

## Report

A STUDY OF  
THE CONNECTICUT  
JUDICIAL DEPARTMENT'S  
COMPUTER OPTIONS



National Center for State Courts

649067

## Northeastern Regional Office

### A STUDY OF THE CONNECTICUT JUDICIAL DEPARTMENT'S COMPUTER OPTIONS

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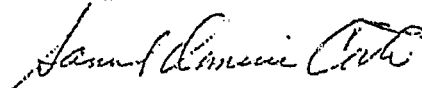
Mr. Joseph Keefe  
Executive Secretary  
Connecticut Supreme Court  
Hartford, Connecticut 06101

Dear Mr. Keefe:

We are pleased to transmit to you A Study of the Connecticut Judicial Department's Computer Options. We have attempted to outline not only the present computer options open to the Connecticut Judicial Department, given your current level of operations, but, more importantly, to provide tools so that your office can continually analyze these options.

Your cooperation and that of your staff during the conduct of the study has been very much appreciated. If we can be of any further assistance in this area, please call on us.

Very truly yours,



Samuel Domenic Conti  
Regional Director

SDC/jh

Enclosure

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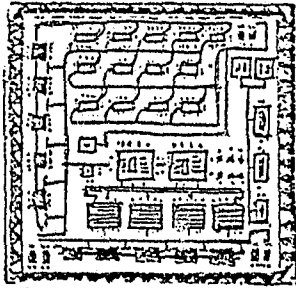
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"The impact of computers on  
bureaucratic structure is potentially  
comparable to the impact of mass  
production on industrial organization."

The above quote is from Kenneth C.  
Laudon's book, *Computers and Bureaucratic  
Reform*, published by John Wiley and Sons  
(New York) in 1974.



*Illustrated on this page and on other section cover pages in this report is a computer developed by the Teledyne Systems Company, Inc. This computer, which is approximately the same size as our representations (2 inches square), is sold for \$1,295 and contains over 100,000 transistors.*

*A photograph of this computer appeared on the cover of the May, 1975 edition of the Scientific American. Complete credits and a more detailed description of this computer are in Appendix VIII.*

## Summary

## INTRODUCTION (Section 1.0)

Should the Connecticut Judicial Department (CJD) continue renting computer time from the Connecticut State Data Center? Should the CJD purchase a computer? What other courses of action are available to the CJD? What type of organizational structure and management tools are needed by the CJD to analyze its current and future computer needs? These questions, and like ones relative to the evaluation of the CJD's Computer options, are analyzed and answered in this report.

Clearly, it is an appropriate time for such a study as both the CJD's use of automated information processing systems and the cost of these systems has increased dramatically in a short period of time. In 1969, the CJD's sole use of computing equipment was the operation of an electric accounting machine for compiling statistics; today, four computer systems - civil, criminal, jury and juvenile - serve the Connecticut courts. In contrast to automatic information processing costs of less than \$50,000 in 1969, 1974 costs were \$1,540,000.

In order to address both the immediate and long-term computer options of the CJD, equal stress has been placed

on the managerial and technical aspects of the problem.

This balance is reflected in the report format.

- In THE STATE OF AUTOMATED INFORMATION PROCESSING IN THE CONNECTICUT COURTS (Section 2.0), the organization of the CJD's data processing personnel and their information processing goals are described; then the CJD's existing computer systems are documented.

- Because the swiftly changing world of information technology often impacts of computer decisions, an ASSESSMENT OF INFORMATION TECHNOLOGY (Section 3.0) is made.

- In THE ANALYSIS OF THE CONNECTICUT JUDICIAL DEPARTMENT'S AUTOMATED INFORMATION PROCESSING OPTIONS (Section 4.0), the CJD's computer options are listed and analyzed; then recommendations are made.

- In PLANNING COMPUTER SYSTEMS IN THE CONNECTICUT JUDICIAL DEPARTMENT (Section 5.0), a number of planning techniques are compared, one of which is then recommended for use by the Executive Secretary's office.

#### THE STATE OF AUTOMATED INFORMATION PROCESSING IN THE CONNECTICUT COURTS (Section 2.0)

##### Organizational Structure

Because the administrative functions of the county governments in Connecticut have been abolished, many government operations are centralized in Hartford. The administrative arm of the Connecticut courts is no exception; it is located in Hartford, headed by the Court Administrator, who provides overall administrative direction to the CJD. The Executive Secretary, who reports to the Court Administrator, oversees the day-to-day affairs of the

courts. A centralized management philosophy prevails with many of the managers, as well as many other individuals in the CJD, reporting to the Executive Secretary.

With respect to the organization of the data processing, within the Executive Secretary's office, it is dispersed (see Exhibit 8). Some of the responsibility resides with the Assistant Executive Secretary, who supervises the Administrative Assistant for Judicial Research, who in turn is conducting a computerized statistical study of the juvenile courts; some resides with the Jury Administrator, who manages a computerized jury system; some resides with the Administrative Assistant for Data Processing, who oversees much of data processing operations and the systems and programming; and finally, some resides with the manager of the Middletown based Central Accounting Office, who is responsible for producing computerized statistical reports and for entering data on motor vehicle violations into a computer system.

#### Information Processing Goals

Because the automated information goals of the CJD are needed for policy guidance in subsequent analysis phases of this study, they are documented here. These goals are:

- providing a higher quality of justice for the citizens of Connecticut,
- maintaining the independence of the judicial branch of government,

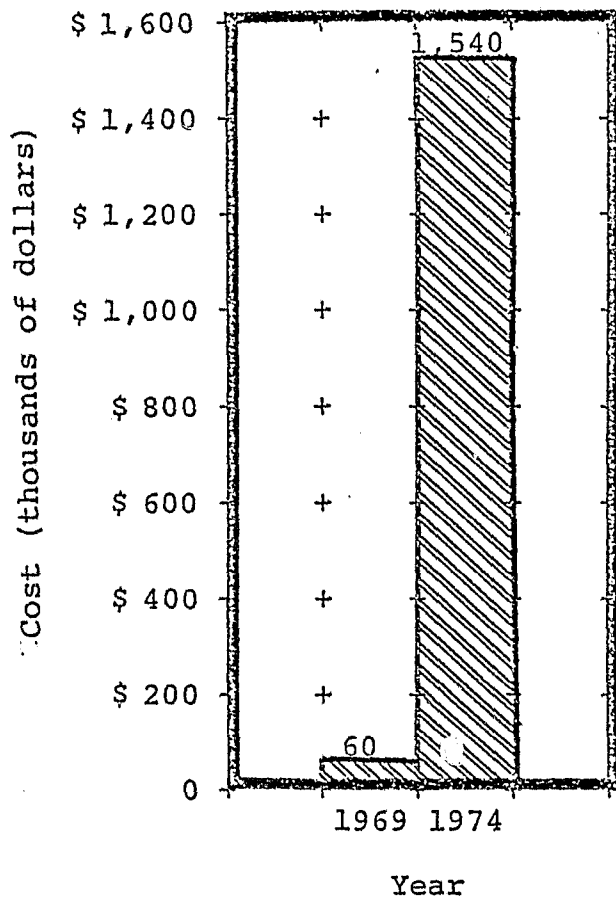


EXHIBIT 1: COMPARISON OF THE  
CJD'S COMPUTER-BASED INFOR-  
MATION SYSTEM'S COST IN 1969  
AND 1974.

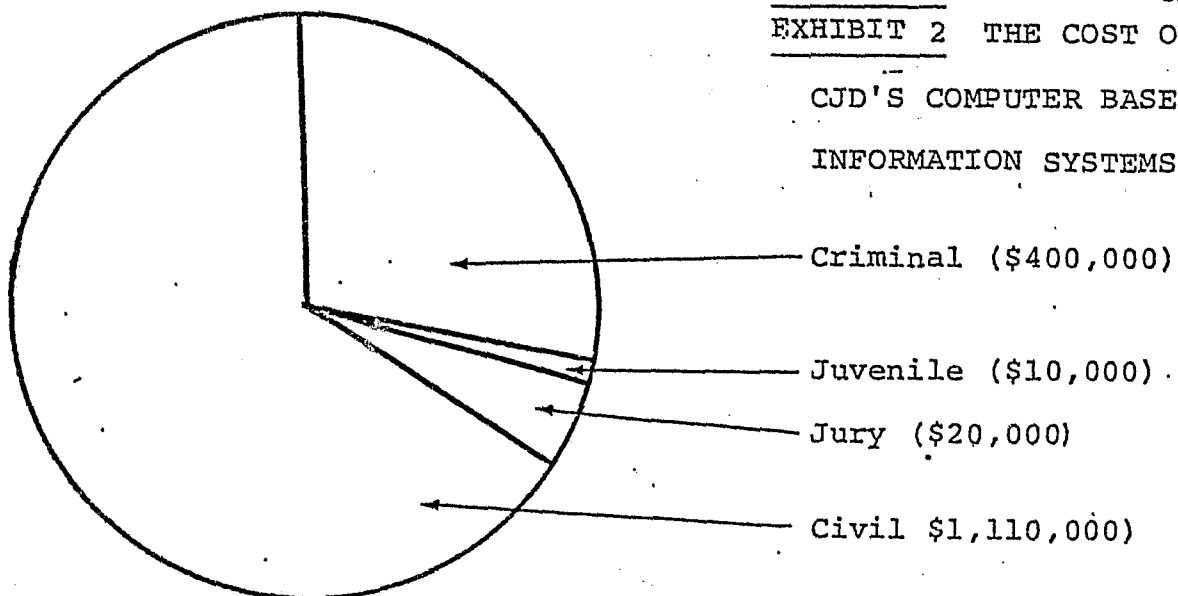


EXHIBIT 2 THE COST OF THE  
CJD'S COMPUTER BASED  
INFORMATION SYSTEMS IN 1974.

- cooperating with the other branches of the state government,
- maintaining centralized managerial control in the Executive Secretary's office,
- adopting a uniform information processing capability,
- selecting the least costly automated information processing capability that will meet the specifications of the CJD.

#### Existing Systems

At present, four computer based information systems, civil, criminal, jury and juvenile, serve the Connecticut courts. (See Exhibits 1 and 2 for the costs of these systems.)

#### *Civil System:*

Of the four systems, civil is the most productive and most expensive. Terminals in ten locations throughout Connecticut accept information for this system. It performs indexing, docketing, calendaring, and compilation of statistics. Each case is tracked from its inception to its disposition. The system generates notices of appearances, maintains trial lists, schedules trials, as well as performing many other important functions. The computer processing for this system is performed at the Connecticut State Data Center (SDC), which is located in Hartford.

In its documentation of the civil system, the Center noted that a substantial amount of information (4,650 characters or "bytes" per case) is maintained on disk file.<sup>1</sup> This may be unduly large. Thus, we recommend that the CJD investigate the rewriting of the civil system's programs to compress or reduce its data needs.

*Criminal System:*

The criminal system is really two disparate systems: compilation of criminal statistics and processing of motor vehicle cases. Statistics are compiled on an outdated electric accounting machine in Middletown, Connecticut. Motor vehicle complaints are entered into the second part of this computer system by personnel of the motor vehicle department. Updating of the file is performed by the Central Accounting Office in Middletown. The processing itself is divided between the State Data Center and the Motor Vehicle Department. The computerized processing of these motor vehicle complaints is overly complicated; it should be changed to a much simpler, more efficient method.

---

<sup>1</sup>4,650 is an aggregate figure. It includes characters used for attorney's information and other ancillary files as well.



At the present time, the Connecticut Judicial Department is considering joining a comprehensive criminal justice information system, which would process court, police and corrections information. While there are many important issues to be weighed, such as the cost of the system, the most important one by far is the effect of such a system on the CJD's autonomy. Security of confidential data and control of managerial data are among the critical issues to be considered. Because more and more criminal information processing will be automated in the future, these decisions will have a profound impact on the future of the CJD itself.

*Jury System:*

After potential jurists are selected by each of 169 towns in Connecticut, the jury system generates a questionnaire which is sent to all of these potential jurors. The replies are processed by the computer system, and name of the selected jurors are maintained on a computer file as well.

*Juvenile System:*

Protecting information on juvenile offenders from unwarranted disclosure and the processing of juvenile information at a computer at the University of Connecticut (Storrs Campus) are two of the key features of the juvenile system. Essentially, basic information (type of offense, etc.) on all cases is recorded on a case processing form which is subsequently

EXHIBIT 3: PRESENT AND FUTURE EXPECTED INFORMATION ACCESS TIMES

	Number of Bits	Access Time
Today	Millions	One tenth of a second
Expected in the Future	To one billion	One ten thou- sandth of a second
	At least 1000 billion	One tenth of a second
	Up to per- haps 100,000 billion	One to ten seconds

*The capacity for handling information will grow enormously in the next 30 years, judging from the technological innovations already in the works.*

*Computers process information in "bits", each representing a "yes-or-no" answer, or the information represented by a single hole in a punched card. It may take several bits to express a word or number. Access to this information - taking it from the computer's storage capacity and bringing it to the area of the machine where it can be manipulated - is measured in the number of bits that can be retrieved in a given time.*

SOURCE : *A Perspective on Information Resources, The Scope of the Program 1973-1974, Program on Information Technologies and Public Policy, Harvard University, Cambridge, Massachusetts, October, 1974.*

key punched and entered into the computer at Storrs. The offender's name is not part of this information, only his number is recorded for computer entries; his name and number, however, are cross-referenced on a list, which is kept under lock and key. The computerized information is used to evaluate, among other things, juvenile recidivism and geographical caseloads.

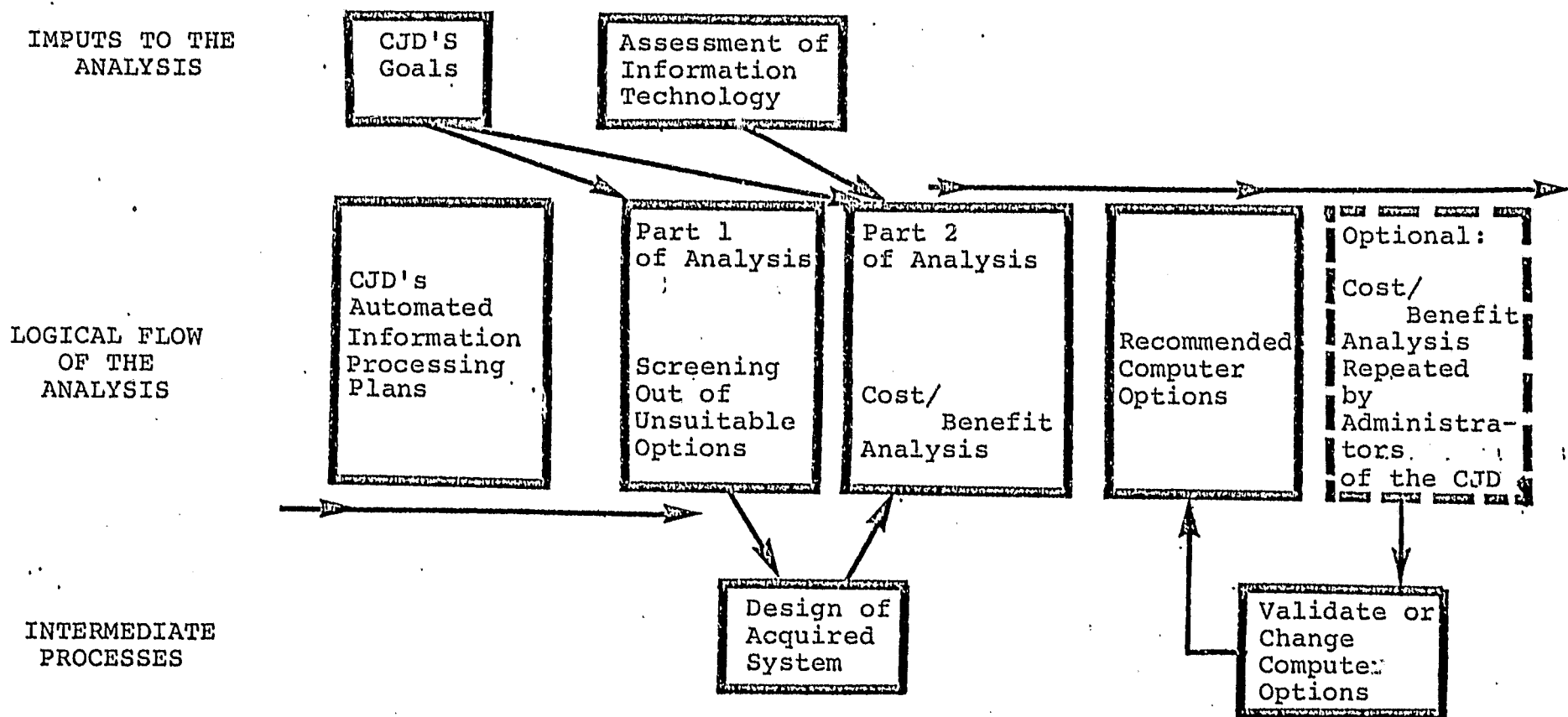
#### ASSESSMENT OF INFORMATION TECHNOLOGY (Section 3.0)

Because of the considerable impact the ever-changing world of information technology has on computer decisions, it is assessed at this point so that the reader will have this information in hand when considering the subject matter of the last two sections of this report, the analysis of computer options and the selection of a computer planning technique. Below are the trends in information technology which significantly affect court computer-based information systems:

- . cost and performance: while the cost of computer hardware is becoming cheaper daily, the performance of this equipment is becoming ever more powerful and reliable (see Exhibit 3).
- . telecommunications: the extensive use of telephone lines to transmit computerized information is changing the computer industry. Ten years ago, were an individual to communicate with the computer, he had to go to the room which the machine occupied. Today, because of the use of phone lines, individuals many miles from a computer transact

EXHIBIT 4 : A VISUAL DESCRIPTION OF THE ANALYSIS OF THE CJD'S  
COMPUTER OPTIONS.

-8a-



business with it. (The processing of airline reservations is a good example of this usage: typically, an airline has a central computer which is connected to its airport locations via terminals.) Tomorrow, there will be a great deal of inter-, as well as intra-, organizational computer communications. A forerunner of this activity is the ARPA (Advance Research Projects Association) network, which connects, among others, MIT, Carnegie Mellon University, Harvard University, UCLA and the Rand Corporation.

- . man machine dialogues: in the past, because of the vast expense of a computer, the focus of the design efforts was on the efficient use of it. In the future, the computer user, whether he be a manager, an engineer or a clerk, will become the central point of design efforts. Well designed, terminal dialogues will allow individuals to communicate directly with the computer in English.

#### AN ANALYSIS OF THE CONNECTICUT JUDICIAL DEPARTMENT'S COMPUTER OPTIONS (Section 4.0)

The Center's analysis of the CJD's computer options is in two parts (see Exhibit 4). First, after the computer-based information processing plans of the CJD are set forth, their computer options are listed. Then, the options that clearly conflict with the CJD's goals are set aside. Because one of the options to be included for analysis is the purchase of a computer, the design of two alternative configurations is undertaken before the second part of the analysis, the cost-benefit evaluation, is begun. The surviving options, including the designed systems, are then subjected to a cost-benefit analysis. Finally, recommendations are made.

EXHIBIT 5: SUMMARY OF PART 1 OF THE ANALYSIS OF  
CJD'S COMPUTER OPTIONS (THE SCREENING OUT  
OF UNSUITABLE OPTIONS)

Options	Recommendation
Facilities Management: Commercial Vendor	Include tentatively for futher analysis
Facilities Management: State Data Center	Exclude
Rental of Computer Time: Commercial Vendor	Include
Rental of Computer Time: State Data Center	Include
Acquire an In-House Computer System	Include

## The CJD's Automated Information Processing Plans

The starting point of the analysis is the CJD's automated information processing plans, which are listed below in order of priority.

1. maintenance of extant systems; addition of appeals tracking to civil system; continued development of the jury system.
2. implementation of CJIS project, beginning in the 1976-1977 fiscal year.
3. Institutionalization of jury system.

The above priorities are based on our perceptions of the CJD's plans. In the future, these plans should be in a more explicit, detailed form. Specific recommendations relating to the planning process are contained in the final section of this report.

## Part 1 of the Analysis (Screening out of Unsuitable Options)

All of the computer processing options open to the CJD are considered, with one broad option, facilities management from a commercial vendor, being dropped for further analysis. Exhibit 5 summarizes the results of this part of analysis.

## Design of Acquired Systems

In designing two configurations for inclusion in the second part of the analysis of the CJD's computer options, three factors guided us.

1. The computer plans of the CJD provided us the necessary structure for calculating the expected future volume of transactions on which our specifications (e.g. storage and response time needs) are based.

2. The goals of the CJD furnished us with a conceptual framework in which to work. For instance, because management control over computer development and maintenance is a goal of the Executive Secretary's office, a pre-programmed computer system (where initial and maintenance programming is normally performed by the vendor) is not considered.
3. Our information technology assessment informed us of the trends of this technology. New, worthwhile features, which reflect these trends, such as the extensive use of terminal dialogues, are incorporated in the design as well.

Our first selection is a network of four minicomputers, fed by thirty-eight remote terminals. In that a breakdown by a single computer will not degrade system performance markedly (three computers will still be running), its strong point is reliability.

Our second selection is broken into two sub-options: (a) a single computer (b) three interconnected minicomputers. Both of these configurations would be located at a single location in Hartford and, as with the network selection, would be fed by thirty-eight remote terminals. The principal advantages of this configuration are (1) that all of the computer operations will be under one roof and (2) that it is somewhat less expensive than the network.

#### Part 2 of Analysis (Cost/Benefit Analysis)

With the design of two configurations completed, the second part of our analysis can commence. The options surviving the first part of our analysis, now refined by the addition of two specific configurations, are rated using the



**EXAMPLE 6: SUMMARY OF THE CENTER'S WEIGHTING OF COMPUTER OPTION'S EVALUATION CRITERIA**

Criteria (Benefits)	Weights		Alternatives				
			Facilities Management	Rent-SDC	Rent-Other	Acquired System #1	Acquired System #2
Software Flexibility	10	High	8	5	6	8	7
		Low	6	5	5	5	4
Reliability	20	High	7	7	6	7	8
		Low	4	6	4	3	5
Hardware Versatility	25	High	9	6	7	10	9
		Low	5	4	4	6	6
Ease of Interface	10	High	9	5	7	9	9
		Low	5	3	3	7	9
CJD Autonomy	75	High	5	3	5	10	10
		Low	3	1	4	10	10
Financial Control	50	High	8	4	5	10	10
		Low	3	1	2	6	6
Operational Control	40	High	0	4	4	10	10
		Low	0	2	1	10	10
Public Profile	5	High	8	6	5	9	8
		Low	5	2	2	7	6
Overall Organizational Impact	45	High	5	4	3	10	8
		Low	1	2	3	7	6
Total IPS Weight		High	1,575	1,235	1,370	2,705	2,595
		Low	810	605	845	2,130	2,130
Range-% of High			48.57%	51.01%	38.32%	21.26%	17.92%

The weights, which are arbitrary numbers reflecting the Center's values, are multiplied by a high and low rating (the scale is from 1 to 10 with 5 being average) to obtain the total IPS weight. For example, the high total for Facilities Management was obtained by multiplying the weight for Software Flexibility (10) by the rating of 8 for a total of 80; all of the other weights and rating are multiplied and summed to yield a total of 1,575.

Options

		Total Benefits Score		Discounted 5-year Costs*		Benefit/Cost**	
Facilities Management: Commercial Vendor	High	1,575	***	***	***		
	Low	810	***	***	***		
SDC With Conversion	High	1,235	\$4,100K	1.51			
	Low	605	\$4,100K	.74			
SDC Without Conversion	High	1,235	\$4,794K	1.29			
	Low	605	\$4,794K	.63			
Commercial Rental at 50% of SDC Rate	High	1,370	\$2,434K	2.81			
	Low	845	\$2,434K	1.74			
Commercial Rental at 75% of SDC Rate	High	1,370	\$3,153K	2.17			
	Low	845	\$3,153K	1.34			
Commercial Rental at 100% of SDC Rate	High	1,370	\$4,100K	1.67			
	Low	845	\$4,100K	1.03			
Acquired System #1	High	2,705	\$3,649K	4.35			
	Low	2,130	\$3,112K	2.02			
Acquired System #2 Sub-option A	High	2,595	\$3,487K	4.78			
	Low	2,130	\$2,714K	3.05			
Acquired System #2 Sub-option B	High	2,595	\$2,905K	5.10			
	Low	2,130	\$2,545K	3.67			

EXHIBIT 7

SUMMARY OF THE BENEFITS AND COSTS OF THE CJD'S COMPUTER OPTIONS

\* A 10% interest rate is assumed in discounting costs.

\*\* The benefit/cost ratio is calculated by dividing the total benefits score by the discounted 5-year costs, and then multiplying by 5,000 in order to change the final ratio to a more manageable number (e.g. .000344 to 1.72). The highest benefit/cost ratio is calculated by dividing the best benefits by the lowest costs; similarly, the lowest benefit/cost ratio is calculated by dividing poorest benefits by highest costs.

\*\*\* The Center is unable to estimate facilities management costs; thus the benefit/cost ratios for this option can not be calculated here.

criteria listed in Exhibit 6. Since these criteria are of unequal importance in rating computer options, they were weighted by us. As can be seen in Exhibit 6, operational control (40) is deemed twice as important as reliability (20). The costs of the options were then compared against the ratings (see Exhibit 7).

#### Recommended Computer Options

Because of this analysis, three recommendations are proffered.

1. The best long-term course of action for the CJD is to acquire a computer configuration.
2. Before undertaking such action, the exact nature of the man-machine dialogues of all systems should be designed, thereby establishing a sound basis for specifying equipment needs.
3. The CJD should obtain benchmarks on running its civil system at a commercial computer service. If a significant savings can be obtained, the CJD should immediately move its civil system to this location. By 1977, the CJD should take appropriate steps to acquire their own computer configuration.

#### Recommended Analysis by Administrators of the CJD

Since the efficacy of our analysis and subsequent recommendations depend in large measure on our ratings of the various criteria, our further recommendation is that the administrators of the CJD, especially the senior administrators, repeat this analysis using weights of their own choosing. The appropriate forms and instructions for doing so are contained on pages 152 thru 155. This analysis will be invaluable, as it will either validate our conclusions or unearth other options more in line with the outlook of the CJD's management.

PLANNING COMPUTER SYSTEMS IN THE CONNECTICUT  
JUDICIAL DEPARTMENT (Section 5.0)

While computer-based information systems have been planned in the CJD, this activity has thus far been conducted on an ad hoc basis. Planning has commenced immediately before the start of a new project, rather than being performed on a continuing basis. Because the CJD's use of computers has been small until the recent past, this type of planning has yielded satisfactory results. At the CJD's present level of computer expenditures (\$1,540,000 in 1974), however, planning for computer systems should be institutionalized. In this section, therefore, some of the current planning techniques are reviewed, then one is selected for use in the CJD. Finally, the organizational changes needed for the adoption of formalized planning are recommended, and some of the significant points of its use in the data processing group are outlined.

Selection of a Planning Technique

After a review of planning techniques currently used both in the public and private sectors, PPBS (Planning, Programming, Budgeting and Systems) is chosen because it best suits the needs of the data processing group. Essentially, PPBS ties together activities that are performed in all organizations. It is effective because the results of a planned computer system are measured

by criteria set during the planning and programming processes. For instance, if the agreed on criterim was a reduction of case backlog, the fact that the backlog was not reduced, even though the system was technically excellent, would indicate poor performance.

#### Implementation of PPBS in the Executive Secretary's Office

PPBS should be implemented in the Executive Secretary's office in two steps. First, the data processing group should begin using PPBS. Second, after a year's experience of using PPBS, a management planning unit, reporting directly to the Executive Secretary, should be created. With the creation of this unit, the use of PPBS in the data processing group will be strengthened and the Executive Secretary can consider it for use in other administrative areas as well.

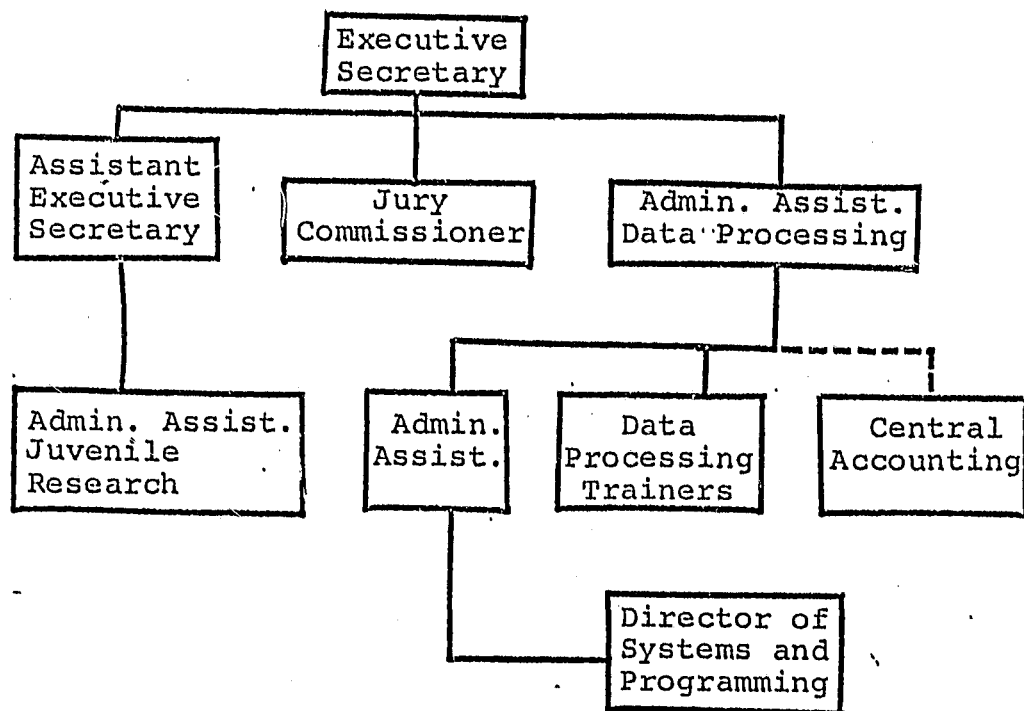
While it is desirable to institute a management planning unit immediately, this course of action is not recommended. Instead, as stated above, initially PPBS should be implemented in the data processing group with the creation of the planning group to follow in one year's time. The reasons for these recommendations are practical:

1. Since the data processing group is small, departmental personnel, by acquainting themselves with the literature, could implement PPBS.
2. No additional costs would result from this course of action.
3. The one year period of using PPBS would allow the data processing group to demonstrate the technique's worth.

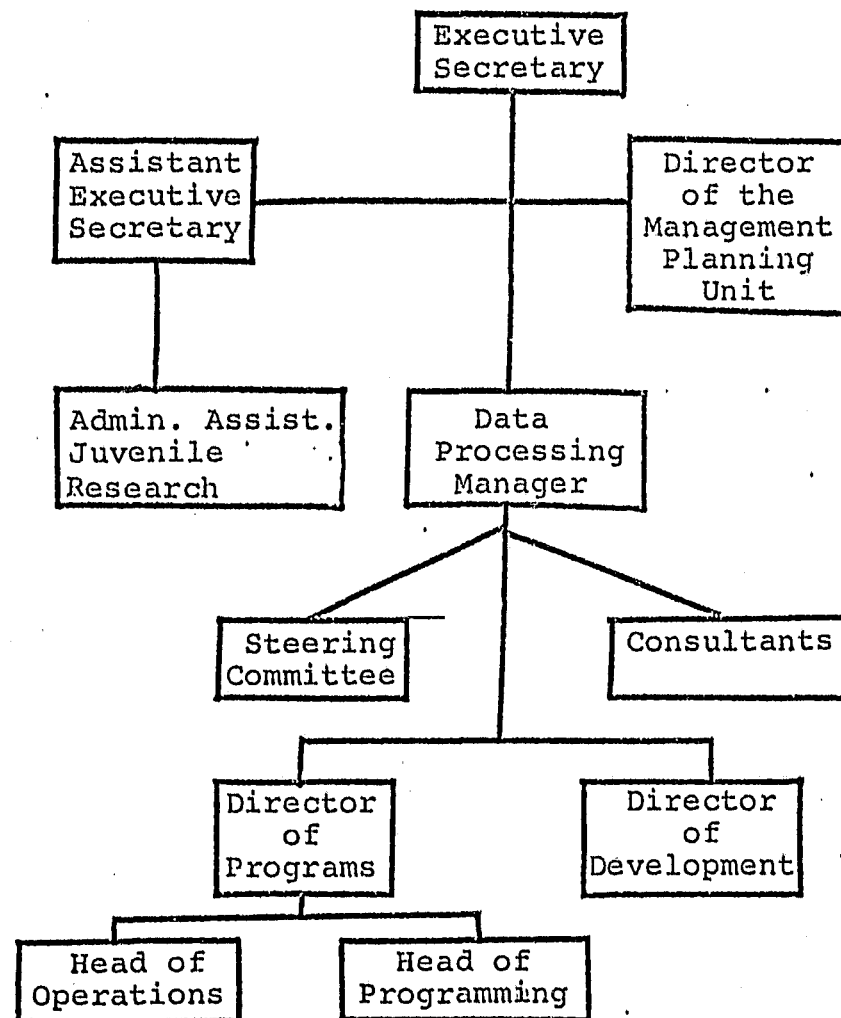


EXHIBIT 8 : EXISTING AND PROPOSED DATA PROCESSING ORGANIZATIONAL STRUCTURES IN THE EXECUTIVE SECRETARY'S OFFICE.

EXISTING



PROPOSED



In the long run, however, for the use of formalized planning to flourish, the management planning unit should be created.

In order for PPBS to work in the data processing group, the structure of the organization adopting PPBS must reflect the structure of PPBS. The proposed organization structure of the Executive Secretary's office, under PPBS, is contrasted against its existing structure in Exhibit 8. The organizational changes suggested for the data processing group should be instituted concurrently with the introduction of PPBS.

#### The Use of PPBS in the Data Processing Group

The first step in using PPBS in the data processing group is to develop strategic goals. Some of the goals should come from the senior administrators of the CJD. One such goal might be reducing case backlogs. Suggestions for other goals would be initiated in the data processing group. Performing a system analysis on a non-computerized court, such as small claims, may suggest new goals. A scan of the literature may yield favorable results as well.

The next step, programming, is the process of deciding on the programs by which the organization accomplishes its goals. For instance, if one of the goals of the CJD were to reduce backlog, a program might be to develop a more efficient calendaring

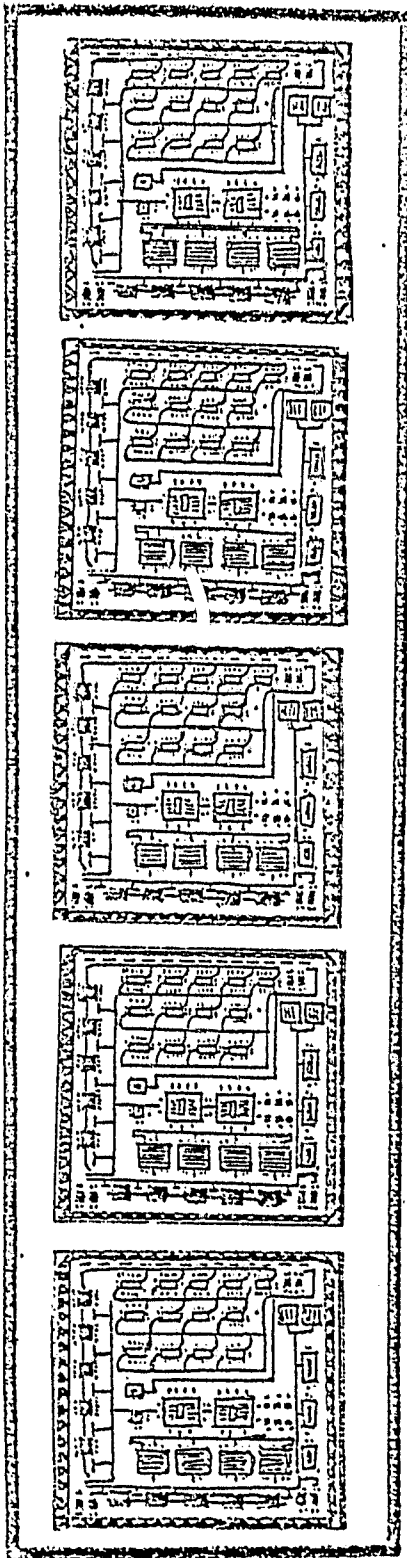


system. It is important that results of each program be measured. Continuing with our calendaring example, concrete measures of achievement, such as a reduction of idle courtroom time or lessening of the adjudication time, must be adopted. Before deciding on the final form of the program, alternate methods must be explored. An assessment of information technology, as well as small-scale experimentation, such as trying a new terminal, may suggest new possibilities for accomplishing the program's ends. Educational efforts also may bring to light new ideas. Then, with a knowledge of what is possible with respect to computer-based information systems in hand, alternate methods of achieving program objectives are formulated. Next, using the results of a cost/benefit analysis as a guide, explicit programs are chosen. A rolling multi-year plan (5 years is suggested) is then written, incorporating all of the programs and their goals as well as their resource requirements by year.

Although programs usually extend over several year's time, budgets normally cover only one year. Hence, the first year of the rolling multi-year plan serves as a basis for the budget.

Systems are developed to measure how well each program is doing in relation to its stated objectives.

While our recommendation for adopting PPBS is far-reaching, it is made because in the Executive Secretary's office there is sound base from which to proceed. The CJD's accomplishments in developing and implementing computer based information systems have been substantial. Moving forward from this base -- and the adoption of PPBS should help -- the CJD can become a leader in the effective use of computer based information systems in not only the courts, but the entire public sector as well.



## 1.0 Introduction



Computerized information processing in the state courts of Connecticut is at an important juncture. By fostering the use of computing technology, the Connecticut Judicial Department (CJD) has modernized many of the procedures in its courts. A computerized statewide civil system, perhaps the most sophisticated in the United States, is now in operation. Statistics on juvenile offenses are now compiled and analyzed on the University of Connecticut's (Storrs) computer. Computer processed forms now speed the jury selection process. By way of a computer printout, judges are informed of a traffic violator's previous traffic offenses. As a result of the implementation of these automated systems, the cost of CJD's computerized information processing has risen from less than \$50,000 in 1969 to \$1,540,000 in 1974. Clearly, the CJD's information processing activities have reached a new level. The CJD is no longer a small user of data processing services; its operations are comparable to those of a medium size corporation. The challenge is, then, clear. Certainly, the CJD must continue to use, and enhance its computer capabilities (or, in more delightful words, the administrators of this department must continue

drinking Pepsi rather than switching to Geritol).<sup>2</sup> At the same time the CJD must become introspective. It must adapt to its new environment and that may mean changing its organizational structure as well as its procedures. For sure, it entails a determined, structured, and continuous effort to control computing costs.

Opportunities for using computer technology in the Connecticut courts are great. Information processing is a significant part, if not all, of the work of the courts. The Connecticut courts do not produce tractors, machine tools, chemicals, typewriters, telephones, nor do they produce any of the other instruments of an industrialized society. They do, however, process a lot of information. Transcripts of trials and judicial records are typed; notices are sent to attorneys, defendants, and witnesses; forms record the necessary steps in the probate of a will; statistics are compiled on civil, criminal and juvenile caseloads; calendars are typed and displayed in prominent places in courthouses; and depositions and testimony are taken from witnesses. While some of this work has already been computerized, much of it is still processed manually. To be sure, some of this information will always be processed by traditional methods. In the future, however,

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<sup>2</sup> An adaption of an expression used by James B. Muldoon, Secretary of the Judicial Council of Massachusetts.

because of the sharply reduced cost of computers, more and more court applications could be (and should be) processed by computers.

The tools of the computer analyst are becoming cheaper and more reliable daily. Today, Hewlett-Packard markets for a price of roughly \$600 a handheld programmable calculator that has the processing power of an IBM 1401 computer<sup>3</sup>, the standard computer of ten years ago, which, because of its size, was rarely placed in a room less than 20 feet by 30 feet in area and cost generally between \$100,000 and \$300,000. The Teledyne Systems Company now sells for \$1,295 a computer, which is two inches square and .2 of an inch thick and incorporates more than 100,000 transistors.<sup>4</sup> (This computer is illustrated on the section cover pages of this report).

So powerful is the sweep of computer technology, that the work habits of entire industries are changing. Many newspaper reporters now type their copy at television-like computer terminals. Immediately after typing his copy on a terminal, a reporter can start editing it. Paragraphs, in fact entire pages, can be displayed on the computer terminal's screen, thereby allowing a reporter to visually scan

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<sup>3</sup> Lecture by James Martin, International Systems Corporation of Lancaster Conference, Great Gorge, New Jersey, October, 1974, attended by William Popp, Senior Staff Associate.

<sup>4</sup> Description of the cover, *Scientific American*, May 1975, p. 4.

his text. After editing, the copy is typeset by the computer. This use of the computer increases the productivity of reporters and editors alike, and, more significantly, reduces the time from the occurrence of an event to the time we read of it. Changes, similar to those in the newspaper industry, will occur with increasing rapidity in other industries in the United States as well.

Yet, with all this promise, there are significant obstacles to overcome in order to use information technology effectively. Many organizations have encountered problems using computers. These have included ill-conceived system designs, overly long implementation times, poorly trained data processing personnel, user difficulty in adapting to systems, and higher than expected operating costs. Thus far, the CJD has avoided most of the pitfalls encountered by other organizations. However, the CJD is facing a problem of escalating computer operating costs.

In this report, therefore, we strike a balance between discussing the effective use of information technology and the control of that technology. Whenever a new computer project is suggested, however imaginative, it must satisfy a rigorous set of criteria in order for it to be approved. First, it must fall within the long range plans of the CJD.

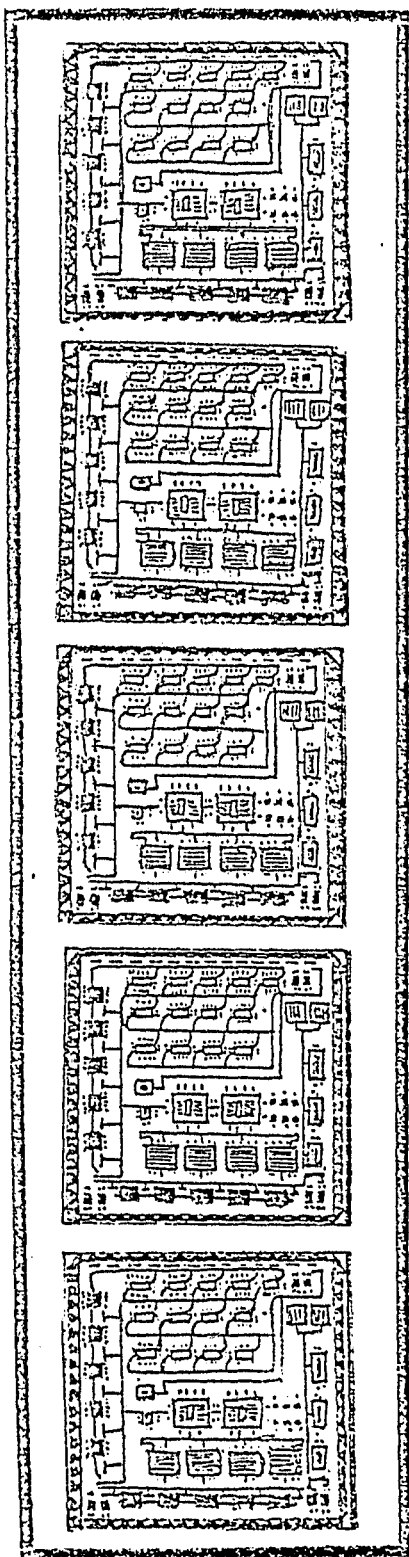


Second, it must be compared against other potential projects to determine its development priority. Third, the benefits of the project must be commensurate with its costs. Because this evaluation of new projects should be a continuing process, some or all of the above-mentioned planning and control procedures, or others like them, must be institutionalized. Hence, in addition to recommending a computer configuration best suited to the CJD's immediate needs, we recommend a growth strategy for the CJD's data processing department as well.

