System, Arrest Statistics Modus Operandi System, Personnel History System, Police Equipment Cost System. In general, these systems are designed to abstract statistical information from the transactional information files of systems which have been described in this chapter. Statistical information generated by the automated management information system is designed to provide management statistics for decision-making at senior levels of command.

The current AMIS configuration at LAPD is temporary. Eventually, the PATRIC file management software will be used as the primary medium for

access to management information and generating statistical reports for management.

Finally, a description of the LAPD management information systems would not be complete without mentioning information support for Team Policing. Most readers of this report will be familiar with the Los Angeles commitment in the concept of Team Policing. The Patrol jurisdiction of Los Angeles has been divided into 65 team policing sectors. These are patrolled, and a large proportion of criminal investigation is accomplished by integrated teams of individuals. Each team comprises 30-50 individuals and is responsible for most police functions occurring in each sector.

LAPD has developed a system known as Automated Deployment of Available Manpower (ADAM) to assist in the allocation of resources within the team policing environment. ADAM is designed to provide the department with deployment planning information in terms of proportionate need for manpower by the various geographic areas and workload. In addition, performance measures are available to

measure effectiveness and to assist in budgetary planning and cost-effectiveness analysis.

ADAM is a resource allocation system that uses data obtained from records of citizen requests for police services as well as records of officer-initiated activity. Management reports are produced for each patrol area every four weeks to coincide with the 28-day police deployment cycle. Examples of the reports provided by ADAM are:

- total number of hours devoted to patrol activities by each geographic area (e.g., citizen calls for service, officer-initiated activities, and administrative functions);

- a summary, by area, of the number of calls received, service level achieved, and average delay in responding to calls.

There are plans for interfacing ADAM and PATRIC. This will allow for short-term forecasting of calls for service and the units required to service that workload.

ADAM is similar in scope and purpose to one component of ALERT in Kansas City (Computerized Police Resource Allocation System).

(c) Computer Power

Although the LAPD management information systems are completely dependent on computers, there is no computer in the Los Angeles Police Department. Except for the input/output equipment (e.g., CRT terminals, line printers, etc.) all computer hardware used by LAPD is operated by the City Data Services Bureau. In addition, most software development services for police MIS is Los Angeles are carried out under contract, by city programmers.

Given the size of its management information systems, their complexity and the rapid rate of new systems development which is occurring, the experience of Los Angeles proves that police departments can develop and maintain highly sophisticated information systems without owning their own computer hardware.

4. Relevance of the Los Angeles MIS Development for Canadian Police Forces

There are many reasons for Canadian police interest in the Los Angeles MIS developments. But, the most important reason is that MIS at Los Angeles is managed in a professional systems environment. Canadian police officers can learn much about the type of development environment required for successful MIS implementation at Los Angeles.

The basic elements of this professional management information system development environment are:

- a reasoned allocation of technical tasks for both the development and maintenance of management information systems between civilian and sworn personnel. Los Angeles has learned how to make maximum use of civilian personnel in its MIS program.

- a smooth, well run interface between police and city agencies in the management of both computer time and software development projects. In

contrast with Kansas City and Miami, Los Angeles has shared its development program with city agencies. Yet, the LAPD management information systems are just as successful as other cities that have kept control over the development process within the police jurisdiction.

- an environment of rational resource allocation to MIS development. Before LAPD can develop a new system or component of its MIS, it must cost-justify this development process with the city administration. This procedure requires a high level of discipline from the entire development program. Canadian police officers can learn much from this process.

D. Dallas, Texas

On November 3 and 4, 1976, we visited the City of Dallas Police Department. Mr. C.D. Bellamy, Director of the Data Processing Division, was our primary contact. We toured many of the areas which are directly involved as users of the data processing systems. These include

Communications, Reporting Division, Planning and Research, and Crime Analysis.

1. The Jurisdiction

The City of Dallas is located in the northern part of the State of Texas and is within the larger urban area of Dallas County. The department patrols a total area of 340 square miles with a population of just under 900,000 people. In 1975, the City of Dallas Police Department had approximately 2,000 sworn officers and 500 civilian employees. The total operating budget of 1975 was about $35 million.

The City of Dallas is characterized by a high crime rate relative to other police departments visited in the United States and most major cities in Canada. Dallas had 245 reported murders in 1975. For the same year, Metropolitan Toronto - with a population of 2.5 million people - had 94 reported murders. The per capita murder rate for Dallas was almost ten times that for Toronto. The City of Dallas has experienced a significant reduction in population as a result of the move to the surrounding suburban and ex-urban areas. This situation has led to a significant

increase in crime rates over the years. The systems which are described below reflect the operational problems involved in coping with high crime rates.

2. System Development Background

In 1967, the International Association of Chiefs of Police conducted a survey of methods to improve the administration and operations of the City of Dallas Police Department. The project staff encountered difficulty in obtaining data related to the distribution of workloads. It was discovered that the configuration of basic reporting areas and beats was not sufficiently detailed. The IACP project staff developed a preliminary version of an atom map defining 980 reporting areas across the city. In addition, the IACP study recognized the need to develop systems capable of giving management the type of information required to make basic decisions about where crime is happening and how much of what type of resources are required.

The first major development project subsequent to the IACP study involved the development of a compre-

hensive geo-coding scheme. This provided the foundation for all subsequent systems development.

3. The Systems

The Computer Assisted Dispatch (CAD) application is the heart of the Dallas Police Department processing systems. The approach taken by Dallas is unique among the departments reviewed and visited in the United States. None of the other departments began their MIS with the development of CAD. In fact, San Diego was the only other department with an operational CAD system. Miami, Los Angeles and Kansas City are developing or planning to develop CAD systems.

Dallas has developed a totally integrated approach to the capture and retrieval of raw field data. The data entry operation begins at the time a complaint clerk receives a call for service. A record of the "case" is created. More data is added to the "case" as more things happen to affect the status of this "case". The dispatcher sends a patrol unit to serve

the call. The patrol unit signifies that it has arrived, and so on, until the reporting officer submits his report. The unique feature of the Dallas system is the fact that on-line, real time status of any active case can be retrieved from the system at any time throughout this cycle of events.

Since the CAD system was rendered operational in 1970, other components have been added, including the following:

- Offence Reporting; a facility for capturing and reporting summary data related to reported calls for service.

- Police Management Information System (PMIS); a facility for generating statistical reports which reflect what types of crimes are occurring, in various areas of the city.

- Police Personnel Locator System; a facility for maintaining and providing access to personnel records for civilian and sworn officers. Regular personnel and assignment reports are generated by this system.

- Automated Vitae System; a system which complements the Police Personnel Locator System. This system has three major files including:

  .. Position Identification - a listing of all positions assigned to the department, the person currently assigned to that position and a history of the persons previously assigned to that position.

  .. Departmental History - a listing of recruit, academy class, and assignment and leave information.

  .. Personnel Information - a listing of biographical, educational, military and safety data for each employee.

- Property Identification System; a facility for registering identified property for interested citizens.

- Moving Traffic Citation System; a facility developed by the Dallas Court Department whereby police department personnel enter data on moving

violations into the central system via on-line keyboard terminals.

The Dallas Police Department uses the City of Dallas data processing facilities, and the systems were developed primarily by the city's data processing personnel.

4. Future Developments

In Dallas, plans exist for major systems development in three areas. These are:

- an Automated Property Recovery and Identification System (APRIS),
- a Direct Entry Field Reporting System (DEFR),
- an Automatic Vehicle Monitoring System (AVM).

The main thrust of future development efforts continues to be in the direction of more and better systems at the operational level as compared to the statistical and management reporting level.

The Proposed Property System (APRIS) will provide a tool for controlling the collection and disposition of items of property. APRIS will consist of centralized on-line files which contain detailed descriptions of the following types of articles: lost, found, pawned, stolen (as reported), protective custody, recovered stolen, and impounded vehicles.

APRIS will be linked to existing files containing offence and suspect information. Users in the Criminal Investigation Division will enter all data and make inquiries related to property using on-line terminals located throughout the various sections. Patrol officers in the field will be able to make inquiries through the dispatchers.

The proposed Direct Entry Field Reporting System (DEFR) will provide a facility whereby patrol officers in the field will be able to call in their reports by telephoning terminal operators who will enter pertinent data into the system via on-line terminals. The main benefits will be a significant reduction in paper work for field officers, and faster turn-around on critical field information. CID officers will have access to the reports within minutes instead of

several hours. Other important advantages will be a significant improvement in the quality of information, and a reduction in the amount of lost field data.

The Dallas Police Department is currently conducting an experiment in one district involving the use of automatic vehicle monitoring (AVM) technology. The proposed system will provide a two-way digital communication facility between the dispatchers and all patrol units in the field. Dispatchers will have access to CRT display screens which will indicate the location of all units superimposed on a map of the patrol districts. It is expected that AVM will offer a number of operational advantages. These include:

- better dispatch decisions by dispatchers because of more accurate and up-to-date patrol unit location information.

- reduction in the dispatchers' load of routine voice messages involving, primarily, unit status reporting.

- a significant increase in patrol officer safety because of in-car and out-of-car emergency signal features and the visual representation of vehicle location in the communications room,

- an improved operational management because of the ability to monitor planned versus actual deployment tactics.

In the future, it is expected that the AVM system will be expanded and integrated into the existing CAD system in Dallas. However, the decision to proceed with a full scale implementation of AVM technology will only be made after a thorough evaluation of the technology and the many options available.

5. Relevance for Canadian Police Departments

The Dallas police MIS is not as advanced as that of Miami or Kansas City. Yet, it provides important lessons for Canadian police interested in developing management systems.

First, the Dallas MIS development illustrates

the U.S. preoccupation with violent crime and officer safety. The system is oriented entirely to Computer-Assisted Dispatch. Its operating characteristics emphasize rapid response time and centralized command and control over patrol acitivities. A visit to the Dallas Police Department communications centre can provide insight into U.S. police tactical preoccupations. A plethora of computer equipment is arrayed to assist dispatchers with patrol deployment. The emphasis is on tactical response to violent criminal activities; over one hour during our visit, we observed the communications centre responding to two bank robberies.

Second, the Dallas experience illustrates that a total information system can be built around computer assisted dispatch. That is, the basic control over field information begins with call for service information which is input into the MIS through CAD. This is the intention of the Miami system, although it has not yet been fully implemented. The Dallas system, since it is reasonably mature, and operates successfully, proves that the "CAD approach" will work.

E. San Diego, California

We visited the City of San Diego Police Department on November 11, 1976. The Assistant Chief of the Support Services Bureau was our primary contact in the department. We carried out extensive interviews with officers in the Research and Analysis section and toured the communication centre in order to view the operation of the Computer Aided Dispatch facility.

1. The Jurisdiction

The City of San Diego is located on the California coast, adjacent to the Mexican border. The San Diego Police Department is one of several law enforcement agencies located in the County of San Diego. The land area patrolled by the San Diego Police Department is non-contiguous. The lower third of the area is patrolled by two other law enforcement agencies. This partitioning of the land area creates some unique problems involving patrol zone design and manpower allocation.

In 1975, the City of San Diego Police Department

consisted of 965 sworn officers and 275 civilian personnel, serving a population of approximately 800,000 people.

Compared to the other departments visited in the United States, San Diego has the lowest number of sworn officers per capita by a wide margin. The crime rate involving Part I (or Index) crimes is comparable to that of Los Angeles.

2. Background on Systems Development

Systems development efforts in the San Diego Police Department began in 1968. The early years of the systems development were dominated by an emphasis on the development of an elaborate command and control centre. This centre was conceived with the notion that computer-aided dispatch (CAD), automatic vehicle locators (AVL), in-car terminals and sophisticated communications technology were an essential first component of an over-all information processing system. Clearly, the proposed technology was innovative, if not in advance of the state of the art at that time. In 1972, the development of the proposed command and control centre was halted.