As for the format of this report, we first document both the CJD's existing computer based information systems and the organization that administers these systems (section 2.0).<sup>5</sup> Then, before the analysis of our findings, we briefly review the trends in information technology (section 3.0). In the analysis of our findings (section 4.0) we begin by describing the computer options currently open to the CJD and then, after analyzing all these options, we suggest a course of action. More importantly in the long run, we suggest in the final section (section 5.0) that the CJD adopt formal planning techniques which, to work, require changes in the CJD's organizational structure.

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<sup>5</sup> Although we have made an effort to reduce information processing jargon to a minimum, at times in this and other sections, we must use words the non-technical reader may not be familiar with. Hence, a GLOSSARY OF TECHNICAL TERMS, APPENDIX VII, is included.



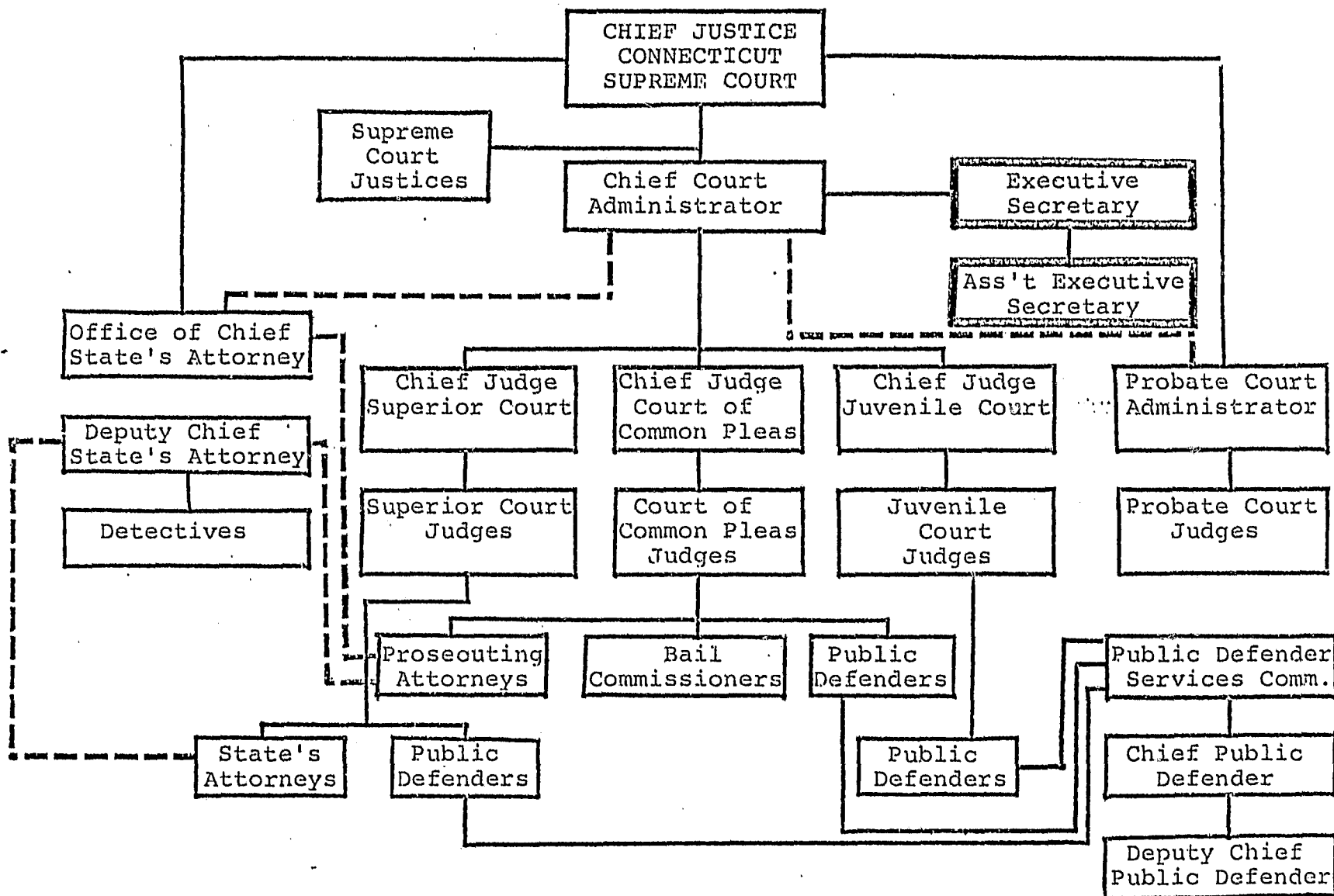
## 2.0 The State Of Automatic Information Processing in the Connecticut Courts

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## 2.1 INTRODUCTION

This section documents the administrative structure of the Connecticut Judicial Department, the information processing objectives of this department, and the existing automated information processing systems in operation in the courts of Connecticut. We begin by outlining the administrative structure and its objectives with respect to information processing; then we proceed to document exactly what computer systems are in operation and are being planned for the state courts of Connecticut.



## 2.1 INTRODUCTION

This section documents the administrative structure of the Connecticut Judicial Department, the information processing objectives of this department, and the existing automated information processing systems in operation in the courts of Connecticut. We begin by outlining the administrative structure and its objectives with respect to information processing; then we proceed to document exactly what computer systems are in operation and are being planned for the state courts of Connecticut.

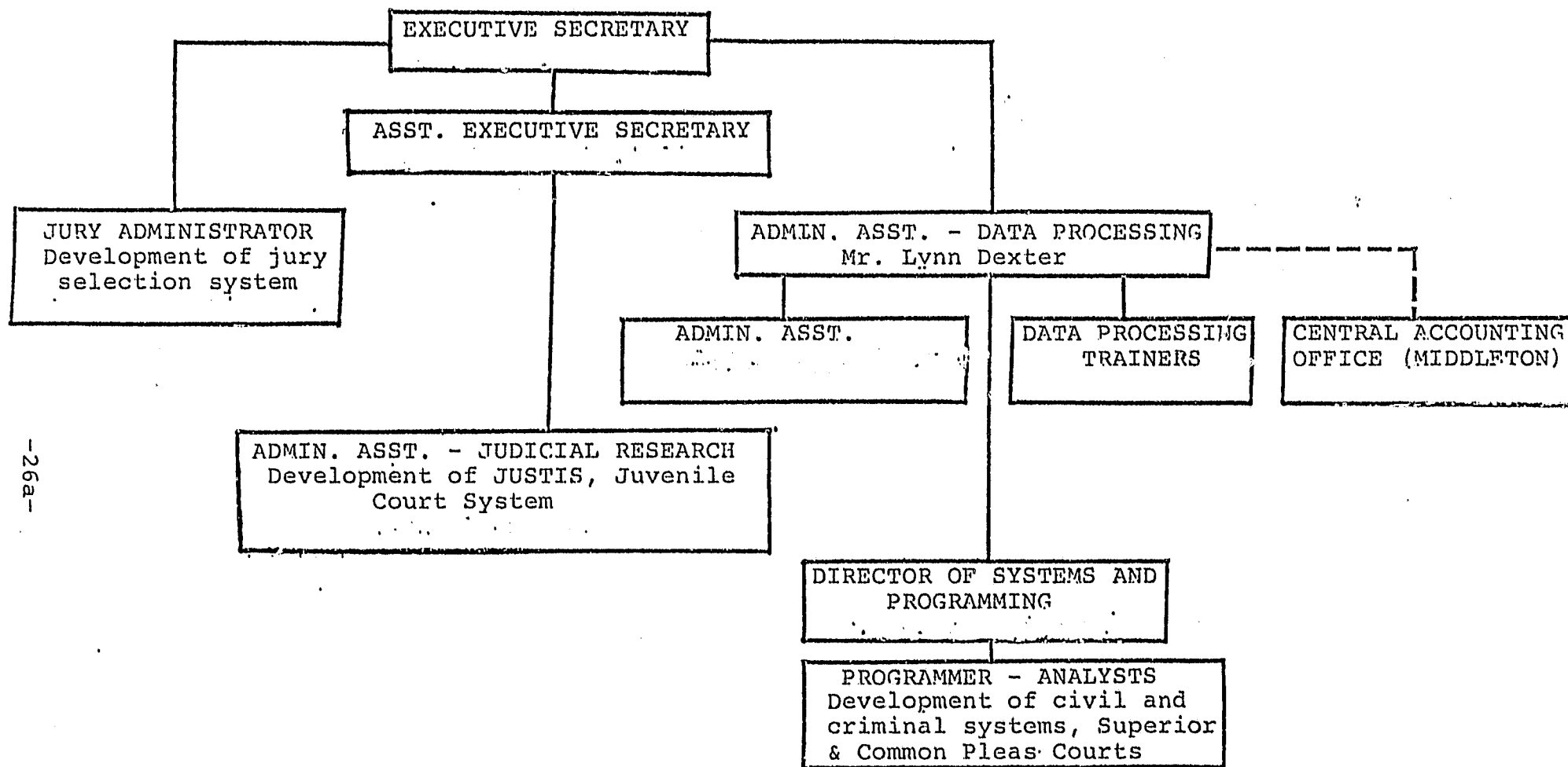
## 2.2 ORGANIZATIONAL STRUCTURE OF THE CJD AND ITS DATA PROCESSING DEPARTMENT, AND THE CJD'S DATA PROCESSING GOALS

As can be seen from the accompanying organizational chart of the Connecticut court system (see Exhibit 9), the Executive Secretary of the Connecticut Judicial Department (CJD), and the Assistant Executive Secretary, serve the Chief Court Administrator in a staff capacity. Their principal responsibility is to administer the operations of the Connecticut state courts.

Both in terms of its physical location and its administrative philosophy, the Office of the Executive Secretary is centralized. Most of the staff is located in Hartford. In addition to the managers of the CJD reporting to the Executive Secretary, many of the other administrators of this department discuss problems with the Executive Secretary as well.

The responsibilities of the Office of Executive Secretary include, among other things, developing and operating computer-based information systems, providing accounting services and administering LEAA grants. This office has assumed significantly more responsibility over the past few years. Now, the Executive Secretary approves the hiring of all clerical staff throughout the judicial department. The staff of Executive Secretary, in con-

EXHIBIT 10: ORGANIZATION OF DATA PROCESSING FUNCTIONS  
IN OFFICE OF EXECUTIVE SECRETARY,  
CONNECTICUT JUDICIAL DEPARTMENT







junction with the operations of the civil computer system, is in contact with many courts on an everyday basis; an example of this contact is the continuing training sessions for operators, who enter information into the civil computer system.

As for the organizational structure of data processing, it is dispersed. (See Exhibit 10. In describing the functions of the individuals noted in this exhibit, we proceed from left to right.) The Jury Administrator is managing the development of a computer based jury system. Overall responsibility for the data processing activities falls on the Executive Secretary. The Assistant Executive Secretary supervises the Administrative Assistant for Judicial Research, who is developing a computerized statistical system for analysing the operations of the juvenile courts. The Administrative Assistant for Data Processing is responsible for overseeing the operations of the civil and criminal systems as well as for supervising the systems and programming effort; his aid, termed Administrative Assistant, trains data entry clerks and performs operations duties. The Director of Systems and Programming supervises the systems design and programming of additions to the civil computer system and

the maintenance programming of that same system. The Manager of Central Accounting supervises the entry of information on criminal cases; develops and implements court statistical reports; and maintains a liaison on computer matters with the Administrative Assistant for Data Processing.

Much of the development work on CJD computer systems continues to be done by consultants. The CJD's civil system was designed and programmed by Computer Assistance, Inc., which is now working jointly with the Mitre Corporation on the design of the court's part of the planned Criminal Justice Information System (CJIS) in Connecticut.

#### 2.2.1 Overall Computerized Information Processing Objectives

The overall objectives of the CJD, with respect to computerized information processing, are listed below. (Objectives specific to a system are included with other information relating to that system later in this section.) To some, the following goals may seem obvious. Nonetheless, they should be listed because often even objectives which are not articulated govern the decisions of an organization.

*-Providing a high quality of justice:* Apparent in the Executive Secretary's Office of the CJD is concern for high quality of justice. Its computerized systems reflect this concern.

*-Maintaining centralized management control:* The Office of the Executive Secretary will be headquartered in Hartford for the foreseeable future; administrative control of its work will continue to be centralized in this office.

*-Maintaining the independence of the judicial branch of government:* The Connecticut Judicial Department is conscious that it is a separate branch of the government. This is manifested in many ways: the CJD plans, manages, and controls its own administrative machinery; it hires its own personnel; it selects and purchases its own equipment. The CJD informs the executive branch of government when an infringement is perceived by the judicial department. In our analysis, we assume that this sense of identity on the part of the CJD will continue in the future.

*-Cooperating with the other branches of the State government:* The CJD maintains good relations with the executive branch of the Connecticut state government. Many of the information processing systems now in operation in the judicial department are intertwined with information processing systems in the executive branch (e.g. the preparation of

materials for check writing by the judicial department and the actual check writing by the executive branch of government). We assume that this good working relationship will continue in the future.

*-Adopting a uniform information processing capability:*  
Whatever the final form of the CJD's computer capability, it must be as uniform as possible so as to facilitate management control of that resource and to standardize approaches to information processing problems. In other words, the CJD computer systems should not be programmed in a number of different languages, should not be implemented by a number of different sources, and should not differ from one another unless a justification exists for the variation.

*-Selecting the least costly automated information processing capability that will meet the specifications of the CJD:*  
When considering new, or re-evaluating, old computer based information systems, the management of the CJD will opt for the least costly information processing capability that meets their objectives,

### 2.3 OVERVIEW OF THE CONNECTICUT JUDICIAL DEPARTMENT'S COMPUTER BASED INFORMATION SYSTEMS

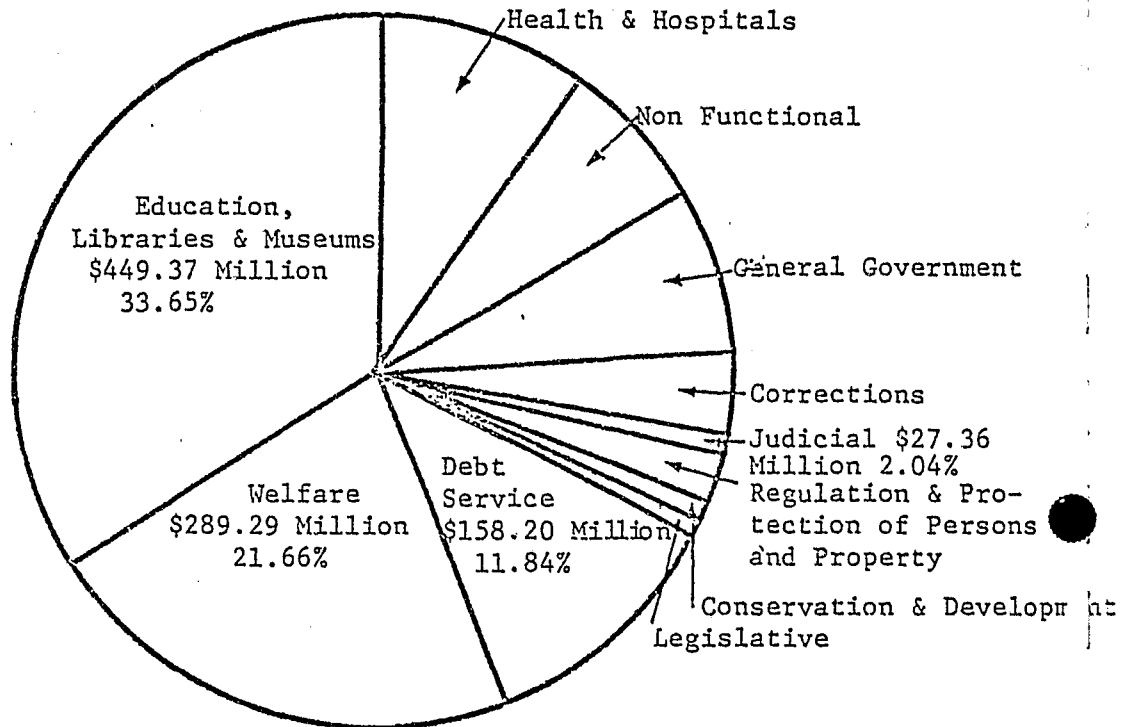
In the last four years, the Connecticut Judicial Department (CJD) has designed and implemented four computer based information processing systems. The systems report statistics, control case activity, provide management information and, in general, address the judicial department's overall objectives. Another major system, that monitors criminal case processing in cooperation with state criminal justice agencies, is currently in the planning phase.

The largest of the extant systems, the Judicial Reporting and Information System I (JURIS I), is a sophisticated computerized system which processes civil cases in both the upper (Superior) and lower (Common Pleas) courts. JURIS I tracks and schedules cases, generates forms and notices, indexes, and compiles statistics. Its criminal counterpart, JURIS II, currently processes motor vehicle infractions and provides elementary statistics. Plans are being made for an inter-agency Criminal Justice Information System (CJIS) which will perform for criminal cases analogous functions to those performed by JURIS I for civil cases. A jury selection system is undergoing trial implementation; it selects jurors for trials.

EXHIBIT 11:

BREAKDOWN OF THE CONNECTICUT GENERAL FUND INDICATING  
TOTAL JUDICIAL EXPENDITURES

BY FUNCTION



SOURCES:

General Fund Recommended Appropriations 1974-1975,  
Total \$1,335,120,000 taken from *Report of the Judicial  
Department, State of Connecticut, Charles S. House, Chief  
Justice (January, 1975).*

The Juvenile Court has implemented the trial year of its Juvenile Uniform Statistical Transaction Information System (JUSTIS), and begun to compile accurate statistics on the referrals processed by that court.

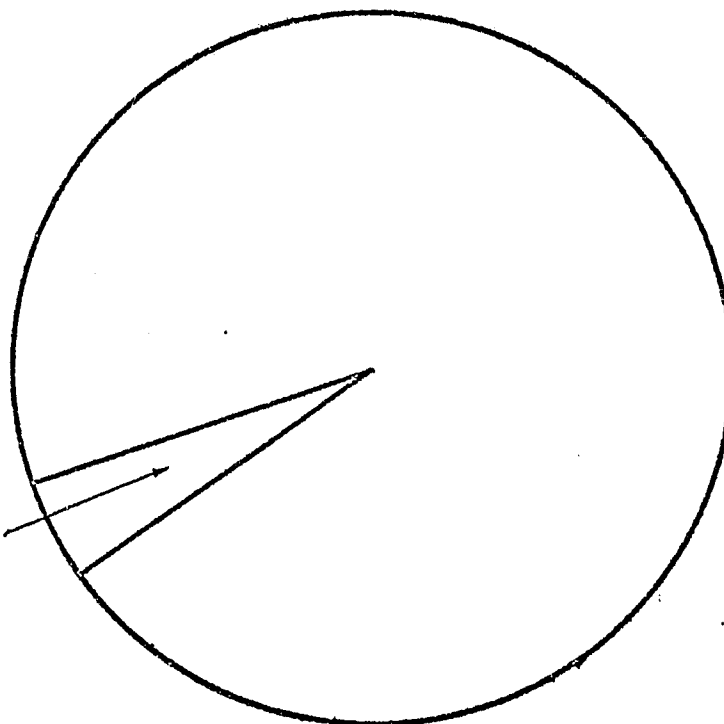
The CJD's entire budget for the 1974-75 fiscal year represented a little over 2 percent of the State of Connecticut's budget, or \$27,360,000 as shown in Exhibit 11. Of this \$27 million, about . 5 percent was spent on computerized processing of information (approximately \$1,540,000). (See Exhibit 12) . Of this latter amount, \$550,000 was spent on the rental of computer time alone.

1975 has been a crucial year for computer based information systems in the judicial department. As of the first of January 1975, the former Circuit Court merged into the Court of Common Pleas, and JURIS I began processing almost twice as much information as it had in comparable months in 1974. The costs of this were likewise increased. The CJD is facing an increase of more than \$250,000 in the cost of automated processing this year, with no relief in sight. The advent of the CJIS system should almost double the CJD's expenditures for computer based information processing.

In the following sections, we will document the status, historical development, processing flow, case loads and costs, and planned developments for each of these systems.

EXHIBIT 12:    PORTION OF CJD BUDGET EXPENDED DIRECTLY ON  
COMPUTER BASED INFORMATION SYSTEMS

Computer Based  
Information  
Systems: 4.7%  
(\$1,540,000)



Total CJD Budget: \$27,360,000



## 2.4 DOCUMENTATION OF EXISTING SYSTEMS: CIVIL (JURIS I)

### 2.4.1 Civil System: Introduction and Status

The CJD's civil information processing system, JURIS I, is a fully automated system that performs indexing, docketing, calendaring, and compilation of statistics. From the moment of entry, each case is tracked to disposition. The system automatically generates notices of appearance to all involved parties, maintains trial lists, schedules trials (within parameters defined by the court), prints index cards and updates docket sheets for the case file, and compiles statistical summaries for both management control and general reporting. The only civil cases not monitored by JURIS I are small claims, summary process, and support.

On January 1, 1975, the former Circuit Court merged into the Court of Common Pleas, taking the latter's name. Whereas JURIS I had not processed any circuit cases until January 1, as of that date it began absorbing all that court's new civil cases. Because of this development, the civil system will process at least twice as many new cases by mid-1976 as it did in the 1974 calendar year.

JURIS I is fully operational on a statewide basis and is performing well despite soaring case and transaction loads.

EXHIBIT 13: CIVIL SYSTEM HISTORY

HISTORICAL KEYFOINT	DATE
Planning Began	Spring 1968
Planning Completed	Fall 1969
Hartford Common Pleas Testing	Spring 1970
Statewide Conversion Completed	Spring 1972
Trial List - Test Phase	Fall 1971
Trial List - Statewide Conversion	Fall 1972
Short Calendar - 1st Implementation	Summer 1972
Short Calendar - Statewide Conversion	Fall 1973
Attorney Appearance - Implemented	Fall 1974

#### 2.4.2 Civil System: Historical Development

Planning for an automated civil control system preceded the Safe Streets Act of 1968 and the subsequent foundation of the LEAA. Planning began in spring 1968 and the system design was completed in the fall of 1969. The first test implementation of the civil system, in the Hartford Court of Common Pleas, began in early spring 1970. The statewide conversion to automation was essentially complete by spring of 1972.

Two important sections of the JURIS I system were added during the latter part of this conversion. The Trial List with its associated calendaring features was first tested in November 1971, and was installed statewide by October 1972. Concurrently, the Short Calendar<sup>6</sup> was implemented in the summer of 1972 and statewide conversion finished in late fall 1973. More recently, the automatic Notice of Attorney Appearance was installed completely by November 1974.

A summary of the historical keypoints of the civil system is given in Exhibit 13.

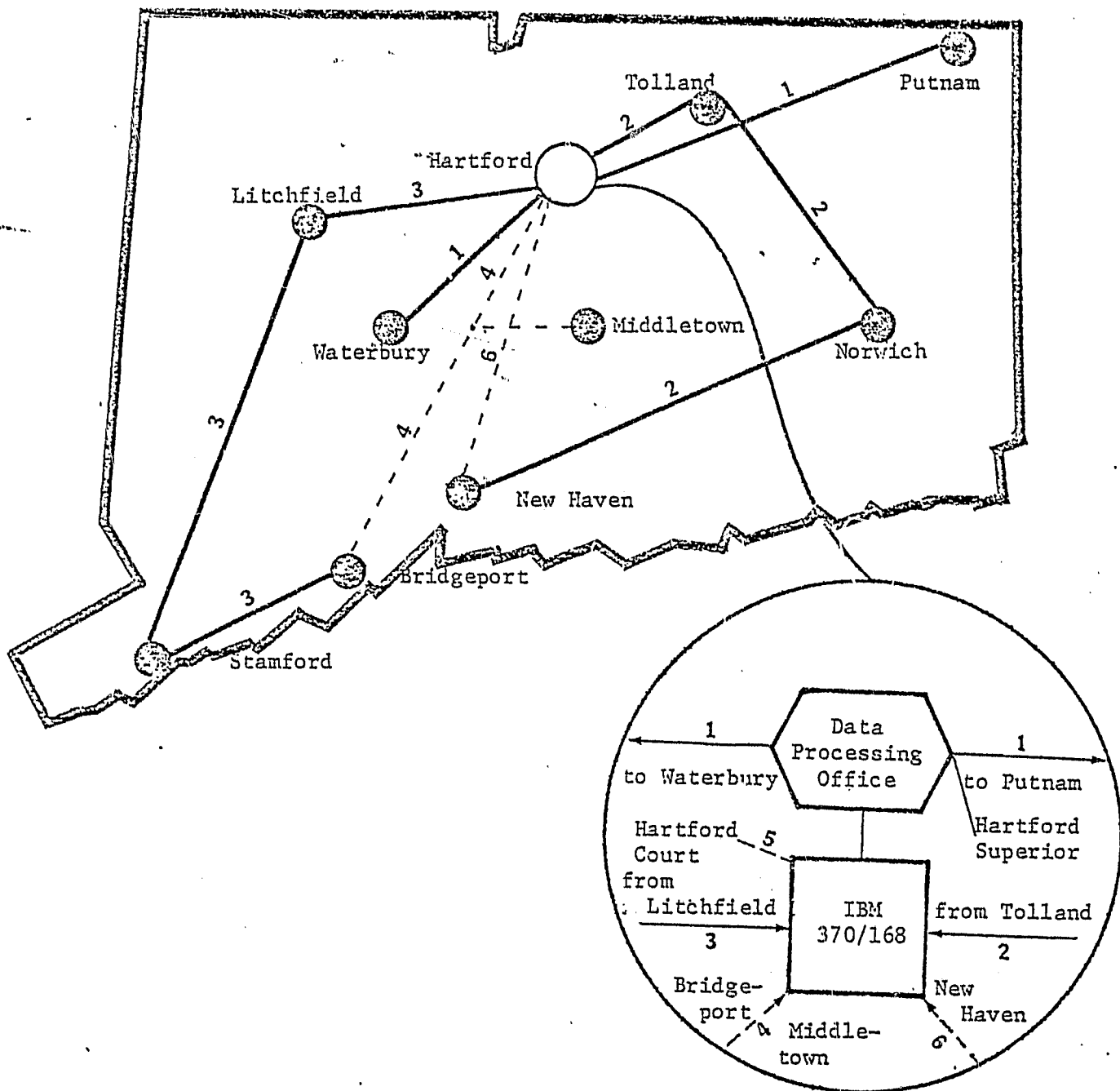
#### 2.4.3 Civil System: Processing of Information *Overview*

JURIS I is a complex system; only a summary of some important features is given here. Note that cases in both

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<sup>6</sup> For a discussion of the Short Calendar, see page

EXHIBIT 14 | CIVIL SYSTEM TELECOMMUNICATION NETWORK



All civil system lines are slow-speed untreated "voice-grade" lines with a capacity of 134.5 baud.

The transmission employs IBM series 1050 card readers, which consist of three units: the 1056 card reader, 1052 keyboard, and 1051 controller.

the Superior and Common Pleas courts are processed identically. Due to the different nature of its case load, the Supreme Court is not included in JURIS I.

Every new civil writ entered into the courts is added to the docket, which is maintained in a computer file. Information such as the names of the plaintiff(s) and defendant(s), their respective attorneys, type of case, date and location of filing are coded at the court, keypunched onto punched (Hollerith) cards at the local clerk's offices, and transmitted to the State Data Center's (SDC) IBM 370/168 computer in Hartford via a teleprocessing network. All subsequent pleadings and motions are also recorded in this manner. (A diagram of this telecommunications network can be found in Exhibit 14.) At the time of data entry, the card reader terminal checks the punched card for simple errors. The data entered during the day is logged onto a magnetic tape at the SDC; no daytime processing is performed. All processing occurs during night shifts, in batch mode.<sup>7</sup> If an entry has been improperly punched or is otherwise unacceptable (e.g., it purports to be an update of a case which does not exist), this is detected during the batch processing. A complete

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<sup>7</sup>All CJD programs are written in ANSI COBOL (American National Standards Institute version of Common Business-Oriented Language). See Glossary for an explanation of Batch mode, which is synonymous with batch processing.

EXHIBIT 15: CIVIL CASE "LIFE"

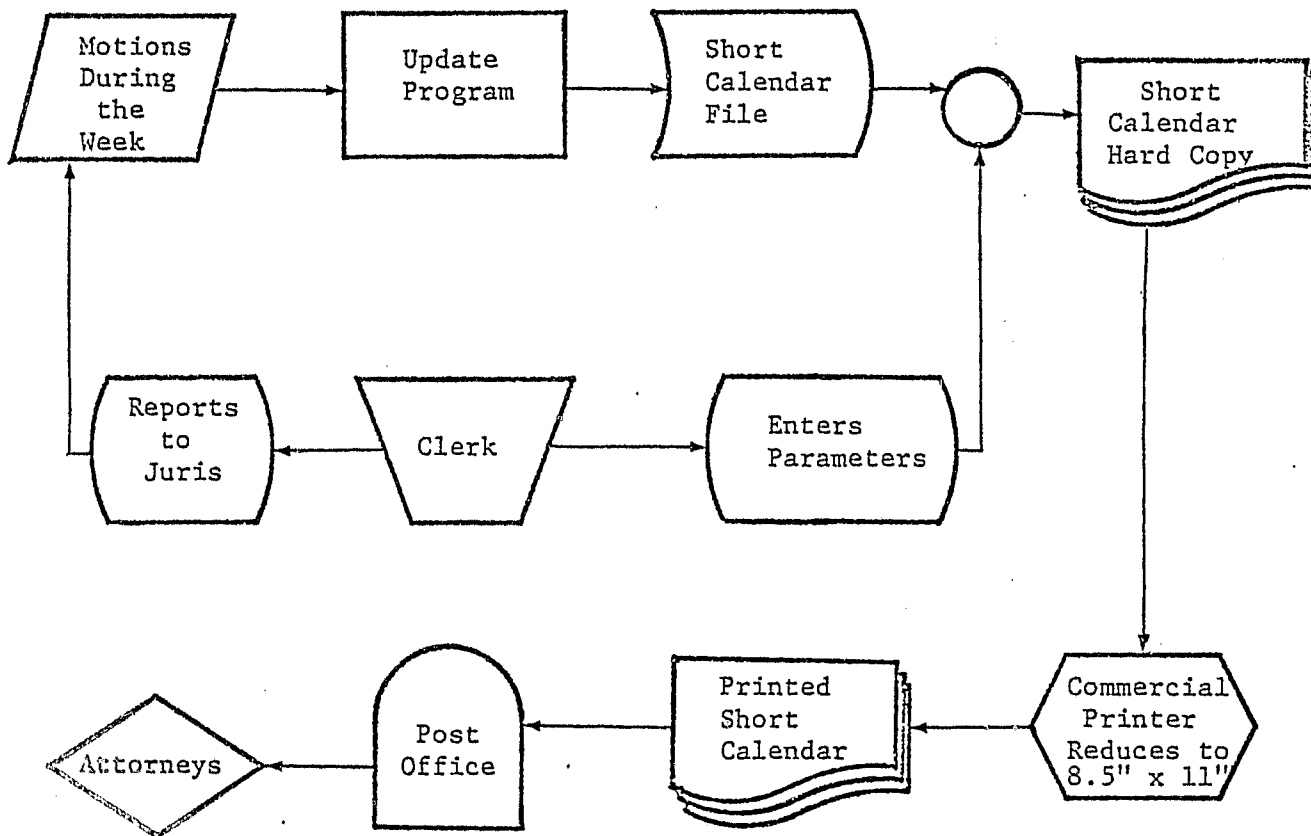
KEYPOINT #	KEYPOINT NAME	DESCRIPTION OF CONTENTS
0	Writ Entry	A new case is added to the civil docket and given a docket number.
1	Defense Appearance	The defense attorney identifies himself to the court.
2	Pleading	The preliminary pleas and counter-pleas are made.
3	Trial List	Preliminaries finished, the case is listed for trial.
4	Assignment List	The case is scheduled for trial automatically, according to parameters entered by the Clerk.
5	Trial Complete, Verdict Entered	The verdict is entered.
6	Disposition	The end of a normal case. The case is removed from the docket and filed finally.
7	Appeal	The case is appealed. C.P. appeals to Appellate Session of Superior Court; Superior appeals to Supreme Court.
8	Re-open	Any post-judgment activity.
9	Close	Cases closed normally remain closed, but some can be re-opened.

list of data entry transactions, including both acceptances and rejections, is produced every night and returned to the local courts in the morning via courier.

The civil case "life" consists of ten key points, as shown in Exhibit 15.

In batch-mode operation, the daily transactions are sorted and entered into appropriate files to update them. Several master control files are maintained, including a specific code for every type of motion or action, and a directory with the addresses of every law firm and member of the Connecticut Bar who has filed an appearance in the civil courts. The other batch work of JURI; I, besides file update, is manifold. If a case has been placed on the list for trial, a calendar is generated to be mailed to the involved parties; extras are sent to the clerks. If a new case is entered, index cards (used for cross-reference, as cases are filed by terminal digits of the docket number, not by party names) are produced for the clerk, and a docket sheet, containing names of the parties, their attorneys, the type and return date of the case, etc., is prepared for it. If a new motion on an existing case was logged during the day, this information is added to the case history and a new docket sheet is printed. If a case has been closed, a complete docket record is printed on 100% rag content paper for final filing.

EXHIBIT 16: SHORT CALENDAR PROCESS





### *Short Calendar*

Some motions demand the Courts' immediate attention. When such a motion occurs, the case is placed in the Short Calendar file. This is updated daily and printed weekly. The court clerk chooses how many of what type of case he wishes scheduled on which days of the following week and enters these parameters into the computer. The proper cases are automatically scheduled, and a list of these printed for each court location. One copy also goes to each involved lawyer. The information flow of the Short Calendar process is diagramed in Exhibit 16.

### *Trial and Assignment Lists*

The civil system also maintains assignment and trial lists, which correspond to keypoints three and four of the case life, respectively. Both are too complex to be reviewed here conveniently. They serve to advance cases towards trial in an orderly fashion. Once the pleadings and motions of a case are closed, it is placed on the trial list. In general,<sup>8</sup> a case moves through the assignment list on a first in-first out chronological basis. When clerks enter the priorities for case assignment, the cases on the trial list, which themselves are the top of the assignment list, are scheduled for court.

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<sup>8</sup> Barring requests for continuances, etc. In reality, there are numerous exceptions to this--e.g., jury vs. non-jury claims, etc.



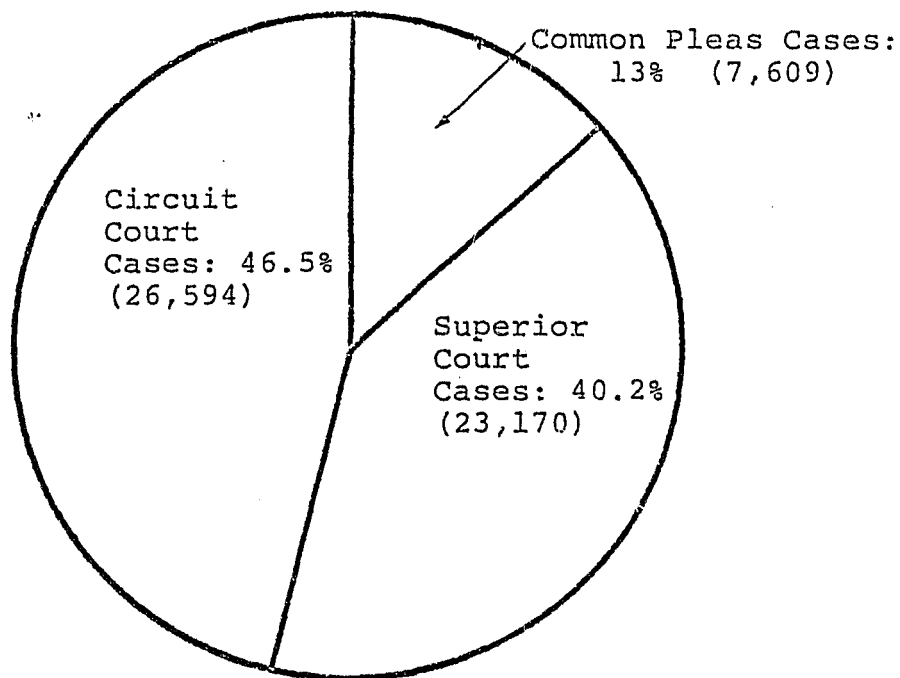
### *Dormancy Run*

In order to identify and eliminate inactive cases, a "dormancy" run is performed periodically. This locates cases which have been on the docket for more than a specified period of time (e.g., the February, 1975 dormancy run identified cases pending for over four years), and assigns a high priority to them for scheduling. As these cases then either are withdrawn from the docket or go to trial, they are removed from the pending case docket. Since 1972, over 25,000 dormant cases have been removed from the docket.

### *Statistics*

Every case is monitored closely every step of its life. Monthly and quarterly statistics are gathered on the loads in each step, broken out by type of case, type of trial claimed (if any), court, etc. Two statistics routines are used, one compiling cases by type for use in the annual report and for general dissemination, and one compiling cases by court for management control purposes. Technical data on the number of transactions (by court location), the bytes contained in those transactions, etc. , are produced daily.

EXHIBIT 17 : CIVIL CASES ENTERED BY COURT (1973-1974 COURT YEAR)



Total Cases: 57,373

SOURCES:

Twenty-Fourth Report of the Judicial Council of Connecticut, December 1974, pp. 31-55.

#### 2.4.3 Civil System: Loads and Costs

##### *Observed Loads*

The number of civil cases entered during the 1973-74 court year in the Superior Court was 23,170, representing 40.2 percent of the total civil cases added; the Circuit Courts accounted for 46.5 percent (26,594), and the Court of Common Pleas, 13.3 percent (7,609), as shown in Exhibit 17. This is a total of 57,373.<sup>9</sup> The number of cases handled by JURIS I was only little more than half that (30,779), as the old Circuit Court was not computerized. The total docket as of July 1975 (7 months) was 56,073 cases.

It should be noted that neither the number of cases added nor the number of pending cases on the docket provides a true portrait of the processing loads placed on the civil computer system, as the current court business at any given time includes not only the addition of new cases, but also motions and other update actions. In reality, about one-third of the civil system's transactions<sup>10</sup> pertain to the entry of new writs. However, since the number of cases added corresponds closely to the number of cases disposed of,<sup>11</sup> we believe entries represent a good general indicator of the courts' "throughput."

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<sup>9</sup> Excludes Summary Process and Small Claims Cases.

<sup>10</sup> For the first six months of 1975 (calendar year), there were about 85% as many dispositions as entries, which is on the low side of the average for the past five years.

<sup>11</sup> Where new writs are indicated by transaction cards JU01-JU03. A technical note on the observed transaction loads of JURIS I is contained in Appendix II, TECHNICAL NOTE: CIVIL TRANSACTION FLUCTUATIONS.

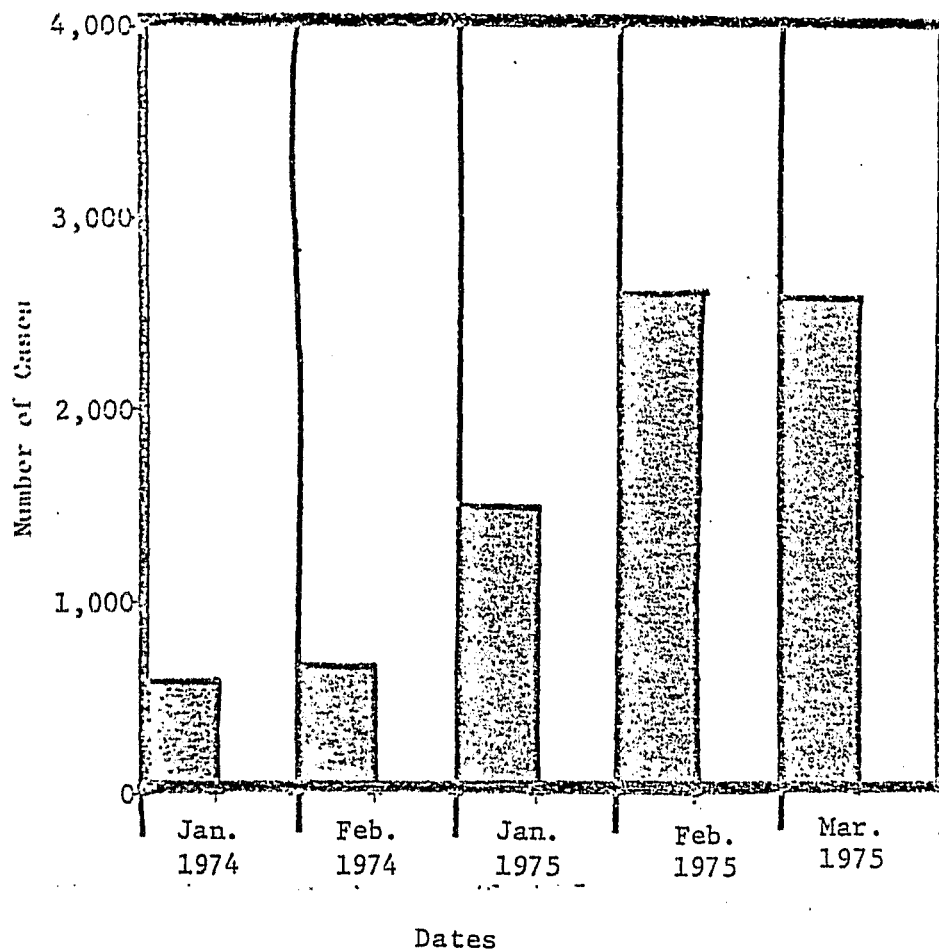


EXHIBIT 18: JURIS I  
PROCESSING LOAD

*Note that the months of January 1975-March 1975 reflect the impact of the merger between the circuit court and the court of Common Pleas.*

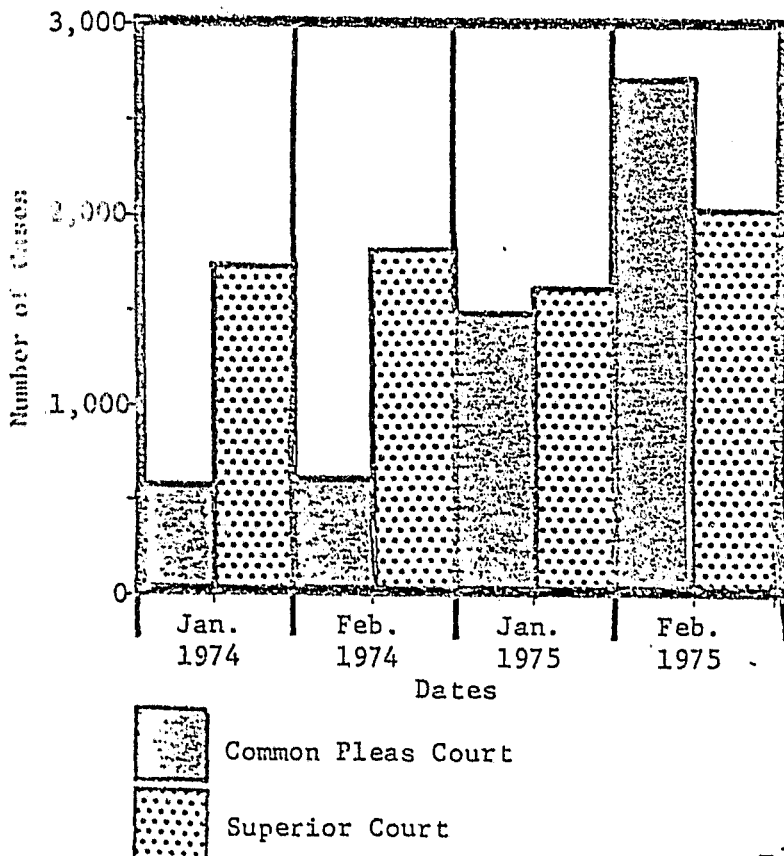


EXHIBIT 19: THE INCREASE IN  
CASES IN THE SUPERIOR COURT  
COMPARED AGAINST THE INCREASE  
IN CASES IN THE COURT OF COMMON  
PLEAS

*The dramatic impact of the merger of the Circuit Court into the Court of Common Pleas can be seen by the relative stability of the number of cases entered into the Superior Court over the period January 1974 to February 1975 as compared with entrances over the same period into Common Pleas. Using January 1974 as a base date, the higher court varies only 19% at most (in February 1975), while an increase of 392% can be seen in the lower court.*

### *Caseload Trends*

The Superior Court civil caseload increased gradually over the period 1969-70 to 1973-74,<sup>12</sup> increasing 19 percent (from 19,399 to 23,170 cases added). Statistics for the first half of 1975 support the prediction that an average increase of about 7 percent per year will hold for the foreseeable future. It is more difficult to perceive any long-range trends in the Court of Common Pleas, as comprehensive statistics are not available for the former Circuit Court. Over the four-year period 1969-70 to 1973-74, an 8 percent decrease in entries was observed in the Circuit Court. From the perspective of the JURIS I system, however, the merger of the Common Pleas and Circuit courts has had, and will continue to have, a tremendous effect on the processing load. As shown in Exhibit 18, more than three times as many civil cases were added to JURIS I in the first two months of 1975 than in the same months in 1974, apparently due to the merger. This is compared to the relative stability of the Superior Court in Exhibit 19. (A breakdown of this increase by court location is presented in Exhibit 20.) It is not anticipated that the Common Pleas case entries will be predictable until mid-1976 (end of the 1975-76 court year).