Subsequently, the department shifted its attention from the "ultimate" command and control centre to other vital areas of need. During our visit, we were able to identify four major system applications which have been developed to date. These were:

(a) On-Line Inquiry

The on-line inquiry system provides remote access, via keyboard terminals located throughout the department, to three different data bases containing wants and warrants - Local, CLETS and NCIC. The basic functions involved in this application are similar to the wants/warrants systems developed in the other police departments visited. To a very large extent, CPIC provides the Canadian police departments with similar capabilities.

(b) Property System

The property system provides the facility to register all stolen, wanted and pawned articles which can be identified with a unique serial number.

(c) Computer-Aided Dispatch System

The computer-aided dispatch (CAD) system has been operational since mid-1975. The main features of this system include:

- on-line entry of calls for service,
- automatic assignment of priorities to calls,
- status boxes in each patrol unit,
- automatic indication of the closest available patrol unit to the scene of the call,
- interface to local wants/warrant system, CLETS and NCIC,
- stand alone hardware configuration of PDP11/38,
- backup CPU, and,
- record of each call for service recorded on tape for later processing.

The CAD system in the San Diego Police Department is substantially different from the one in the Dallas Police Department. In Dallas, the CAD system is an integral part of the over-all system. The dispatch record is the basic building block upon which all other reporting related to a specific incident is based. The CAD system in San Diego operates in a stand alone fashion. After the CAD system creates a dispatch record of a call for service, there is no further updating of that record.

(d) Patrol Management System

The patrol management system is used to assist in the deployment of manpower to patrol beats, based on the calls for service information generated by the CAD system. A variety of management and statistical reports are generated by the patrol management system including:

- calls for service by patrol unit,
- dispatch activity by watch, hour of day and day of week,
- patrol units dispatched by hour of day, day of week and unit number,
- calls for service by beat,
- beats ranked by workload hours in descending order,
- calls for service by hour of day, day of week within each beat,
- calls for service by hour of day, prioritized within each beat,
- calls for service by hour of day, day of week within census tract, and,

- calls for service by hour of day prioritized within census tract.

3. Future Developments - Project ARJIS

There are many gaps in the management information system capabilities within the San Diego Police Department. There is no automated processing of incident (occurrence) data, arrest information, personnel records, criminal history records, and field interrogation information. With the exception of the four application areas mentioned above, there is a proliferation of undocumented procedures involving fragmented files, uncontrolled reports and input forms. There is a total absence of an analytical reporting capability. In response to this recognized problem, the San Diego Police Department is currently involved in a major effort to upgrade its information processing capabilities.

The City of San Diego Police Department has received a grant through the Office of Criminal Justice Planning of the State of California to develop the law enforcement component of an Automated Justice Information System (ARJIS). This system will allow the exchange of information among the various law enforcement agencies within the County of San Diego via keyboard terminals.

The law enforcement component of the proposed system will consist of the following nine applications:

(a) Field Interrogation

The Field Interrogation system will provide an on-line capability for users to have access to the information contained in the Field Interrogation Reports. The system will significantly reduce the delays (currently about five days) in processing the field interview data. The information contained on file will be indexed to allow several methods of access including:

- name of individual (s),
- location of interview,
- officer(s) involved in the interview, and,
- time and date.

(b) Arrest

The arrest system will allow the department to consolidate all arrest information. The present manual system is plagued with problems associated with the maintenance and access of a large number of separate and fragmented files. The proposed system should limit the time required by police department personnel to file and control arrest information. This system will be interfaced with the local Wants/Warrants system. CLETS, NCIC and a proposed Prosecutor Management Information System which is being developed as part of the over-all ARJIS project.

(c) Property Control

The proposed Property Control application will involve the modification of the existing property system to include:

- the control and disposal of impounded property,
- the registration of property including firearms and bicycles,
- the control of departmental stores inventory, and,
- the expansion of the existing reporting capabilities associated with wanted and pawned property.

(d) Automated Case Information

The Automated Case Information application will provide users with a facile method of storing and providing access to information on all criminal incidents. Interfaces will be built to connect the incident data with the corresponding criminal history, arrest and property data bases. In order to eliminate the duplication of data entry, an interface to CLETS will be developed.

(e) Automated Worthless Document Index

The Automated Worthless Document Index system will provide the means of access to all available information concerning individual fraud cases. The index will link all fraud incidents to the various data bases, including criminal history, arrest, incident and property. It is similar to the Worthless Document system developed by the LAPD.

(f) Personnel

The Personnel system will provide a tool for scheduling, assigning and tracking personnel in the department. In addition, it will produce management

reports reflecting the level of education, special training, skills, attrition rates, etc.

(g) Master Operations Index

The Master Operations Index will provide the users with the capability to perform single entry name checks on individuals. The index will reference each occurrence of a name in the incident, property, personnel, case, criminal history, arrest, and interrogation files. The index will also indicate how the name is known to the department (i.e., victim, witnesses, suspect arrestee, finder, loser, associate, etc.). The Master Operations Index will also have a SOUNDEX capability whereby sound-alike names will be searched and displayed for each inquiry. At the present time, there is no automated or manual index available in the San Diego Police Department.

(h) Automated Crime Analysis

The Automated Crime Analysis system will provide the capability to produce reports reflecting the incidence of crime indexed by a host of variables including beat, shift, time of day, day of week, census tract, and type of crime.

(i) Automated Manpower Resource Allocation

The Automated Manpower Resource Allocation system will be an operational planning tool which will produce projections of workloads and resource requirements based on crime and calls for service data. This

is similar to the ADAM system of the LAPD and the Computerized Resource Allocation System at Kansas City.

4. Computer Power

San Diego's MIS systems are being developed for operation on in-house computer equipment. PDP mini-computers have been designated as the main frame hardware. See our write-up of the Miami systems for a more comprehensive description of this type of configuration.

5. Relevance of the San Diego MIS Program to Canadian Police Departments

San Diego represents "the other side of the coin" compared to Kansas City and Los Angeles. In these jurisdictions, MIS was built slowly, at a rate consistent with the police department's capacity to absorb and manage technological change. This was not the case in San Diego.

San Diego began its development process with state of the art, and somewhat unproved, technology. In 1968, Automatic Vehicle Locator and Computer Assisted Dispatch technology was not developed to a complete and tested level of sophistication. San Diego paid the expensive lesson of the "innovator" in this area.

The overwhelming emphasis in the early development program at San Diego was on command and control.

There was no interface between CAD and operating (field level) information systems. By contrast, in Dallas, the CAD is completely integrated with the over-all information system. As a result, CAD is an expensive mechanism in San Diego; only recently is effort being applied to the development of an over-all MIS system.

There are many lessons for Canadians arising from this experience. In fact, a major reason for Volume IV of this study arises from the reaction to the San Diego experience. In Volume IV we emphasize the need for significant advance planning on the precise nature of the required MIS before investment in hardware and software is contemplated. At the same time, we advocate that CAD should be incorporated into police MIS, late in the development stage. Before then the department should have in place an operating system which is capable of storing and creating operational information for the management of more important police functions.

CHAPTER V

COMMITMENT TO MANAGEMENT INFORMATION SYSTEMS IN THE UNITED STATES

In the United States, the responsibility for preventing and reducing crime rests with the state and local governments and they devote most of the manpower and resources dedicated to this purpose. For example, in 1973, 87.4 per cent of total criminal justice expenditures originated with state and local governments. In the police sector, 70.9 per cent of the expenditures were funded by local governments alone.

Since 1968, however, state and local crime prevention activities have been supplemented through Federal financial assistance provided by the Law Enforcement Assistance Administration. LEAA has spent over $5.1 billion from 1969 to 1976, and recent legislation has allocated $5.4 billion for LEAA programs over the next five years. Note, however, that LEAA accounts for just over 5 per cent of all expenditures in Law enforcement in the U.S.

Despite the limited extent of LEAA expenditures, relative to the total (more than $15 billion - 1977), we believe that LEAA has had a profound, perhaps fundamental, influence on the course of MIS development in the United States. Accordingly, in this chapter on U.S. "commitment" to MIS, a major emphasis is on the role of LEAA. This role is described in the first section of the chapter. Following that, we describe the commitment to MIS by local police departments. It is interesting to note that our statistics on local MIS developments were gathered from LEAA source documents, in the absence of LEAA we would know very little about MIS developments in the U.S.

A. The Law Enforcement Assistance Administration: The Federal Commitment

LEAA was created by Congress in the Omnibus Crime Control and Safe Street Act of 1968. Some of LEAA's major contributions are:

- new ideas; LEAA has acted as a stimulant, promoter and propagandist of innovative concepts for the management of all sectors in the criminal justice system.

- a risk buffer on new technology; new technology in any institutional sector like policing has major risks associated with it. Failure can be very expensive, in terms of direct monetary outlays or various forms of public stigma. LEAA has acted as a risk buffer by both absorbing many of the costs of technological innovations and making expertise available through advisors and consulting staff.

- a medium for interface between elements of the criminal justice system; much of the LEAA funding has gone into:
  .. support for state planning agencies to co-ordinate state level criminal justice activities, and,
  .. conferences and other media for disseminating information about management innovations which are taking place in the criminal justice system.

The U.S. criminal justice system in the early 1960s, was characterized by very little cross-fertilization of ideas. LEAA has made a major contribution to creation of the current, open environment.

1. LEAA Programs: Major Accomplishments

Virtually every state and locality in the United States has felt some impact from LEAA's programs. Tens of thousands of programs and projects have been funded with LEAA funds, hundreds of institutions allowed to develop, and millions of hours utilized for solutions to the crime problem and to improving criminal justice. It is impossible to describe these activities in the few pages that we devote to LEAA. Accordingly, we briefly describe the major accomplishments of LEAA in the areas of: Information; Planning Standards and Goals; Reseach; and, Police Activities.

(a) Information

The National Criminal Justice Information and Statistics Service (NCJISS) is an LEAA service which has committed millions to statistical studies to draw a better picture of crime, the number of jails and prisons, and a wealth of other information never before available. Enormous deficiencies have been revealed and much information has been provided to enable more accurate assessment of existing institutions in the U.S.

The National Crime Panel Survey of Victimization, a long range $12 million per year program, obtains statistical data about the amount of crime, trends, and the nature of crime, its costs, the characteristics of victims and the relationships between victims and offenders. The Bureau of Census conducts the survey while LEAA provides funds for the entire effort. The results have been surprising. For example, rape, robbery, aggravated assault and burglary have been shown to have rates two times higher than reported to the police. The results of the surveys will have long-range implications for all law enforcement agencies.

Ten years ago, only 10 states had state-level information systems which could provide information on offenders and statistics which could describe the administration of justice. Today, all 50 states have developed such a capability. These capabilities have largely been developed through LEAA grants to set up State Planning Agencies.

Information on what works and does not work in crime reduction is becoming available. The National Institute of Law Enforcement and Criminal Justice (NILECJ) has conducted extensive evaluations of programs and has widely distributed this information. The institute has developed new and better equipment and techniques to make police and criminal justice work safer and more efficient.

The National Criminal Justice Reference Service (NCJRS) provides more than 36,000 registered users with documents, information and reference services.

From September 1972 to 1975, the service has disseminated about 1.5 million LEAA documents. In 1975, there were 12,000 documents in the data base and new documents were being received at the rate of 500 per month.

(b) Planning Standards and Goals

The National Advisory Commission of Criminal Justice Standards and Goals supported by LEAA, has produced a detailed blueprint for crime control. The two-year study of the criminal justice system has produced six reports with 400 recommendations, including minimum requirements for physical and human resources, and administrative structures and strategies.

Although LEAA has not endorsed any of the Commission's recommendations, believing that each state must decide which standards and goals are most appropriate and will work the best, it has encouraged a study of the recommendations and has awarded more than $16 million to finance state-wide standard setting programs. Phase II of the program, launched in 1975, set task forces to study the private security industry, criminal justice research and development, and civil disorder and terrorism.