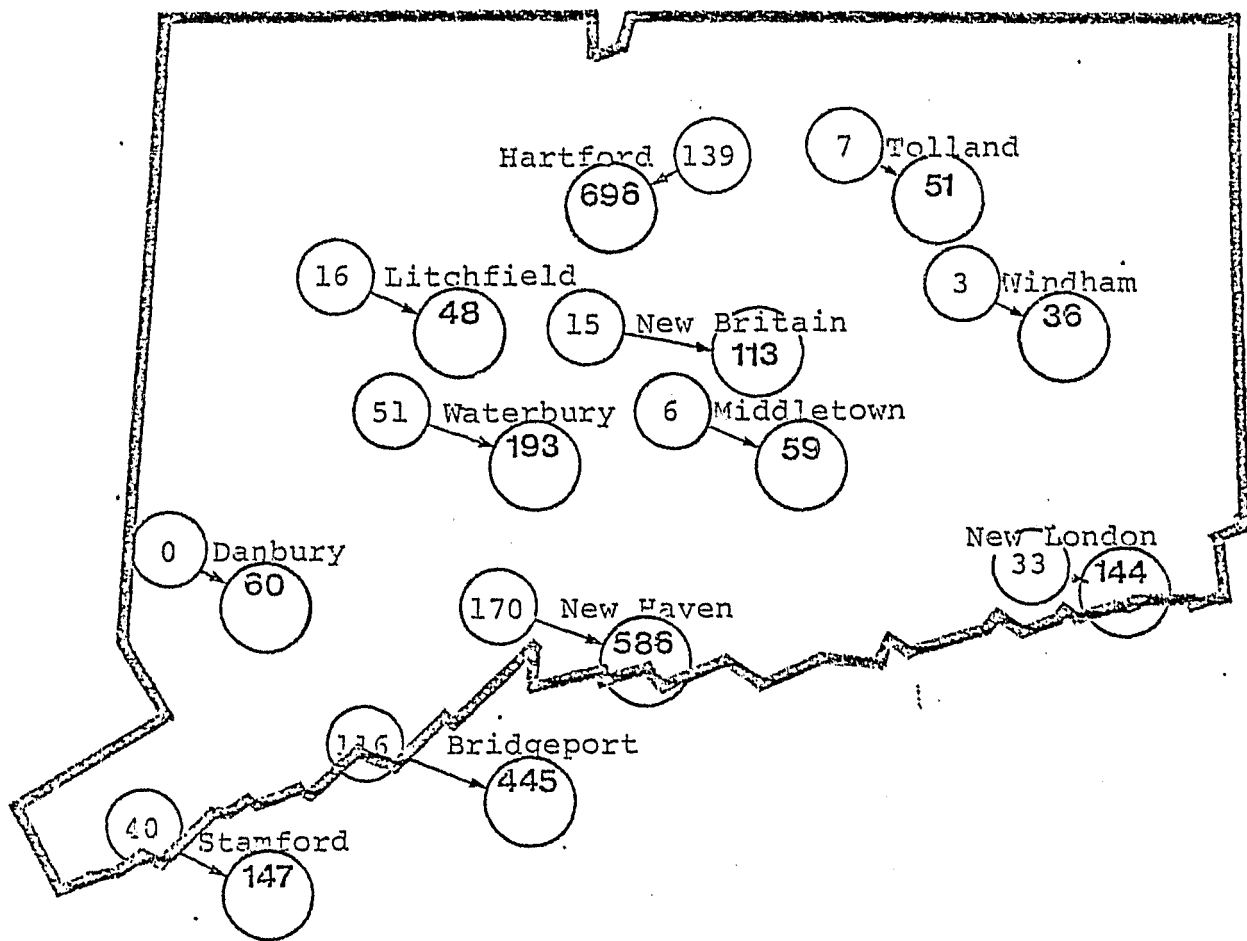
### *Caseload Projections*

Based on the trends outlined above, about 34,800 writ entries in the 1979-1980 court year are projected for the

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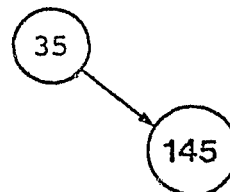
<sup>12</sup> This information is based on the court year which is from August 1 to July 31.

EXHIBIT .20: 1. NUMBER OF CIVIL CASES ENTERED (FEBRUARY , 1974  
VERSUS FEBRUARY,1975)



Key:

Number of Cases  
in Feb. 1974.



Number of Cases  
in Feb. 1975.

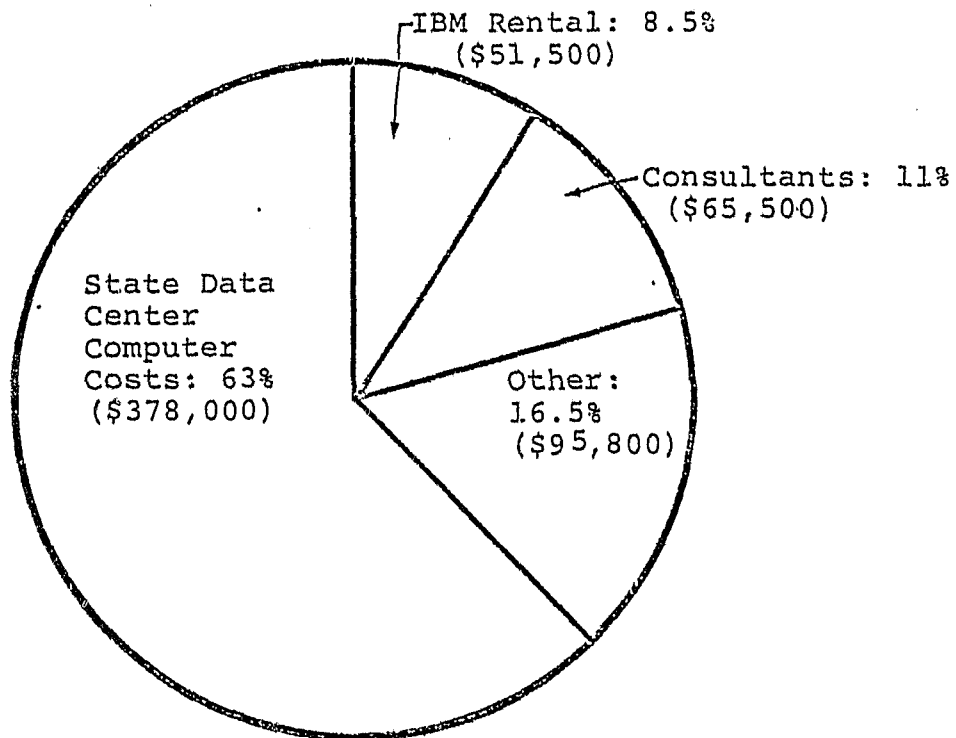


Superior Court. This assumes a linear (constant) 7 percent increase per year as shown in Exhibit 21. With the absorption of the old Circuit Court, Common Pleas JURIS I entries should approximate 65,500 in 1975-76. As no trends were observed for either the Circuit or Common Pleas court, our 1979-1980 prediction for these courts is tenuous. (We assumed the annual increase will correspond roughly to Connecticut's population growth factor - a little under 2% annually. Based on that factor, the number of civil cases added in Common Pleas in 1979-1980 would be about 41,800.)

The total civil entries to JURIS I, based on our predictions, then would rise 16.9 percent in the next five years, from 65,500 in 1975-76 to 76,600 in 1979-1980. The ratio of entries in the higher court to entries in the lower would remain about the same in 1979-1980 (45% Superior, 55% Common Pleas) as in 1973-74 (41.2% Superior, 58.8% Common Pleas and Circuit combined).

#### *Observed Costs*

The Data Processing division of the CJD paid \$590,800 for operating JURIS I in 1974 (calendar year), or over \$40,000 per month. These figures do not include the Data



Total Costs: \$590,800

Note: These costs exclude personnel.

Processing division personnel, data entry personnel, or any costs paid directly by any other CJD division. The primary expenditure was \$378,000 for computer usage at the State Data Center (teleprocessing, occupancy charges and processing), which composed 63 percent of the total as shown in Exhibit 22. The rest was for IBM. terminal rental on the 1050 card readers and keypunch machines, outside consultants (Computer Assistance, Inc.), and other costs (phone, postage fees, forms and paper, etc.).

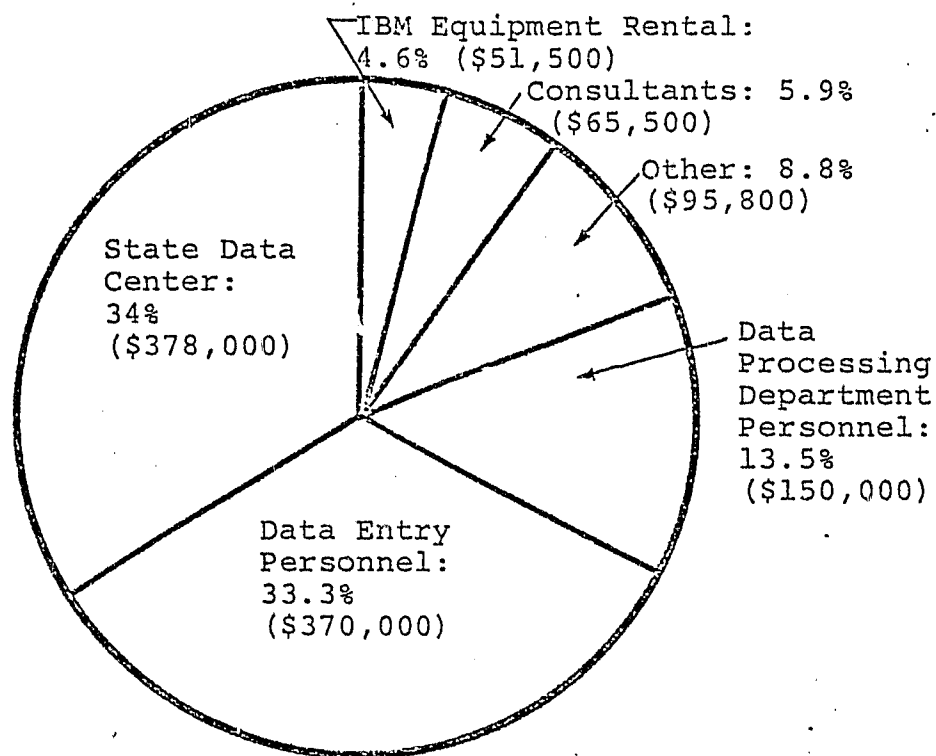
The associated personnel expenses are estimated to total \$520,000. Of this, \$150,000 is attributable to the staff, including clerical, of the Data Processing division. The other \$370,000 is attributable to data entry personnel located in the individual courts. According to estimates provided by the CJD, about 46 person-years are devoted annually to data entry:<sup>13</sup> three of these (6.5% ) to keypunching alone, and 43 (93.5%) to coding, filing, and related services. Including this estimate for personnel, the annual cost of operating the civil system is approximately \$1,110,000 (see Exhibit 23).

While it is difficult to correlate calendar year costs with court year case entries, a rough approximation of

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<sup>13</sup>Note that the ratio of data entry personnel in the Superior Court to those in Common Pleas - 47% vs. 53% closely matches both the transaction and caseload ratios between those two courts.

EXHIBIT 23: TOTAL JURIS I COSTS - 1974.



Total Costs: \$1,110,800

cost-per-case can be computed. Assuming that about 31,000 civil cases were entered on JURIS I in the 1974 calendar year, the cost per case entered was roughly \$35, of which \$14 went to the SDC for rental of computer time, \$4.75 for Data Processing division salaries, \$11.50 for data entry personnel,<sup>14</sup> \$2 for consultants, and the remainder (\$2.75) for equipment rental and miscellaneous expenses. Of the \$14 spent at the SDC, only about \$.75 was spent on teleprocessing.<sup>15</sup>

#### *Cost Trends*

To meet the processing demands of the increased civil system load, increased computer costs and an expansion of the data entry clerk pool is anticipated. We stress the fact that processing twice as much information does not mean that the total JURIS I costs will double. The full amount of many expenditures -- such as equipment rental, programming staff, etc. -- would be constant if only 100 cases were processed each year. Were the 1974 cost per case computed above applicable to the 1975-76 caseload, JURIS I would cost the CJD over \$2,500,000 to operate in that year! Instead, we predict substantial increases in only the SDC processing charges and the salaries for entry personnel. Increase in processing charges at the SDC is not strictly linear, i.e., costs do not increase at the same rate as the number of cases entered.

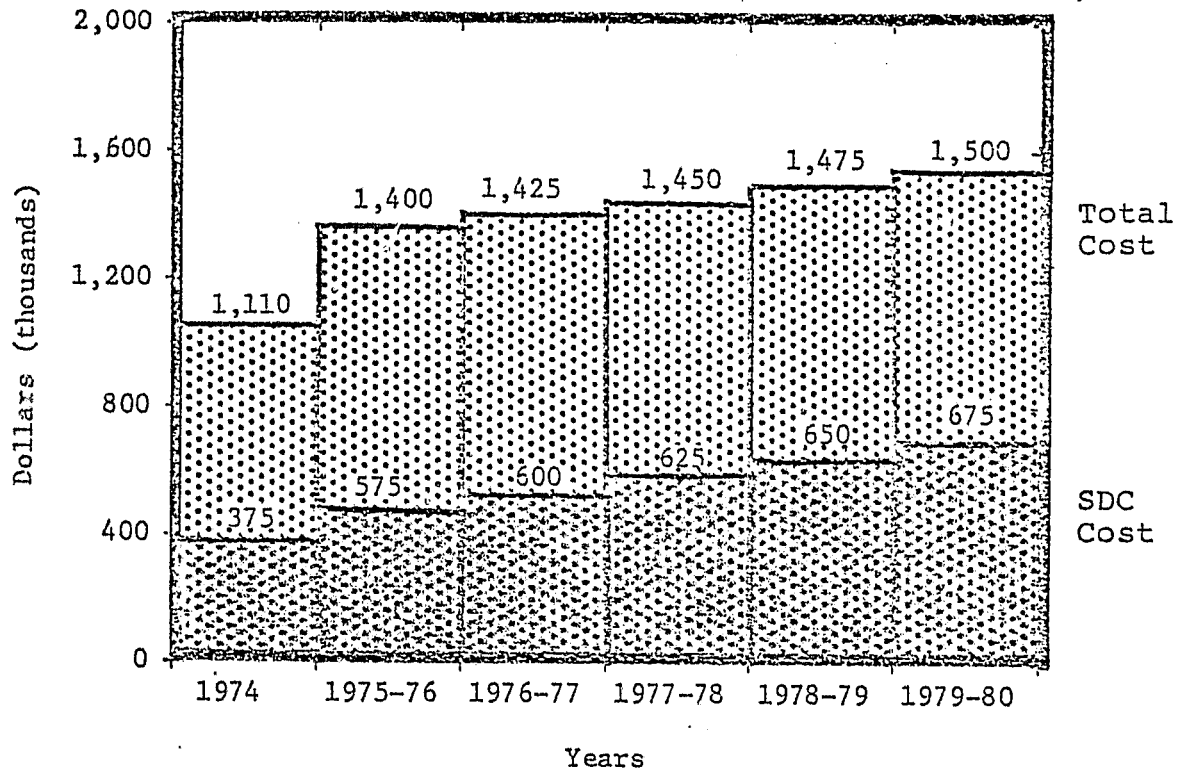
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<sup>14</sup> Most of the data processing personnel formerly were assigned to manual processing jobs and have been re-trained for these assignments.

<sup>15</sup> The State Data Center charges for civil teleprocessing, including both CPU and "point" charges, came to \$23,000 in 1974, or about \$1,900 per month. This does not include costs payable to the Southern New England Telephone Company (SNETCo.) for data lines.

EXHIBIT 24:

PROJECTED JURIS I COSTS: 1975-76 to 1979-80  
(Court Years)



In the first six months of 1975, the SDC charge per civil writ entered was only about \$9, down from \$14 in 1974. We expect the computer time cost per case to stabilize at about \$8.50 during 1975-1976 and remain there at least until 1980.

#### *Projected Costs*

Based on the trends mentioned above, the projected SDC bill for the civil system during the 1975-76 court year would be around \$575,000. This is up over 40 percent from the 1974 calendar year, although a 100% increase in entrances is projected. This approximates the "guesstimates" solicited from members of the CJD Accounting Office, which placed the cost at between \$500,000 and \$750,000 over the next several years. By 1979-1980, the SDC bill would rise to about \$650,000. The addition of 25 percent more data entry clerks would mean an additional \$95,000 or so, beginning in 1975-76.

Therefore, the total cost to the CJD of operating JURIS I is projected to be about \$1,400,000 in 1975-76 (up 26 % from 1974), rising to \$1,500,000 by the end of 1980, as shown in Exhibit 24.

Note that the economies of scale reduce the cost per case entered to \$20 in 1979-1980, a decrease of over 40 percent from 1974, but, of course, the absolute cost will increase as case filings increase.

## *File Usage*

A note about JURIS I file usage is in order here. In discussing its file sizes below, all references are to IBM 3330-type (single density) disks, as currently employed at the SDC. Each unit, costing about \$35,000, stores around 100 megabytes of information, or 400 cylinders.

All CJD files are organized as index sequential. Three are master ("reference") files: the directory to the attorneys and law firms who have filed appearances, the docket abbreviation legend, and the list of companion cases. They require 23, 23, and 7 cylinders of disk, respectively. There are also three primary data files: civil control, resume of activity, and docket appearance, which require 170, 324, and 436 cylinders, respectively. In addition, a small number of other files exist, whose size was estimated by Data Processing division personnel to approximate 50 cylinders.

Translating this into total terms, the data files currently in use (at the current level of activity) reside in about 2.6 disks, meaning about 260 million bytes (characters). This data base supports a total docket (all courts) of 56,073 (as of July 1, 1975). In other words, each civil case requires almost 4650 characters or 58 (80 character) cards per case. (At this rate, with the addition of an equivilant criminal system, the CJD would become a main user of disk space at the SDC.) In our opinion, this allocation of disk space for each case appears high.



We conclude that the file organization designed for JURIS I several years ago originally was oriented toward a substantially lower volume of cases and hence did not economize on file space, as it was not a high priority consideration at the time. Thus, the National Center suggests a conversion of the JURIS I file structure, and appropriate re-writing of the JURIS I system programs. This is desirable in any event, as these programs were written several years ago, and have not enjoyed any extensive revision since. Our programming experience has taught that few "first cuts" remain satisfactory for extended periods of time. Second cuts, based on a largely satisfactory original, are both easier to write, and also more satisfactory from the perspective of the users and in terms of efficiency, in most cases. Such a revision must take into account considerations relating to the hardware on which it will be run, as discussed in the later sections of this report.

RECOMMENDATION 1: THE CJD SHOULD INVESTIGATE THE COST EFFECTIVENESS OF RE-WRITING THE JURIS I (CIVIL) SYSTEM WITHIN THE NEXT YEAR. THE AIMS OF THIS CONVERSION SHOULD BE TO REDUCE FILE SIZES AND INCORPORATE MINOR ALTERATIONS WHICH HAVE BEEN SUGGESTED SINCE THE FIRST IMPLEMENTATION. CONSIDERABLE DELIBERATION SHOULD BE GIVEN TO THE CHOICE OF LANGUAGE. THIS CONVERSION SHOULD BE ORIENTED TOWARD WHATEVER HARDWARE SOURCE IS OPTED FOR FOR THE NEXT FIVE YEARS.

#### 2.4.5. Civil System: Objectives and Plans

The CJD's JURIS I system has already achieved its primary objectives of standardizing forms and procedures, tracking and scheduling cases, modernizing the case filing system, providing detailed statistics, and improving the quantity and quality of information available for management control. While there are no plans for extensive revision, several minor changes are under consideration. Continual refinement in gradations within the JURIS I case life, especially in the area of backlog, is being undertaken. Frequent requests for statistics which can only be gathered by ad hoc programs are difficult to honor. The CJD is currently investigating the addition of more comprehensive statistics for management control, which should reduce the need for ad hoc programs.

An extension into the Supreme Court of the appeals tracking function is being considered.

Lastly, the CJD intends to integrate JURIS I into the unified judicial information processing systems it desires.

## 2.5 DOCUMENTATION OF EXISTING SYSTEMS: CRIMINAL (JURIS II AND CJIS)

### 2.5.1 Criminal System: Introduction and Status

Some of the information processing of criminal cases is now automated. It is performed by two disparate programs which are operated by two state agencies (the CJD and the Motor Vehicle Department). Statistics on all non-motor vehicle criminal cases are compiled by the Central Accounting Office and Records Retentions Center of the CJD, based on data supplied by the courts. This office also processes motor vehicle cases in cooperation with the Motor Vehicle Department (MVD). These two functions comprise the current JURIS II, the criminal system.

The CJD has embarked on the development of a multi-agency Criminal Justice Information System (CJIS), an ongoing project intended to provide a full range of computerized information processing for the entire criminal justice process, serving not only the courts, but also police and corrections. JURIS II is the court segment of the CJIS project. Eventually, CJIS will incorporate a sophisticated multi-purpose criminal system similar to the extant civil one. Planning for the subsequent stages of CJIS by the CJD in cooperation with the other criminal justice agencies has been, and present indications are that it will continue to be, a lengthy process.



The ultimate form of CJIS will have perhaps the most important impact on the CJD of all its computer based information systems.

#### 2.5.2 Criminal System: Historical Development

The impetus for development of an automated criminal justice system was the foundation of Project SEARCH, of which Connecticut was an original member, in 1969. Proposals were presented with the aim of developing an overall criminal justice system "the primary aims of which are to control and reduce criminal behavior and enforce criminal law."<sup>16</sup>

The feasibility of automating the motor vehicle function was acknowledged in early 1970, and by the fall of 1971 this system was being tested in parallel operation with the manual system. Full operational capability of the motor vehicle function was attained by the fall of 1972.

Automated processing of criminal cases, similar in conception to the civil system, have remained in the planning stages. In 1973 the then Governor Thomas Meskill further suspended funding for any CJIS implementation until a detailed overview of the entire proposed project could be provided. In fall of that year, Computer Assistance, Inc.,

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<sup>16</sup>The Administration of Criminal Justice in Connecticut (Initial Plan and Action Program), Connecticut Planning Committee on Criminal Administration, 1969, p.1

EXHIBIT 25:      CRIMINAL SYSTEM:    HISTORICAL SUMMARY

HISTORICAL KEYPOINT	DATE
Foundation of Project SEARCH	Spring 1969
Conn. Criminal Planning Report	1969
Planning of CJIS Initiated	Fall 1969
Motor Vehicle Feasibility Report	Winter 1970
Motor Vehicle Parallel Run Test	Fall 1971
Full Motor Vehicle Operation	Fall 1972
CJIS Proposal	Fall 1972
Governor's Order	1973
Computer Assistance Inc. Report	Fall 1973
Minicomputer RFI Published	June 1975

issued its preliminary requirements design for CJIS. Since funding for a CJIS project director could not be approved, a contract was entered into between the State Data Center and MITRE, Inc., the latter to provide pre-implementation management. A CJIS Advisory Board, consisting of representatives from each of the criminal justice agencies involved in the project, was created to oversee and coordinate MITRE's efforts.

In June, 1975, the CJD published a Request for Information (RFI) on the capabilities of the modern minicomputer as a first step in examining hardware alternatives.

Exhibit 25 contains a summary of the historical key-points in the development of the criminal system.

### 2.5.3 Criminal System: Processing of Information

The motor vehicle infraction processing and reporting functions are disjointed and operate independently; the only point of intersection is the involvement on both by the CJD Central Accounting Office.

The processing of motor vehicle cases begins with the issuance by enforcement officers of a Uniform Summons and Complaint (USC). Copies of these are forwarded by police to the clerk of the Common Pleas Court, who in turn sends them in bundles of fifty (50) to the Motor Vehicle Department.





**CONTINUED**

**1 OF 4**

Entry clerks at the Motor Vehicle Department on-line<sup>17</sup> to the State Data Center 370/168 computer check the license and suspended license files for driver information and add the new complaint to the court's pending case file. If an accused operator has a prior motor vehicle conviction, this information is extracted from the Driver History file and a "rap sheet"<sup>18</sup> is generated and sent to the court. After disposition, the clerk of the court sends a copy of the Uniform Summons and Complaints and notice of the type of disposition to the Central Accounting Office. Here the disposition is entered via IBM 2260 CRTs, updating the Pending Case file. A magnetic tape containing the updated information is produced at the State Data Center and sent to the MVD. The MVD uses this to update the driver history file. Thereafter, abstracts for central accounting and tabulating cards, used for compilation of motor vehicle statistics, are punched. Any fines imposed are accounted for at this point. (These cards, combined with cards used for criminal statistics, are compiled into overall statistics at Central Accounting Office on an IBM 402 electric accounting machine.)

The Central Accounting Office in the CJD is the sole source of automated data pertaining to criminal cases. Currently,

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<sup>17</sup> IBM Model 3270 CRT (Cathode-Ray Tube) terminals are used at this stage.

<sup>18</sup> In February, 1975, a policy of generating arrest records ("rap sheets") for only five serious offenses, plus suspension cases, was adopted.

the court clerks provide Central Accounting with information regarding the filing and disposition of all criminal cases. This information is limited to type and number of charges, date of entry, type and date of disposition. No monitoring of case progress equivalent to the JURIS I (civil) procedure exists.

#### 2.5.4 Criminal System: Loads and Costs

##### -- *Observed Caseloads*

Motor vehicle complaints account for the majority of the total criminal caseload (64.1%).<sup>19</sup> Non-motor vehicle<sup>20</sup> criminal cases account for the remainder, with the Circuit (now Common Pleas) Court handling 34.6 percent and the Superior Court 1.3 percent. Exhibit 26 contains a summary of respective case volumes.

##### -- *Caseload Trends and Projections*

Motor vehicle offenses are increasing at a rate of about 3 percent a year (see Exhibit 27). It is difficult to perceive any trends in the non-motor vehicle criminal caseloads, as the available statistics report only dispositions, and not entries. Using the available figures as a base, we estimate

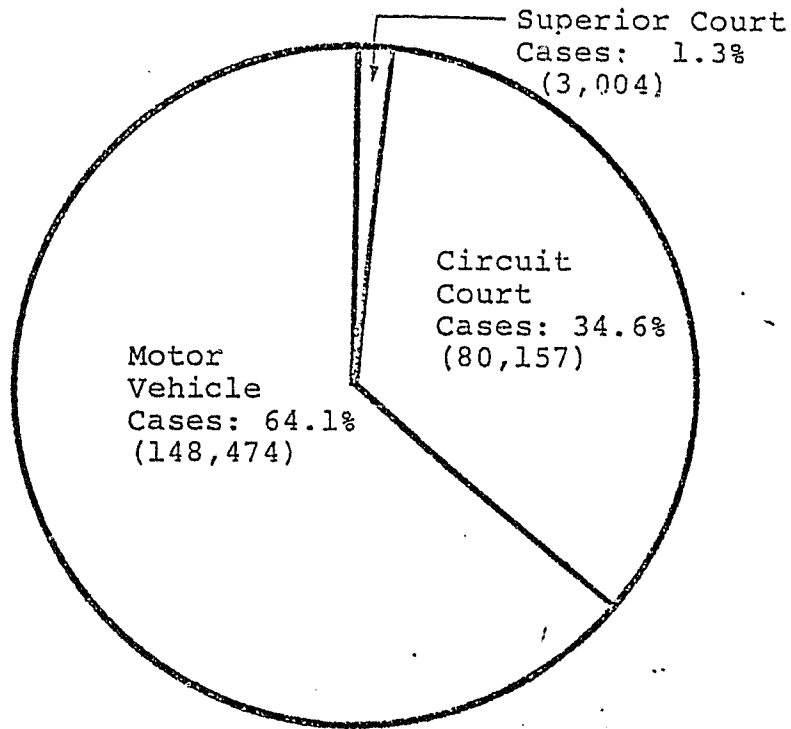
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<sup>19</sup>Motor vehicle offenses may not all be characterized as criminal in a legal sense; however, for data processing purposes all have been included in the criminal system.

<sup>20</sup>Within the non-motor vehicle category, the Circuit (now Common Pleas) Court, which processed minor criminal offenses, handled 96.4% of the criminal business, and the Superior Court, which processed serious felonies handled the remaining 3.6%.

EXHIBIT 26:

COMPARISON OF THE CRIMINAL CASELOAD  
IN COURT YEAR 1972-73.

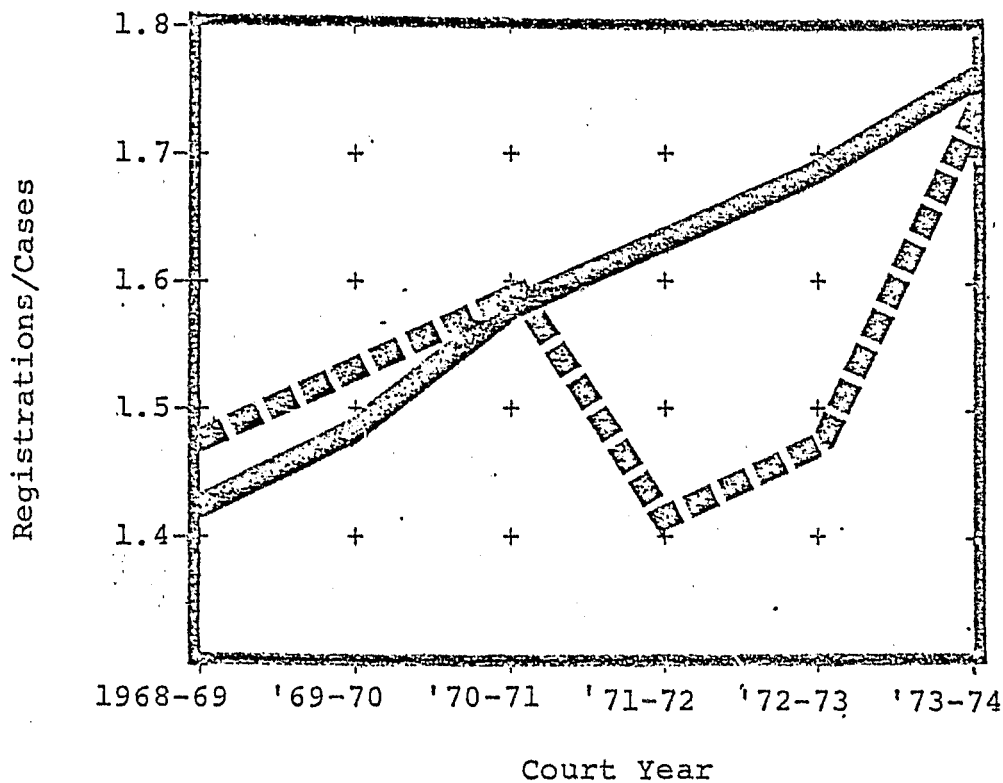


Total cases: 231, 635

SOURCES:

Twenty-Fourth Report of the Judicial Council of Connecticut, December, 1974, pp.41 and passim.

EXHIBIT 27: PASSENGER CAR REGISTRATIONS COMPARED WITH MOTOR  
VEHICLE CASES ADDED (1968 - 1973).



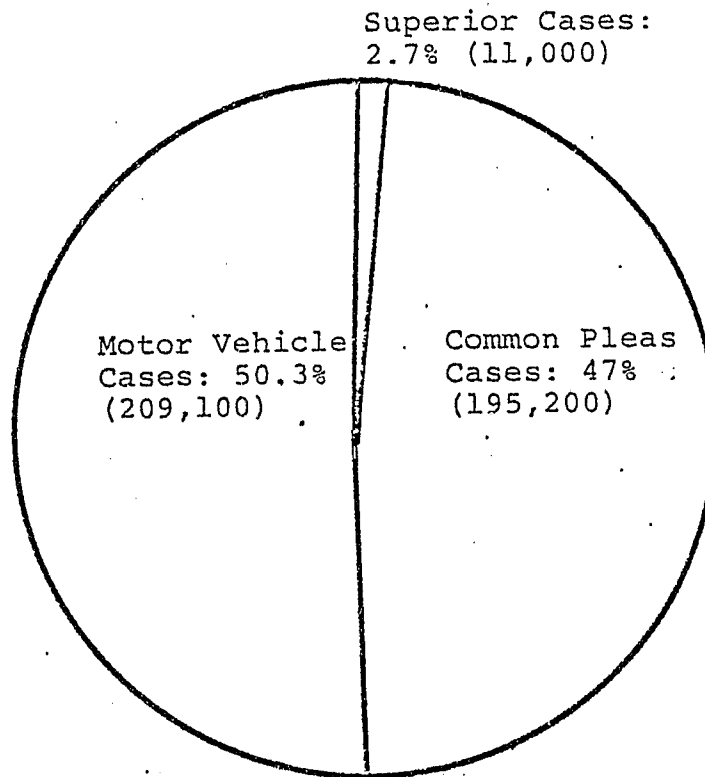
: Passenger Car Registrations (millions).

: Motor Vehicle Cases Added (hundred thousands).

*The trend in the motor vehicle caseload is closely related to the change in the number of motor vehicles registered. The trend can also be affected substantially by statutory changes such as the adoption of the 55 m.p.h. speed limit, or by a change in the enforcement policies of the Connecticut State Police. The sharp "decrease" in cases reported between 1970 and 1971 is most likely attributable to the change-over in the methods of reporting, from a by-charge to by-case basis.*

EXHIBIT 28:

1979 - 1980 (COURT YEAR) CASELOAD PROJECTIONS



Total Cases: 415,400

NOTE: See Exhibit 20 for Current Caseloads.

SOURCES:

Based on:

Annual increase in dispositions of; Motor Vehicle: 3%  
Common Pleas: 16% and Superior: 30%

that the average annual increase in the Superior Court business should continue to be around 30 percent, and the increase in the lower court (now Common Pleas) about 16 percent. (MITRE Corporation has calculated a "growth factor" of about 6% for criminal business.) Based on our projections, the complexion of criminal cases for the court year 1979-1980 may be noticeably different, with motor vehicle infractions accounting for only 50 percent of the total criminal business, and Common Pleas, almost 47 percent. Exhibit 28 shows the 1979 criminal disposition projections.

-- *Observed Costs*

The cost of automated processing of criminal business could not be determined exactly, due in part to the disjointed administrative structure. The costs discussed here are solely those accruing to the CJD. They include:

- motor vehicle data entry personnel at Central Accounting
- equipment and supplies used for statistical reporting
- SDC processing charges
- telephone line costs
- consultant services

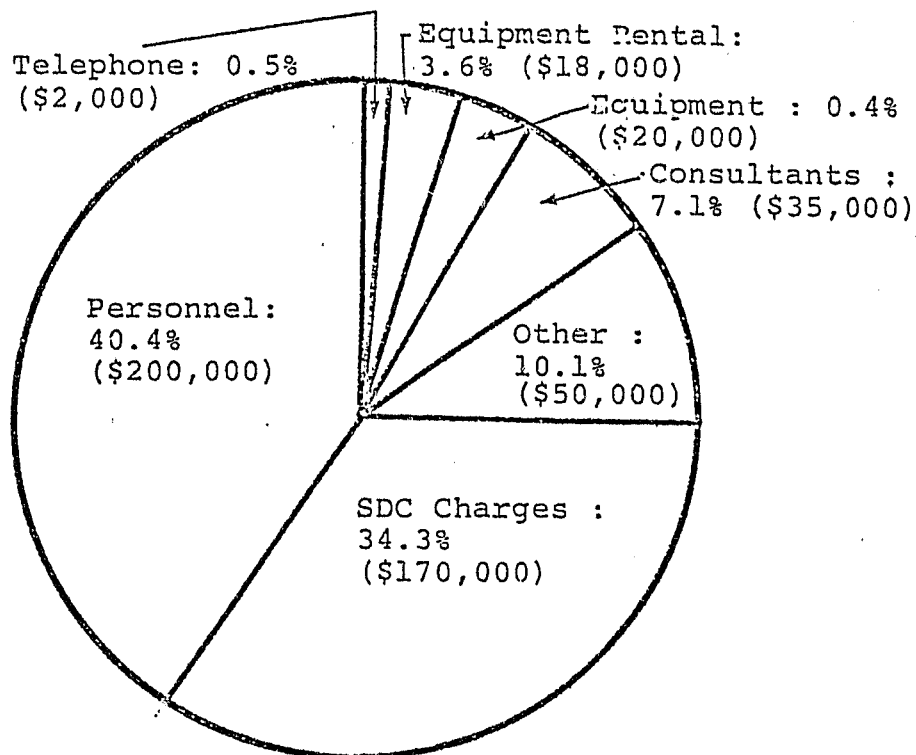
and exclude:

- personnel not utilized for automated processing
- miscellaneous expenses of Central Accounting
- expense borne by the MVD

The Data Processing Division of CJD pays for data lines, all processing costs at the State Data Center, consultant services,

EXHIBIT 29:

BREAKOUT OF CRIMINAL CHARGES: 1975 Calender Year  
Projections



Total: \$495,000

SOURCES:

Central Accounting

Data-Processing Division

Note: These projections are based on  
observed costs for the first half of 1975.



and some supplies; Central Accounting contributes management and entry personnel, office supplies, data processing equipment rental, and other function-related costs.

The available information for Central Accounting and Record Retention Center unfortunately includes the costs of the records center, making it difficult to break out personnel and other expenses solely attributable to automated criminal processing. We assume, based on observations of the Central Accounting Office's operation, that about \$200,000 is spent on personnel, with three-quarters of that attributable to motor vehicle case processing. Equipment rental and maintenance is estimated to approximate \$20,000 per year. Other associated costs, including data processing supplies, directly attributable to automated processing are estimated at approximately \$50,000 per year.

The criminal system costs accounted for by the CJD's Data Processing division are well known. Based on averages for the first six calendar months of 1975, we project that about \$225,000 will be spent on criminal processing, the bulk (about \$170,000) for expenses at the SDC. The remainder is equipment rental (\$18,000), and telephone lines (\$2,000), as portrayed in Exhibit 29. Thus, we would anticipate the 1975 calendar year expenses attributable to criminal processing to approximate about \$500,000, in contrast to our estimate of \$400,000 for 1974.

#### *-- Cost Trends and Projections*

The criminal system has not been in operation long enough to provide data from which accurate long range projections could

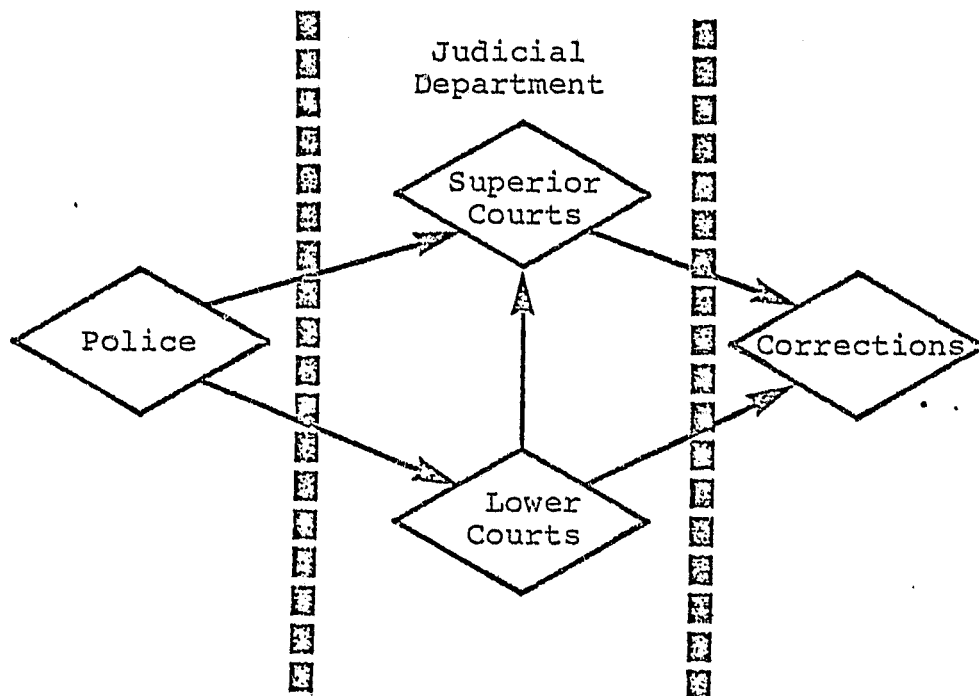
be made. In any event, the criminal system, in its current form, will not continue to exist long enough for such projections to be necessary. With the advent of the comprehensive CJIS/JURIS II system in 1977, the current activities will be displaced. Until then, criminal system costs should remain relatively stable, increasing no more than 10% (about \$50,000).

The eventual costs of CJIS are contingent on the functions the system will support, and on the computer used. As the function of this report is to lay out and analyze those computer options, no single estimate is possible. Cost estimates for various options are presented in §4.6.4 of the ANALYSIS OF THE CONNECTICUT JUDICIAL DEPARTMENT'S COMPUTER OPTIONS section of this report.

#### 2.5.5 Criminal System: Objectives and Plans

The CJD intends to replace the current JURIS II system with the comprehensive, multi-agency CJIS. Present plans call for the CJD to form one part of the proposed system. This system will track each case through the criminal process from arrest to correction. Toward this end, a CJIS Advisory Board, of which the CJD is a member, has been created. The board, consisting of representatives of state criminal justice agency, will decide on the computer configuration or automation source to be used. The CJD retains full control over its degree of participation in CJIS. It appears that the CJD is strongly committed to the development of this multi-agency system and views the future of its criminal processing solely in terms of CJIS. We were unable to ascertain

EXHIBIT 30: CONCEPTUAL SCHEME OF ENVISIONED CRIMINAL  
JUSTICE INFORMATION SYSTEM (CJIS)



Key: Arrows indicate the direction of the  
flow of criminal cases processing over time.

the CJD's contingency plans, if any, in the event that CJIS does not materialize, is substantially delayed, or takes a form unacceptable to the CJD management.

Exhibit 30 shows the relationship of the judicial department to other criminal justice agencies in respect to the CJIS information processing flow. The criminal system is expected to perform analagously to its civil counterpart, with appropriate alterations for differences in the civil and criminal procedures. It should monitor the case life, generate docket sheets, schedule assignment and trial lists, issue appearance notices to involved parties, and produce statistical reports for management. Like the civil system, it is intended to operate on a case basis.