(c) Research

LEAA Sponsored two institutes, the National Institute of Law Enforcement and Criminal Justice (NILECJ) and the National Institute for Juvenile Justice and Delinquency Prevention (NIJJDP). Both institutes are

responsible for fashioning innovative programs, evaluating them and other similar efforts and promoting national use of successful programs. NILECJ is interested in general crime patterns and in the functioning of police, courts and corrections systems; NIJJDP concentrates on youth crime and juvenile justice problems.

LEAA emphasizes their responsibility for ensuring that knowledge acquired through research or project experience is made available to the law enforcement and criminal justice community. LEAA has a "Technology Transfer" program complementing its research effort. It works through:

- Exemplary Projects; operating manuals providing special information and training materials;

- Prescriptive Packages; a publication series which synthesizes the best available knowledge and operating experience in selected areas of criminal justice administration;

- National Training Program; short, intensive workshops to acquaint key officials of major criminal justice agencies with the most promising techniques developed through research and field experience;

- Demonstration Program; supports the implementation in selected communities of the most outstanding new criminal justice management and operations concepts from the training program;

- NCJRS; for the distribution of all published material on all criminal justice developments to more than 36,000 registered users.

SEARCH (System for Electronic Analysis and Retrieval of Criminal Histories) represents the first major effort funded by LEAA that emphasized cooperation between federal and state governments. SEARCH was created to develop a uniform format for recording criminal histories that could be used by police, courts and corrections at all levels of government. It is now a non-profit, 50-state consortium and has successfully developed other programs. They are far-ranging in scope, including and inter-state organized crime index system which provides information on known criminals, the offender-based transaction statistics system and the original standardized crime reporting system.

(d) Police Activities

In 1974, 27 per cent of all LEAA funds were spent on upgrading the ability of the police to control crime and to perform effectively.

During 1975, more than 1,700 police agencies received assistance in the areas of crime prevention training, operational assistance, manpower allocation surveys, bomb handling investigation and 300 other courses and categories of technical aid. More than 3,000 law enforcement officers, from patrol officers to sheriffs and police commanders, have received direct technical assistance from the $5 million of

programs developed and implemented by the Police Division.

LEAA police programs reflect legislative directions. Police/citizen cooperation is a major priority. Programs reinforce this priority by emphasizing:

- effective, efficient police services, i.e., prompt police response to calls for service, professional attitudes towards police work;

- team or geographic policing, i.e., assigning patrol officers permanently to an area, allowing them to form close ties with the community;

- representative recruiting, i.e., reflection of the ethnic make-up of a community in the personnel roster of the force;

- training of policemen in community relations problems and in crisis intervention;

- police and community crime prevention programs that cause police and citizens to work together, i.e., environmental design projects with police working closely to develop appropriate policing techniques for the revised community;

- support of the National Association of Police/ Community Relations Officers through administrative and funding assistance;

- production and distribution of National Institute

prescriptive packages such as:

.. Improving Police/Community Relations, and,
.. Community Involvement in Police Activities.

From 1972 to 1975, LEAA spent some $160 million to finance the High Impact Anticrime Program in eight cities. The goals were to reduce burglary and street crime by 5 per cent in two years and 20 per cent in five years, and to demonstrate the effectiveness of crime specific planning as a means of reducing crime. Common program components were:

- public education projects to inform citizens of how to protect themselves and their property;

- expanded police patrols, better trained with improved equipment to improve response time;

- projects to process street crime and burglary cases faster and more efficiently in courts;

- rehabilitation of target offenders, especially juveniles and narcotics addicts.

Evaluation showed that crime oriented planning is essential to good programs. A number of individual projects had success. Denver reduced burglary by 25 per cent in a high crime area through a "marking of valuables" program. A St. Louis foot patrol project helped reduce residential burgalry 35 per cent in their target area.

Police research is another major priority area for LEAA. NILECJ, through sponsorship of innovative research in the police sector, has and is producing insights into more effective allocation of police resources. It has been responsible for hundreds of projects.

An ongoing NILECJ project in the Kansas City Police Department examines a traditional assumption: that the speed with which officers appear at the scene is a critical factor in apprehending offenders. The findings suggest that the greatest delay occurs between the time an offence is committed and the time the complaint is lodged. Thus it may well be that response time is critical only for crimes in progress or in cases of personal injury and that other calls for service could be deferred without impairing effectiveness. This study will be completed in 1977.

In Wilmington, Delaware, an experiment in Split Force Patrol wherein one part of the patrol responds only to complaints and calls for service (no preventative patrol activity) and the other is responsible only for preventative patrol, may suggest a more efficient method of patrol deployment. One important by-product will be the development of a direct or planned approach to preventative patrol, instead of leaving the strategy to the discretion of individual officers.

A number of other projects examine traditional notions of police operations with a view to challenging conventional wisdom and proposing new techniques which

improve productivity:

- Neighbourhood Team Policing is an experiment which combines the specialized equipment of large departments with the more personal police-community contact services of the small department.

- Specialized Patrol Operations assesses patrol strategies such as plain-clothes, tactical and suspect-oriented patrol units.

- Traditional Preventive Patrol studies the effectiveness of traditional preventive patrol and the suitability of varying kinds of neighbourhoods for different patrol forms, citizen perception and acceptance of traditional patrol forms, officer perception of his and her role and discretion, and efforts to concentrate the service function of patrol officers.

- Crime Analysis addresses the critical patrol support function to increase understanding of crime, to predict probable future occurrences of crime and to develop crime-specific operational responses. An example is pin map plotting to computerize analysis and models.

The Institute is evaluating a new body armour for law officers made of a cloth-like synthetic fibre called Revlan. The evaluation involves more than 3,000 policemen in 15 communities. The lightweight armour has been proven to stop most hand-gun bullets

fired from 15 feet from guns as powerful as the .38 calibre police special. It is now being tested for comfort when worn for a full work day, its adaptability to temperature extremes, its durability, and the psychological effect it has on the officer wearing it.

B. Investments in Management Information Systems for Local Police Forces

LEAA has made a major contribution to the development of new technology in the criminal justice sector of the United States. We now examine the nature of this contribution in the area of police MIS. We examine the extent to which U.S. municipal police forces have invested in MIS, the LEAA contribution, and the type of information systems developed.

Our statistical source for this section of our report is an LEAA document intitled - 1976 Directory of Automated Criminal Justice Information Systems, Volume I. This is an up-to-date report on "MIS resources" in criminal justice agencies in the United States. The report contains no summaries; rather, it describes MIS resources on an agency-by-agency basis. We created a summary of the information by setting up a computer file with abstract information on each agency described by the LEAA document and computing the summary statistics ourselves.

1. Level of Investment and LEAA Contribution

Table V-1 contains a summary of data on U.S. police management information systems extracted from the LEAA document. We analyzed only the data on local police departments. We further separated the information to enable an analysis of investment by "population served" by the police department.

One hundred and sixty "local" police departments in the United States reported the existence of a management information system. Of these, 24 police departments were in jurisdictions serving over one million people. The average development cost, for all police departments responding to the survey, was approximately $1.2 million. By size of police force, development costs varied between $190,000 for jurisdictions of under 100,000 to $3.4 million in police forces serving over one million people.

Annual operating costs varied between $60,000 for the small police departments, to $1.5 million for the largest police forces. Expressed as a percentage of development cost, the annual operating costs varied from 27 per cent in police forces serving between 100,000 and 250,000 population, to 44 per cent in police forces serving over one million population.

LEAA plays a major role in the development of MIS. Our data show that LEAA has funded approximately 34 per cent of the total development costs associated with MIS in the 160 police forces surveyed.

Finally, we analyzed development and operating costs on a per capita basis. As would be expected, smaller police forces had larger per capita development and operating costs. In the "under 100,00 jurisdictions, per capita development costs were $3.81 and operating costs were $1.20. For the police forces serving over one million population, the per capita development costs were $1.69 and operating costs were $0.75.

Our LEAA source document did not contain information on the budgets of the police departments responding to the MIS survey. Therefore, we cannot get an accurate estimate of the internal commitment to MIS by these police forces. However, if we attribute budget information from police forces of different sizes to the data on Table V-1, we can get a rough measure of budgetary commitment to MIS. To do this, we extracted statistics on "total police costs per capita" for Kansas City and Los Angeles and used these to compute "proportion of budget" devoted to MIS purposes for cities of that size. If the Kansas City and the Los Angeles police budgets are representative of police expenditures in cities of their size, then the survey data suggest that cities of approximately 500,000 population are investing 1.6 per cent of the total police budget in MIS, and cities of over one million population are investing approximately 1.2 per cent of the police budget on MIS.

Finally, our data confirm that LEAA is underwriting a large portion of the development of the police MIS. This is particularly true for smaller

police forces. For cities of under 500,000, LEAA has shared between 50 per cent and 38 per cent of the total development costs. Nevertheless, LEAA is by no means acting as the only stimulant for police MIS development. Police forces themselves are obviously making a major commitment to MIS. They are not only paying over 50 per cent of the total development costs, but they are maintaining significant annual operating costs without any LEAA support.

2. Types of Systems Developed in U.S. Police Forces

One of the items of information which we abstracted from the LEAA Directory is the type of "systems function" represented by the management information systems within the police forces. This provides a general description of the purposes of these information systems relative to police operations. Because of the way that information was outlined in the Directory we had to use existing system function designations. There were 42 system function designations utilized. Table V-2 describes the frequency of occurrence of these 42 functions in the 160 municipal police forces which responded to the survey.

Information on Table V-2 is self-explanatory. We will interpret only the highlights. These include:

- A major emphasis on field reporting; over 73 per cent of the surveyed police forces had instituted an automated activity reporting system. In addition, 69 per cent had an arrest reporting system and a large proportion of the forces had

other types of systems such as warrant control, stolen property, criminal history, and alphabetic index systems to support field officers.

- An emphasis on communications support systems; virtually all of the police departments surveyed reported a message switching, on-line inquiry or mobile digital terminal application. To a large extent, the emphasis on this systems function in U.S. police forces arises from the need for local command and control capacity. In addition, 28 per cent of the departments reported computer-assisted dispatch functions.

- An interest in tactical and strategic planning; systems functions which support tactical and strategic planning include: crime trend analysis, planning, research/statistics, resource allocation, simulation modeling and geoprocessing. The large number of police departments reporting developments in this area suggest a major emphasis on planning.

One additional characteristic of the information on Table V-2 is of interest to Canadian readers. Many of the systems functions reported as developed by municipal police forces in the United States already exist in Canada as a utility provided by the RCMP. This includes the following functions: on-line inquiry, criminal history, stolen property, warrants/wanted persons, and, to some extent, message switching. The absence of comprehensive information facilities, such as the Canadian Police Information

Centre which exists in Ottawa for the use of all police agencies in Canada, is a major stimulant for MIS development in the U.S.

Finally, we were surprised at the relative availability of both Command and Control and Computer Assisted Dispatch systems among American police forces. In total, 62 of the 160 police forces surveyed claimed to have implemented one of these systems functions. Obviously, a number of smaller police departments implemented either Command and Control, or Computer Assisted Dispatch systems. Yet, they are highly expensive in both hardware and maintenance costs. This confirms our earlier opinion that crime conditions in the United States support the need for information systems designed primarily to promote officer safety; during our field visits to U.S. jurisdictions (see Chapter IV) many officers stated that the major advantage of CAD is "improved officer safety".

APPENDIX A: NORTH RICHLAND HILLS, TEXAS

A. The Jurisdiction

The City of North Richland Hills is a small ex-urban community situated in the north central part of Texas between Dallas and Fort Worth. The police department consists of 25 sworn officers and nine civilians, serving a population of 25,000 people living in an area covering 19 square miles. The total annual operating budget is approximately $500,000. By all standards of measurement, the North Richland Hills Police Department is small.