A significant difference is that some on-line processing will be supported, especially in regard to queries from other agencies.

## 2.6 DOCUMENTATION OF EXISTING SYSTEMS: JURY SELECTION

### 2.6.1 Jury Selection: Introduction and Status

Selection of jurors is made by the Connecticut Judicial Department (CJD) using data processing techniques following manual operations of the jury committees of each individual town. The automated system rejects prospective jurors who are exempt from duty by law, and generates notices to those who are to be called for service. The first phase of the complete system was implemented in 1974; returns from which jurors will be selected for the following court year began coming in to the CJD in early 1975.

### 2.6.2 Jury Selection: Historical Development

Automation was employed in the selection of Connecticut jurors as early as 1965. In the mid to late 1960's several towns (e.g., New Haven) used punched tabulating cards and mechanical sorting devices to select jurors. At that time all selection was done by each of the state's 169 cities and towns. The first step toward centralization and uniformity came in 1967 with the passage of Conn. Gen. Stats. §51-220A, which invested in the Chief Court Administrator the power to authorize specific methods of random

selection of jurors from the town voters' rolls. In 1969, legislation "providing for the selection and summoning of jurors by means of automatic data processing"<sup>21</sup> was passed by the General Assembly, but vetoed by the Governor due to both the failure of the Legislature to appropriate sufficient funds and also the unacceptable form of the bill. This problem was later corrected, and by late 1972 the CJD initiated planning of a centralized, automated selection process. These plans were completed in 1973 at which time it was proposed that random selection (i.e., not selection by lot or on a rotational basis) for the entire state, using the already computerized MVD licensed drivers file be adopted. A bill amending the base pool from qualified voters (as designated in Title 51, Chapter 884) to persons holding valid motor vehicle operating licenses was introduced by the CJD in 1973 and again in 1974, but not enacted.

Thus, a different automated system, which accepts the jurors selected by the communities of Connecticut and generates and processes questionnaires to these jurors, was adopted and is currently being implemented (see the following section, Jury System: Processing of Information, for the details on the operation of this system). Design of programs and forms was completed by late 1974; a trial implementation began in

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<sup>21</sup>Report of the Chief Court Administrator, 1969-1970 (March, 1971), p. 68.

EXHIBIT 31: JURY SELECTION SYSTEM HISTORY

HISTORICAL KEYPOINT	DATE
Town Tabulating Card Operations	1965
Passage of 51-220A	1967
Governor's Veto of Decentralization	1969
Central Takeover Approved	1973
Legislation to Allow Use of MVD Files	1973 & 1974
Tolland County Implementation Begun	Fall 1974
Statewide Conversion Complete	1977

the fall of 1974, and is expected to yield jurors for the next annual call. Statewide conversion on a county-by-county basis is being undertaken; the anticipated rate of conversion is about three counties per year.

### 2.6.3 Jury Selection: Processing of Information

The jury selection system relies heavily on manual operations. The local jury committees select from the voter lists names of twice as many persons as the town is required to supply as jurors.<sup>22</sup> These names are forwarded on a standard form to the Jury Administrator. The CJD mails to everyone on a list prepared by the Jury Administrator a computer-produced questionnaire designed to identify further exemptions. (Those persons exempt by statute -- doctor, lawyers, certain mothers, etc.,<sup>23</sup> -- are supposedly screened out at the town level.) When they are returned,<sup>24</sup> the replies are entered into a computer system via an OCR (Optical Character Recognition); at which point persons claiming exemption for other reasons are rejected. Approximately 34 percent of the original list is removed in this process. The remainder, which represents 132 percent of the number of jurors required, are sent to the County Jury Commissioners. This list is pared to

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<sup>22</sup> At last count, 17 towns have these names in some form of automated format.

<sup>23</sup> C.G.S.A. §§51-218 (1958) and 51-219 (as amended 1973).

<sup>24</sup> If they are returned: Hartford, for example, has a 17 percent non-return rate. The names of persons not replying may be added to the inclusion list.



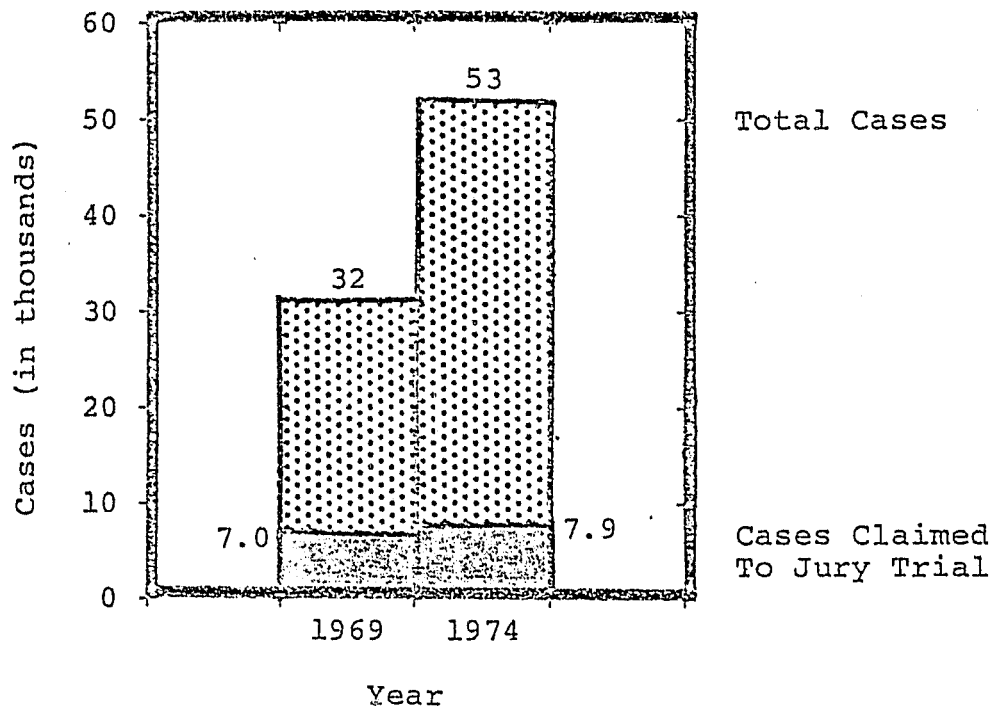
exactly one-half the number of names originally supplied by the towns. This final list, containing the names of those persons who will be called for jury duty in the following court year, is entered into a computerized data base from which the jurors for all courts are summoned. When jurors are needed, summonses for duty are issued automatically according to parameters set by the Clerk. After completing service, jurors are paid according to length of service, and are issued a Certificate of Service. Both these operations are presently performed manually.

#### 2.6.4 Jury Selection: Loads and Costs

The number of jurors required from each town is set by the Legislature. In 1974, 72,000 names were required statewide, of which 36,000 were selected to be jurors.

No provision for calling additional jurors has been integrated into the selection system. While some localities "run out" of jurors from that area, the total number of jurors required has not thus far to our knowledge necessitated a second call. Since caseload data for jury trial in the Circuit Court are lacking, no projection of jury trails for this court is possible. Relatively good figures available for the Superior Court show an increase on only about 12 percent between the 1969-1970 and 1973-1974 court years in the number of cases tried to juries. This compares to an almost 70 percent increase over the same period in the total number of cases (see Exhibit 32).

EXHIBIT 32: TOTAL SUPERIOR COURT CASES COMPARED AGAINST  
SUPERIOR COURT CASES TRIED WHERE JURY TRIALS  
ARE REQUIRED. (1969-1974)



SOURCES:

Report of the Chief Court Administrator 1969-1970,  
p. 42.

Docket and Trial List Summary for 9/1/73-8/31/74,  
Connecticut Judicial Department, run date: 9/22/74.

As for costs, we estimate them at \$20,000 for 1974; they are attributable to early implementation efforts.

As an aside, it is interesting to note that the expenditure for jury fees for all courts has decreased about 22 percent during the five year period 1969-1974.

#### 2.6.5 Jury Selection: Objectives and Plans

The partial centralization and automation of the selection of jurors will allow the CJD to improve the efficiency of this process. It is important to note that this is the single most visible aspect of the judicial process to the public at large. Efficient, considerate management will inevitably be reflected in a favorable public perception of the quality of justice administered in Connecticut. Automation means that accurate statistics can be compiled from the data base, and the forms utilized in the process will become standardized.

Several further refinements of the jury selection system are under consideration. Standardization and computerization

of the source lists (currently the town voter rolls) is being pursued. A single source list, such as the MVD license file, would greatly simplify this process, and inevitably result in reduced costs.<sup>25</sup> In lieu of these alternatives, the voter rolls will probably remain the base source for the foreseeable future.

The CJD also desires to extend automation of processing to those functions currently done manually, to all levels including the towns. It is believed that computerization of the data base at the town level would speed up the selection process and reduce overall costs by the displacement or reallocation of manual labor. Lastly, the reporting of jury service to the Accounting Department, now done manually by each court, could be automated in order to speed compensation of jurors. IRS Form 1099 (for jurors receiving over \$600 in fees) and the Certificate of Service could be generated concurrently.

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Some states employ multiple sources for jury selection to assure the inclusion of all population groups.

## 2.7 DOCUMENTATION OF EXISTING SYSTEMS: THE JUVENILE COURT

### 2.7.1 Juvenile System: Introduction and Status

The Juvenile Court initiated implementation of the first phase of its JUSTIS (Juvenile Uniform Statistical Transaction Information System) system on January 1, 1975. It is designed to collect data on the intake, processing, and disposition of juvenile referrals for statistical analysis. After the results of this phase, which will last one year, are available, planning of a comprehensive system will be undertaken.

### 2.7.2 Juvenile System: Historical Development

The compilation of statistics for management usage has been deemed less important than the business of expediting the case flow in the juvenile system. Prior to the inception of JUSTIS, the most recent statistics available were contained in the 1971 Annual Report of the Juvenile Court, published in late 1974. In January, 1975, implementation of JUSTIS began, when a letter of agreement was signed with the Social Science Data Center at the University of Connecticut (Storrs Campus) to provide data processing service for JUSTIS.

### 2.7.3 Juvenile System: Processing of Information

The Administrative Assistant for Judicial Research characterizes JUSTIS as having been

designed to perform two primary functions: providing data for research and evaluation of programs, practices and dispositional effectiveness and supplying monthly statistics for management control. A by-product of the system is the availability of information to satisfy requests from related agencies and external organizations. <sup>26</sup>

In order to accomplish these aims, the system generates

monthly reports showing total intake and dispositions for that month are prepared and include summaries for the total state, each district, each area office, and each probation officer. In order to correct any coding errors made in the early months, and update any case disposition coding, a six month report was produced which included all intake and disposition of cases, including those cases pending as of January 1, 1975.<sup>27</sup>

Basic information (name, offense, etc.) on all intake cases is recorded by the register clerk on a case processing form. A unique case number is assigned at this time. As the case proceeds through the juvenile process, various forms appropriate to each step are filled out. These sheets are coded according to standardized codes at the local centers on a regular basis. Once a month, a keypunch agency picks up the coded sheets, punches tabulating cards, and delivers these to the Social Science Data Center at UConn (Storrs). The SSDC provides "monthly reports...aimed at determining such trends

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<sup>26</sup> Interview with Mrs. Kathleen Sloan, conducted by Martin Gatter.

<sup>27</sup> Ibid.

as ages of offenders or rates at which juveniles return before the court for subsequent violations"<sup>28</sup> using standard statistical packages such as SPSS (Statistical Package for the Social Sciences), Datatext, and OSIRIS-4. The specific information includes caseloads by geographical area, regional location, court, judge and probation officer, and classifications of offenses by type, age of offender, sex, etc. In addition, log sheets listing caseloads are generated for the probation officers' notebooks. The programs for these reports were developed by the programming staff at the Social Science Data Center.

The high priority placed on anonymity of juvenile offenders has not been sacrificed in the process of computerization. Every child referred receives a unique number. All information is referenced by this number and not by name.

#### 2.7.4 Juvenile System: Loads and Costs

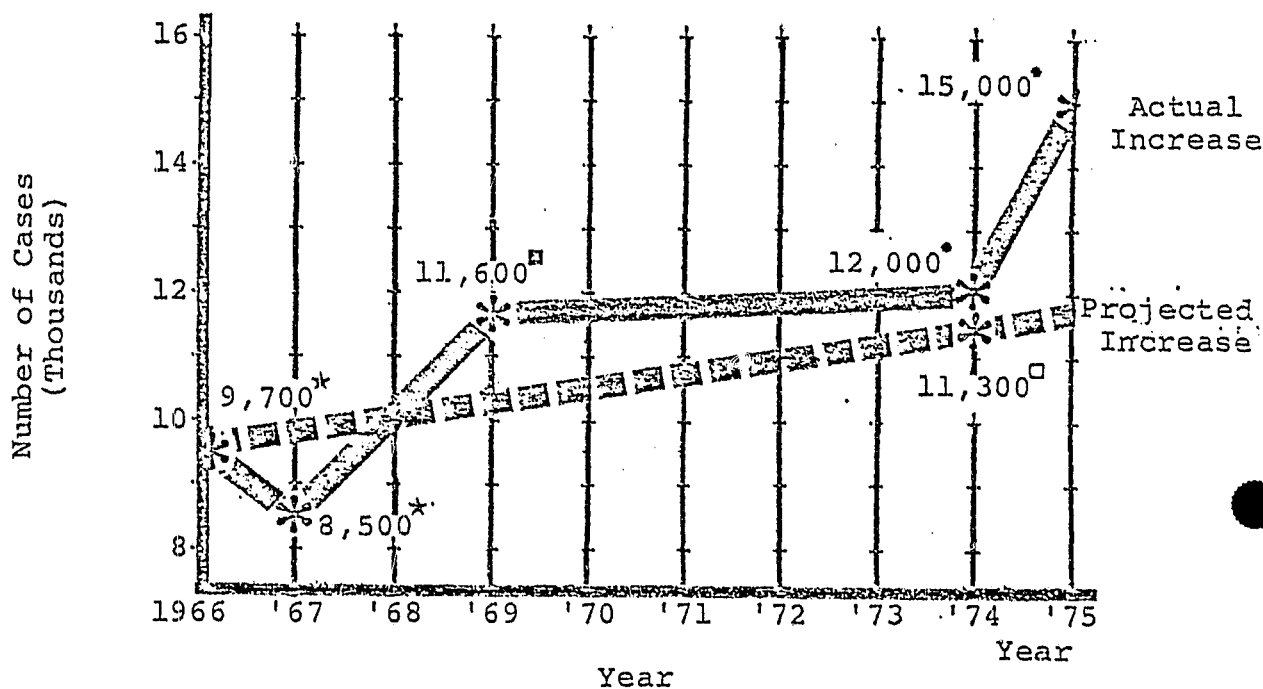
Prior to its implementation, no significant increase in juvenile intake of delinquency cases had been observed over the past ten years. In 1967 the Juvenile Court caseload was about 9,800 cases (including neglect); by 1974 this had increased to 12,000. This increase in the juvenile caseload (21%) is slightly

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<sup>28</sup> University of Connecticut (Storrs) Press Release #515-2 (February, 1975).

EXHIBIT 33:

THE ACTUAL AND PROJECTED JUVENILE  
CASELOAD (1966 - 1975).



Juvenile Court Caseload  
1966 - 1975

SOURCES:

\* *Annual Report 1967 - Juvenile Court for the State of Connecticut*

□ *Report of the Chief Court Administrator 1969-1970, State of Connecticut*

\* *Based on estimates supplied by Mrs. Kathleen Sloan - 1974 - 1975 extrapolated from first few months.*

□ *Projected number of referrals for delinquency, based on the increase in the juvenile (under 17) population*



higher than the increase in population growth (15%).<sup>29</sup> However, a startling 25 percent increase in intake has been noted since the inception of JUSTIS. About 15,000 cases are projected for 1975, based on January and February 1975 data. It is most likely this "increase" is only the result of improved data gathering. The cases themselves, however, appear to have changed between 1967 and 1974, with recidivists increasing from 31 percent of delinquency cases to about 55 percent over this period, and the percentage of girls involved in the court's delinquency distribution rising from 16 percent to 23 percent.<sup>30</sup>

We estimate \$10,000 for startup costs in 1974. The data processing costs of the Juvenile Court for the trial year (1975) of JUSTIS will be relatively unaffected by any changes in caseload. The agreement with the Social Science Data Center is for a fixed price of \$15,000 for the year (1975), regardless of volume. The keypunching service costs \$80 per 1,000 cards, including pickup and delivery. This amounts to so little in comparison to the \$15,000 for programming and processing that even doubling the caseload would not increase the 1975 cost of JUSTIS significantly.

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<sup>29</sup>Connecticut Market Data, 1974/75," Connecticut Department of Commerce, 1974, pp. 20-32.

<sup>30</sup>Report of the Judicial Department, State of Connecticut, January, 1975, p. 12.

#### 2.7.5 Juvenile System: Objectives and Goals

The gathering of improved data yields three benefits. Not only does it allow the timely publication of the Annual Report for the Juvenile Court, but, more importantly, it provides accurate information for management of the courts. Improvement of the management control function will be an increasingly important by-product of JUSTIS. In addition, the standardization of forms and procedures necessitated by computerized processing will serve to aid the courts' efficiency. This benefit has already been seen in the more accurate reporting of case loads. Using JUSTIS, data essential to the evaluation of special programs in the Juvenile Court will be readily available.

Decisions on the future of JUSTIS' integration into the CJD's unified information processing system are pending, contingent on the findings of the trial year, 1975.

## 2.8 SUMMARY

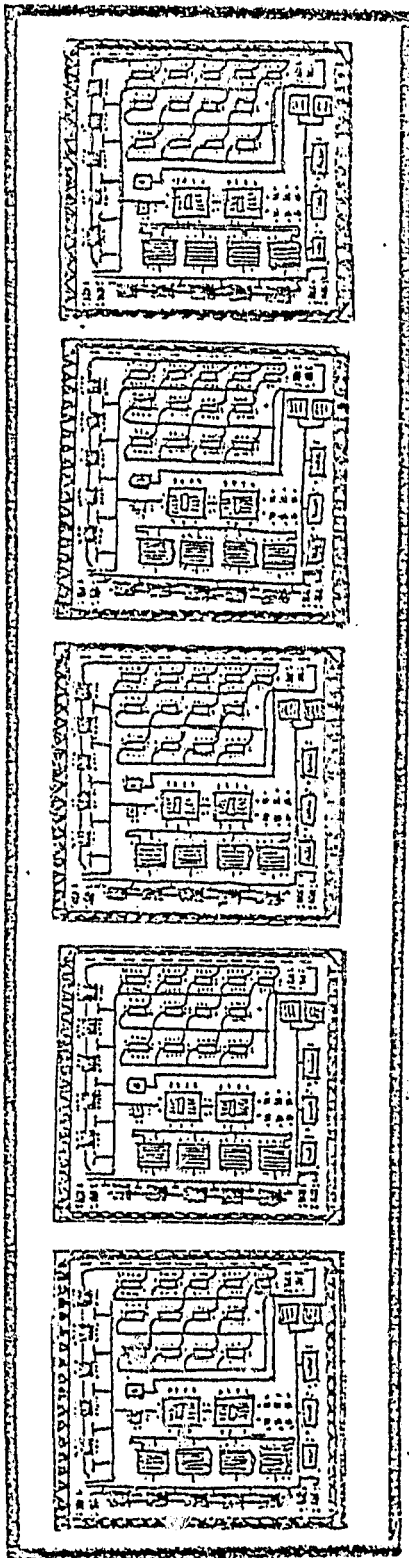
In documenting that portion of the CJD's organizational structure in which data processing decisions are made, we noted that the Executive Secretary reports on a staff basis to the Chief Court Administrator, who is also the Supreme Court Justice. On the next level, a number of individuals, who have been delegated specific data processing responsibilities, report to the Executive Secretary. The goals of this organization with respect to computer-based information systems are:

- Providing a high quality of justice
- Maintaining centralized management control
- Maintaining the independence of the judicial branch of government
- Cooperating with the other branches of the state government
- Adopting a uniform automated information processing capability
- Selecting the least costly automated information system capability that meets the specifications of the CJD

Our analysis indicates that the CJD's existing computer based information systems are of a mixed quality. The civil system, which prepares dockets, schedules cases,

notifies individuals of court appearances and, in general, reduces much of the clerical work associated with case processing, is performing well. The jury system generates juror questionnaires, processes the replies to these questionnaires and maintains a file of individuals selected for jury duty. For a remarkably small amount of money, the juvenile system is compiling badly needed statistics. The criminal system, however, while performing a number of worthwhile services such as accounting for fines and motor vehicle violations, is disjointed both technically and administratively.

As for the future, evolutionary changes to the CJD's civil, jury and juvenile systems will be made. Significant changes, however, are being considered for the criminal system. The CJD must decide with specificity its degree of participation in the planned criminal justice system (courts, police and corrections). These decisions will have a profound impact on the CJD's future information processing plans and, indeed, on the courts of Connecticut as a whole.



## 3.0 Assessment Of Information Technology

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### 3.1 INTRODUCTION

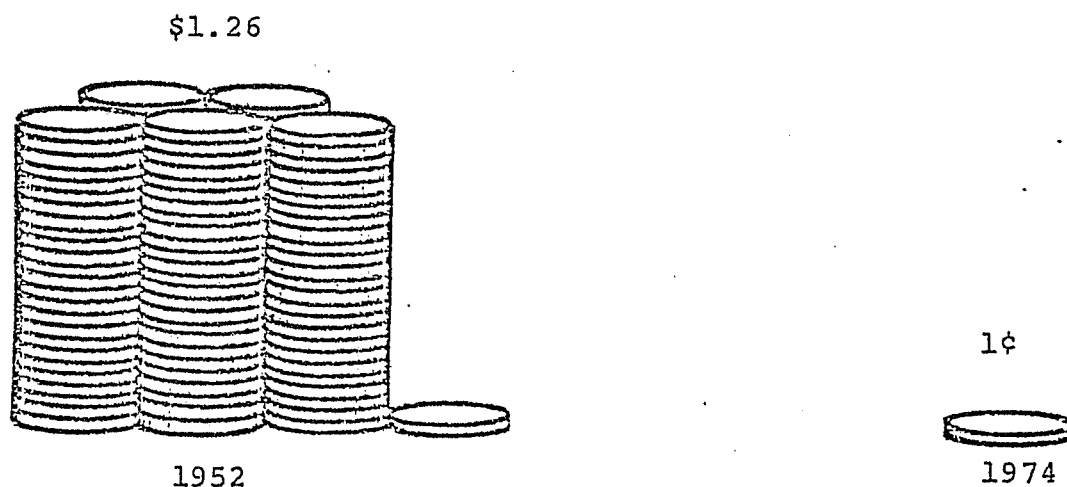
Because information technology is advancing at a truly phenomenal rate, and new developments of this technology often bear on the choice of a computer system, we assess this technology here before evaluating the computer options available to the CJD.

Although the past accomplishments of information technology are discussed in this section, it is only to place present and future developments in this discipline in perspective; the major thrust is what is occurring and what is likely to occur in information technology. Further, our emphasis is on the technology that is most relevant to the courts. Hence, the focus of this section is commercially oriented computer-based information systems. However, other areas of information technology, which may be part of current or future court systems (e.g., microfilm, microfiche, Picture phone service) are touched on as well.<sup>31</sup>

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<sup>31</sup> Information on other areas of information technology relating to the courts may be found in other National Center for State Court publications (See Appendix IX).

EXHIBIT 34: THE COST OF PROCESSING 100,000 MULTIPLICATIONS ON AN  
IBM COMPUTER IN 1952 AND 1974.



SOURCE: IBM Advertisement, Atlantic Monthly, October, 1974.



### 3.2 COMPUTER HARDWARE AND SOFTWARE

Ten years ago the topic of computer hardware and software would have constituted the bulk of this report on information technology. Today, the use of computers has been enhanced by two developments of the last ten years: (1) the ever increasing use of telephone lines for the transmission of data, and (2) the increasing concern of computer designers with the role people play in the use of computer systems. Both of these topics are discussed later in this section. Computer hardware (the electrical and mechanical devices that constitute a computer, e.g., a computer terminal) and software (the programs which instruct the computer what to do) are discussed here.

#### 3.2.1 Digital Circuitry

Advances in computer technology have been most striking in the realm of digital circuitry. Relays, vacuum tubes, discrete transistors, and integrated circuits (ICs) have succeeded one another, while the speed/cost ratios of the components have improved by a factor of more than a billion. The circuitry has also become more reliable, more compact, and less sensitive to the environment. Meanwhile, ICs have continued to evolve, with larger and larger circuits being

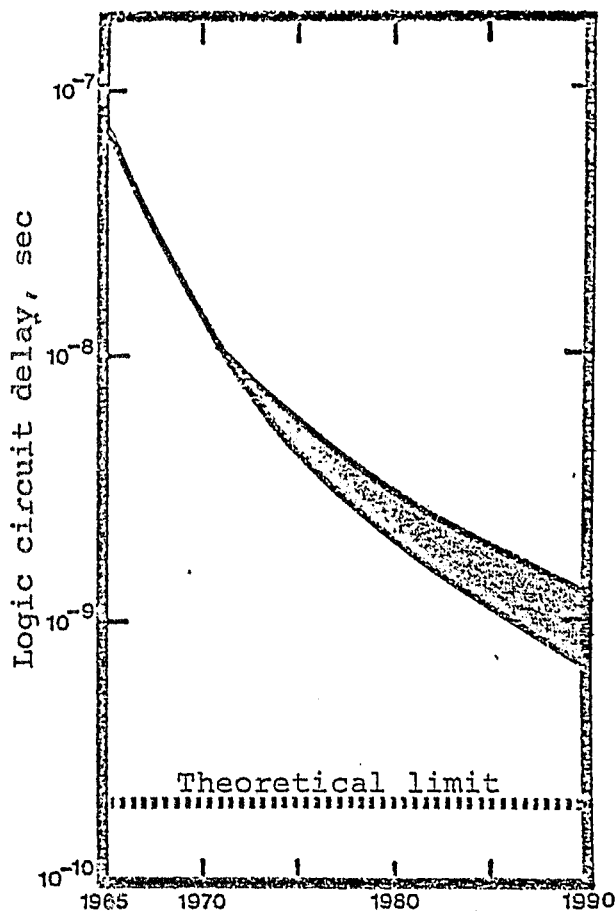


EXHIBIT 35: FORECAST OF BIPOLAR SEMI-  
CONDUCTOR LOGIC-GATE DELAYS.<sup>1</sup>

*The speed of a logic-circuit is expressed in terms of generalized gate delay. This exhibit describes the dramatic decrease in circuit delay (or increase in logic-circuit speed) which has been projected for the 1980's.*

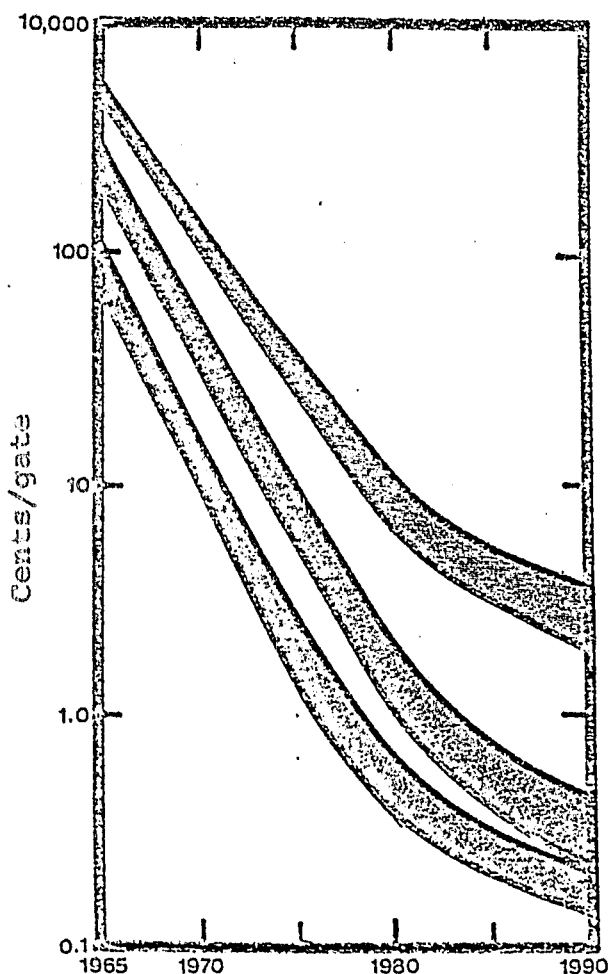


EXHIBIT 36: PROJECTED COSTS OF SEMI-  
CONDUCTOR LOGIC CIRCUITS.<sup>2</sup>

*A logic-gate is an element of memory. This exhibit describes the equally dramatic decrease in the cost of memory elements. Coupled with the increased speed of logic-circuits (as indicated in Exhibit 35), this exhibit demonstrates the extraordinary improvements which have been and will continue to be made in logic circuit performance.*

SOURCES:

<sup>1</sup>Turn, Rein, *Computers in the 1980's*, Columbia University Press, New York and London, 1974, Figure 21, pg. 153.

<sup>2</sup>*Ibid*, Figure 23, pg. 159.

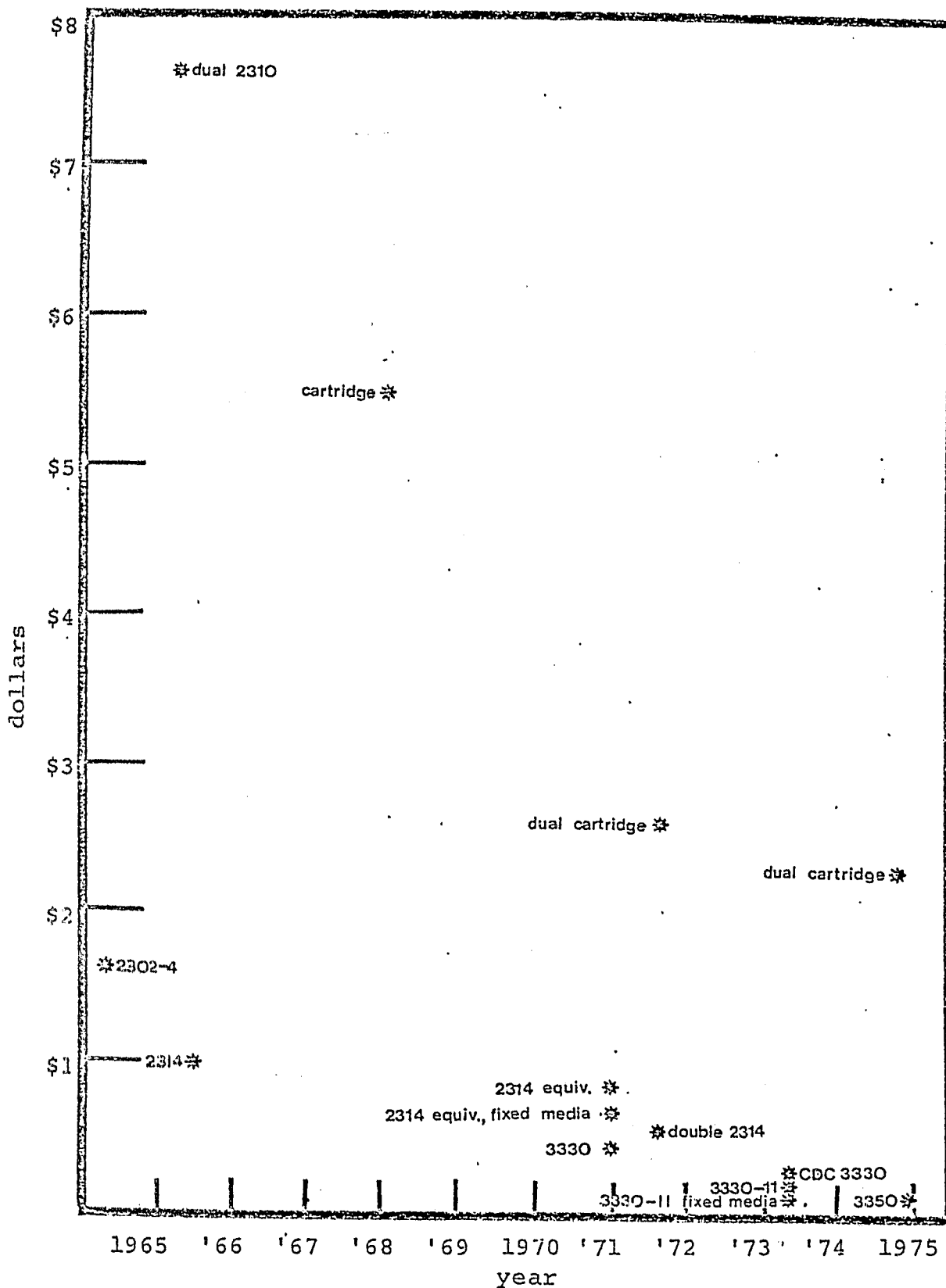
fabricated on a single piece of silicon. Most hand calculators use only one or two ICs; and some of these ICs contain as many transistors as some early computers. This evolution is certain to continue for at least several years, after which it will be several more years before computer systems will fully utilize these smaller but more powerful ICs. Thus, the cost/performance ratio for computers will continue to improve for at least the next ten or so years. (See Exhibits 35 and 36.)

### 3.2.2 Central Processing Units (CPUs)

The main beneficiaries of this technological progress are the central processing unit (CPU) and its associated high-speed memory. The CPU performs all data manipulation and controls the other devices, in accordance with the program being executed. The memory unit holds all data being processed, as well as the program being executed. Central processing units, which once filled entire rooms, can now be fabricated as a single IC. Memory costs have declined from about \$2/character to \$.25/character in the last 10 years, while speed has gone from between 3.0-5.0 to between 0.8-1.0 microseconds for a typical access of this memory. Comparing the cost of an entire computer system of ten years' vintage with a current minicomputer system is equally revealing. (This is done in 3.5 COMPUTER SYSTEMS, later in this section.)

# EXHIBIT 37: A COMPARISON OF DISK STORAGE COSTS

(DOLLARS per 1000 BYTES) FROM 1965 TO 1975.



SOURCES: Datamation: July '66; Oct. '68; Sept. '70; May '70; Aug. 1970; Aug. '71; Nov. '71; Apr. '73; Aug. '73.

### 3.2.3 Data Storage Devices

Most computer systems need more data storage than is possible in high-speed memory. Disk and tape units provide this capability. Magnetic tapes store huge amounts of data inexpensively (40 million characters/\$10 reel), but provide slow access to this data. In contrast, information on a disk can be accessed in a fraction of a second. Because many current computer based information systems require fast access times, more and more information is being stored on disks. The cost of disk storage has been declining rapidly (see Exhibit 37), thereby providing computer designers with an opportunity to reduce information storage costs or increase the amount of computer-accessible information and, in some cases, to accomplish both ends in the same system.

### 3.2.4. Trends in Maintenance

In addition to becoming less costly, computer components are becoming more reliable. Early computer hardware was extremely delicate requiring precise environmental control. Computer circuitry and components failed or became unreliable under even the slightest fluctuations in power or temperature. Large computer installations usually required the services of a full-time maintenance engineer. Today, computer hardware has become significantly more

reliable than its predecessors. Many computers today (especially small "mini" computers) require no special power supply or environmental controls (such as air conditioning or humidity control). Future computers will follow this trend, requiring less and less maintenance.

### 3.2.5 Software

As technology continues to solve many of the problems related to computer hardware, more attention will be shifted to the development of software. Unlike that of hardware, the cost of software is rising. Not only are "people" costs increasing, but, as hardware configurations become more complex, the software required to operate and control the hardware becomes more complex. Hence, we discuss here recent developments and future trends in computer software, with emphasis on the techniques that aid in the reduction of software development (programming) costs.

Inquiry systems are now offered for sale by many manufacturers. These systems allow their users to query the computer directly. For instance, using an inquiry system, a court administrator could ask: What is the number of civil cases tried in a particular court over the past two years? This question could be answered in a matter of seconds or minutes

at a computer terminal. In the past, a special program, necessitating at least one-half day of a programmer's time, would have had to be written to retrieve the necessary information.

Data management systems are being developed and many enhancements to these systems are expected in the future. These systems allow programmers to specify data elements of a file much more quickly than was possible in the past. This development should increase programmer productivity significantly.

Some computer manufacturers (and other vendors) offer computer systems which include not only the hardware and system software but also the application software required for a specific task. These systems are referred to as "turn-key" systems, the significance being that once such a system is delivered and installed, all the user has to do is plug it in and "turn the key" and his application is automatically computerized.

In that it was quite personalized, programming methodology used to be considered on the level with painting a portrait. Some programmers wrote large programs; other wrote many short programs; each programmer maintained that his programs were best. Recently, many organizations have found that

certain programming techniques are more efficient and lend themselves better to management control. Two of the techniques which are being used more frequently by programming departments are the use of sub-routines and tables.

(These techniques are often incorporated in what is referred to as "structured programming.") The use of these techniques allows a programming job to be broken into smaller segments and, hence, facilitates increased control of this activity.



### 3.3 TELECOMMUNICATIONS

Ten years ago very few United States organizations transmitted data over telephone lines. Today, thousands of organizations, including many courts, routinely transmit some data over phone lines. Tomorrow, in the comfort of their offices, lawyers will routinely check the status of their cases over phone lines on terminals linked to appropriate court computer centers.

The potential of this means of communication is great. Here is one computer authority's view of possibilities of telecommunications:

The most rapidly growing use of the world's telecommunication links is for data transmission. The most rapidly growing area in the exploding data processing industry is teleprocessing. The reason is the power and versatility that the interlinking of computers can bring, plus the potential benefits to the individual of having this power at his fingertips. In all walks of life and in all areas of industry, the devices connected to distant computers will change the realm of what is possible for man to do. In centuries hence, historians will look back on the coming of computer data transmission as a fundamental step forward in civilization, perhaps eventually having a greater effect on the human condition than even the invention of the printing press.

Data transmission will become as indispensable to city-dwelling man as his electricity

supply. He will employ it in his home, in his office, in shops, and in his car. He will use it to pay for goods, to teach his children, to obtain information, transportation, stock prices, items from stores, and sports scores; he will use it to seek protection in the crime-infested streets. The best potentials of data transmission will give man more knowledge, more power, more leisure time; he will have less mandatory travel; his job will be more interesting. In many ways his life will be richer. The worse potentials of data transmission conjure up visions of George Orwell's 1984 and will cause us to look harder at issues involving privacy, security and the democratic process.

Data transmission will drop in cost. Long-distance costs will drop much more than short-distance costs, thereby having an effect on the organization of nationwide corporations. The cost of intercontinental links will drop much more than that of national links, and the international corporation will be bound together via satellite communication.<sup>32</sup>

In the future, data transmission will be much faster. AT&T has forecast that 1 percent of the domestic telephones and 3 percent of business telephones in service will be Picturephone by 1980.<sup>33</sup> Much of the data for this service will travel in digital form, thus allowing for transmission of computer data at a rate of 1.3 million bits<sup>34</sup> per second over telephone lines; currently, data is typically

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<sup>32</sup> Martin, James, *Systems Analysis for Data Transmission*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1972, p. 1.

<sup>33</sup> Martin, James, *The Future of Telecommunications*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1971, p. 35.

<sup>34</sup> Ibid., p. 38.

transmitted at a rate of 300 bits per second. This difference in transmission speeds is truly astounding. While this type of communication line will not be common until the late 1980s, data transmission rates in the near future will increase markedly. The next step will be the use of the Bell Digital Dial Service network,<sup>35</sup> which is now in operation in some parts of the United States (and will be expanded in the 70's) and which allows a transmission speed of over 50,000 bits per second.<sup>36</sup>

Complementing the faster transmission speed will be a reduction in its costs. The user will pay less to transmit data on a bits-per-second basis; however, it is likely that most users will be transmitting much more data, thus the overall costs for data transmission may increase.

Because of the coming telecommunications improvements, computer-based information systems will be more effective tools of the manager. Today, within organizational boundaries, computers talk to one another. Thus, in an increasing number of organizations, a number of computers, tied together by telephone lines (this is called "distributed intelligence") are replacing a single centralized computer. Tomorrow, the

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<sup>35</sup> Note from lecture by James Martin, International Systems Corporation of Lancaster Conference, Great Gorge, New Jersey, October, 1974, attended by William Popp, Senior Staff Associate.

<sup>36</sup> Ibid.

computers of one organization will talk to the computers of other organizations. An existing example of inter-organization communication between computers is the ARPA (Advanced Research Projects Association) network, which connects, among others, MIT, Carnegie-Mellon University, Harvard University, UCLA, and the Rand Corporation.<sup>37</sup> This technology will also have an important impact on the operations of courts. In the future, attorneys' calendar conflicts between the Federal and State courts will most likely be subject to resolution following a check by a computer system, connected to appropriate courts via a telecommunications network.

Of special significance to the courts is the advent of Picturephone service. A trial could conceivably take place with the participants scattered all over the United States, and perhaps the world, with the principal means of communication being conference Picturephone calls. The thought is intriguing.

In sum, the telephone network, which once was used solely to facilitate voice communications, now will be used to transmit data at ever increasing speed. The designs of new court information systems should take advantage of this capability.

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<sup>37</sup> Martin, James, *Systems Analysis for Data Transmission*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1971, p. 298.

### 3.4 MAN-COMPUTER INTERFACE

Fading very quickly are the days of punched cards and the ideas of that era, exemplified best by the slogan on many cards, "don't bend, fold or mutilate." In other words, the concern was for the computer rather than the individuals using it. That philosophy is changing. An articulate advocate of change is James Martin.

During its first two decades, the data processing industry (with a few academic exceptions) paid little attention to effective man-machine dialogue. Technicians have concentrated primarily on the efficient use of the central processing unit and storage media. This is hardly surprising in view of the computer's expense and remarkable capabilities. ... Systems have been designed from the inside, out.