B. System Development Background

Early in 1976, North Richland Hills was selected as one of nine small police departments in the north central region of Texas which were to be involved in the development of computer-based tools. LEAA funded the system development project costing over $200,000. The objectives of this project were to:

- identify the needs of these departments;

- specify and program one common set of applications;

- select one type of computer hardware suitable for all nine departments; and

- test and implement the systems.

During our visit to North Richland Hills, the first of eight application modules was demonstrated. All applications are targeted for completion by the end of 1977.

C. The Systems

The North Richland Hills system is designed to assist with the internal reporting needs of the department. The application modules include:

- calls-for-service
- offence reporting,
- jail arrest record,
- juvenile contact record,
- personnel record,
- persons suspect record,
- vehicle suspect record, and,
- witness record.

All of these appliccations modules are designed and programmed to run on a micro-computer system. The main features of this computer hardware include:

- keyboard,
- video screen,
- printer,
- dual diskette,
- tape cassette,
- micro-processor, and,
- communications link to NCIC

This micro-computer configuration is designed to serve both as a stand-alone internal data processing facility and a terminal for communicating with the NCIC system.

The eight applications modules are described below:

1. Calls-For-Service

This module accepts on-line input of data on each call-for-service, stores it on diskette and produces two different output (hardcopy) reports.

The "Daily Calls-For-Service Report" provides a listing of each recorded call-for-service in terms of:

- service number,
- complainant's name,
- type of call,
- time received,
- time dispatched,
- time arrived,
- time cleared,
- response time,
- total time,
- dispatch location,
- offence number,
- shift code,
- patrol zone,
- patrol unit code, and,
- officer badge number.

The second type of report is the "Monthly Radio Calls" summary. This report lists the number of calls-for-service for the month arrayed by hour of day within shift for each patrol zone and summarized by patrol districts. It was indicated that this monthly summary was particularly valuable. It has led directly to the redesign of patrol districts and zones in North Richland Hills and has greatly increased

the operating efficiency of the force.

2. Offence Reporting

This module accepts on-line data input from offence reports, stores the data on diskette and produces three hardcopy reports. The "Chief of Police Morning Report" is a summary of all indexed offences reported in terms of:

- daily total for the current data,
- month-to-date,
- last month-to-date,
- last year month-to-date,
- this year-to-date, and
- last year-to-date.

The second report produced by this module is the "Monthly Crime Summary". This report is a listing of the number of indexed offences, arrests, cases cleared, and cases suspended for each type of offence. The third type of report is the "Statistical Crime Report by Offence" which lists each type of criminal offence and the number of occurrences in each patrol district.

3. Jail Arrest Record

This module consists of a file containing a record for each booking incident, and produces a daily report on the arrests. A comprehensive set of data elements are contained on the file, including:

- name of arrested person,
- sex,
- date of birth,
- age,
- height,
- weight,
- colour of hair,
- colour of eyes,
- home address,
- criminal history number,
- location of arrest,
- arresting officer,
- date of arrest,
- time of arrest, and,
- charges.

The "Daily Jail Arrest" report is a listing of all arrested persons described in terms of the data elements listed above.

4. Juvenile Contact Record

The Juvenile Contact Record contains several data elements describing the juvenile and the nature of contact. These include:

- name of juvenile,
- sex,
- date of birth,
- height,
- weight,
- address,

- telephone number,
- name of parent or legal guardian,
- date of contact,
- time,
- type of contact,
- date of release, and,
- time.

The Juvenile Contact module provides a system whereby a comprehensive history of all juvenile encounters can be abstracted, input to the system, stored on a file, and retrieved as required.

5. Personnel Record

This module contains a file with a record of each employee and generates a police personnel report. The file contains the following types of information:

- name,
- rank,
- employee badge identification,
- address,
- home telephone number,
- emergency telephone number,
- sex,
- educational background,
- secondary occupation and skills,
- date of employment,
- date of rank,
- salary classification,
- division number, and,
- section number.

The "Police Personnel Report" is a summary listing of all employees on the file.

6. Persons Suspect Record

Data related to persons encountered during field observations are captured and stored on file. The types of data captured for each include:

- name,
- sex,
- date of birth,
- height,
- weight,
- colour of hair,
- colour of eyes,
- build, and,
- scars.

7. Vehicle Suspect Record

Vehicle related data encountered during field observations are captured and stored on file. The types of data captured for each incident include:

- licence number,
- licence year,
- licence date,
- make of vehicle,
- type of vehicle, and,
- vehicle colour code.

8. Witness Record

This last module provides a capability for capturing basic administrative information about witnesses. Each witness is described in terms of:

- name,
- sex,
- date of birth,
- address,
- telephone number,
- reporting officer, and,
- offence report number.

In view of the size of North Richland Hills, we were quite impressed by the potential of the system defined by these eight application modules. The major development costs of $15,000 are associated with the micro-computer/intelligent terminal configuration outlined above. Operating costs are minimal, mainly because all data entry, computer operations and data retrieval functions of the system are being managed with existing staff. The major data entry and retrieval functions are performed by the communications/dispatchers. The micro-computer is physically located in the communications room. The system maintenance functions are being managed by the planning and research officer. This person controls the files, the software updates, and the system documentation and procedures.

D. Relevance of the North Richland Hills Development for Canadian Police Departments

Simply stated, the systems development experiences of North Richland Hills clearly demonstrate that affordable

computer-based options exist for small police departments. In terms of the absolute numbers of departments (i.e., there are many more small departments with less than 50 employees), the North Richland Hills experience has important applications to U.S. and Canadian policing.

The success of the North Richland Hills systems is directly dependent on the arrival of micro-computer technology. This technology was introduced to the marketplace by computer hardware manufacturers within the last two years. The apparent sudden awareness of the potential of the "small business" market prompted many of these developments. Prior to micro-computer technology, most small businesses were forced to either purchase service on a time-shared basis from a service bureau or be satisfied with existing manual systems. Computers were just too expensive for the small user. Time-shared services tend to be expensive as well. The new micro-computer/intelligent terminal technology is targeted to the small user as an affordable option to manual processing.

Through the development of the eight application modules which comprise the system, the North Richland Hills experience demonstrates the feasibility of the application of the micro-computer technology to assist with the data processing in small police departments. Clearly, small Canadian police departments can benefit as a result of these experiences. These and other similar LEAA experiments should be closely monitored on behalf of Canadian police forces.

GLOSSARY OF TECHNICAL TERMS

ADMINISTRATION OF CRIMINAL JUSTICE (System of Criminal Justice): The inter-organizational relationships that exist between law enforcement, prosecution, adjudication, probation, corrections, and parole.

AUTOMATIC DATA PROCESSING (ADP): Denotes both electronic data processing (EDP) and electric accounting machinery (EAM).

BATCH INFORMATION PROCESSING: The function of providing data within some reasonable time, but not simultaneously with operations. This type of processing is frequently accomplished in an off-line mode. Off-line pertains to operating devices not under the direct control of the central processing unit. Batch processing can also operate in an on-line mode.

CATHODE RAY TUBE (CRT): A CRT is a visual display terminal used for inquiry into the memory of a computer system. The terminal consists of a keyboard, a signal generator-interpreter, a buffer, and a visual display screen similar to a television screen.

CENTRAL PROCESSING UNIT (CPU): The component of the computer that contains the main storage, arithmetic unit, and special registers. It is synonymous with Central Processor.

CODE: It is either a system of symbols for representing data or instructions in a computer or a tabulating machine, or it is the translating of a program for the solution of a problem on a given computer into a sequence of machine

GLOSSARY (continued)

language or pseudo instructions and addresses acceptable to that computer.

COMPUTER (Digital): An electronic device capable of accepting information and performing prescribed processes to the information and supplying the required results in micro-seconds.

DATA: Facts used as a source for processing a series of actions or operations directed toward an end; the raw material for the function of information processing.

DATA COMMONALITY: The identification and use of the same data element by more than one person or organization.

DATA FOUNDATION OR DATA BASE: File or files of information existing in permanent or semi-permanent storage, excluding transitory or impermanent information to be operated upon by the system or contributing to the operation of the system.

DECISION MAKING: An organizational strategy for mounting a collective response to a problem situation.

DISK: A storage device on which information is recorded on a magnetizable surface. The disks rotate at a high speed, providing rapid (random) access to information.

DRUM: A high-speed, rapid (random) access storage device consisting of a rotating drum coated with a magnetic material upon which data are stored.

GLOSSARY (continued)

ELECTRONIC DATA PROCESSING (EDP): The kind of automatic handling of information which is done by the million-operations-a-second electronic computer.

HARDWARE: Hardware is all of the mechanical, electrical, magnetic, and electronic components forming the equip-ment portion of an information system.

INFORMATION: Knowledge derived through the analysis of data.

INPUT: The acquisition of data and placement into the system.

INQUIRY (I/O): A device, generally a typewriter keyboard, used to "talk" to the computer, usually to get quick answers to random questions. Also, it may accept new data, send it into the computer for processing, receive the results, and convert them into a usable form.

INTEGRATED INFORMATION SYSTEM: Developing and coordinating the individual elements of a system so as to form a compatible over-all system configuration.

INTERFACE: The intersection or common boundary of two or more logical or physical entities. In the context of this report, to interface two systems or effects is to integrate and coordinate the specific systems or efforts such that the results can be combined to provide a unified solution.

MAGNETIC TAPE: A ribbon of tape impregnated or coated with a magnetic material upon which data may be stored as magne-tically polarized spots or wave forms.

GLOSSARY (continued)

MODEL BUILDING: The abstract construction of an ideal state of affairs which usually acts as a guide for subsequent design, development, and implementation of the concept.

OPTICAL SCANNER: A computer input device that recognizes many characters and digits by optical scanning.

OUTPUT: To present the results of the processing or the status of any data stored in the system.

PAPER TAPE: A ribbon-like strip of paper, one inch or less in width, used as a means of recording data in the form of coded perforations.

PROCESSING (of either information or data): To manipulate data according to the specified rules.

PROGRAM: A series of instructions which cause a data-processing system to process a specific application.

PUNCHED CARD: A punched card is a card of standard size and shape in which data are stored in the form of punched holes. The hole locations are arranged in 80 or 90 columns with a given pattern of holes in a column representing one alphanumeric character or one digit. The data is read by mechanical, electrical, or photo-electrical sensing of the hole position.

RAPID ACCESS (Random): Pertaining to the process of obtaining information from or placing information into storage where the time required for the access is independent of the information most recently obtained or placed in storage.

GLOSSARY (continued)

This type of process is capable of operating at extremely fast speeds.

REAL-TIME, ON-LINE INFORMATION PROCESSING: Real-time means the processing of information in a sufficiently rapid manner so that the results are available in time to influence the process being monitored or controlled. It is sufficiently fast that there is virtually no passage of time between inquiry and result. On-line pertains to operating devices under the direct control of the central processing unit.

RETRIEVAL: The recovering of desired information or data from a collection of documents or other graphic records.

SIMULATION: This is an exercise which generally uses a computer as a scorekeeper while people make decisions concerning a mathematical model of the business world. The model consists of a group of cause-and-effect formulas that determine what happens when a decision is made by a human competitor.

SOFTWARE: Software includes design documentation, computer programs and their supporting description documentation for operational and support functions, operator methods and procedures handbooks, orientation materials, and system exercising and training materials.

SYSTEM: A set of components and their attributes interrelated by process or structure possessing a functional purpose and organizational unity. Depending on the context it

GLOSSARY (continued)

may be either an organization or a set of informational relationships.

SYSTEM ANALYSIS: A specialized method of subdividing an integrated complex into its more basic parts in order to examine each component's use and relationship to other components. This process requires ascertaining some relatable denominator as quantitative value.

SUBSYSTEM: A subdivision of a system; a system contained within a system.

END