Increasingly in the next decade, *man* must become the prime focus of system design. The computer is there to serve him, to obtain information for him, and to help him do his job. The ease with which he communicates with it will determine the extent to which he uses it. Whether or not he uses it powerfully will depend upon the man-machine language available to him and how well he is able to understand it. To be effective, systems will have to be designed from the outside, in. The terminal or console operator, instead of being a peripheral consideration, will become the tail that wags the dog.<sup>38</sup>

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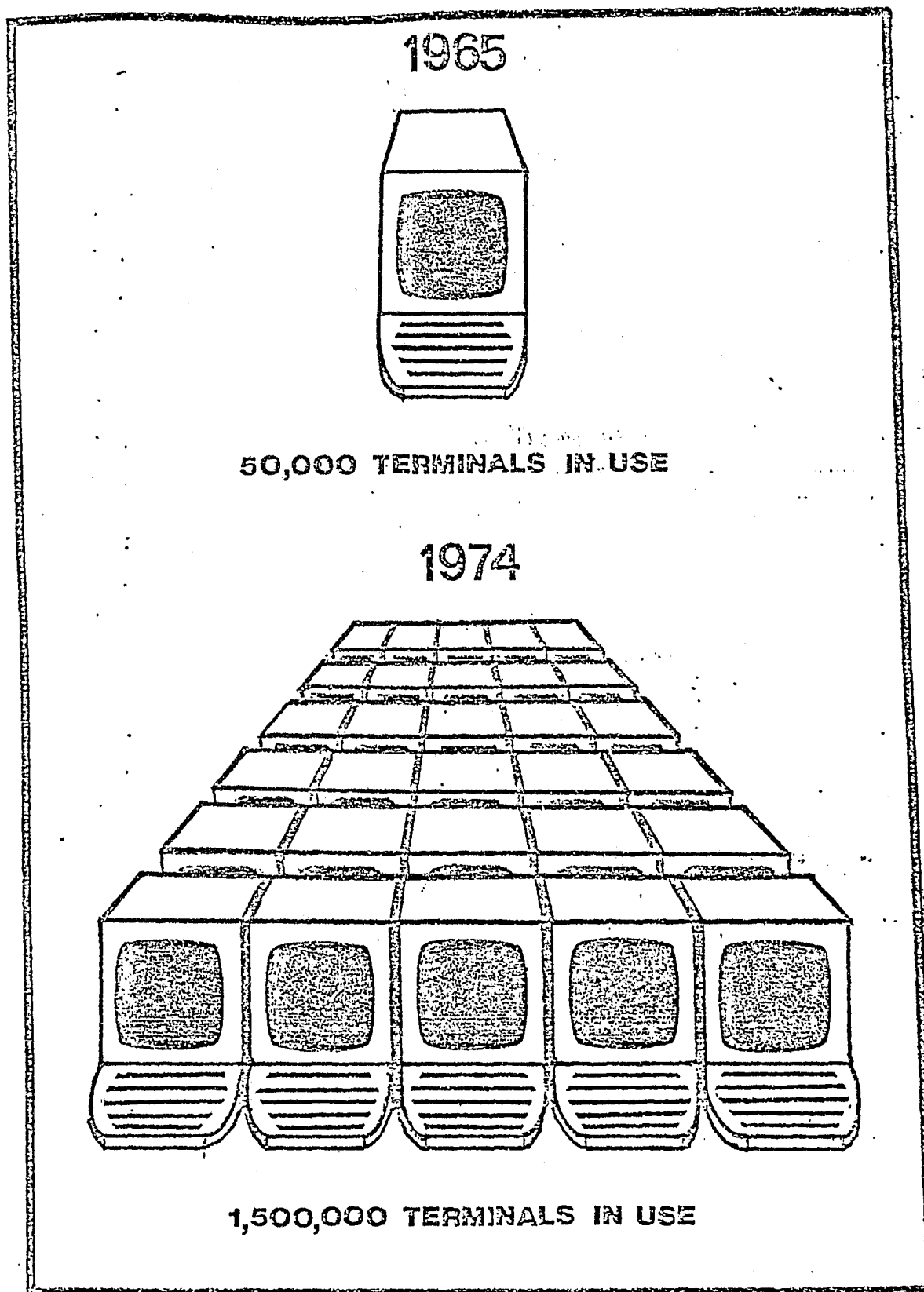
<sup>38</sup> Martin, James, *Design of Man-Computer Dialogues*, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1973, p. 3.



For the past three decades the punched card has been the standard input medium to computers. The first commercial computers, in fact, were conceived as extensions of the punched-card systems then in use. Computers later became more efficient at collating, storing, sorting, and the other functions formerly done with punched card machines. Cards allow only 80 or 96 characters of data to be punched; this data must often be transcribed onto special coding forms prior to being punched. Punched card devices, being relics of a mechanical and electro-mechanical technology, have benefited only slightly from the technical developments of digital circuitry, in cost or performance. Although still in widespread use, punched card machines will eventually be replaced by newer and more efficient data entry equipment.

In addition to punched card devices, the earliest computers had mechanical printers attached to them for output. Printers have improved somewhat in speed since then, with the fastest mechanical printers now capable of several thousand lines per minute. Being primarily electro-mechanical in nature, they are not expected to show great improvements in the future. Their use is inevitable for many purposes, however, so that they are unlikely to be replaced.

EXHIBIT 38: GROWTH IN THE NUMBER OF COMPUTER TERMINALS IN  
USE FROM 1965 TO 1974.



SOURCE: "CRTs Seen Starting to Challenge Cost Edge of Printer Terminals,"  
*Computerworld*, February 26, 1975.



Several other devices have been developed to produce printed output. Electrostatic printers offer quiet operation and often allow graphic output, at the same or higher speeds (1-2000 lines per minute) but at a higher cost. Other devices print onto microfilm or microfiche (Computer Output Microfilm, COM), also at great speed. These devices, and others as they are developed, will continue to replace printers in certain applications. Microfilm and microfiche are replacing paper output for large printouts (over 200 pages), particularly where several copies are needed, or where mailing costs are prohibitive for paper output.

In the future, as Martin suggests, most computer systems will be designed from the outside, in, requiring the extensive use of computer terminals. At a computer terminal, men can converse in a continual dialogue with the computer, much as an individual would talk with an acquaintance. To be sure, these dialogues are designed with a special purpose in mind. Generally, though, active dialogue makes it easier to communicate with the computer.

The use of terminals is growing at a remarkable pace. In 1965, 50,000 computer terminals were in use; at the end of 1974, the number of terminals in use had increased to 1.5 million<sup>39</sup> (see Exhibit 38).

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<sup>39</sup> "CRTs Seen Starting to Challenge Cost Edge of Printer Terminals," *Computerworld*, February 26, 1975.

Many terminals combine keyboard input and low-speed output in a unit oriented toward a single user. Most terminals are intended to be used "on-line" to a computer, which provides immediate feedback to the data and commands entered on the keyboard. Terminals used for output include, among other possibilities, Teletype <sup>®</sup> pointers, matrix printers, silent thermal printers, cathode ray tube (CRT) displays, and braille embossers for blind users. As the diversity of terminals is increasing, their cost is dropping (\$3000 to \$1500 in the last five years for a typical CRT unit), and should continue to do so for several years.

To increase the usefulness of terminals, they are often provided with some means of local data storage, thereby allowing data to be prepared at the user's location and later transmitted to the computer. Another feature being found increasingly in many terminals is a built-in micro-computer, which provides for local editing of data. In that a terminal equipped with both a micro-computer and local data storage has significant information processing capabilities; such as allowing users to enter, edit, and store data without being connected to a computer, it is said to be "intelligent." Because of the rapidly decreasing cost of micro-computers and computer accessible storage, which can considerably reduce data entry costs, many people feel that "intelligent" terminals will soon replace "non-intelligent" ones for most applications.

Obviously, many organizations are replacing keypunch input with terminal data entry devices. One advantage is immediate detection of certain errors. The terminal provides a visual display of data entered, and the data can also be checked for internal-consistency. Errors detected immediately have been estimated to be 10 to 100 times less expensive to correct than errors detected later. Another advantage in a well-designed system is ease of training and use. The high turnover in data entry personnel (over 5% a year) and the difficulty of obtaining trained keypunchers can create problems for keypunch installations. Also, terminals can make it possible for a wide range of personnel to interact directly with the computer, reducing the load on the data entry group. For instance, computer programming can be done at a terminal. Finally, terminals can reduce the delays associated with card data entry.

The data entry system can be organized in many ways. One possibility is for the terminals to communicate directly with a large central installation. Examples include the airlines reservation systems, and systems used in many banks, where ordinary touch-tone phones are the "terminals." Such systems are designed to minimize the CPU time and memory requirements, particularly if the central installation has other work to do concurrently; they also must insure rapid response to all users.

If the data need not be processed immediately, it may be more practical to use another computer dedicated to data entry, physically closer to the data entry stations. Advantages include lower costs, faster response times, and less time lost when the large computer is "down." Pratt & Whitney in East Hartford switched from cards to this approach, and increased productivity per operator by an average of 86 percent. <sup>4</sup>

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<sup>40</sup> From data given by Dawson Alexander, consultant to the National Center for State Courts, for this feasibility study.

### 3.5 COMPUTER SYSTEMS

Designing a present day computer system, an analyst must meld computer hardware and software, telecommunications and the man-machine interface requirements into a single entity. All of these components must be used in the correct proportion if the computer system is to be successful. This task is becoming ever more challenging.

To illustrate the difficulty of the task, as well as the marked changes in computer systems over the past ten years, we compare here a computer of the early 60s and one which has recently entered the market place. They are both representative of small, commercially oriented data processing systems.

The first system chosen is the IBM 1401, which was introduced in the early 60s, and which dominated commercial data processing during much of that decade. Both tapes and disks were available for the 1401, but a usable configuration of either would roughly double the price of the card system most commonly used. A typical system included a CPU, four-thousand characters (4K) of memory, a card readerpunch, and a line printer, and cost about \$130,000. Several key punches, key verifiers, card sorters and collators, etc., were used with this equipment, adding \$10,000 to \$20,000 to the total system price.

The modern system used as an example is the recently announced Data General Eclipse C/300 system, one of a number of systems recently developed for small businesses. The system is built around the Eclipse minicomputer, specially modified for commercial applications. One possible configuration, consisting of the Eclipse CPU, 160K of memory, 180 megabytes of disk storage, a tape unit, a line printer, 7 CRT terminals (each could be placed at a distant location, linked to the computer via telephone lines) and a communications controller, is listed at \$160,000. Card equipment is available, but is not expected to be used by many users of these systems.

The costs of the two systems are similar; the capabilities of the two, however, are markedly different. The Eclipse CPU has 40 times more capacity and is 10 to 100 times faster than the 1401, depending on the job; and, unlike the 1401, the Eclipse CPU is capable of overlapping (multiprocessing) its operation completely with that of the other devices (printer, tape-units, etc.). The 1401 was limited to handling one task at a time, while the Eclipse is capable of handling several terminals while concurrently processing background tasks. Both the increased CPU speed, and the increased core size, are needed to provide this capacity.

The 1401 was provided with FORTRAN, COBOL, RPG, and assembly (machine-level) programming languages. Most programming for business applications was done in assembly language or, later, in COBOL. The 1401 did not have an operating system; all programs had to be initiated by hand, by an operator who was familiar with the machine and with the program to be run. The C/300 system includes an operating system which schedules the performance of tasks for several users, a data base management system to provide convenient access to disk files, and a number of languages such as RPG, FORTRAN, BASIC, and ALGOL. The data base management system allows users at terminals to access and update of files, and is integrated into the higher-level languages.

In operation, the C/300 offers several advantages over the 1401. The C/300 can handle a much larger workload, with smaller delays in processing. Through the use of video terminals on the Eclipse, an individual can check the status of a job in an instant. The 1401, on the other hand, was limited to handling jobs that did not require a response faster than a few days. The C/300 is also capable of communicating with other computers, notably IBM 370s, for handling very large data processing tasks and for coordinating many systems in a powerful data processing network.

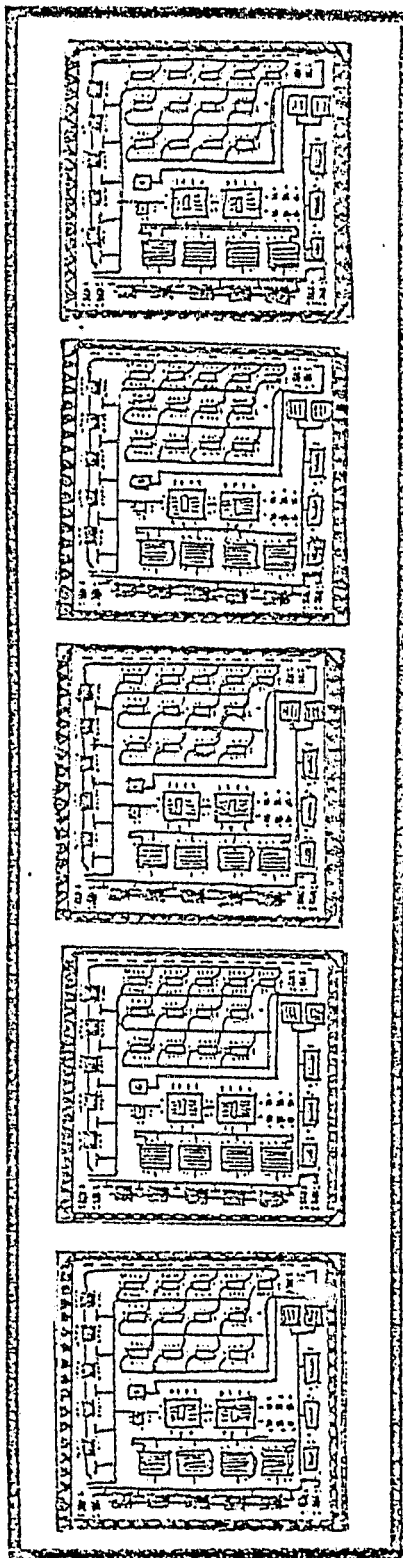
In sum, while the price of the two systems is similar, the difference in their performance is enormous. The Eclipse is much more powerful and complex; computers of 80s, when compared with the Eclipse, will similarly outclass it by a wide margin. Clearly, then, the analyst, when planning new computer based information systems, must carefully assess the trends in computer technology before deciding on a configuration.



### 3.6 SUMMARY

Current trends paint a bright future for computer based information systems. A large and expanding variety of equipment will enable computer power to be put to new uses, making many new computer applications feasible. The increase in performance and decrease in cost of computer equipment will make these new applications not just feasible, but practical. Furthermore, an increasing number of systems are designed to ease the problems of expanding into new uses.

These developments are not, however, an unmixed blessing for the system designer. The increasing variety of devices means that an increasing number of decisions need to be made. These decisions can no longer be left to manufacturers representatives, for no vendor can offer a complete line in all areas. Finally, the system designer must be careful not to concentrate excessively on current demands, to the detriment of future potential.



## 4.0 Analysis of the Connecticut Judicial Department's Computer Options

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#### 4.1 INTRODUCTION

In this section, we embark on an investigation of the computer based information processing system options open to the Connecticut Judicial Department (CJD), moving toward the determination of the best courses of action for the judicial department over the next five years. We begin by discussing the various options which are available to the CJD, thereafter screening out any infeasible options (sections 4.2-4.3). To augment the range of available choices, two in-house systems are designed (4.4). These configurations, combined with other viable options, comprise the conceptually feasible alternatives under consideration. These alternatives are then subjected to a detailed analysis (4.5), leading to the Center's recommendations. This analysis employs a technique adapted specifically for the cost/benefit analysis of computer based information systems in non-profit public sector organizations.

In the following discussions, the Center has made numerous assumptions in the absence of adequately detailed information. All recommendations, as well as the validity of the analysis itself, are contingent on the validity of these assumptions. It should also be noted at this

point that the Center has not undertaken a cost/benefit analysis to determine whether or not the CJD should computerize its information processing in the future at all. Strictly speaking, such an analysis must precede any discussion of what the CJD's best computer option is. However, as such an analysis is beyond the ambit of this report, we proceed upon the premise that the CJD has established the cost effectiveness of computerizing their information processing.

## 4.2 OBJECTIVES, SYSTEMS, AND PRIORITIES

### 4.2.1 Establishment of Objectives

Initially, the CJD's system objectives must be determined. With this information, we can establish the broadest level of requirements which any feasible computer based information processing option must meet. Thus, the question "what information processing functions do we want computerized within the planning period?" must be addressed. The period of time during which planned developments can be seen is the "planning window." As of this writing, we can discern no agreement in the CJD as to the dimensions of the planning window. In fact, virtually all the CJD's contemplated plans appear to be contingent on developments which should mature by the end of 1975. The three most important of these are:

- (1) final pre-implementation findings of the CJIS project;
- (2) precise determination of the impact of the merger of Common Pleas and Circuit courts on the cost and volume of JURIS I; and
- (3) results of the trial year of the Juvenile Court's statistical survey using JUSTIS.

In proceeding toward an analysis of the CJD's options, we assume a planning window of five (5) years.<sup>41</sup> Thus, the

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<sup>41</sup> As a convention for the sake of convenience, this will be treated as a static window, ending in 1979-80, not as a rolling window (as should be used in planning).

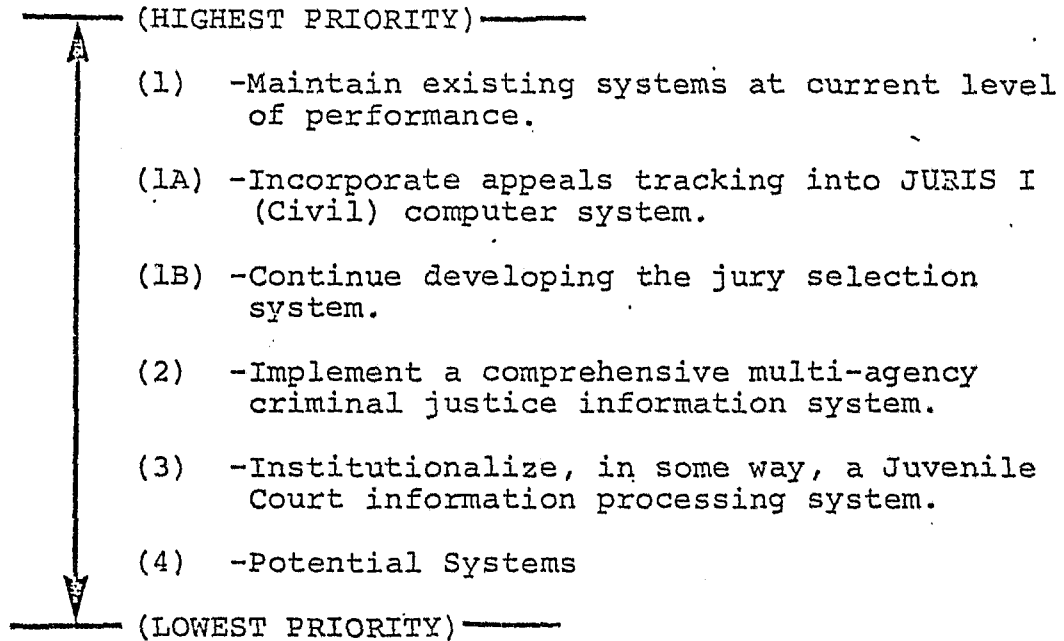
question regarding objectives should be stated as "what computerized information systems are desired by 1980?" Because of the increasingly rapid advance of computer related technology (see ASSESSMENT OF INFORMATION TECHNOLOGY), predictions as to the type and cost of computer systems become more and more tenuous beyond five years into the future.

#### 4.2.2 Prioritizing of Objectives

Myriad possible areas for development face the CJD. Some of these are already in development; some have been contemplated; others have received only passing mention; and yet others are still unthought of. These programs include:

- expansion of the Jury Selection system after its full implementation has been reviewed;
- establishment of the CJIS system in cooperation with other state criminal justice agencies;
- augmentation of the management statistics provided by JURIS I (civil);
- extension of the appeals tracking function of the civil system;
- automation of the accounting function;
- establishment of a computerized Grants Management Information System (GMIS) for project leaders;
- integration of court fees and fines accounting into the unified information processing system;
- development of a Juvenile Court system after review of the trial year of JUSTIS.

EXHIBIT 39:    CURRENT CJD SYSTEM PRIORITIES







This is more than the CJD can reasonably expect to accomplish in the five years of the planning window. Some of the desired programs must be sacrificed, at least for the moment, to practical constraints. This acceptance and rejection constitutes the prioritizing process; i.e., the ranking responds to the question "in what order are the desired functions to be implemented?"

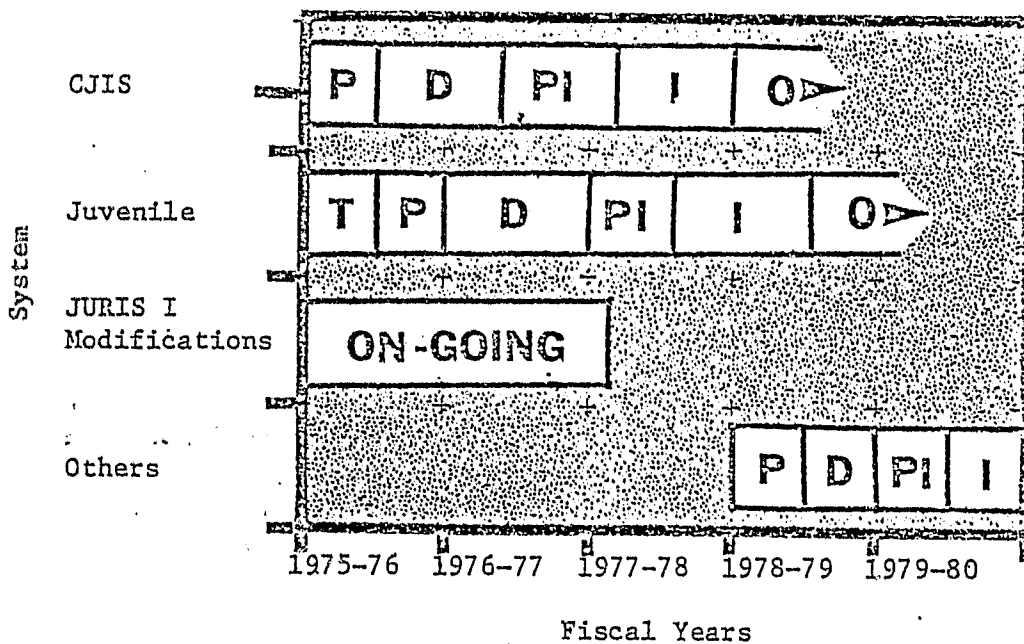
Programs should be prioritized according to the values held by the CJD. Thus, if the CJD assigned, say, autonomy and maintenance of management control the highest importance, and a very low value were assigned to cooperation with other branches of the state government, then the multi-agency Criminal Justice Information System (CJIS) program would receive a low priority. No explicit prioritizing procedure has been undertaken by the CJD to the best of our knowledge. (In the next section, PLANNING, these and other procedures for the institutionalization of the planning process are discussed.)

In the absence of this information, the Center presents its own assumptions and observations relating to the priority of programs within the CJD.<sup>42</sup> These assumptions are summarized in Exhibit 39.

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<sup>42</sup> Note that these represent the Center's perception of the CJD's priorities, and not any recommendations on the Center's part as to what CJD policy should be in these matters.

EXHIBIT 40: PROJECTED DISTRIBUTION OF CJD COMPUTERIZED  
INFORMATION PROCESSING SYSTEMS 1975 - 1980.



T	Trial Year
P	Planning
D	Development
PI	Pre-Implementation
I	Implementation
O	Operational

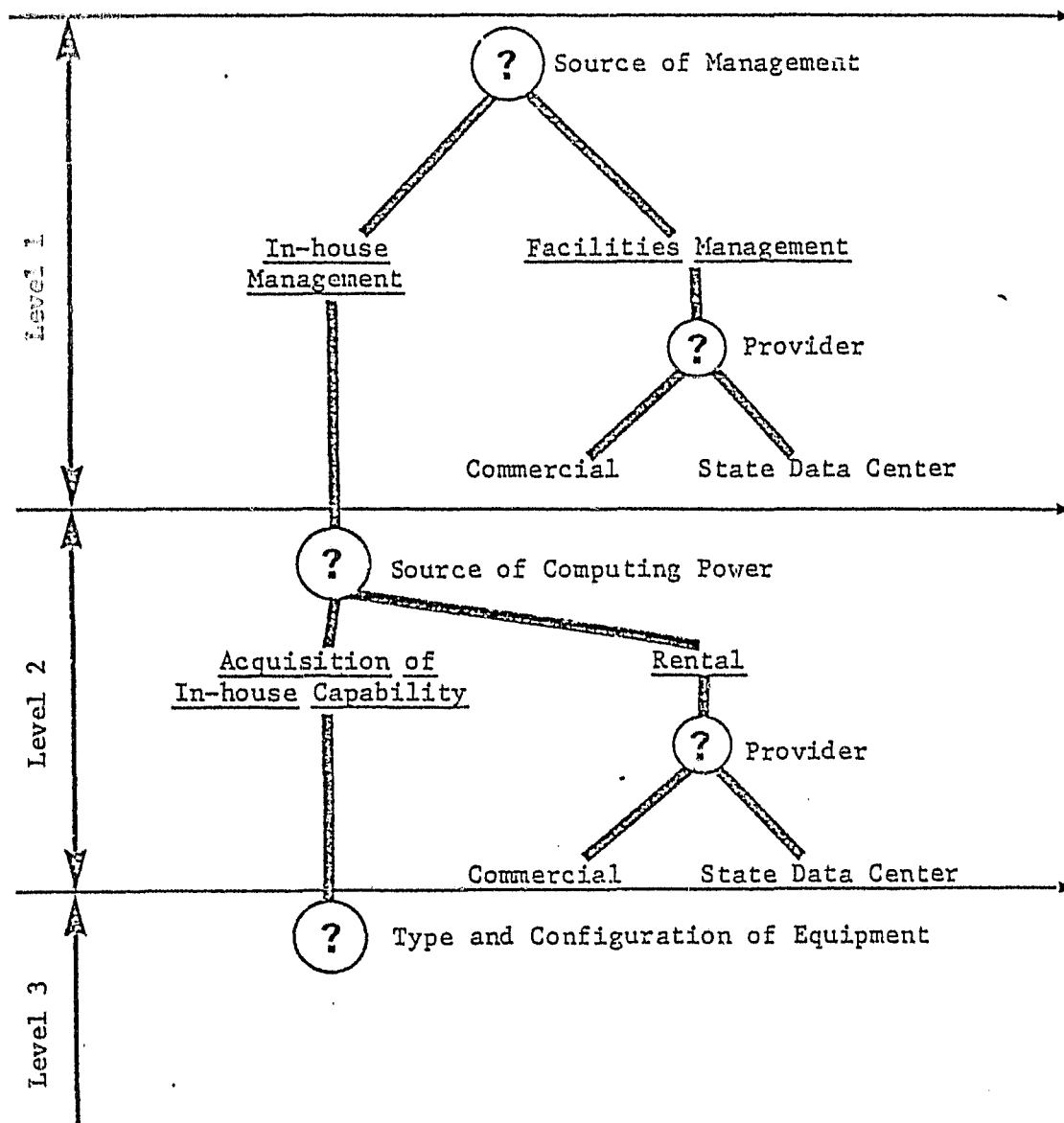
NOTE: This projected distribution of activities does not include the adoption of the Center's recommendation 1 (to change the Civil system's file structure).

Top priority is currently assigned to the maintenance of existing systems at their current level of performance. Given the same priority are the addition of an appeals tracking capability to the civil system and the continued development of the jury selection system. On the second level is the implementation of a comprehensive multi-agency criminal justice information system. The third level of ranking falls to augmentation of a juvenile statistical system. The decision either to integrate the Juvenile Uniform Statistical Transaction Information System (JUSTIS) into the planned unified CJD system or to continue limited development at UConn is pending, contingent in part on the value of JUSTIS.

In keeping with our five-year planning window, "potential" systems such as the grant management information system, court fees, conversion, etc., are mentioned even though no concrete plans in that direction have been observed. Accordingly, any feasible option for automated information processing must permit the incorporation of at least some of these functions within the next five years.

Whether or not the development and implementation of any "other" function can or will actually take place depends largely on the variables of policy, cost and available resources. However, the limitations of these variables are unknown to us. It is difficult to evaluate the amount of the CJD budget allocable over the next five years to these additional projects. In this vacuum, we group these additional systems together as "Others" in Exhibit 40, which contains a rough estimation of the dispersion of the projected programs through the planning window.

EXHIBIT 41: DECISION TREE OF INFORMATION PROCESSING ALTERNATIVES.



First, the question of facilities Management must be resolved (level 1). At this level, the CJD retains only policy-level control. If management of the information processing function external to the CJD is chosen, the vendor of that management service must be determined. If, on the other hand, in-house management is preferred, the source of the processing capability (computing power) becomes the question at hand (level 2). If rental of this capability from an outside agency is desired, the specific agency must be chosen. Here the CJD relinquishes only operational control over the function. (Note that the value controlling the decision as to the provider of this service is more comparative cost than management control.) If rental is rejected, the only remaining alternative is the acquisition of in-house computerized information processing capability (level 3). At this level, the CJD retains control over policy, management, and operational-level decisions.

### 4.3 SCREENING OF CONCEPTUALLY FEASIBLE ALTERNATIVES

To reduce the large spectrum of possible computer based information system alternatives to a manageable size, the options will be categorized into a small number of groups, and these groups analyzed from the perspective of the CJD's values as mentioned previously. The format we have chosen for the analysis of the CJD's information processing options is to answer a series of related questions. These questions form a hierarchical decision-making tree which is presented as Exhibit 41.

The decision-making proceeds from the broadest level of question ("who will manage the automated capability?") to the most specific question, viz., "what type of equipment should be acquired?"<sup>43</sup> This is essentially a process of screening out infeasible alternatives prior to detailed analysis.

#### 4.3.1 Facilities Management

"Facilities management" refers to the contracting with agency outside the CJD to provide management and/or operational level services related to the data processing function. The use of facilities management in data processing was

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<sup>43</sup>"Acquisition" here covers all possible methods of obtaining in-house equipment: rental, outright purchase, lease/buy, etc. No specific method of acquisition is implied.

relatively unknown until 1969; since then, it has grown rapidly. Today a large number of reputable firms (there are an estimated fifty "giants" alone) provide this service. A broad range of services is available, including software design, installation of systems, contracting of personnel, structuring of management and planning functions, conversion operations, redesign of a system, or all or any combination of these.

Advocates of facilities management cite three significant advantages: (1) high assurance of success, (2) predictability of expenditures, and, especially, (3) cost reduction. The ready availability of numerous reputable firms is a main factor behind the many successful facilities management contracts. Success is further insured by the rapid implementation of systems by the facilities management firm, since

instead of slowly building a competent systems staff on a hit-or-miss basis, an organization can sign a contract with a Facilities Management firm which will, in turn, provide the professional management and manpower required to do the job.<sup>44</sup>

Reduction in cost results not only from the more efficient use of technical skills stemming from the availability of specialized

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<sup>44</sup> Fred Bice and F. William Withrow in *Information Systems Administration*, McFarland et al., p. 240. See the ANNOTATED BIBLIOGRAPHY (Appendix III).

experts, but also by modifications made in the existing systems and their supporting hardware, such as redesigning systems to achieve faster processing of information. Some facilities management firms guarantee their efforts to reduce costs, often operating on a percentage-of-savings fee basis. This leads to the stabilization of costs at a predictable level:

A Facilities Management contract provides a firm with a completely known...and guaranteed figure for computer costs. The expenditures are based upon a flat rate or a percentage of profit. The expenses can therefore be planned upon in advance and a reasonable return on investment calculated.<sup>45</sup>

The problems encountered in facilities management, however, are not to be underestimated. Some investigators claim that the promise of lower costs is often not realized. The degree of management control afforded the hiring agency is inversely proportional to the extent of the services furnished by the facilities management firm. In practice, few "arms-length" arrangements are found. Normally, the facilities management firm converts the contractor's systems staff to its own organization. Lastly, few contracts for under \$100,000 per month are signed, the average contract being about double that.<sup>46</sup> This may prohibit small and medium scale operations from employing facilities management.

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<sup>45</sup> Ibid., p. 242.

<sup>46</sup> Ibid., p.

EXHIBIT 42: SCREENING OF FACILITIES MANAGEMENT OPTIONS

ALTERNATIVE 1: *Facilities management by a commercial managing agency.*

DESCRIPTION: A commercial firm would provide Facilities Management for the CJD. The CJD would probably have to engage this firm for a broad range of alternatives.

ADVANTAGES: Possible reduced costs; no long-range investment in either personnel or equipment.

DISADVANTAGES: Loss of management control; little flexibility in applications; no incentive within CJD to train and develop its own staff; potential security compromise; lack of understanding of judicial applications on the part of management provider.

RECOMMENDATIONS: Include tentatively.

COMMENTS: Overall, the loss of management control overrides any consideration of potential financial savings. See text for explanation of tentative acceptance.

ALTERNATIVE 2: *Facilities management by the Connecticut State Data Center*

DESCRIPTION: The SDC would be contracted to manage and operate the CJD's information processing systems. This necessarily implies usage of SDC's programming staff and computer facilities.

ADVANTAGES: Access to computer management and usage experts; probably a slightly greater degree of control is possible than in Alternative 1.

DISADVANTAGES: No reason to anticipate any significant reduction in costs; lack of management specialists; poor future flexibility; poor applications flexibility; lack of understanding of judicial environment on the part of the management provider.

RECOMMENDATION: Exclude from further analysis.

COMMENTS: The losses to CJD autonomy, management control, and range of applications bring no significant advantages.



Only one advantage, cost reduction, could accrue to the CJD. Of the other two potential advantages cited by proponents of facilities management, neither any assurance of success nor any predictability of expenditures is anticipated, due to the novelty of the judicial environment to managers accustomed to profit-oriented organizations. There could be many disadvantages. Flexibility of applications, vital to the specialized nature of court systems, could be adversely affected. Security of sensitive information could be compromised. Most importantly, the benefit of reduced cost is bought only to the degree to which the CJD relinquishes management control to the facilities management agency.

Were facilities management opted for, two alternative sources would be available. These are reviewed with summaries of their advantages and disadvantages in Exhibit 42

The loss by the CJD of both financial and operational control appears to force the rejection of facilities management as a viable option. However, we will retain one of the sources (commercial) on a tentative basis. This option will be used for comparison to others during the detailed analysis (sections 4.5-4.6). If facilities management is rejected, the responsibility of making all decisions regarding the source of the computing capability falls to the CJD.



#### 4.3.2 Rental of Computer Time

An important advantage of renting information processing power is that it requires no long-range commitment in either data processing equipment or operating personnel. Further, the CJD would maintain not only policy-level, but also limited operational-level, control over information systems, primarily through the use of computer programs which have been developed in-house. An in-house programming and development staff allows quick response to management desires. Costs for running the CJD systems at commercial sites can be ascertained with relative ease.

There are also a number of disadvantages with respect to the renting of computer time. At the State Data Center (SDC) the CJD management has limited, if any, control over the billing rate. No matter what the rental source, no capital equipment is acquired, despite the fact that the billing rate must subsume charges toward the lease/purchase of the processing equipment.

Applications flexibility varies among installations. Most installations which could support a wide range of applications possess sophisticated, extremely powerful equipment. Computer "overkill", the discrepancy between the power available and the limited needs of the CJD's

EXHIBIT 43: SCREENING OF RENTAL OPTIONS

ALTERNATIVE 3: *Rental of computer services from a commercial data processing agency*

DESCRIPTION: A commercial data processing installation would be contracted to provide all computer processing services required by the CJD. Programs and file organization methods would be provided by the CJD. The services provided might be more or less comprehensive than those currently provided by the SDC, but would typically include running all programs, maintaining a residence for files, and delivery of output to a Hartford location.

ADVANTAGES: Potential substantially decreased costs due to competitive bidding; availability of good applications flexibility; possibility of balancing available resources to needed resources for better utilization.

DISADVANTAGES: Changeover costs in converting to another installation may be high; a state data processing service would not be used; security of sensitive information possibly jeopardized.

RECOMMENDATION: Include for further analysis.

COMMENTS: The effort required to maintain strict security requirements, if any, should be examined closely.

ALTERNATIVE 4: *Rental of computer services from the State Data Center*

DESCRIPTION: The status quo. The services provided might be made more or less comprehensive than those currently provided, depending on the future needs of the CJD.

ADVANTAGES: Proven reliability; no change-over required; access to extremely powerful equipment; acceptable security and privacy capabilities.

DISADVANTAGES: Negligible applications flexibility--many possible systems not currently supported by the SDC; wasteful "overkill" in power available.

RECOMMENDATION: Include for further analysis.

COMMENTS: Current costs are not sufficiently high to warrant automatic exclusion. Current satisfactory performance counterbalances lack of input to, or control over, SDC billing procedures.

systems, is potentially wasteful in that the higher costs of this equipment may be passed on to the CJD. Depending from whom the computer time is rented, the security of confidential information may be jeopardized beyond a point acceptable to the CJD (e.g., beyond Project SEARCH standards).<sup>47</sup>

In relation to facilities management, rental of computer time sacrifices potential cost reductions in favor of improved management control and applications flexibility. Conversely, in relation to the option of acquiring an in-house capability, it sacrifices management control and applications flexibility in order to avoid both the problems of operating and maintaining a data processing facility, and investing in the equipment and personnel which accompany such a facility.

Given that the status quo, viz. rental of time from the SDC, has proven acceptable until now, no compelling reason exists to reject the rental option at this time. Two potential sources of rental exist. They are summarized, with their advantages and disadvantages, in Exhibit 43.

#### 4.3.3 Acquisition of In-house Capability

The foremost advantage of acquiring an in-house computer is relatively low cost. The CJD could acquire just enough

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<sup>47</sup> *Security and Privacy Considerations in Criminal History Information Systems*, Technical Report No. 2, Project SEARCH (System for Electronic Analysis and Retrieval of Criminal Histories), Sacramento, California, 1970.



hardware to fulfill its processing needs, thus eliminating potentially costly "overkill". On the other hand, unlike rental of computer time, no other users exist to help share the cost of acquisition and maintenance. Further, 100 percent utilization of the computer's capability in 1975 implies insufficient computing power to accommodate increased volume or new functions in later years. As a corollary, a configuration attuned to 100 percent utilization in 1979 will be under-utilized in 1975. This is noted in comparison to rental of computing power, where only the needed processing is paid for.

Nonetheless, the factors recommending acquisition of an in-house information processing capability -- primarily low cost due to a good fit of hardware to needs, complete management control over all phases of operation, security of data, and acquisition of capital equipment in return for expenditures -- outweigh negative considerations such as the responsibility of maintaining a full-scale data processing installation. Well-balanced, efficient use of the processing equipment during both day and night shifts is essential if a competitive cost level is to be attained. In our opinion, this can be achieved by the CJD sometime during the planning window, as new systems become implemented. Therefore, the Center considers the acquisition of an in-house information processing capability to be conceptually feasible.

EXHIBIT 44: SUMMARY OF OPTIONS AND RECOMMENDATIONS

CATEGORY	RECOMMENDATION	RECOMMENDATION
Facilities Management	Commercial Vendor	Include tentatively
	State Data Center	Exclude
Rental	Commercial Vendor	Include
	State Data Center	Include
Acquisition of In-house Capability	(All)	Include



#### 4.3.4 Summary

A summary of the information processing options discussed in this section, and the Center's recommendations for either inclusion in, or exclusion from, the detailed analysis, is contained in Exhibit 44.

#### 4.4 DESIGN OF ACQUIRED SYSTEMS

In order to facilitate the detailed analysis, we now design two (2) computer configurations representing different viable options within the Acquisition of In-house Capability category. They are designed to meet the 1979-1980 court year requirements projected for each system documented in the "Loads and Costs" discussion in the STATE OF AUTOMATIC INFORMATION PROCESSING IN THE CONNECTICUT COURTS, section 2.0. These configurations are intended to serve only as examples of in-house systems which could be acquired by the CJD. By the time the CJD would be in a position to consider hardware, new, more sophisticated computer components should be on the market which would supersede many of the components suggested for use at this time. We have had to make several subjective judgments about the data processing requirements which these systems must meet, e.g., the number of discrete transmissions which can be expected. Therefore, our designs should be considered only potential CJD computer configurations. They are used in this analysis only as examples, to allow us to compare the category of acquired systems to the categories of facilities management and rental.

Currently, civil transactions are entered during the day and are processed in a batch mode at night. The motor vehicle portion of the criminal system processes information in an interactive environment<sup>48</sup> during the day; again batch processing is performed in the evening. The advantage inherent in interactive processing is that the user can retrieve information without a 24-hour wait, and can be advised of errors in data entry immediately. Further, the data files are updated instantly, reflecting the change(s) to users making inquiries only seconds later. It is not anticipated that the JURIS I (civil) system will require this instantaneous update, at least within the time period specified as the planning window. On the other hand, such a feature is essential to CJIS. Therefore, the systems designed by the Center will operate both in batch mode (during night shifts), and also interactively while on-line. All civil, and some criminal, processing will be performed in batch, while the remainder of the criminal processing will be on-line. Data entry will remain a daytime operation.

The vast majority of both civil and criminal cases are geographically isolated in the area of original venue. Only statistical summaries, CJIS inquiry coordination, transfers between court levels, and changes of venue need to be

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<sup>48</sup>For example, an immediate response can be obtained when querying the license file.



coordinated between two or more locations. Hence, these files could be geographically isolated. Since some teleprocessing is required to permit this communication, such a configuration is best described as a distributed network. We will construct one network of regionally distributed processors. This will be Acquired System #1.

As an alternative, the second system designed by the Center will utilize a single large, centrally located processor. Such an arrangement, while increasing the distance which information must be transported (and therefore the costs of transportation), takes advantage of the economies of scale. This will be Acquired System #2.

#### 4.4.1 Transaction Requirements for Acquired Systems

Both configurations sketched out by the Center are designed to meet the projected 1979-1980 court year civil and criminal caseload requirements. The response time observed by users of the interactive system (CJIS) will depend on the fluctuations in data entry volume. We have observed both day-to-day fluctuations during the week (as described in TECHNICAL NOTE: CIVIL TRANSACTION FLUCTUATIONS, Appendix II) and also hour-to-hour fluctuations within each day. Unless there is significant peaking in transaction entries, the systems as designed would provide an observed on-line response time of

EXHIBIT 45; 1979-1980 (COURT YEAR) TRANSACTION

REQUIREMENTS

COMMENTS

All estimates are based on 250 6-hour days per year. Use of a 6, rather than 8, hour day helps account for the peaking of transaction entries. In fact, it is not possible to anticipate what the maximum volume will be for any given day or hour. As mentioned in the text, the evening-out of these fluctuations is important to the efficient utilization of the acquired hardware. In the design of the configurations, a two (2) second response time (on-line) was used as the desired performance level.

CJIS

The 1979 on-line entry transaction requirements were based on the estimates included in the RFI published by the CJD on June 26, 1979.

The total on-line transactions should be around 4,400,000 (all types) per year by 1979. This represents 2925 per hour, or if an even distribution is observed, the equivalent of 48.5 a minute (.81 transactions each second). Inter-agency requests account for more than half of this (2,451,000). Intra-CJD transactions are expected to be less than 2,000,000 (1,949,000), or an average of 2.77 seconds for the processing of each.

In the first configuration (Acquired System #1), an even distribution of transactions among the three processors would make each mini process a transaction every 3.5+ seconds. Note that all these averages assume an even distribution of entries over time.

JURIS I

The civil system will continue to operate in batch mode. Output will be transmitted automatically to the local printers during night shift or early morning. The data entries are merely logged and acknowledged while on-line, a simple and brief process.

EXHIBIT 45 : 1979-1980 (COURT YEAR ) TRANSACTION

REQUIREMENTS

Our projections indicate about 8000 transactions on the average day in 1979, or about 1300 an hour (6-hour day), which represents 22 a minute or 2.75 seconds per civil entry. The occupation of data lines and amount of CPU time required to process and log these entries is negligible.

In Acquired System #2, the logging of these entries would be performed by the processor front-end or terminal controller, without any CPU intervention.

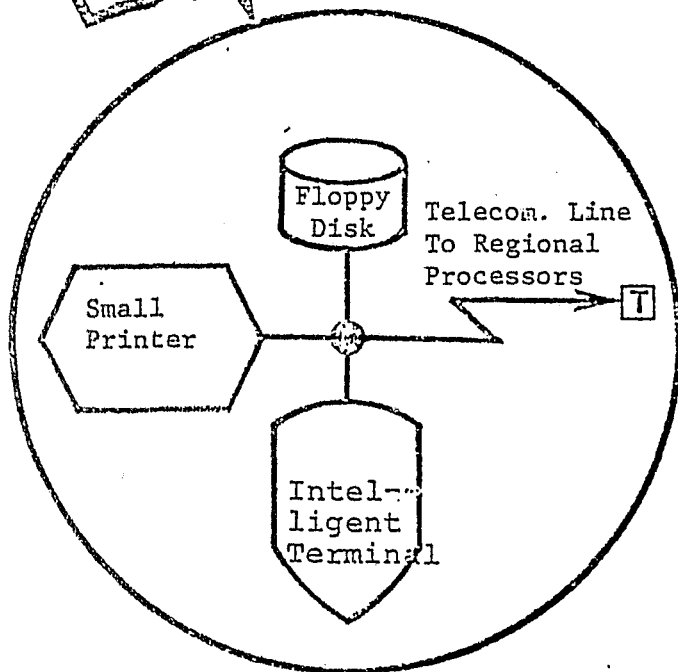
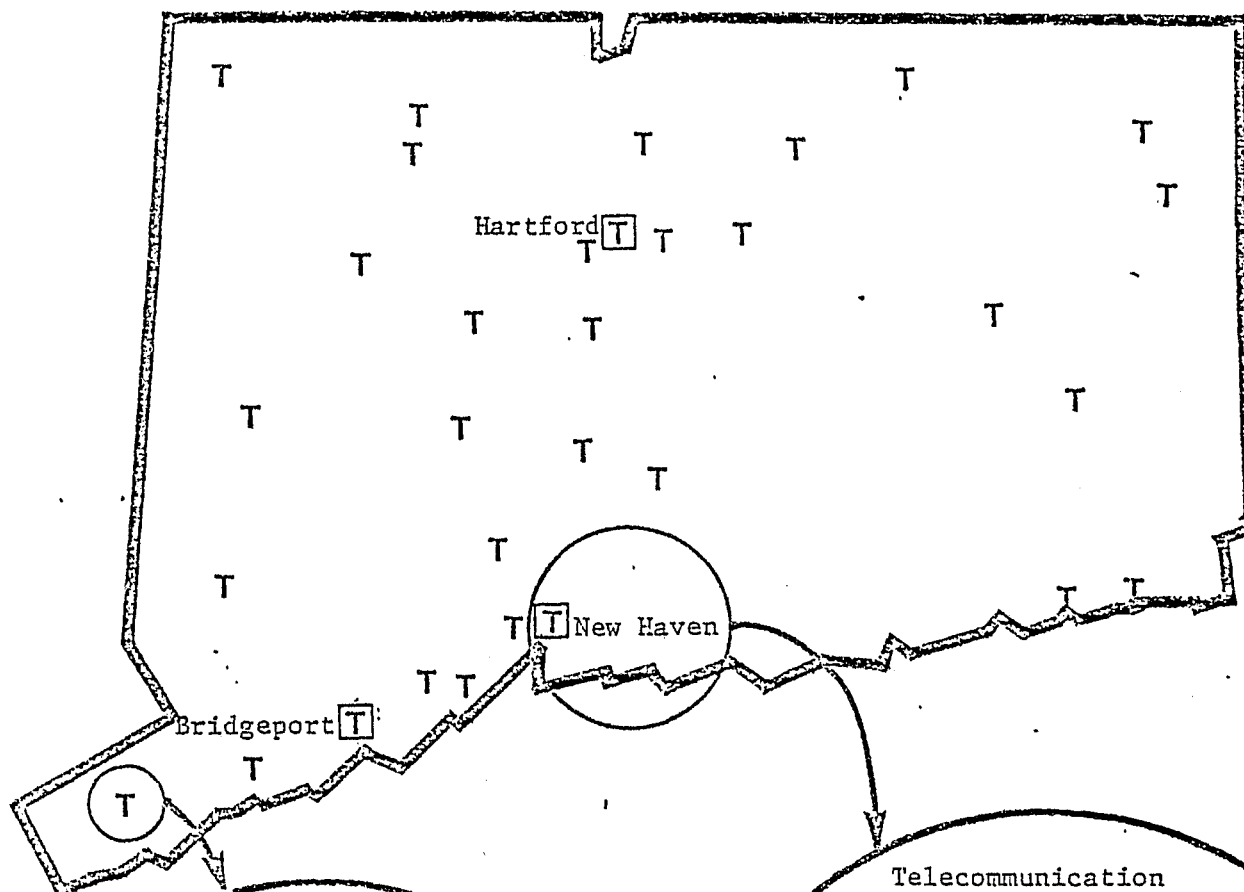
CONSTRAINTS

Note that the Center observed that every motor vehicle transaction in the current system required about one minute for an operator to enter. Assuming that every CJIS transaction takes one minute, the CJD's portion of CJIS (1,949,000 transactions) would be about 20 transactions per minute, i.e., it would keep 20 terminals and operators going full blast. If only 10 terminals were employed, this would force an even dispersion of transactions over the day, as the operators could not keep up with the workload otherwise. (The remainder of the transactions originate in other agencies.)

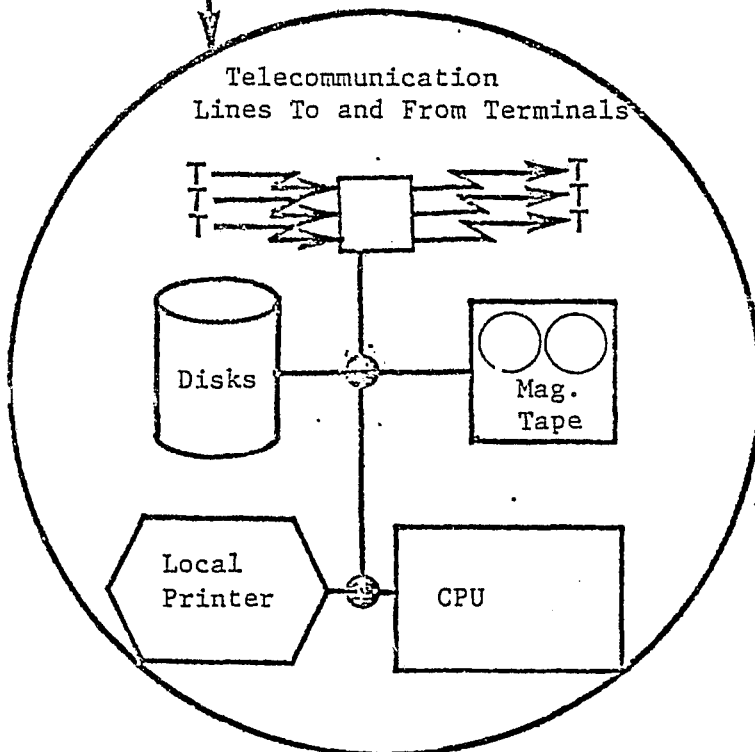
SUMMARY

<i>System</i>	<i>Number of Transactions</i>	<i>Transactions per minute</i>
CJIS (Intra-CJD)	1,949,000	21.66
CJIS (Inter-Agency)	2,451,000	27.23
CJIS-Total	4,400,000	48.5
JURIS I	2,000,000	22

TERMINAL LOCATIONS



DETAIL OF A LOCAL TERMINAL



DETAIL OF A REGIONAL PROCESSOR

NOTE: T=Terminal location; [T]=Regional processor location.



two seconds or under. We suggest that a detailed study of entry transaction peaking and methods to minimize these fluctuations (e.g., limiting the number of entry terminals, thereby forcing operators to distribute their entries at a constant rate evenly over the day) be made. A summary of the transaction volumes used here as requirements is presented in Exhibit 45.

#### 4.4.2 Acquired System #1: Exposition and Implications

The first system would be configured as a distributed network, a diagram representing it is shown in Exhibit 46. Three processing sites would be used. At each of two sites, New Haven and Bridgeport, would be located a mini-computer (of between 128K and 256K of core) with disk files which house the data base, connected to a number of remote terminals. In Hartford, two minicomputers would serve two different functions. One would operate, as in Bridgeport and New Haven, as the processor for JURIS I and the judicial department's portion of CJIS. The other would act as a message switcher and processor for inter-agency CJIS queries.

The maintenance of data files near the site of use is maximized where possible to reduce the amount of transportation of information. Extensive use of processing "intelligence" is integrated into the configuration. The Center argues that the low, and decreasing, cost of such

intelligence warrants its usage wherever such usage can reduce manual effort or help assure satisfactory performance under all conditions.

All data files would be maintained at one of the four interconnected processors located in Connecticut's three major cities --Hartford, New Haven, and Bridgeport. These areas process 70 percent of the civil caseload; in the absence of contrary evidence, we assume a similar percentage of the criminal caseload is concentrated in these areas. The Hartford location would also maintain a residence for all master control ("reference") files, which are not duplicated at other sites. No significant data redundancy would exist among the three areas' files. The remaining geographical locations would be linked to one of these processors through cathode-ray tube (CRT) terminals.

The various aspects of the processing procedure -- input, processing, output -- for each of the civil and criminal systems is briefly outlined. More information on these and other features can be found in Appendix V, TECHNICAL NOTES: DESIGN OF ACQUIRED SYSTEMS.

#### *(1) Input*

Data input with respect to civil cases would be entered at remote terminals during the day, transmitted across data lines to the appropriate central processing unit (CPU), and logged onto tape. At night, in batch mode, the-

data would be read off the tape and processed. Dialogues would guide the operator in making data entries. Further, a complete range of error checking (e.g., wrong year) would be performed by the terminal's intelligence. As in the current system, more subtle errors (e.g., an entry purports to be an update on a case which does not exist) would not be detected until batch processing is performed in the evening; appropriate error messages would be displayed to the operator the next morning. Entry data for the on-line CJIS system would be transmitted immediately to the regional processor where it would be processed. Should an entry be improperly typed, two stages of correction would take place: (1) the local formatting intelligence in the terminal software would reject obvious errors, and (2) more subtle errors would be detected at the main processor, and an appropriate advisory error message would be relayed to the local terminal operator within seconds.

*(2) Processing*

The normal daily information processing would be performed at the regional CPUs. The civil, jury selection, and "other" systems which do not require better than overnight turnaround would be processed at night in batch mode. The interactive portion of the CJIS system would be processed on-line during

the day. In all cases, transfer of cases among regions would be performed automatically by the main processors: the case record would be transmitted to the appropriate location, where it would be added to the data base. Should the remote processors require reference to the master control files at any time, they would query the appropriate (civil or criminal) Hartford unit.. The most significant degree of coordination would be required in order for statistics to be compiled and for the preparation of management information reports. This would be effected by software in each main processor, which in turn would communicate the results to the Hartford installation for integration into statewide figures. Such operations would be performed during night-shift slack periods.

### *(3) Output*

Remote printers would be employed at each court location. After processing the information, the CPU would transmit densely coded information to the local terminal which "expands" the information according to pre-defined formats, and generates the output (e.g., new docket sheets, indices, etc.) on the local printer. (These formats for dialogues and output forms would be stored on the terminals' floppy diskettes, and need not be transmitted from the regional processor.) Hardcopy output for the civil system would be produced at night (the CPUs can

trigger the local printers automatically), so that a stack of sheets would be awaiting the terminal operators when they arrive in the morning.<sup>49</sup> Depending on how busy the main processors become -- which is highly dependent on the peak demands of the CJIS system -- necessary hardcopy output would be generated either immediately or during slack periods.

The significant implications of the adoption of such a network are discussed below.

-- To properly utilize the features incorporated in this configuration, a complete software revision of JURIS I would be necessary. As stated previously (in section 2.4.3) the Center believes that such a revision would improve the efficiency, and thus reduce the operating costs, of the civil system. The effort required to assemble, program, test, and debug the configuration with the new JURIS I would be considerable. An estimated cost of this conversion is included in the total system acquisition cost calculated in section 4.5.4.

-- If CJIS is not on-line 24 hours a day, the disk drives used for CJIS during the day could be re-mounted with the civil file disk packs for batch operation, cutting the number of required spindles in half, a potential \$200,000 plus savings in the cost of acquisition.

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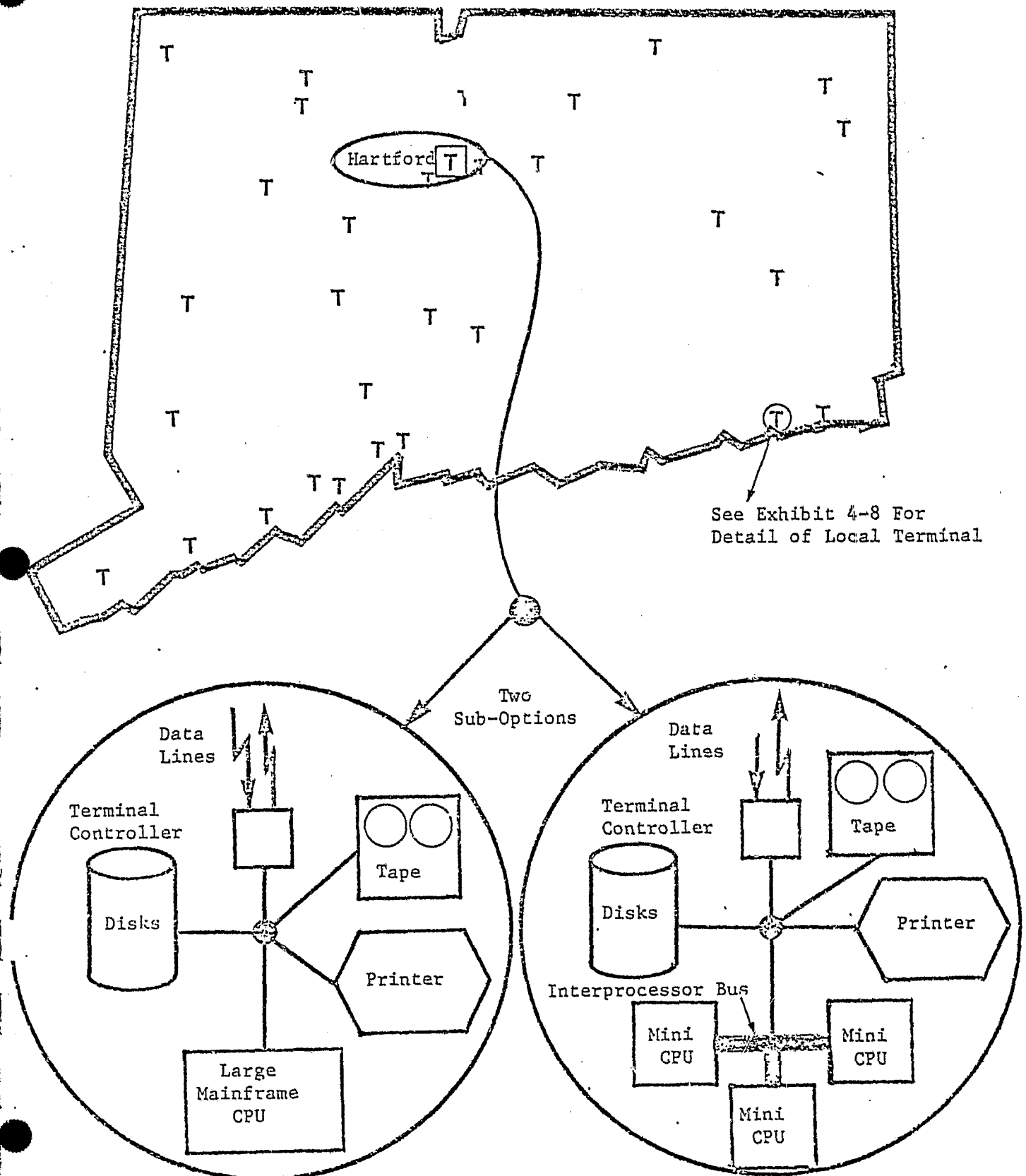
<sup>49</sup> Note that the comprehensive master calendar would be outdated by such a configuration. Each clerk's own calendar -- which is really what interests him -- would be printed locally.

-- Even at 1979-1980 volume levels, considerable night shift "slack" time should be left. In fact, all batch processing is unlikely to require more than one night shift (7 hours), if that. This time could be profitably utilized by the addition of more systems and by experimental programs. A significant implication of this much processing slack time is that the configuration could support another large-scale system of the magnitude of JURIS I. (This assumes that the on-line night-shift demands of CJIS, if any, would be fairly infrequent.)

-- The employment of four regional minicomputers would require an operational staff. Currently, the CJD pays only indirectly for the operators and allied personnel at the SDC. Minicomputers require little specialized expertise to operate, and can run unattended for extended periods of time, but reliable, well-regulated system operation would require one operator per site per shift. During daytime hours, these operators could divide their time between the computers and another job, if appropriate other jobs could be found. Fortunately, computer operators are low-salaried personnel; college students are often employed for night shifts. Assuming an average annual cost, including fringe benefits, of \$10,000 per operator, three shifts of operation would cost \$90,000 per year for the three sites combined. This cost is

EXHIBIT 47: ACQUIRED SYSTEM #2

TERMINAL LOCATIONS



See Exhibit 4-8 For  
Detail of Local Terminal

Sub-Option A: Detail of  
Centralized CPU (Hartford)

Sub-Option B: Detail of Alternate  
Centralized CPU (Hartford)

NOTE: T=Terminal location; [T]=Processor location





**CONTINUED**

**2 OF 4**

incorporated in the calculation of the total system acquisition cost in section 4.5.4.

#### 4.4.3 Acquired System #2: Exposition and Implications

The second system sketched by the Center would be based at a centralized facility. Two sub-options are provided for it: (a) a single large-scale mainframe, and (b) inter-connected minicomputers. Diagrams of these systems are provided in Exhibit 47, parts A and B, respectively. This single facility would be located in Hartford, so as to be close to the CJD management.

Note that with the exception of the location of the processor(s) both options of Acquired System #2 are similar to Acquired System #1. In respect to the methods of data entry, they would be identical. Therefore, for the sake of brevity, only those characteristics which differ from Acquired System #1 are reviewed below. More details on Acquired System #2 can be found in Appendix V, TECHNICAL NOTES: DESIGN OF ACQUIRED SYSTEMS.

Sub-option A would employ a single large CPU, with between 512K and 1 megabyte of semiconductor core memory, while Sub-option B would utilize three minicomputers which are connected to each other through a high-speed interprocessor bus.<sup>50</sup> In both

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<sup>50</sup> With a data transfer rate of not less than 1.5 megabytes/second.

cases, all disk files would be located at the central processing site.

Transaction handling would be a straightforward affair in Sub-option A, the single processor being responsible for all operations. In Sub-option B, a terminal controller would manage the transmissions. According to the type of message, it would be channeled to one of the three processors; one would manage civil logging and some intra-CJD CJIS, the second would be devoted solely to intra-CJD CJIS, and the third would be responsible for interagency CJIS requests. All three would share the criminal data base during on-line operation.

The implications of the selection of Acquired System #2 are outlined below.

-- For the time being, JURIS I could be transferred almost intact to Sub-option A. Such a course of action would be desirable only if this was an interim measure, and a conversion of JURIS I was undertaken as soon as possible.

-- Acquired System #2 limits the degree of future applications much more than the first configuration. This should be reflected in appropriate savings. Even as is, however, extensive management reporting could be implemented, even on-line, without degrading the performance of the system. This

means that exotic additions, such as a management information system viewed through a CRT in the court administrator's office, could be supported.

-- If the CJIS re-evaluation does not take place until the early 1980s, both options of this configuration should still be viable and cost-competitive. Additional power could always be obtained through modular augmentations: more core, a fourth active CPU in Sub-option B, more disk space, more terminals, etc., either separately or collectively.

-- Little operational support personnel would be required. A single site means that only one operator for each of three shifts is needed. Using our previous estimates, this would cost about \$30,000 per year.

#### 4.4.4 Summary

The Center has designed two computer based information processing configurations to serve as examples of acquired systems in the cost/benefit analysis which follows (sections 4.5 and 4.6). Any configurations submitted in reply to the CJD's request for information<sup>51</sup> (on minicomputers) should be subjected to the same analysis as have the systems designed by the National Center.

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<sup>51</sup>In June 1975, the CJD forwarded a request for information on minicomputers to a number of corporations manufacturing this equipment.

#### 4.5 SELECTION OF ALTERNATIVE COMPUTER OPTIONS

In the following discussion, the selected conceptually feasible alternatives culled out above are costed, their benefits identified and weighted, and their comparative benefit-to-cost ratios analyzed. The Center proffers its recommendations partially on the basis of this cost/benefit analysis. In order that the usefulness of this analysis will not end when the Center's participation in this project does, advice on how to apply the analysis methodology is included at the end of this section (4.7).

##### 4.5.1 Multi-dimensional Evaluation of Benefits <sup>52</sup>

Cost-benefit analysis of computer based information processing systems remains, despite voluminous publications on the subject, an ill-defined problem. The few valid techniques reviewed in the literature have been developed solely for application in limited spheres of the private sector. Attempts to extend these methodologies to non-profit organizations and into the public sector have been stymied by the difficulties involved in the accurate quantification of

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<sup>52</sup> The Center is indebted in this discussion to K.E. Knutsen and R.L. Nolans' article, "On Cost/Benefits of Computer-Based Systems," in *Managing the Data Resource Function*, Richard L. Nolan, ed., West Publishing Company, 1974. See the ANNOTATED BIBLIOGRAPHY (Appendix III) for a more complete discussion of this book.

benefits. The Center employs a variation freely adapted from the "multi-dimensional" approach developed by Dr. Richard Nolan at Harvard Business School. <sup>53</sup>

Historically speaking, the rapid emergence of the information processing function caught management specialists unprepared. Until recently, all evaluations of computerized systems were based on traditional approaches: a "good" computer based information processing system was defined as one which yielded a positive benefits-to-cost ratio. That is to say, a system was desirable only as long as it reaped greater benefits than were expended to obtain it. Two popular techniques were employed: cost-justification and ROI (return on investment). In both instances, costs and cumulative benefits were quantified in identical, and therefore comparable, units (usually dollars) and compared. Such techniques have been difficult to apply in organizations where the benefits were either intangible or unsusceptible to quantification in economic terms, e.g., public sector organizations. Thus, the Center has incorporated the theoretical bases of cost justification and ROI in our analysis, but believes the methods should be supplemented by evaluation of the less tangible aspects of computer applications. In opting for this course of action, the Center aligns itself with Dr. Nolan who suggests "that

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<sup>53</sup> Knutsen and Nolan, "On Cost/Benefits of Computer Based Systems," *Managing the Data Resource Function*.

the estimated costs of computer based projects be treated separately from the estimated benefits." <sup>54</sup>

#### 4.5.2 Methodology

To arrive at comparable benefit-to-cost ratios for each alternative information processing system, the total value of the benefits accruing from each alternative will be analyzed in relation to the cost of that alternative. The costing of each information processing system is a straightforward procedure employing standardized techniques. The technique used to evaluate the qualitative benefits of each option is a subjectively-oriented weighting. In this section, we will review the problems involved in weighting qualitative benefits and discuss the use of indicators in ascertaining weights. This having been completed, we will then proceed to the actual application of the methodology in the next section (4.6).

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<sup>54</sup>Ibid., p. 282.





#### 4.5.3 Exposition of the Weighting Technique

All the conceptually feasible alternatives participate in the qualitative benefits, though to varying degrees. There are two components, which form the weighted score: (1) the benefit's weight, and (2) the rating of the benefit's weight. The product of these two components (benefit times rating) represents the value of that information processing system option in relation to the benefit in question.

To illustrate how this technique is applied to choices which cannot be made in economy terms, we provide the example of choosing among automobiles in Exhibit 48. Reference to this simple example during the following discussions should help clarify the steps taken in the weighting process.

#### 4.5.4 Perceptual Weighting vs. Objective Quantification

At this point, it is useful to distinguish between weighting and quantification. To quantify a benefit implies that it possesses clearly delineated boundaries within which are a number of constitutory elements which bear a one-to-one relationship with a concrete unit of measurement, e.g., dollars.

EXHIBIT 48:      EXAMPLE OF WEIGHTING PROCESS

As an example of this "weighting" technique, we offer the example of choosing an automobile. Choosing a car cannot be decided on "objective" criteria, i.e., a Rolls Royce is not a "better" automobile than a Volkswagen if your values are, say, ease of repairs and availability of parts; instead, choosing a car is a very personal ("subjective") choice. We will show how different values change entirely the decision on what is "best." We will assume for the sake of convenience that only three makers' products are under consideration: Mercedes Benz, Alfa Romeo, and Volkswagen. Four benefits are used to evaluate each car: ease of repairs, safety (both active and passive), road performance, and availability of parts. First, we will rate each car on how well it furnishes each benefit (in the report, this will actually be done second).

On a scale of 0 to 10 (ten being best), the VW rates a 9 for ease of repairs, the Alfa a 5, the Mercedes only 4. For safety, the Mercedes leads with an 8, following by Alfa (6) and VW (3). The Alfa rates a 10 in sporting performance, with Mercedes at 7 and VW at 2. The VW rates a 10 in availability of parts, followed distantly by Mercedes (3) and Alfa (2).

If your foremost value is making home repairs, at 100, followed only distantly by safety (40), performance (15) and parts (10), the vehicle which will yield the most benefits is the VW. It yields 1150 benefit "units," vs. 810 for the Alfa and 955 for the Mercedes. These totals are reached by multiplying the ratings by the weights of the benefits, and summing them for the total. This advantage becomes more pronounced when we look at the benefit-to-cost ratio. The benefit/cost ratio is computed by dividing the total benefits score by the car's price (in thousands of dollars). Thus, as the VW costs \$3,000, the Mercedes \$14,000, and the Alfa \$7,000, their respective benefit/cost ratios are 383.33 (VW), 68.21 (Mercedes), and 115.71 (Alfa), representing the number of benefit "units" which can be bought with \$1,000 invested in each. Here the VW is the "best buy" favored by the benefit/cost ratio.

Benefits	Weights	Mercedes		VW		Alfa	
		Rating	Weighted Rating				
Ease of Repairs	100	5	500	9	900	4	400
Safety	40	8	320	3	120	6	240
Performance	15	7	105	2	30	10	150
Parts Availability	10	3	30	10	100	2	20
TOTAL BENEFITS		955		1150		810	
COST		\$14,000		\$3,000		\$7,000	
BENEFIT/COST RATIO		68.21		383.33		115.71	

If, on the other hand, you valued sporty road performance most at 150, safety at 55, and other considerations only 5 apiece, the total scores would favor the Alfa at 1860, followed by Mercedes at 1530 and VW at 560. Their benefit/cost ratios are 265.71, 109.29, and 186.67, respectively.

Benefits	Weights	Mercedes		VW		Alfa	
		Rating	Weighted Rating				
Ease of Repairs	5	5	25	9	45	4	20
Safety	55	8	440	3	165	6	330
Performance	150	7	1050	2	300	10	1500
Parts Availability	5	3	15	10	50	2	10
TOTAL		1530		560		1860	
COST		\$14,000		\$3,000		\$7,000	
BENEFIT/COST RATIO		109.29		186.67		265.71	

Note that, although the Mercedes rates higher than VW in total benefit "units," the VW is a "better buy" from the benefit/cost perspective in this case.

From this we can see that the crucial factor in our evaluation technique is the weighting given each qualitative benefit.

Qualitative benefits cannot be quantified as they lack these clearly delimited parameters, and consist of elements which bear no direct relationship to any traditional unit of measurement. In characterizing qualitative benefits as non-quantifiable we do not mean to suggest that an estimate of their importance cannot be approached, or that their component elements cannot be at least partially identified.<sup>55</sup> Were such the case, these benefits would remain empty categories, a sort of "black box" about which nothing could be known. Rather, what is intended is that they cannot be exhaustively measured in terms of concrete units. Thus, in place of components, we have instead rough indicators, and instead of direct measurement, an evaluation of how important these indicators are from the perspective of the person performing the analysis.

The Center therefore employs a technique of perceptual weighting. This weighting relies on subjective judgment to identify indicators and determine what credence should be assigned the indicators according to the weighter's own

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<sup>55</sup> The difference here corresponds to the difference between cardinal (1, 2, 3, etc.) and ordinal (first, second, third, etc.) scaling. In quantifying a benefit as, say, "2," we would mean that it is exactly twice as good as a benefit of "1" (cardinal relationship). In an ordinal (qualitative) system, "2" is simply "better than" 1, but not necessarily twice as good. Due to the complexity of ordinal mathematics, we weight the various benefits on normal cardinal scales.

perception of what is important. (Of course, these indicators cannot be summed, or their importance weighted per se, as they possess no inherent value, i.e., they are meaningless in a vacuum, outside the context of the weighter's values. If they possessed inherent value, they could be objectively quantified.)

Nine (9) qualitative benefits are used. They are weighted according to the Center's perception of the CJD's priorities. We strongly urge the CJD to weight the suggested benefits and introduce new benefits they feel are important to them prior to any decision-making, and compare the resultant ratings with those reached by our analysis.

RECOMMENDATION 2: THE CJD SHOULD IDENTIFY THEIR PERCEPTIONS OF THE SIGNIFICANT INDICATORS OF EACH BENEFIT AND MAKE EXPLICIT THE VALUES BY WHICH THESE INDICATORS SHOULD BE JUDGED. USING THIS INFORMATION, THE CJD SHOULD PERFORM THEIR OWN ANALYSIS USING THE PERCEPTUAL WEIGHTING TECHNIQUE. THE CENTER'S SUBSTANTIVE RECOMMENDATIONS BASED ON THIS WEIGHTING SHOULD BE EVALUATED BY THE CJD IN LIGHT OF ANY DISCREPANCY BETWEEN THEIR RESULTS AND THOSE OF THE CENTER.

#### 4.5.5 Benefit Weighting

The first step is to determine the relative importance of the nine qualitative benefits. They are ranked on a scale beginning at zero, where the higher numbers indicate more important benefits. One benefit is used as a "reference point" for the others. This is the benefit whose value is most easily and accurately estimable. The weights assigned the other

benefits therefore indicate whether these benefits are considered more or less valuable than the reference point benefit, and to what degree.

#### 4.5.6 Rating of Information Processing System Options

The second step is the rating of how well each option under consideration facilitates maximum accrual of each of the nine benefits. This ranking is performed on a scale of zero to ten, where ten is best and five means "normal" or "average." The middle of the scale (number 5) thus serves as the reference point.

Since the quality of the implementation of any information processing system (which is difficult to predict) substantially affects how well the information processing system performs in regard to the different benefits, a range of weights is often given. This range is composed of a low and a high estimate. Therefore, the total weight for each option is also a range, showing the poorest and best it can be expected to rate in respect to the qualitative benefits.

#### 4.5.7 Costing of Alternatives

In calculating the cost of each alternative, all costs are expressed in 1975 dollars. Discounting<sup>56</sup> has been used to adjust the expenditures required in the later years of the planning window. The prices used to cost the acquired systems were extracted from computer manufacturers' price lists in effect as of 1 January 1975, or as close to then as possible.<sup>57</sup>

No attempt has been made to determine the cost of the option which computerized information processing has displaced (i.e., manual processing). The costs of the information processing "tool" displaced by the computerized system, viz., manual processing, were not readily identifiable, being "lumped in" with the total personnel line item. While the amount of this direct cost displacement could be ascertained, the cost of the required research would probably not justify the acquisition of this information.

Only those costs which are not common to all options will be included in the total cost of the alternatives. Thus, data entry personnel, CJD staff, physical plant, etc., are excluded, while computer operators (for acquired systems) are included.

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<sup>56</sup>Members of the Center staff interviewed personnel in several Connecticut state agencies, but were unable to ascertain whether or not the State used a discount rate in evaluating proposed programs, much less what that rate might be. We have used 10% as our discount rate, in the absence of a more appropriate figure.

<sup>57</sup>To compensate for any bias, several viable components of each type were priced, and the highest and lowest of these used to form a range of probable cost.

#### 4.5.8 Qualitative Benefits

Nine qualitative benefits are used in the evaluation of the alternatives previously outlined. None of these benefits are necessarily mutually exclusive. That is to say, it is theoretically possible, given unlimited financial and other resources, to optimize all of them.

The nine qualitative benefits identified by the Center are:

- Software Flexibility
- System Reliability
- Hardware Versatility
- Ease of Interface with Other Criminal Justice Agencies
- Autonomy of the CJD
- Financial Control
- Public Profile
- Overall Organizational Impact

#### 4.5.9 Parameters and Indications

##### (1) *Software Flexibility*

"Software flexibility" refers to the ability of the computer programs to support a broad range of applications. System software, while usually treated separately from the hardware in which it is implemented, is not, in fact, independent of the hardware configuration. Certain software applications cannot be supported by certain systems, as the necessary hardware units are simply not present. A prime indication of good flexibility is whether or not the information processing system's programs are written in an industry-standard, universal language. In this respect, FORTRAN is superior to COBOL, as the latter is not supported



by all mini- and midi-computer manufacturers; on the opposite end of the scale, assembly level languages, while quite efficient and incomparably versatile, are machine-dependent, being unique to each manufacturer. The option should also allow use of hierarchical data base managers. Contraindications would include use of any machine-dependent routines or languages, lack of modular approach, etc.

## *(2) System Reliability*

"Reliability" is a measure of the system's ability to constantly deliver expected performance. A system's reliability depends not only on the reliability of its components, but also the presence of adequate backup procedures. Indications of good reliability include processor backup (especially if data entry backup is not provided), data entry backup, employment of proven equipment, use of error-checking core memory, and control over institution of adequate security measures. Contraindications include dependence on hardware support equipment (e.g., air conditioning for processors), use of equipment utilizing other than integrated circuits for logic, employment of difficult-to-read (e.g., assembler-level) software, etc.

## *(3) Hardware Versatility*

"Versatility" is the hardware counterpart of software flexibility. It refers to the ability of the system to support

varied applications without substantial revision of equipment. The foremost contraindication is an inability to operate in both interactive and batch environments. Indications include employment, as needed, of video (CRT) as well as hard-copy terminals, use of sophisticated peripheral devices such as Optical Character Recognition (OCR) scanners,<sup>58</sup> and possession of sufficient slack processing time to permit a variety of future applications without degrading the performance of extant functions.

*(4) Ease of Interface with Other Criminal Justice Agencies*

One criterion by which any prospective information processing system must be judged is the ease with which it can be interfaced with the systems employed by other criminal justice agencies. A significant indication of easy interface is the mutual use of IBM-compatible hardware, or the possession of an EBCDIC-ASCII code translator. A fatal contraindication is the lack of any telecommunications capability (as in batch-only systems), which would necessitate the physical transportation of data and query communications. Such telecommunications apparatus must be compatible with that possessed by other agencies, in respect to its technical specifications.

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<sup>58</sup> This is one area where optimization of two benefits could be in conflict, as many high technology peripherals are not noted for their reliability.

(5) *Autonomy of the CJD*

The autonomy of the CJD as an independent branch of government is undoubtedly of primary importance. For this reason, it is broken out as a distinct and separate benefit, although most of its constitutory elements (e.g., control over the budgetary process) are themselves evaluated here as benefits. The most obvious -- and important -- indicators are powers of management control: control over budgeting, hire/fire control in respect to data processing personnel, etc. The multi-agency CJIS project adds to this list control over dissemination of criminal record information, and over procedures taken to physically secure hardware and files. Besides the converse of the considerations listed above, contraindications would include the lack of management control at any level where that control is ceded to another state agency, and the absence of monitors on information accesses from other agencies. Note that the autonomy of the CJD is not usually regarded as adversely affected when responsibility for management is contracted out to independent organizations whose employment is controlled by the CJD.

(6) *Financial Control*

The alternatives under analysis are divided among three sources (facilities management firms, rental services, and direct acquisition from manufacturers) and are not

( uniform in respect to the amount of financial control afforded. (The cost of the services is not of interest here; it is possible to wield absolute control over an inordinately expensive system.) Favorable indications include the existence of fixed-price contracts, input to billing procedures, control over hiring/firing and salaries of data processing personnel, control over daily operations where such operations affect the operational costs of the system, etc. Contraindications would be the responsibility for payment for services not directly under management's control (in the absence of fixed-price contracts), acceptance of poorly understood or variable billing procedures, lack of input to billing methods, gross discrepancy between predicted and actual expenditures, etc.

Since the budgeting and financial control process is well understood and clearly defined, this benefit will be used as the reference point in relation to which all other benefits will be weighted.

(7) *Operational Control*

"Operational control" applies to all levels of line personnel involved in the data processing function: systems analysts, programmers, entry clerks, operators, etc. The

foremost indication is direct and substantial control over all personnel involved. Contraindications include lack of appropriate operations-monitoring procedures by upper level management, and the extensive utilization of outside service agencies employing their own personnel.

(8) *Public Profile*

The "public" involved here includes anyone outside the CJD itself: attorneys, jurors and prospective jurors, legislators, personnel of other criminal justice agencies, the media, persons involved in civil or criminal cases, etc., as well as the general citizenry. Some accurate quantification of this benefit could be obtained through scientific opinion research, but the costs would be prohibitive. Significant indications of a good public profile would be a warm reception for data processing expenditures by legislative appropriations committees and favorable comments from jurors and the general public. Contraindications are more readily identifiable: editorial attacks in the media on the automated systems, complaints from other criminal justice agencies, letters of protest from attorneys, etc.

EXHIBIT 49: SUMMARY OF THE CENTER'S QUALITATIVE BENEFITS WEIGHTS

BENEFIT	WEIGHT
Software Flexibility	10
Reliability	20
Hardware Versatility	25
Ease of Interface	10
CJD Autonomy	75
Financial Control	50
Operational Control	40
Public Profile	5
Overall Organizational Impact	45

EXHIBIT 50: COMPLETED WEIGHTING WORKSHEET

Criteria (Benefits)	Weights		Alternatives				
			Facilities Management	Rent-SDC	Rent-Other	Acquired System #1	Acquired System #2
Software Flexibility	10	High	8	5	6	8	7
		Low	6	5	5	5	4
Reliability	20	High	7	7	6	7	8
		Low	4	6	4	3	5
Hardware Versatility	25	High	9	6	7	10	9
		Low	5	4	4	6	6
Ease of Interface	10	High	9	5	7	9	9
		Low	5	3	3	7	9
CJD Autonomy	75	High	5	3	5	10	10
		Low	3	1	4	10	10
Financial Control	50	High	8	4	5	10	10
		Low	3	1	2	6	6
Operational Control	40	High	0	4	4	10	10
		Low	0	2	1	10	10
Public Profile	5	High	8	6	5	9	8
		Low	5	2	2	7	6
Overall Organizational Impact	45	High	5	4	3	10	8
		Low	1	2	3	7	6
Total IPS Weight		High	1,575	1,235	1,370	2,705	2,595
		Low	810	605	845	2,130	2,130
Range-% of High			48.57%	51.01%	38.32%	21.26%	17.92%

#### *(9) Overall Organizational Impact*

The overall impact on the CJD as an organization of a new information processing system is by far the most difficult benefit to predict. It also is of considerable importance. It can affect daily procedures, personnel structure, the degree of information available for (and therefore the quality of) planning, to name only a few. No concrete indications or contraindications are proposed. We suggest that the overall organizational impact of any specific option be evaluated in terms of how well the option helps the CJD meet its goals (such as improving the quality of justice).

#### 4.5.10 Benefits Weighting

The weights assigned the nine qualitative benefits represent a consensus of opinion at the Center. In keeping with the subjective nature of the perceptual weighting, no attempt to define precisely why each benefit is important to the CJD was made. A summary of these weights is contained in Exhibit 49.

#### 4.5.11 Information Processing System Alternatives Rating

A completed work sheet, performed by the Center, showing the ratings for each alternative and each benefit, is included as Exhibit 50. The following comments serve to clarify why some ratings were assigned.



(1) *Software Flexibility*

Software written by, or under the direction of, a facilities management firm would likely possess good modularity and machine independence. The comparatively high scores (vs. rental) assigned the acquired systems reflect their advanced hardware which permits varied applications.

(2) *System Reliability*

The weight given Acquired System #2 reflects its simplicity and thorough backup procedures, especially in comparison to the possibly overly complex structure of Acquired System #1, reflected in the latter's low-end weight.

(3) *Hardware Versatility*

The versatility of a configuration designed by a facilities management firm should be at least average. The CJD, if opting for rental, could probably find better versatility in independent sources than at the SDC. Both acquired systems were designed to maximize this benefit.

(4) *Ease of Inter-Agency Interface*

The low scores assigned rental options were due to the consideration that they are unlikely to possess a dedicated small processor to act as a telecommunications "front-end" and message switcher.

(5) *Autonomy of the CJD*

Autonomy is best guaranteed when an organization has complete control of its resources. The CJD would fully control the use of acquired systems #1 and #2 and would have less control of its computing capabilities if another option were chosen.

(6) *Financial Control*

The financial control afforded by facilities management is contingent on the nature of the signed contract, and could vary substantially. Acquired systems are rated highly because they would be directly controlled by the administrators of the CJD.

(7) *Operational Control*

No comments.

(8) *Public Profile*

No comments.

(9) *Overall Organizational Impact*

The organizational impact of a facilities management contract is strong but negative, due primarily to the CJD's relinquishing substantial amounts of control over the components of the system. The proposed acquired systems are both thought to have a strong and positive impact because new applications can be developed during the time the computer is not being used for production work.

#### 4.5.12 Costs

The anticipated costs of each option, including the items outlined above in section 4.5.7, are discussed below.

##### *Facilities Management*

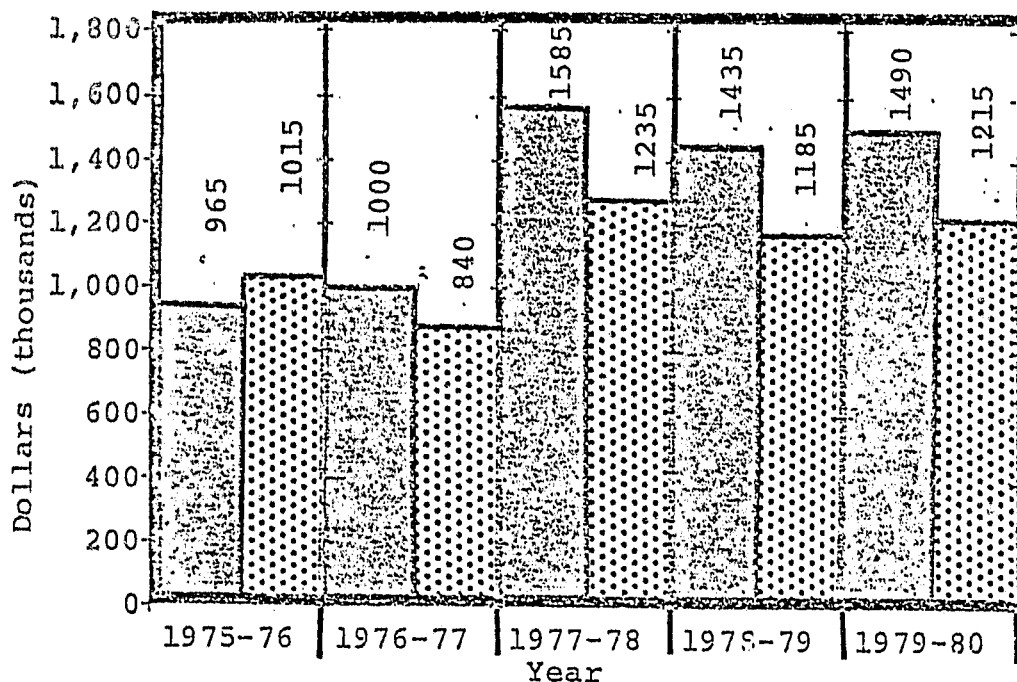
No prediction can be made about the cost of the information processing function if managed by a facilities management organization. An estimate would have to be expressed as a range the magnitude of which would render the estimate almost valueless. The costs are entirely contingent on the form of the agreement as to the services to be provided.

##### *Rental: State Data Center*

The costs of the information processing capability over the five years of the planning window are seen as accumulating in several steps. These steps are a function of the level of system development within the CJD. Until the beginning of 1977, only JURIS I and the Jury Selection systems will be in operation. During 1977, trial implementation of CJIS should take place. During 1978 and 1979, full implementation of CJIS should be realized (see Exhibit 40). By mid-1976, the full impact of the merger of the Circuit and Common Pleas courts will be reflected in the JURIS I processing loads.

EXHIBIT 51: RENTAL: STATE DATA CENTER  
WITH AND WITHOUT RECOMMENDED FILE CONVERSION.

Total 5-year Cost Without Conversion: \$6,475,000  
Total 5-year Cost With Conversion: \$5,490,000  
Average Yearly Cost Without Conversion: \$1,295,000  
Average Yearly Cost With Conversion: \$1,098,000



Without file conversion.

With file conversion.

**NOTES:**

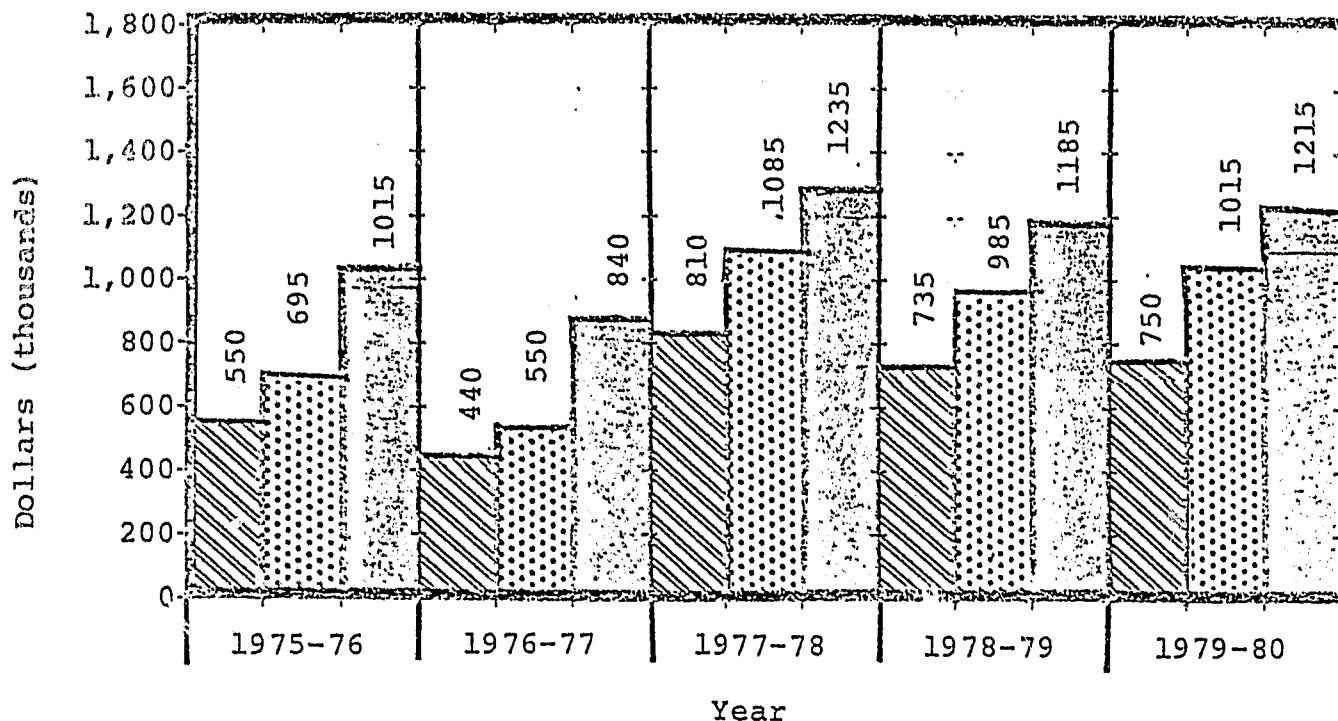
- 1) Includes:
  - SDC processing and residence charges
  - Equipment rental
  - Other associated automation expenses
  - Teleprocessing and line costs
- 2) Excludes:
  - Personnel (including entry personnel)
  - Physical Plant
  - CJIS development costs
- 3) Status Quo remains in force until implementation of CJIS, which is assigned to 1977-78
- 4) Overlapping processing charges of \$200,000 are assigned to 1977-78 during trial implementation of CJIS
- 5) File Conversion is assumed to improve efficiency 25%
- 6) Conversion costs are estimated at \$50,000, assigned to 1975-76, although its effects will not be felt until 1976-77.

We estimate that the annual processing bill under the status quo for both civil and criminal systems will approximate \$750,000 in the 1975-76 court year, and almost \$800,000 in 1976-77. If all systems are processed at the State Data Center, 1977-78 will see a substantial increase in processing costs. Re-designing the JURIS I system and its file structure, if implemented, should significantly limit future costs. If the CJD opts for this course of action, the JURIS I portion of the SDC costs should fall between \$450,000 and \$550,000 (depending on the effectiveness of the conversion) from 1977-1978 until 1979-1980. Including the CJIS costs, equipment rental, and allied expenses (but not personnel costs), this means a total computerized information system bill of about \$1,235,000 in 1977-78, and \$1,215,000 by the end of 1980. If this reorganization is not effected, the comparable bills should be about \$1,585,000 and \$1,490,000.

The addition of data entry terminals for the CJIS would cost at least \$50,000 rental per year, if the current type of entry system were employed. Exhibit 51 shows the distribution of estimated rental costs over the five years of the planning window.

**EXHIBIT 52:**

**RENTAL COMMERCIAL**  
**BASED UPON 50%, 75%, AND 100% OF THE STATE DATA**  
**CENTER RENTAL CHARGES.**



50% of State Data Center Rental Charges.

75% of State Data Center Rental Charges.

100% of State Data Center Rental Charges.

**NOTES:**

*All costs assume file conversion.*

	50%	75%	100%
Total 5-year Costs:	\$3,285,000	\$4,330,000	\$5,490,000
Average Yearly Costs:	\$657,000	\$866,000	\$1,098,000

*Rental: Commercial*

Should the CJD wish to investigate this option further, the Center recommends that several benchmarks<sup>59</sup> be obtained (See Recommendation 5). Competitive billing rates can be obtained from commercial agencies. The annual processing expenditure resulting from opting for this alternative should be considerably less than (at the worst, comparable to) that obtained from choosing rental from the SDC. The degree of variation is unknown. In the absence of precise benchmarks, three alternative pricing schedules have been computed for this option. They are 50%, 75% and 100% of the cost of rental from the SDC. One of these percentages should approximate the findings of the benchmarks. Later, three separate benefit/cost ratios are computed for this option on the basis of these estimates.

These costs, as were those for the continued renting of computer time at the State Data Center, are premised on the reorganization of the civil system's file structure.

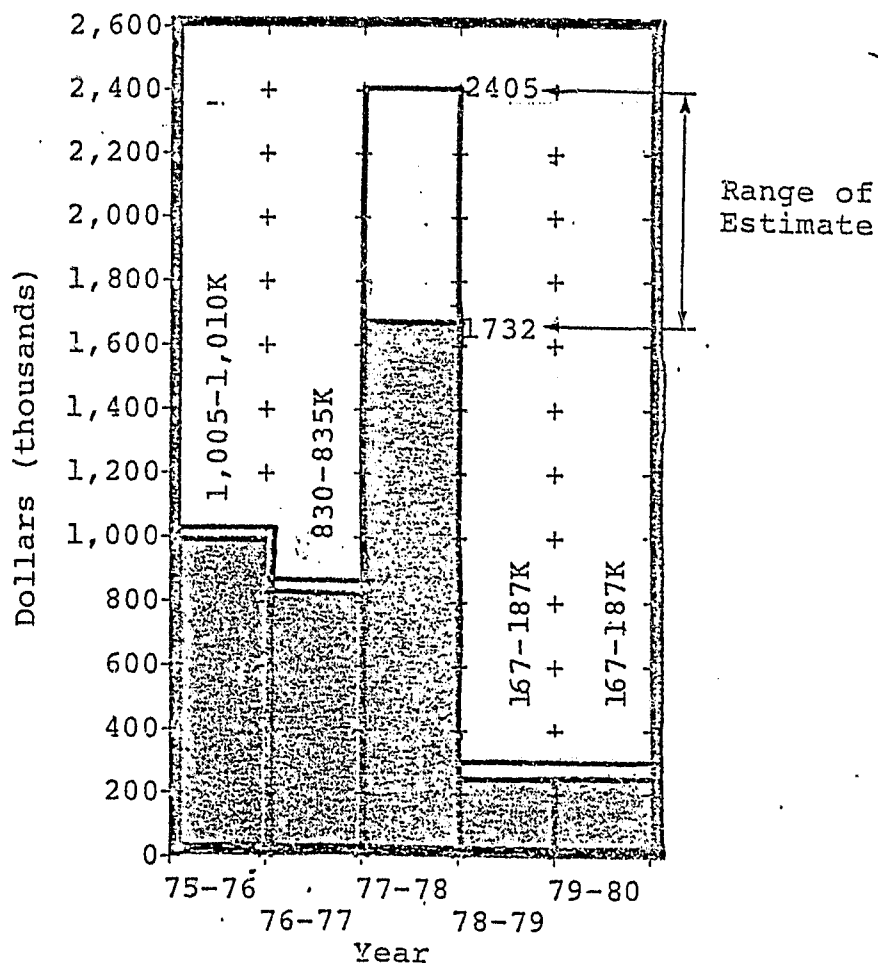
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<sup>59</sup> By running a system on a vendors computer, an estimate (benchmark) of the running time can be obtained, thereby allowing the vendor to quote a rental price.

EXHIBIT 53: ACQUIRED SYSTEM #1.

Total 5-year Costs: \$ 3,901,000 - \$4,620,000

Average Yearly Costs: \$ 780,200 - \$ 924,000



**NOTES:**

- 1) CJIS implementation is assigned to 1977-78; \$200,000 overlapping processing charges apply to that year.
- 2) Status Quo applies until then.
- 3) Conversion costs are assigned to 1975-76, although its effects are not felt until the following year.
- 4) All acquisition costs are assigned to 1977-78.



### Acquired System #1

The adoption of Acquired System #1 implies the implementation of virtually the complete configuration in order to support even the smallest function. The only additions which can conveniently be "plugged in" when more functions are operational are more terminals and disk file space. The full cost of the initial acquisition, then, is assigned to the 1977-78 fiscal year.

Aside from the system hardware, several inclusions and exclusions should be noted. Excluded from the cost computations are physical plant space and maintenance, presently employed data processing personnel and CJIS development costs. Included are additional personnel, teleprocessing, maintenance and supplies costs.

-Operators: 3 shifts, 3 locations, at \$10,000 each per year.....	<u>\$90,000/year</u>
-Maintenance contracts.....	<u>\$7,500/year</u>
-Ancilliary supplies (disk packs, air filters, paper, magnetic tape, etc.)....	<u>\$10,000-15,000/year</u>
-Two(2) additional programmers, at \$15,000/year each.....	<u>\$30,000/year</u>
-Teleprocessing Costs.....	<u>\$30,000-45,000/year</u>
Totals.....	<u>\$167,500-187,500/year</u>

The following costs relate to the complete configuration, as it would appear in 1979; these costs are displayed in Exhibit 53.

- CPUs  
Four (4) each, with allied equipment  
(e.g., console), at \$95,000 to 185,000  
each.....\$380,000-740,000
- Disk Units  
Fourteen (14) spindles, at an average  
of \$35,000 each.....\$490,000
- Magnetic Tape Drives  
Three (3), at \$10,000-19,000 each....\$ 30,000- 57,000
- Terminals, intelligent, including floppy  
disk, thirty-eight (38), at between  
\$7,500 and \$12,500 each.....\$285,000-475,000
- Telecommunications Apparatus  
Price unknown, pending choice of  
hardware, assume \$15,000 total.....\$ 15,000
- Low-speed Printers  
Eighteen (18), at \$3,000-7,000 each..\$ 54,000-126,000
- High-speed Printer  
One (1), at \$12,000 to 17,500.....\$ 12,000- 17,500

Total.....\$1,266,000-1,920,500

Thus, the total system acquisition cost (purchase price) is estimated to be between \$1,266,000 and \$1,920,500, while the total annual operating and incidental expenses would be between \$167,500 and \$187,500.

If the status quo (rental of processor time from the SDC) remains until full implementation of the CJIS system is operational, some duplication of activities would occur. The extent of these concurrent costs will depend on the implementation schedule. If the acquired system is not implemented until mid-1977, about \$200,000 for concurrent rental processing would be incurred 1977-78. While not resulting from the acquisition of this system in a proper sense, this expense is nonetheless added to the system's absolute cost as it will, in fact, arise.

Considerable re-programming of JURIS I should be undertaken; written several years ago, the system has had no extensive revision since. Working from the largely satisfactory first cut, a commercial software firm could probably complete the conversion in six to nine months at a cost of about \$50,000.

#### *Acquired System #2*

Most of the points made in the discussion of Acquired System #1 apply to Acquired System #2 as well. There is, however, one significant difference: the yearly operating costs will be reduced by \$60,000 if Acquired System #2 is chosen; this is because computer operators will be required at only one location for Acquired System #2 (\$30,000) as opposed to the 3 locations for Acquired System #1 (\$90,000). The Center reasserts its recommendation to change the file structure of the civil system; Sub-option A of this alternative (single large processor) could, however, support the existing civil system with only minor changes.

Costs have been estimated for both Sub-option A and Sub-option B. The costs common to both include:

- Disks  
Twelve (12) spindles, at an average  
of \$35,000 each ..... \$420,000
- Magnetic Tape Drives  
Two (2), at between \$10,000 and  
\$19,000 each ..... \$20,000 - 38,000
- Terminals, intelligent, with floppy disks  
Thirty-eight (38), at \$7,500 to  
\$12,500 each ..... \$285,000 - 475,000
- Low-speed Printers  
Eighteen (18) at \$3,000 - 7,000 each ..... \$54,000 - 126,000

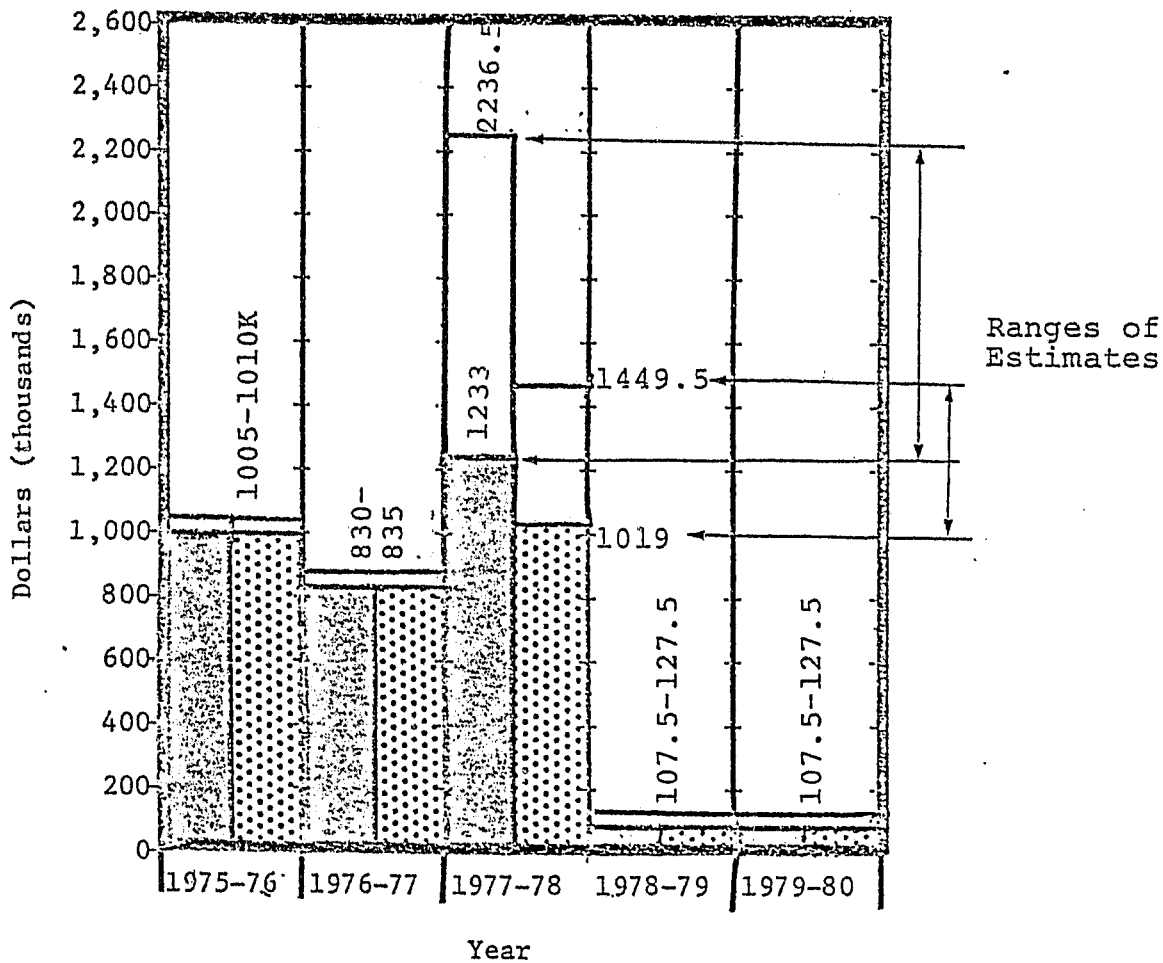
EXHIBIT 54: ACQUIRED SYSTEM #2 (TWO SUB-OPTIONS)



Total 5-year Cost: Sub-option A = \$3,356,000 - \$4,390,000

Total 5-year Cost: Sub-option B = \$3,131,000 - \$3,615,000

Average Yearly Cost: Sub-option A = \$671,200 - \$878,000

Average Yearly Cost: Sub-option B = \$626,200 - \$723,000



 Sub-option A (Single Processor)  
 Sub-option B

- High-speed Printer  
One (1), at \$12,000 to 17,500 .....\$12,000 - 17,500
  - Telecommunications Apparatus  
Estimate, \$10,000 - 15,000 .....\$10,000 - 15,000
  - Totals..\$801,000-1,091,500
- The requirements specified for the single central

processor employed in Sub-option A allow a broad range of hardware to be included. These processors are priced between \$400,000 and \$1,100,000.

- CPU (Sub-option A) .....\$400,000 - 1,100,000

Although, almost any minicomputer on the market in 1975 could be adapted to the configuration employed in Sub-option B, only a few manufacturers currently have the required supporting software. Although this is likely to change by the time the CJD shops for hardware, only minicomputers from manufacturers known to support such configurations were priced.

- CPUs (Sub-option B)

Three (3) each, at between \$54,000 and \$92,000 each .....\$162,000 - 276,000

One (1), 16K core, at \$24,000 to \$37,000 .....\$24,000 - 37,000  
Totals..\$186,000-313,000

The total price of acquiring Sub-option A of Acquired System #2 is projected at between \$1,201,000 and \$2,191,500. The total acquisition cost of Sub-option B is projected at between \$987,000 and \$1,404,500. Both sub-options would require an annual expenditure for incidental and operating costs of between \$107,500 and \$127,500.

Exhibit 54 summarizes the five-year costs of both sub-options of Acquired System #2.

EXHIBIT 55 : SUMMARY OF THE WEIGHTINGS, BENEFITS, AND COSTS OF THE CJD'S COMPUTER OPTIONS.

CJD'S COMPUTER OPTIONS.							
Options			Benefits Weighting (High/Low)	Total 5-year Costs	Discounted 5-year Costs *	Discounted Cost - Annual Average	Benefit/Cost Ratio **
SDC With Conversion		High	1,235	\$5,490K	\$4,100K	\$ 820K	1.51
		Low	605	\$5,490K	\$4,100K	\$ 820K	.74
SDC Without Conversion		High	1,235	\$6,475K	\$4,794K	\$ 959K	1.29
		Low	605	\$6,475K	\$4,794	\$ 959K	.63
Commercial Rental at 50% of SDC Rate		High	1,370	\$3,285K	\$2,434K	\$ 487K	2.81
		Low	845	\$3,285K	\$2,434K	\$ 487K	1.74
Commercial Rental at 75% of SDC Rate		High	1,370	\$4,330K	\$3,153K	\$ 630K	2.17
		Low	845	\$4,330K	\$3,153K	\$ 630K	1.34
Commercial Rental at 100% of SDC Rate		High	1,370	\$5,490K	\$4,100K	\$ 820K	1.67
		Low	845	\$5,490K	\$4,100K	\$ 820K	1.03
Acquired System #1		High	2,705	\$4,620K	\$3,649K	\$ 730K	4.35
		Low	2,130	\$3,901K	\$3,112K	\$ 622K	2.02
Acquired System #2 Sub-option A		High	2,595	\$4,390K	\$3,487K	\$ 697K	4.78
		Low	2,130	\$3,356K	\$2,714K	\$ 543K	3.05
Acquired System #2 Sub-option B		High	2,595	\$3,615K	\$2,905K	\$ 581K	5.10
		Low	2,130	\$3,313K	\$2,545K	\$ 509K	3.67

\* A 10% interest rate is assumed in discounting costs.

\*\* The benefit/cost ratio is calculated by dividing the total benefits score by the discounted 5-year costs, and then multiplying by 5,000 in order to change the final ratio to a more manageable number (e.g. .000344 to 1.72). The highest benefit/cost ratio is calculated by dividing the best benefits by the lowest costs; similarly, the lowest benefit/cost ratio is calculated by dividing poorest benefits by highest costs.

4.5.13 Summary: Weightings, Ratings, and Cost

Exhibit 55 contains the rating, approximate costs, and benefit/cost ratio for each option.

#### 4.6 ANALYSIS

The first part of this analysis develops from the computation of a benefit/cost ratio for the alternatives under consideration. While a useful general indicator, this technique is not magical and can easily be overworked. The use of discretion in interpreting intermediate findings is crucial to the attainment of a broad range of useful results. Our observations in this regard are discussed in Observations within this part of the report (4.6.2).

##### 4.6.1 Benefit/Cost Ratio

In that facilities management benefits are not substantially above other options and that the loss of management control is potentially great, facilities management, which up to now had been only tentively included for the sake of completeness, is rejected as a viable option.



RECOMMENDATION 3: FACILITIES MANAGEMENT SHOULD BE REJECTED AS A VIABLE OPTION AMONG THE ALTERNATIVE SOURCES OF INFORMATION PROCESSING CAPABILITY FOR THE CJD.

Benefit/cost ratios were computed for the remaining four alternatives. These ratios are expressed as a range. To calculate this ratio, the option's total benefits weight was divided by its anticipated costs, in thousands of dollars. The ratio expresses the number of theoretical benefit "units" which could be bought with an average annual expenditure of \$1,000. The high side of the benefit/cost range represents the most potential benefits divided by the least potential dollars of cost; the low end of the range represents the lowest predicted yield in benefits for the most predicted expenditure. A summary of these ratios and their variance was presented in Exhibit 55.

As these ratios are highly sensitive to changes in weightings assigned, considerable difference must be seen in the benefit/cost ratios for different alternatives before valid conclusions about the "best" alternative can be drawn. In our opinion, the difference between the two rental options and that between the two acquisition options is too minor to provide a clear cut distinction between the two options within the two categories. However, the dramatically more favorable yields of the acquisition options in comparison to the rental options is sufficient to support recommendation of an in-house capability.

RECOMMENDATION 4: THE BEST LONG-TERM COURSE OF ACTION FOR THE CJD IN RESPECT TO ITS COMPUTER BASED INFORMATION SYSTEM OPTIONS IS TO ACQUIRE SOME FORM OF IN-HOUSE COMPUTER CAPABILITY.

Since the conversion to an in-house capability will take some time to effect even after the go-ahead decision has been made -- and the complete information required to document such a decision will probably take a year to collect and synthesize by itself -- therefore, an interim cost-reduction measure is recommended.

Contingent on a commercial benchmark of 80% or less of the charges currently levied by the SDC, the CJD should take immediate steps to move only its civil system processing to a commercial computer service. Such action could be implemented within three months of the go-ahead decision. No interruption in service is necessary, as the actual switch-over could be effected during a long weekend. Most commercial services utilize equipment sufficiently similar to that at the SDC that a negligible amount of software revision (if any) would be required to effect the conversion. In all likelihood, JURIS I could be moved intact. Based on our cost projections, about \$60,000 per year could be saved for every 10% below the current billing rate that the benchmark indicates. It must be stressed that such a step only serves as an interim cost-reduction measure. While rental was at one time undoubtedly the best course of action for the CJD, the acquisition of in-house capability is now the best long-term course of action for CJD to follow.

RECOMMENDATION 5: THE CJD SHOULD IMMEDIATELY OBTAIN SEVERAL BENCHMARKS FROM COMMERCIAL COMPUTER SERVICE AGENCIES. IF A SIGNIFICANT SAVING CAN BE OBTAINED, THE CJD SHOULD MOVE THE JURIS I SYSTEM TO THAT AGENCY'S FACILITY. BY 1977, THE CJD SHOULD TAKE APPROPRIATE STEPS TO ACQUIRE AN IN-HOUSE INFORMATION PROCESSING CAPABILITY. IF A COMPETITIVE BENCHMARK CANNOT BE OBTAINED, THE CJD SHOULD HASTEN ITS EFFORTS TO ACQUIRE THE IN-HOUSE CAPABILITY AS SOON AS POSSIBLE.

It should be noted that about 20% of both acquired systems' acquisition costs represents rented processing time which runs concurrently with the implementation of the unified in-house system. If this rented processing expenditure cannot be reduced through employment of a commercial service, the acquired capability should be implemented as soon as possible to help minimize this expenditure.

#### 4.6.2 Observations

Comparison of the benefits yielded by the two acquired systems suggests that only minimum computer capability should be acquired. The extra power and flexibility afforded by the more complex configuration (Acquired System #1) was only minimally superior in yielding benefits to the second option. This suggests further that the CJD should investigate possible means to even out the hour-to-hour fluctuations in daily processing load. This is most important for any interactive system. Accommodating peak processing loads

without degrading observed performance requires significantly larger and more powerful processors and faster data lines than would otherwise be necessary. This extra power is then wasted in non-peak periods. Any system configured with the minimum requirements in mind must permit easy upgrading of all aspects (disk space, CPUs, etc.) at a later date, should predicted requirements prove erroneous. A modular approach is suggested.

Irrespective of any other developments, the man/machine interface for both the revision of JURIS I and also for CJIS should be defined in detail as soon as possible. Given precise requirements for input/output routines, specifications for terminals should be developed. The current data entry terminals used for the civil system should then be replaced with "intelligent" full-page screen CRT terminals incorporating floppy disk or cassette backup. Most terminals in this category which are currently on the market are general purpose terminals capable of supporting a variety of applications. These terminals should be chosen with the eventual unified information processing system in mind, although they must be able to operate with the current software with little

or no software revision. The IBM 1050 card reader system was once an effective and inexpensive data entry method, but has been supplanted by CRTs and key-to-disk data entry systems in recent years. The \$50,000 currently paid for card reader rental could thus be used to acquire permanent state-of-the-art terminals. Depending on the model chosen, between twelve (12) and twenty (20) CRT terminals, including disk system, could be bought for the equivalent of three years' card reader rental.

RECOMMENDATION 6: THE MAN/MACHINE INTERFACE FOR ALL FUNCTIONS IN THE PLANNED UNIFIED INFORMATION PROCESSING SYSTEM SHOULD BE DESIGNED AS SOON AS POSSIBLE. USING THESE SPECIFICATIONS, AND KEEPING IN MIND THE CURRENT FORMAT REQUIREMENTS, THE CJD SHOULD REPLACE ITS CURRENT CARD READER DATA ENTRY SYSTEM WITH STATE-OF-THE-ART CRT TERMINALS WITH INTEGRATED FLOPPY DISK OR CASSETTE UNITS. THE CURRENT RENTAL EXPENDITURE SHOULD BE DIVERTED INTO ACQUISITION OF THESE NEW TERMINALS, WHICH WILL BE THE TERMINALS UTILIZED BY THE EVENTUALLY ACQUIRED SYSTEM.

The advantages of key-to-disk data entry are numerous: higher keystroke rates than keypunching, more sophisticated error checking, full backup to allow entry to continue during periods of processor or data line failure, faster entry due to automatic terminal formatting, much greater versatility in applications, etc. We believe that any programming and conversion efforts are justified by the additional reliability (operators are never idled by processor failure), the experience gained by experimentation with formats, the increased

productivity, and the probable saving of \$150,000 over three years. A variation of this would be the purchase of non-intelligent CRTs without disk units to replace the current data entry system. Such terminals, with teleprocessing modems, can be acquired for between \$1200 and \$2200 each. The CJD could replace all its current card readers and still have money left over from the first year's anticipated rental cost! A significant drawback to the use of such terminals is that no hard-copy record is maintained at the site of entry, hence entry clerks would be unable to enter data in the event of a processor or line failure.

#### 4.7 GUIDELINES FOR APPLYING THE WEIGHTING TOOL

As stated previously, the five information processing system alternatives discussed previously represent only a few of the conceptually feasible options. In the same view, the nine categories used to evaluate the options could be changed to reflect another focus. Hence, we encourage the CJD management to formulate and weight new systems, and to adjust the qualitative benefits to correspond to its perceptions of the judicial department's priorities. This section is meant to serve as an advisory manual to help facilitate this "do it yourself" process. We suggest it be supplemented with a thorough reading of Knudsen and Nolan's chapter, "On Cost/Benefit of Computer Based Systems" in Managing the Data Resource Function.

RECOMMENDATION 7: THE CJD SHOULD ACTIVELY PURSUE THE FORMULATION OF ADDITIONAL OPTIONS AND WEIGHT THESE ALTERNATIVES. BENEFITS SHOULD BE TUNED TO CORRESPOND TO MANAGEMENT'S PERCEPTIONS OF ITS PRIORITIES. THE WEIGHTING ANALYSIS PERFORMED AS AN EXAMPLE BY THE CENTER SHOULD BE RE-DONE BY THE CJD, AND THIS LATTER WEIGHTING COMPARED AGAINST ANY FUTURE WEIGHTINGS. A FULL SPECTRUM OF PERSONNEL SHOULD BE INVOLVED, INCLUDING BOTH SENIOR-LEVEL MANAGEMENT AND DATA PROCESSING PERSONNEL.

EXHIBIT 56: BLANK BENEFITS WORKSHEET

Benefits	Weights	Alternatives				
		Facilities Management	Rent-SDC	Rent-Other	Acquired System #1	Acquired System #2
Software Flexibility	High					
	Low					
Reliability	High					
	Low					
Hardware Versatility	High					
	Low					
Ease of Interface	High					
	Low					
CJD Autonomy	High					
	Low					
Financial Control	High					
	Low					
Operational Control	High					
	Low					
Public Profile	High					
	Low					
Overall Organizational Impact	High					
	Low					
Total IPS Weight	High					
	Low					
Range-% of High						



#### 4.7.1 General Considerations

No matter what alterations are made to the perceptual weighting technique, a few general guidelines remain in force:

(1) Above all, it is vital that senior-level management participate in the weighting of qualitative benefits. Without such participation, there is no assurance that the total weighted scores will correspond to their priorities.

(2) Several different opinions should be solicited. These should be gathered from all levels of management, in order to reflect potentially disparate perceptions of what considerations are important. A blank copy of the Center's work sheet is provided in Exhibit 56.

(3) Standardization must become a by-word in performing the weighting, especially if numerous individuals participate. For example, the costing system employed must remain the same for any batch of weightings, and should be clearly defined; reference points on the weighting scales should be defined. In general, assumptions should be made explicit where this

is possible without conflicting with the subjective nature of perceptual weighting.

#### 4.7.2 Information Processing Alternatives and Rating

The CJD should actively pursue the formulation of additional system options. Suggestions could be solicited from data processing personnel, consultants, or from model examples encountered in other judicial departments. Along this latter line, Center staff visited a number of prominent judicial information processing facilities, and summarized the noteworthy points of these systems in Appendix IV. The RFI soliciting information from manufacturers on minicomputer capabilities published by the CJD on June 6, 1975 is an excellent example of a fruitful course of action designed to provide background material for constructing further options.

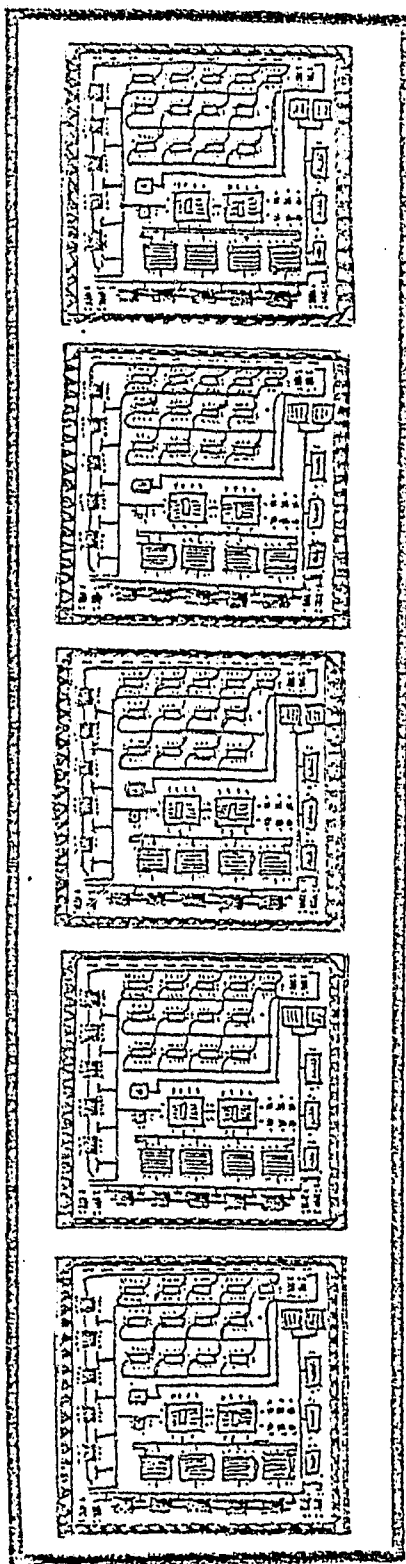
#### 4.7.3 Other Considerations

Improvements in the weighting technique should be incorporated wherever possible. This relates not only to changes in the procedure employed, but more importantly to the information base which "feeds" the analysis. These improvements in the amount and quality of information should greatly enhance the applicability and validity of any results. Some potentially crucial areas include:

- conversion costs
- conversion timetable
- accurate implementation timetable
- benchmarks
- up-to-date hardware prices
- more closely defined offsets
- degree of manual processing displacement.

#### 4.8 SUMMARY

Most of the technically possible sources of computerized information processing capability available in 1975 are conceptually feasible for the CJD. We opened this section with a discussion of their criteria and what they were, screening out those which were ill-suited to the CJD's objectives. For use in analyzing these options, we proposed a technique of perceptual weighting of qualitative benefits. These qualitative benefits are the common ground on which all the available alternatives can be compared. Using this technique, applied to the selected options, we arrived at a number of recommendations. These recommendations address two different problems: (1) reducing the costs of operating the CJD's extant and proposed information systems, and (2) providing a viable long-range computerized information processing capability which does not aggravate the problem of expenditures. These recommendations are forwarded tentatively, contingent on the similarity in the perspective of the CJD's senior-level management and the perspective of the study staff as to what is important. From our analysis, we conclude that rental of computer time from a commercial data processing source may save the CJD a considerable amount of money over the next two years; however, in the long run, the only cost-effective option open to the CJD is the acquisition of some form of in-house computer based information processing capability.



## 5.0 Planning Computer Systems in the Connecticut Judicial Department

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## 5.1 INTRODUCTION

While computer-based information systems have been planned in the CJD, this activity thus far has been conducted on an ad hoc basis. Planning has commenced immediately before the start of a new project, rather than being performed on a continuing basis. Because the CJD's commitment to the use of automated information systems has been small until the recent past, this type of planning has yielded satisfactory results. At the CJD's present level of automation-related expenditure (\$1.5M in 1974), however, planning for computer systems should be institutionalized.

Not that the adoption of a formal planning technique guarantees success. It only works when a strategy is selected with care and implemented by a skilled administrator. Below is a comment on a formal planning technique, PPBS, from a public administrator who has used it successfully in Wisconsin.

The combination of the letters PPBS which stand for planning-programming-budgeting system have received a great deal of attention in the past few years. People who have examined the literature and the concepts have expressed varied reactions. Some regard the idea as a dramatic new insight and technique, which is tantamount to saving the world. Others say it could be more properly defined by dropping the first two P's. I regard these two points of view

as the ends of a continuum, with the real definition lying somewhere between. Basically, the individual ingredients of PPBS offer little that is new. However, their combination and application provide a capacity to change the frame of reference against which one views or interprets a situation. For people involved in administration this is a new tool well worth examining because it goes to the very heart of administration -- the decision-making process.<sup>60</sup>

As suggested by the above quote, some organizations have had problems planning formally; however, many others have found these techniques extremely helpful in achieving their goals. In this section, therefore, we outline some of the planning techniques being used and select one for use in the CJD (in addition, included in the appendix ANNOTATED BIBLIOGRAPHY are recommended readings on these techniques). Because planning, to be effective, must exist within a complementary organization structure, we suggest changes in organization of the Executive Secretary's Office. We then recommend how this technique might be employed by the data processing group. In conclusion, we summarize the preceding remarks and draw some inferences from them.

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<sup>60</sup> Address by Paul L. Borwn, An Operational Model for a Planning-Programming-Budgeting System. (Presented to the Post Audit Seminar, Lexington, Kentucky, June 17, 1970.)

## 5.2 CHOICE OF A PLANNING TECHNIQUE

Here, we briefly survey a number of alternative tools which have been successfully used elsewhere and recently reported in planning-oriented literature.

### 5.2.1 Formal Planning Methods

#### *PPBS*

This method breaks into four parts:

1. Planning. Development of strategy (the thrust of organization efforts) with a mind to the organization's purpose, environment and role changes, and strengths and weaknesses.

2. Programming. Development of, systematic refinement of, and choice between alternate methods of reaching goals elucidated and prioritized in the planning phase.

3. Budgeting. Determination of the need for and supply of funds to the various programs.

4. Systems. Measurement of the organization's performance in relation to its goals and constraints.

In sum, PPBS examines the purpose of the organization, chooses among methods of fulfilling both short- and long-term purposes through cost/benefit analysis, communicates the needs and goals of the organization, and integrates its



various parts. Further, this method measures the performance of the organization in relation to its purpose and systematically refines its efforts toward better cost-effectiveness.

*PERT and CPM (Problem Evaluation Review Technique and the Critical Path Method)*

PERT and CPM aid in planning and controlling a project by logically representing task inter-relationships and isolating those which by their position in the network of inter-relationships may alter the duration of the project. These planning tools focus management attention on such tasks.

*Management by Objectives*

This planning tool provides individuals, or components of an organization, with an opportunity to be self-motivating by setting their own objectives. The manager and subordinates come to common agreement on the subordinates' desired level of performance, thus providing a basis on which to predict performance and judge it more carefully. MBO is used where (1) the subordinates' efforts are clearly differentiated and easily measured, and (2) integration of the individual or component (including re-examination of purpose and objectives) is not necessary or has already been accomplished and need not be reviewed or adapted.

### *Planning Constructive Change (PCC)*

This approach asks the organization to focus upon the results it would ideally prefer to obtain. Having isolated these result areas, and ignoring current operating procedure, the organization is asked to propose methods of producing the desired results. These alternative methods are evaluated through cost/benefit analysis and the best option is pursued.

The focus of PCC therefore corresponds with the planning and programming phases of PPBS, but less emphasis is put on budgeting and system-measurement as frequent review or communication techniques. It examines the purpose of the organization, analyzes alternatives for fulfillment of purpose, ensures relation of effort to goals, and integrates various organization components.

### *Zero-Base Budgeting Review (ZBBR)*

Every three years or so, all components of the organization are asked to again justify through the budget their entire expenditure on a cost/benefit basis in relation to organization goals, rather than merely any additional funding they request. Each component is asked to examine its entire operation and so plan completely its expenditure of funds. The objective of the budget justification report is the attempt to reduce costs and increase the benefits of the operation.

### 5.2.2 Planning Needs of CJD's Data Processing Group

Our purpose now is to deduce and demonstrate the planning needs of the CJD in relation to its data processing group. Having identified such needs, they can be used as criteria by which to choose from among the alternative planning methods that technique which is most suitable for the CJD. A listing and a discussion of these needs follow.

#### *Frequent Systematic Review*

CJD's data processing group is faced with swift changes in technology, capability and cost structure. This indicates a need for continual and systematic review of potential cost savings and beneficial operations-expansion options (those options whose benefits exceed their costs). The need for a frequent and systematic review would point to PPBS, which possesses that facet.

#### *Continual Education*

These same swift changes in the environment necessitate continual education of DP personnel concerning new technology, organization and management techniques, etc. Frequent and systematic review aids in filling this need through the

identification and communication of such developments. This need points to PPBS.

#### *Evaluation of the Funding Need*

The DP group faces large equipment costs each year, indicating a large funding need which must be supplied and evaluated through the budgeting process. Both PPBS and Zero Base Budgeting (ZBBR) support these activities, with the qualification that PPBS provides a better focus for analysis of long-term needs on an ongoing basis, rather than a three-year or five-year, interval.

#### *Strategy*

So that an organization may decide what course to take in a given situation, it needs a firm understanding of its environment and purpose.

Questions such as these need to be answered: What is DP's role vis à vis the clerks and other beneficiaries of its efforts? Does DP respond to requests, give advice or take the lead in developing the computer as an aid to the administration of higher quality justice? Does it take an active or passive role in the education of judges, clerks and other beneficiaries concerning computer applications and potential? Is it to behave as a controller of other

components and events in the organization (as through its civil system), or as a servant, or both? To what extent does data processing involvement with police and corrections further the administration of justice in such areas as tracking of defendants and reducing recidivism? You will note that these questions address the "overall information processing objectives" of the CJD (as first stated in Section 2.0): administration of a high quality of justice, centralization, and independence vs. cooperation with the other branches of government.

From this basis of understanding environment and purpose flows all analysis of the degree to which a given procedural option fits the organization. For example, we know that the DP group faces the problem of choosing from among a seemingly endless number of options (buy, rent, service center, batch, timeshare, etc.) and possible configurations. To choose from among these alternatives, guidelines must be developed as a function of the DP group's purpose.

PPBS and PCC both support this structuring of an organization's objectives.

#### *Relation of Effort to Organization Goals*

Like any group, DP must communicate its goals. If it is to improve, it must integrate its components into goal-related

effort, and evaluate its performance in relation to those goals.

With such evaluation, DP must deal with the fact that its efforts are devoted to the design and implementation of extremely intricate systems by many inter-related individuals. Intricacy can often cloud purpose. PPBS and PCC attempt to make sure that all effort is actively directed towards the organization's goals.

### *Integration*

Integration of operations would mean that any duplication of effort would cease, ability to analyze the costs and benefits of given efforts would improve, gaps in responsibility for the objectives of the organization would be filled. Integration indicates a formalization of communication and lines of authority as well.

PPBS stresses integration of effort by determining purpose (planning), dovetailing responsibility for different organization objectives (programming), and communicating organization needs, goals and evaluation (budgeting and systems). Also of use would be PCC as a half-step in the right direction, in that it possesses the equivalent of PPBS planning and programming functions.

MBO would, of course, not be useful here due to its reliance on self-generation of objectives by individual components, rather than the necessary integration of goals, responsibility and effort in an intricate environment.

### *Analysis Capability*

Computer based information systems as well as their attendant costs and benefits normally continue for more than a year. Analysis of the costs expended and benefits gained during the course of the budget year (the focus of Zero Base Budgeting), then, is useful for review of program performance, but myopic in determining the allocation of resources for next year among old and new programs. This allocation must be made on the basis of long-term costs and benefits properly discounted.<sup>61</sup> PPBS and its literature best support this needed level of sophistication.

Cost/benefit techniques, however, can be borrowed wholesale from the PPBS literature and used in support of PCC,

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<sup>61</sup>*On The Appropriate Discount Rate for Evaluation of Public Projects. Statement from the Planning-Programming-Budgeting System: Progress and Potentials.* (Hearings before the Subcommittee on Economy in Government of the Joint Economic Committee. Congress of the United States, 90th Congress, 1st Session, U.S. Government Printing Office, Washington, D.C., 1967), by William J. Baumol, a Professor of Economics, Princeton University.

EXHIBIT 57: CHOICE OF A PLANNING TOOL FOR THE DATA  
PROCESSING GROUP OF THE CJD

The Data Processing group has the following needs, which  
are best met by certain planning tools:

<u>NEED</u>	<u>best</u>	<u>PLANNING TOOL</u> <u>also useful</u>
Continual systematic review in search of cost savings and beneficial expansion options	PPBS	
Continual education of its personnel in response to changes in the environment	PPBS	
Evaluation of the funding need	PPBS	ZBBR
Strategy	PPBS, PCC	
Relation of effort to organization goals	PPBS, PCC	
Integration	PPBS	PCC
Analysis capability	PPBS	PCC
Project implementation	PERT-CPM	

As can be seen, therefore, PPBS is the best choice of  
a single planning tool for the particular needs of the data  
processing group. And it can most certainly incorporate  
the specialized PERT-CPM planning tool into the implementation  
stage of its Programming function.



In summary, therefore, this data processing group has planning needs, which are best met by certain planning tools.

Exhibit 57 demonstrates the superiority of PPBS in fulfilling the needs of the organization. PCC is found useful, but limited, while PERT-CPM is found necessary in its specific area of application.

RECOMMENDATION 8: THE CJD'S DATA PROCESSING GROUP SHOULD ADOPT AND USE THE PLANNING TECHNIQUE PPBS. THE SPECIALIZED PERT-CPM PLANNING TOOL SHOULD BE INCORPORATED INTO THE PPBS PROGRAMMING FUNCTION.

### 5.3 RECOMMENDED ORGANIZATIONAL CHANGES IN THE CJD TO FACILITATE THE USE OF PLANNING

As has been pointed out, PPBS is the planning method which best meets the particular needs of the CJD in relation to its DP group. However, an organization cannot simply superimpose planning upon its present structure. The organization structure must fit the planning method and focus attention to it if planning is to occur and be effective.

We know from the experience of many others that to implement PPBS successfully, the organization must possess:

1. a formal hierarchy of power centered at the top, with clear lines of authority to subordinates by which to enforce program and cost/benefit decisions;
2. executive support to enforce and protect the technique as it is implemented and until it proves its usefulness;
3. executive understanding and familiarity with the technique;
4. program manager understanding of the cost/benefit technique (because it will be their responsibility to prove the value of their programs and justify new expenditures); and
5. a Management Planning unit reporting to the leadership of the organization as well as Development (management planning) units within each of its divisions (e.g. data processing) where PPBS is being implemented.

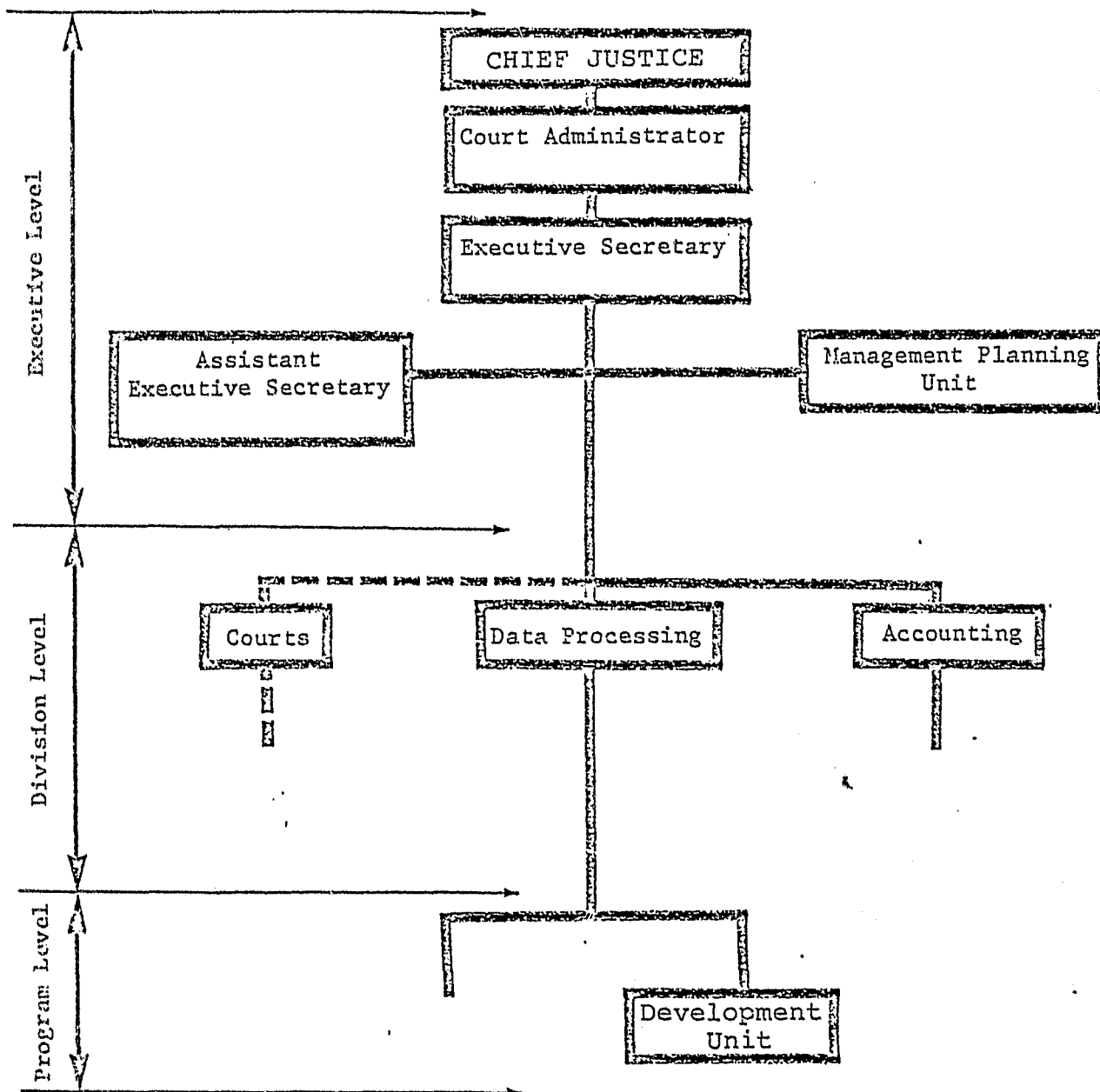
The Management Planning unit's purpose is to implement the PPBS technique, integrate the various divisional activities, provide back-up analysis for management review of existing programs, and most importantly, develop a mechanism for constructive criticism of current strategy and discussion of new approaches and continuing problems.

In order to create a Management Planning unit, a planner (and ideally at least one assistant) must be hired or trained. A hired planner must have leadership experience in the implementation of PPBS. An individual chosen from within for training would necessarily have to be very high level to command the respect, overview of the organization, and coordination that a major PPBS effort requires. Furthermore, he should already be involved in the essence of the PPBS framework: the review of existing program efforts and potential opportunities throughout the CJD.

The importance of this unit's reporting directly to the judicial leadership in a staff capacity must be stressed as a key to successful implementation. It is only in this manner that the designed CJD planning system will reflect top management's style, succeed in commanding respect in the coordination of department heads, and succeed in developing the overview of the organization by which to allocate scarce resources between divisions while aiding and checking the division Development units.

The purpose of the Development units is to coordinate, review present projects, and propose new opportunities

EXHIBIT 58: CJD STRUCTURE UPON IMPLEMENTATION OF PPBS



on the program level. In this way the Development units extend planning and implementation according to organization purpose into the divisions; educate program managers in planning, PPBS, and related implementation work; and aid and check the program-justifications of program managers. Without the aid of Development units on this level, the task of a management planner would be difficult indeed.

Accordingly, the CJD organization structure upon implementation of PPBS at both the executive and program levels should take the basic form illustrated in Exhibit 58.

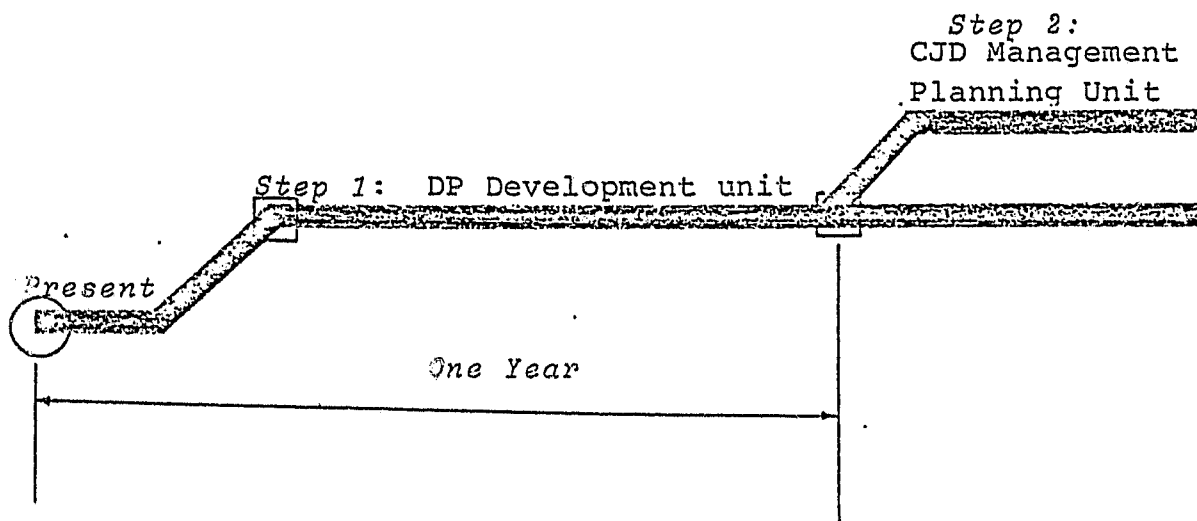
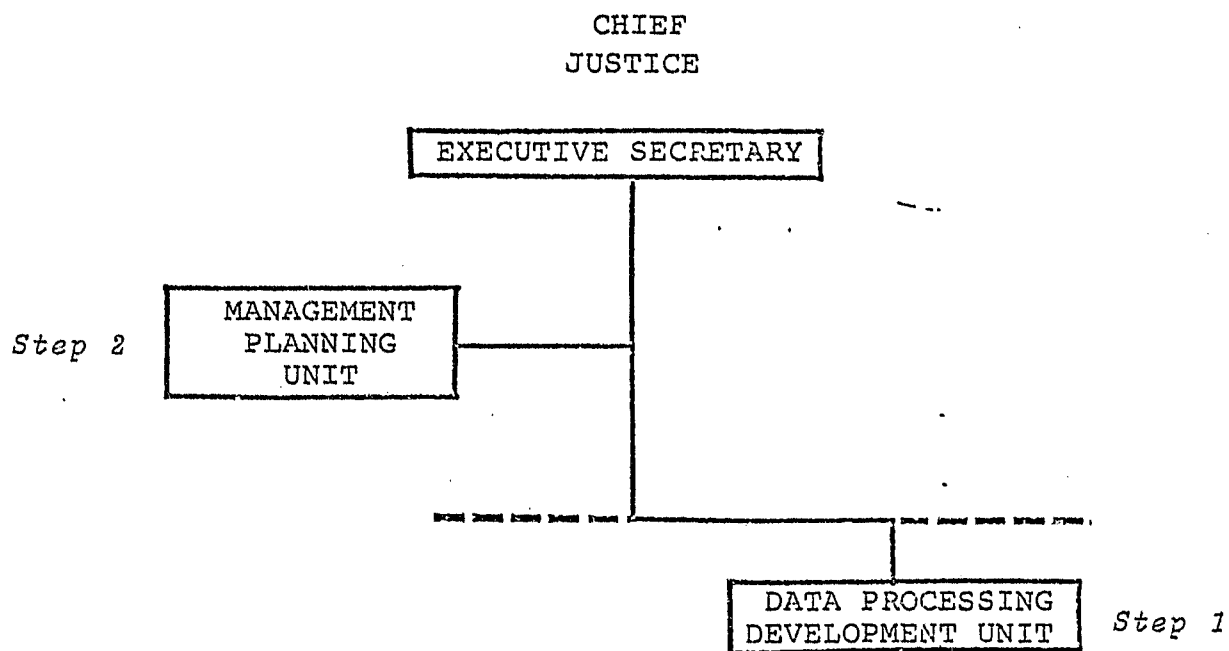
#### 5.3.1 A Timetable for the Implementation of PPBS in the CJD

There are a number of ways that PPBS can be introduced into an organization. Our recommendation, followed by the reasons for it, is listed below.

RECOMMENDATION 9: PPBS SHOULD BE IMPLEMENTED IN THE EXECUTIVE SECRETARY'S OFFICE IN TWO STEPS (SEE EXHIBIT 59). FIRST, THE DATA PROCESSING GROUP SHOULD BEGIN USING PPBS; AFTER THE DATA PROCESSING GROUP HAS ONE YEAR'S EXPERIENCE IMPLEMENTING PPBS, A MANAGEMENT PLANNING UNIT SHOULD BE CREATED WHICH WILL REPORT DIRECTLY TO THE EXECUTIVE SECRETARY.

Our reasons for recommending this course of action are practical. First, it should be noted that the DP group is smaller, less complex, new as a unit, and generally more open to change than the larger and extremely complex CJD.

EXHIBIT 59: TIMETABLE FOR THE IMPLEMENTATION OF PPBS

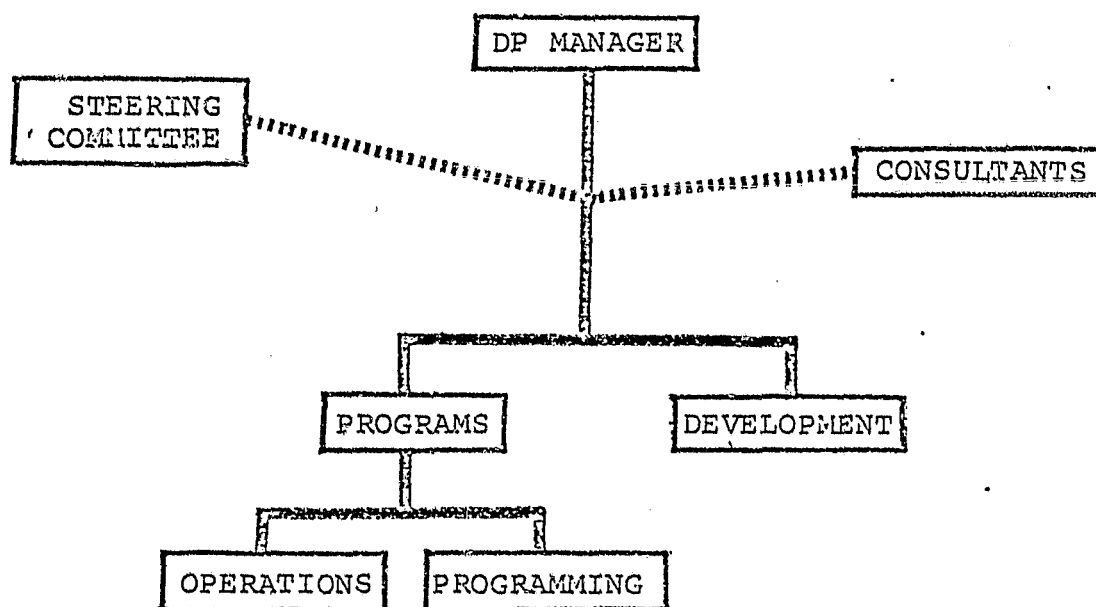


Hence, a planning unit can be developed quickly. And the planning unit need not be created with PPBS expertise and experience already in place. This is not critical at this level of the organization due to the lessened complexity of status relationships, liaison, planning, support and control. The Development unit can grow as the DP group grows. Therefore, it should not be necessary to hire outside expertise for the creation of the Development (planning) unit. One of the existing project leaders can be made head of this unit and given an assistant from among the system analysts. With little difficulty they will be able to master the PPBS concept through its literature and pursue its application.

Second, implementing PPBS in the data processing group will not involve increased cost to the taxpayers of Connecticut. It can be accomplished with existing personnel. After a year's use of PPBS, the data processing group should be able to point to savings through the use of this technique. Hence, in presenting their case for a management planner to funding authorities, the Executive Secretary's office could point to economies instituted due to the prior use of PPBS.

EXHIBIT 60:

RE-ORGANIZED DATA PROCESSING ORGANIZATION  
STRUCTURE





Third, for the management of the CJD, this strategy will provide experience in the use of the PPBS technique, as well as an opportunity to consider it for use in other departments. One year's experience with PPBS should be sufficient to produce the designed benefits and expertise.

5.3.2 Recommended Organization Structure for the Data Processing Group

RECOMMENDATION 10: IN ORDER TO ACCOMMODATE PLANNING IN THE DP GROUP, THAT COMPONENT'S ORGANIZATION STRUCTURE MUST BE CHANGED. THE APPROPRIATE STRUCTURE OF THE DP GROUP IS ILLUSTRATED IN EXHIBIT 60.

*The Development Unit:*

You will have noticed that DP and Accounting are viewed as support divisions (Exhibit 60), aiding the judiciary in fulfilling the purpose of the courts. In the same manner that the CJD Management Planning unit would coordinate these divisions, a development unit in the data processing department would coordinate, review present efforts, and propose new

opportunities on the program level. It is better to implement planning from within rather than from outside an organizational component. This serves to reduce resistance to change and more fully develops the planning abilities of a larger range of individuals, thus improving the potential of the organization as a whole. It is in this manner that the Development unit extends PPBS planning and implementation into the data processing department in support of the goal of improved performance.

The data processing development function should report directly to the data processing manager for the purpose of coordination and ease of communication.

*Steering Committees:*

To define the purpose of the data processing group, its priorities and its role of interaction with other CJD components, the top management of the CJD (as represented by the Chief Court Administrator, Executive Secretary and Assistant Executive Secretary) must meet with the data processing manager. This may be done on a yearly basis as the organization plan is reviewed and expanded, or more frequently as needed. This committee defines the mandate of the data processing division.

To aid the Development group in the isolation of potential computer applications, there should exist a Steering Committee consisting of the heads of Development and Programs and selected court managers, i.e., Executive Secretary, Assistant Executive Secretary, head of Accounting, CJIS policy board representative, and selected Chief Clerks and Justices. This will aid the Development group in obtaining a clear idea of the needs and desires of its potential users, and further, will educate eventual users in the purpose of the data processing component and its potential.

*The Programs Unit:*

The Development group's function of proposing new areas of application suitable to the needs and purpose of the CJD is necessarily a full-time effort. There must also exist a Programs group, subject to direction from above, with responsibility for analysis and choice of all those programs which should move from the proposal stage to implementation.

The existence of a single group with this function naturally improves accountability. Further, it is necessary that this group be responsible from program implementation to program termination for the costs and benefits of its chosen, and so advocated, programs. It creates, as well as implements and

maintains, the CJD's programs. Because responsibility is not turned over to anyone else when coding and system testing is complete, there again exists greater accountability, as well as control over unduly enthusiastic advocacy proposals, sloppy workmanship, poor implementation effort, etc. Lastly, the fact that responsibility for the allocation of resources between programs resides in one Programs group leader lessens the potential for conflict in the allocation process. The existence of several program leaders might cause unnecessary conflict for scarce resources.

In sum, therefore, the Programs head must be responsible for and take control of the civil, criminal (Middletown criminal statistics and CJIS), jury, and juvenile systems, as well as all future programs.

*The Role of Consultants:*

As can be seen, the Programs group is largely responsible for the creation and refinement of computer code, the design and performance of the implementation effort (which brings the program into contact with its users), and the program's

continued success according to originally envisioned purposes, costs and benefits. The personnel resource available to him for the development of computer logic includes the pool of programmers and analysts to be employed by the DP group and any software consultants who might be hired. It is important to note, however, that without extremely specific guidelines, an outside consultant, by definition, lacks sufficient understanding of the organization, its goals and constraints to accomplish the purpose for which he has been hired. Therefore, the use of an outsider must be planned and controlled even more than the activities of in-house personnel. Consultants should not be brought in until an actual need has been demonstrated beyond doubt and the exact nature of his efforts established (task, timing, control by and integration into the organization, and reasonable cost). As with any activity, the Programs head (for the creation of computer code) and the Development head (for assistance in the review of program efforts) must first satisfactorily demonstrate on a cost/benefit basis the desirability of bringing in consultants. Such analyses will necessarily be reviewed by the DP manager and his superiors.

*The Operations Unit:*

To support the Programs group in implementation and continued performance, there should exist an Operations group responsible for the day-to-day requirements of DP programs. These requirements include training and direction of input personnel, auditing of input accuracy, monitoring of machine operation and

preventive maintenance, routing of input and output, etc. The corresponding functions of the Middletown group would be integrated into the Operations group.

It should be noted that, as a support group, Operations should report directly to the head of Programs. This serves to stress Programs' responsibility for all existing computer applications, i.e., anything that the head of Programs needs from Operations to ensure the success of his programs he can acquire. If he consistently fails in living up to envisioned costs and benefits, then "the buck stops here," nowhere else.

*The Data Processing Manager:*

In order for formal planning to succeed on a departmental level, these characteristics must be evident:

1. Accountability & Authority: There exists one individual possessing the authority to carry out top management's orders, and responsible for the success or failure of the data processing group's efforts. Because one individual is responsible, the motivation to perform successfully is great. Again, "the buck stops here."
2. Management Authority for Decision-making: Where conflicts exist between lower-level components concerning the allocation of resources or approaches to fulfilling the goals of the organization, one individual may resolve these questions. Or he may filter these before passing them up for consideration. Top management's time in either case is therefore preserved for more weighty strategic matters.
3. Ease of communication: One individual has an overview of what exists and is being done, or should be done, in a very complex division. To this single individual top management can turn for information, rather than fitting together information fragments from a number of individuals.

4. Ease of Coordination: One individual's studied overview results in the specific and rational assignment of areas of responsibility to his subordinates. All objectives of the data processing organization are covered by effort without overlap because of his coordinating overview and his authority to enforce the assignment of responsibility.

Therefore there must exist an individual firmly entrenched as manager of the entire data processing operation. The heads of Programs and Development report directly to him as he coordinates their activities. The data processing manager supervises the tension between the Programs and Development groups as they agree or disagree over what is, what might be, and what should be. In this manner, he is able to obtain the necessary overview for his role as determiner of the best course to take in light of the goals and constraints of the organization.

## 5.4 THE USE OF PPBS IN THE DATA PROCESSING DEPARTMENT

### 5.4.1 Overview

This section is an overview of the process by which formalized computer system planning should be developed within the data processing group.

The first step is to develop the Envisioned Final Form of program (objective)-based computer based information systems (CBIS) applications in light of the goals of the CJD, the role of the data processing group, and opportunities for computer application. This, within the PPBS framework, is called the Planning step. A planning window (time horizon) is developed by which to time-frame new efforts. In this analysis we assume a rolling five-year horizon and thus a rolling Envisioned Final Form.

The objectives of the existing systems (Civil, Criminal, Jury, Juvenile) are distilled and an appropriate objective-based program structure is developed. This will be used immediately for resource allocation decision-making and for building towards the Envisioned Final Form. This is the initiation of the PPBS Programming step.

All desired, but as yet unfulfilled program objectives are prioritized using the management values of the executives of the CJD. Alternative methods of implementing those high priority systems which should or could be developed within the planning window are then delineated. All alternatives are evaluated, the best alternative is chosen for each desired program-objective, and the resulting resource demands are used as input to



the rolling Five-Year Plan. This plan is an output of the Planning and Programming steps, and describes all programs and their goals as well as their resource requirements by year. Each year the Plan takes on new priorities for development and becomes the basis for the current year's Budget. The Budget is the one-year plan, again stating the goals and requirements of each program. Finally systems are developed by which to measure how well each program responsibility center is doing in relation to its stated objectives. Appropriate strategies for performance-improvement are developed based on these measurements.

#### 5.4.2 Planning

The strategic planning portion of PPBS is long term and is used by management for these purposes:

- a. To define or change the objectives, purpose, or mission of the organization,
- b. To set policy specifying the prioritized goals of the organization,
- c. To propose alternate strategies to deploy resources in pursuit of organization goals.

To elaborate, the first effort made in this process is to define and prioritize key objectives, those areas where the organization must exert effort if it is to succeed in its purpose. Having identified these objectives, one must link these to key decisions which must be made, link the decisions to information required to support the decisions, and finally propose alternative computer based systems for providing the required information.

At this point, the Programming state of PPBS would take over to choose among the alternatives and convert objectives into action, but more of this later.

In the planning process, top management involvement is needed so that the large amount of effort to be undertaken by the DP group will actually reflect the needs and priorities of the organization. The Court Administrator, the Executive Secretary and the Assistant Executive Secretary must meet

EXHIBIT 61: TWO TECHNIQUES FOR UNEARTHING NEW  
OPPORTUNITIES

1. A survey of new program opportunities. The literature is reviewed. Communication is established with organizations with objectives similar to those of the CJD to determine their approach to problems.

2. "Marketing" scan. Borrowing a term from the private sector, this is the systematic and continual communication with the users and potential users of computer based information systems in the CJD so as to understand their desires, their real information needs (not always the equivalent of information desires) and the proper ordering of response to such needs according to the priorities of the CJD.

Note: Normally, these activities are undertaken by the Development unit within the data processing group.

with the managers of the data processing group (Data Processing manager, Programs manager, and Development manager) so as to state formally the purpose of the data processing group. Data processing management attends these meetings with prepared proposals focusing on the perceived and potential role of the data processing group. Included in these proposals could be 1) ideas for the control of activities and the provision of information to the judiciary, and 2) new approaches to perennial problems (see Exhibit 61 for two techniques for unearthing new ideas).

The outcome of the meetings must be a mandate from which the data processing group can proceed. That is, data processing management must have a clear idea of the areas for development and their priorities. This mandate must be renewed through the same process on a yearly basis.

Next, the Steering Committee is involved so as to obtain a clear understanding of key decisions being made in the mandated areas and the information needed to support such decisions. In other words, the Steering Committee is involved to develop specific applications.

The data processing specialists in Steering supplement the presence of the judicial managers by providing technical leadership: indicating the positive and negative aspects of each proposed use of computer based information systems.

The Steering Committee should meet frequently so as to assure that the program effort is meeting and will continue to meet the needs of the organization. A status report should be prepared for each data processing program (in the PPBS sense of the word), whether mature or developing, and be presented for the purposes of discussion. Many organizations just beginning to plan formally have found useful a three-month interval between Steering Committee meetings. In this period of time a substantial amount of work should have been completed upon developing projects, but not so much that the costs incurred are overly large if a wrong turn has been taken.

As to the time horizon (planning window) for strategic planning (definition of the role of the organization, objectives, and alternate strategies for meeting those objectives), the very nature of CBIS work is long-term. Projects often require a long development period between birth and actual use, as evidenced by the CJD, civil and criminal systems' approximated development periods of two and one half years. If the DP group is to think in terms of development of additional systems, they must plan far enough into the future so as to be able to conceive the next step, itself requiring a gestation of approximately two and one-half years, for a total of five years. Additionally, the useful life of computer equipment (before the increasing benefits of new technologies reduce existing equipment to complete obsolescence and unjustifiability on comparative cost/benefit bases) would seem to be in the neighborhood of five years given recent trends. Therefore, a planning window

of five years is thought to be useful. Naturally, the Development group should review existing planning literature (see Appendix III, ANNOTATED BIBLIOGRAPHY) which indicates the planning windows of other organizations and then decide.

Having obtained understanding of the information needs of the organization with regard to the mandated areas of development, and having decided on a planning window, it is the responsibility of the Development group to:

I. Envision a preliminary "final form" information systems program structure with the aid of the Steering Committees. This preliminary structure is fleshed out in the programming phase of PPBS. The data processing group's existing systems are largely devoted to Control of Operations (i.e., tracking, appearance control through notices, calendaring of cases, provision of jurors as needed, etc.). Potential areas for additional development would include the following:

- a. Environment and Capacity Planning  
Purpose: Identify and react to trends (changes in demand levels, characteristics of participants, etc.) in the court environment that materially affect the administration of justice. Incorporate the statistic functions of the existing systems.
- b. Asset Management (Business Functions)  
Purpose: Identify, process, and react to information required to maintain the economic value of court assets. Functions include computerization of budgets, funds control, accounts payable processing, payroll, etc.
- c. Assurance of the Quality of Justice  
Purpose: Identify, supply, and react to information useful in fulfilling the purpose of justice, or useful in determining the extent to which the

CJD is currently fulfilling that purpose. Functions include supply of information for case determination purposes (i.e., case summaries to Juvenile Probation Officers), measurement of speedy disposition, sentencing standardization, etc.

d. Performance Reporting

Purpose: Report the results of operations to external entities (to the public, Legislature, and funding sources), and internally as the basis for setting performance-improvement goals. Incorporate the statistic functions of the existing systems.

II. Examine the present information system's fulfillment of the desired "final form" and determine areas for refinement or new program development.

III. Determine priorities for the fulfillment of unattained objectives of the "final form" with the help of the Executive Secretary and Assistant Executive Secretary.

IV. Develop alternative approaches for the accomplishment of these prioritized objectives (refinement, new development). These would include information as to responsibility, timing, cost and funding supply, requirements for system interfaces with people who must use the system, etc.

V. Develop the Five-Year Plan which demonstrates the efforts being made to accomplish the Envisioned Final Form.

These steps will be considered in more detail in the next section, Programming (5.4.3).





### 5.4.3 Programming

#### *Guidelines*

The strategy of an organization manifests itself in a set of programs which are aimed at fulfilling the goals of the organization. A program is the basic element for organizational planning, resource allocation, staffing and control.

Much thought is given to designing the program structure that is most useful in (1) relating costs to benefits, and (2) providing a basis of comparison of the costs and outputs of similar programs. This is to facilitate choices among alternatives in approaching the desired "final form" of CBIS development. As to defining the boundaries of programs, each should be large enough to warrant existence on a stand-alone basis; but not inclusive of so many objectives that the benefits of an effort become difficult to tie directly to its cost.

#### *Refinement of and Addition to the Existing Program Structure*

Imagine now that the DP Development group has:

I. Envisioned a final form information systems program structure with the aid of the Steering Committees, and it has become generally known as the "Envisioned Final Form."

EXHIBIT 62: SUMMARY OF THE OBJECTIVES (PLANNED OR IMPLEMENTED)  
OF THE EXISTING SYSTEMS.\*

The Civil System

Calendaring  
Tracking for Dormancy and Continuance Control (accomplished through update and maintenance of the docket)  
Appearance Control: notice of case dates to lawyers, conflict eradication, control of lawyers who possess excessive caseloads (associated with use of Connecticut Bar Directory)  
Communication to lawyers of individual case dispositions  
Statistics for: a. management planning  
b. reporting purposes  
Standardization of forms and procedures for efficiency (human cost savings, from standardization as well as automation)  
Provision of permanent paper docket sheets in satisfaction of statute

The Criminal System

Calendaring  
Tracking for Dormancy and Continuance Control  
Supply of Information for Case Determination Purposes: provision of probation, sentencing, and precedent information to aid determination in individual cases; i.e., summaries of past criminal activity (through link-up with other components of the Criminal Justice System)  
Processing of Motor-Vehicle Fines  
Appearance Control  
Statistics for: a. management planning (through criminal side docket examination as well as through link-up to Criminal Justice Information System data bases)  
b. reporting purposes  
Standardization for Efficiency  
Provision of permanent paper docket sheets in satisfaction of statute

The Jury System

Provision of Jurors as Needed (through development and screening of the juror pool, and notification of those selected)  
Statistics for: a. management planning  
b. reporting purposes  
Standardization for efficiency

EXHIBIT 62: (continued)

The Juvenile System

Tracking for Dormancy and Continuance Control

Supply of Information for Case Determination Purposes:

currently represented by provision of case summaries to probation officers toward objective of justice and attendant reduction in recidivism

Statistics for: a. management planning

b. reporting

Standardization for Efficiency

\*These are observed objectives, and are not expected to be all-inclusive.



It is now necessary to:

II. Examine to what extent the present DP program structure matches this Envisioned Final Form.

To reiterate, the most salient facet of such fulfillment is the fact that a single program (whether PPBS or computer) should not be so inclusive of objectives that an effort's benefits become difficult to tie directly to its cost.

In examining the current system structure (see Exhibit 62), we find this lumping of objectives within systems. The civil and criminal systems have caseflow management as their umbrella goal. But this is composed of more elemental objectives to which benefits may be more easily tied, thus supporting program decision-making concerning the refinement or discontinuance of effort. These objectives include: provision of permanent paper docket sheets in satisfaction of statute, continuance and dormancy control, the issuing of disposition notes upon case disposition, case appearance control through notices, calendaring, statistics; etc. Here we see that:

1. the statistics effort may better fit under the aegis of a program dedicated to environmental and capacity planning;

2. upon analysis we could possibly discover that the benefit of disposition notice issuance does not justify its cost;

EXHIBIT 63: ELEMENTAL OBJECTIVES OF CJD EXISTING  
CJD DATA PROCESSING SYSTEMS

The varied computerized information systems have  
as their basis the following objectives:

- Provision of jurors as needed
- Tracking for control of cases (dormancy runs,  
number of continuances)
- Appearance control
- Calendaring of cases
- Standardization for efficiency
- Statistics for management planning
- Statistics for reporting purposes
- Supply of information (case histories, etc.) for  
case determination
- Processing of motor-vehicle fines, other accounts  
receivable
- Communication to lawyers of individual case  
dispositions
- Provision of permanent paper docket sheets in  
satisfaction of statute

3. we might realize that as docket maintenance throughout the CJD becomes computerized, the costs of printing docket sheets in accordance with statute will become so large as to merit approaching the Legislature with the objective of abandoning an obsolete law;

4. lastly, we discover that the present jury system is a perfect example of an elemental system fulfilling a single and carefully refined objective (the provision of jurors as needed) across organization lines.

In this manner, the allocation of resources and refinement of programs becomes easier. For this reason, the Envisioned Final Form organizes according to elemental objectives rather than umbrella objectives or court structures.

With these points in mind, we can envision the useful distillation of elemental objectives from the current systems (see Exhibit 63) and the extension of these objectives in service of all CJD organization components (see Exhibit 66).

RECOMMENDATION 11: IN ORDER TO ACCOMMODATE THE OPTIMAL PLANNING AND RESOURCE ALLOCATION IN THE DATA PROCESSING GROUP, THAT COMPONENT'S COMPUTER BASED INFORMATION SYSTEMS STRUCTURE MUST BE ADAPTED TO REFLECT THE OBJECTIVES OF ITS SYSTEMS. THE PPBS STRUCTURE, DISPLAYED IN EXHIBIT 64, SHOULD BE IMPLEMENTED, WITH REFINEMENT AS NECESSARY, AS THE DATA PROCESSING GROUP IS REORGANIZED.

You will note in the PPBS structure that all programs ignore organization lines insofar as they may be avoided. The end result is that a task, such as the programming of statistical

EXHIBIT 64:

INITIAL PPBS PROGRAM STRUCTURE FOR USE  
BY THE DATA PROCESSING GROUP

CJD Organization Component

Objectives - Programs

	Supreme, Civil Side (Supreme, Supreme, Common Pleas)	Criminal Side (Supreme, Superior, Common Pleas)	Juvenile Court	Probate Court	Defenders Court	Offices of Public Defenders (all courts)	State's Attorney	Office of Attorney
Provision of jurors as needed	*	*						
Tracking for control of cases (dormancy runs, number of continuances)	*	*	*	*				
Appearance Control	*	*	*	*				
Calendaring of Cases	*	*	*	*	*	*	*	*
Standardization for efficiency	*	*	*	*	*	*	*	*
Statistics for management planning	*	*	*	*	*	*	*	*
Statistics for reporting purposes	*	*	*	*	*	*	*	*
Supply of information (case histories, etc.) for case determination	*	*	*	*	*	*	*	*
Processing of Motor-Vehicle Fines, other Accounts Receivable	*	*	*	*	*	*	*	*
Communication to lawyers of individual case dispositions	With a program-structure of this type, the DP. group could more easily examine the benefit/cost of present efforts in this regard.							
Provisions of permanent paper docket sheets in satisfaction of statute								



: Indicates program is suitable for extension into that CJD organization component.



reporting, is accomplished once for the entire organization rather than several times as is currently done. This method of programming should be used for all future systems. However, this does not necessarily mean a re-write of those present systems which do not match the new objective-based program structure (the Civil, Criminal, and Juvenile systems fall into this category). It does mean the DP group must discover the costs of each objective included in the present court structure-based systems. It must then compare these costs to attendant benefits so that intelligent continue vs. discontinue and resource allocation decisions might be made. This task is the responsibility of the Development and Programs units in cooperation with each other.

III. Having identified what effort exists in relation to the Envisioned Final Form, and conversely what does not exist, it is now necessary to develop priorities for filling the gaps. These priorities are based on the overall goals and constraints of the CJD, which are better known to the executives of the CJD than to us. As stated earlier, the DP group will develop its priorities with the aid of the Executive Secretary and the Assistant Executive Secretary, and cost/benefit analysis of the type used in Section 4.0 will be the backbone of this effort.

IV. New programs, rather than reworks of existing programs, will for the most part fill the gaps in the Envisioned Final Form. Having identified the prioritized ranking of these new programs, the Development unit suggests alternative methods for the accomplishment of each objective which it believes should be or could be attempted within the five-year planning window.

At this point, the various approaches are turned over to the Programs head who assumes responsibility for their evaluation. His recommendation is made in proposal form.

To aid in the preparation of such program proposals, guidelines developed in the planning phase are given to the Programs manager. These specify the goals and constraints within which program proposals are to be prepared. Working within these, the Programs manager describes the activities he would propose to undertake in pursuit of the program's goals, and resources required for these activities over a period of several years of program life.

Alternative methods of developing the objective "Environmental and Capacity Planning", for example, are analyzed by comparing estimated economic benefits with estimated costs. The organization recognizes, however, that even the best economic benefit/cost analysis does not provide an automatic signal as

to the preferred alternatives program. Judgment is required in weighing the importance of considerations that cannot be reduced to quantitative terms, as is amply demonstrated in this report's Section 4.0: Analysis of Computer Options.

The Development unit recognizes that most proposals are advocacy proposals and to some extent, biased. It attempts to offset this bias by having its own staff make a careful review of the proposal, or by setting up an adversary relationship in which natural opponents of the proposal are encouraged to criticize it.

The expected cost and benefits of the program will become a measure of the performance of the Programs unit and its manager. Therefore, the proposal becomes a basis of discussion among the Head of Programs, the Head of Development, and the DP manager so as to provide agreement on these measures. The approved "Environment and Capacity Planning" program emerges from this step, but details are subject to some refinement and modification in the budgeting process.

As to the envisionment of the costs of tying in new program elements, proposed by Development, it is necessary to model the existing interface of computer program logic. As one can well imagine, the new program called "Environment and Capacity Planning" will incorporate elements of the existing civil, criminal, jury, and juvenile systems (i.e., the statistical features). A model of the information system aids in



**CONTINUED**

**3 OF 4**



identifying pieces of the system that can be developed as a unit, how these units will interface with others (interfile linkages and common logic elements), as well as the technical constraints that favor the development of one unit prior to another.

It would be the responsibility of the Programs group to keep up-to-date a model of its information system, and through consultation with the Development group (representing knowledge of the priorities and strategy of the organization), the costs and benefits of a given reorganization or new program interface can be obtained.

In developing alternatives for fulfilling the desired programs, first the Development and then the Programs units should engage in two important surveys of their environment:

a. Technology review and experimentation. Here new technology is studied so as to develop in-depth understanding of this particular form of trend: its costs, benefits, and potential. This review includes experimentation with rental of new equipment and software for short periods of time. Experimentation, of course, will be the responsibility of the Development group.

b. Training. This same technology review by the Development group will pinpoint areas where additional skill is needed by DP personnel. It will be the responsibility of the Development group to provide that skill through training programs, informal or otherwise.

It is through continued attention to these factors that the technological base of the DP group is broadened, and so its ability to accomplish its objectives with high benefit/cost ratios.

EXHIBIT 65:

THE CBIS FIVE-YEAR PLAN\*

A. Introduction

1. Summary of major goals, a statement of their consistency with judicial goals, and current state of planning vis a vis these goals.
2. Summary of aggregate cost and savings projections.
3. Summary of manpower requirements.
4. Major challenges and problems.
5. Criteria for assigning project priorities.

B. Program Identification

1. All systems, maintenance projects, all programs proposed, and development projects.
2. Estimated completion times.
3. Manpower requirements, by time period and job category.
4. Computer capacity needed for system testing and implementation.
5. Economic justification by project: development costs, implementation costs, running costs, out-of-pocket savings, intangible savings.
6. Project control tools.
7. Tie-ins with other systems and master plans.

C. Hardware Projections (derived from programs)

1. Current applications - workloads and compilation and testing requirements.
2. New applications - workloads and reruns.
3. Survey of new hardware, with emphasis on design flexibility which will allow the company to take full advantage of new developments in hardware and in software.
4. Acquisition strategy, with timing contingencies.
5. Facilities requirements and growth in hardware, tape storage, offices and supplies.



EXHIBIT 65: THE CBIS FIVE-YEAR PLAN (cont.)

D. Manpower Projections (derived from programs.)

1. Manpower needed by month for each category.
  - a. General - management, administrative, training, and planning personnel.
  - b. Developmental - application analysts, systems designers, methods and procedures personnel, operating system programmers and other programmers.
  - c. Operational - machine operators, key punchers/verifiers, and input/output control clerks.
2. Salary levels, training needs and estimated turnover.

E. Financial projections by time period

1. Hardware rental, depreciation, maintenance, floor space, air conditioning, and electricity.
2. Manpower - training and fringe benefits.
3. Miscellaneous - building rental, outside service, telecommunications, and the like.

\*McFarlan . Information Systems Administration. Chapter 2, Framework for Allocating Resources to Information Systems.

V. Having first chosen which objectives will be attempted within the five year period, and secondly which approaches will be taken in that attempt, it is now possible to identify in complete detail the considered strategy for growth.

This is the interim product of the Planning and Programming stages, the vehicle by which the Envisioned Final Form is actually achieved. It is called the CBIS (computer based information system) Five-Year Plan and it accomplishes the following:

1. Summarizes the goals and purpose of the data processing CBIS effort.
  2. Identifies the various mature programs and the completion dates and resource requirements of those Programs still being developed.
  3. Details hardware requirements for current and new applications.
  4. Details manpower requirements for all DP efforts.
  5. Identifies financial requirements for all DP efforts.
- Exhibit 65 illustrates in more detail the contents of the DP Five-Year CBIS Plan.

It is updated every year summarizing new priorities and constraints and the plans for those years which have come within the five-year planning window. Each approaching year becomes the basis for the yearly plan, more properly known as the budget.

The Five-Year Plan is modified, extended and prepared each year by the Development unit, although naturally with large amounts of input from the Programs unit concerning specific hardware, manpower, and financial requirements.

The achievement of the first year's Final Envisioned Form is, of course, the aim of the first year's Five-Year rolling plan. The current year's Final Envisioned Form, however, is always five years in the future. It may be achieved. On the other hand, because the goals of the CJD may change with the passage of time, it may never be achieved. The important point is that the Final Envisioned Form focuses an organization's attention on the future and on long-term improvement. Each year's accomplishments will have been:

- a. built upon existing systems
- b. organized according to objectives
- c. developed with an eye to new applications
- d. developed with an eye to expanding such applications into other structures of the CJD as necessary or suitable.

Exhibit 66 demonstrates such an Envisioned Final Form, its objectives, its incorporation of existing systems, its extension into the various structures of the CJD, and its new applications. This particular program structure is the Center's conception of one which would be suitable to the needs of the CJD. The Final Form actually developed in the CJD may, of course, be substantially different.

## EXHIBIT 66:

ENVISIONED FINAL FORM OF THE CJD  
COMPUTER-BASED INFORMATION SYSTEMS

(See Code Key at the foot of the  
chart for symbol interpretation.)

## OBJECTIVES - PROGRAMS - SYSTEMS

## PROGRAM ONE - CONTROL OF OPERATIONS

Objective: Identify and process information required to  
effectively operate and control the day-to-  
day activities of the CJD.

- Systems:
1. Provision of Jurors as Needed: (POI as present Jury System)
  2. Tracking for Control of Cases: (POI in present Civil, Criminal, Juvenile systems)
  3. Appearance Control: (POI in present Civil and Criminal systems)
  4. Calendaring of Cases: (POI in present Civil and Criminal systems)
  5. Standardization for Efficiency: (POI in present Civil, Criminal, Juvenile, and Jury systems)
  6. Scheduling Model: designed to discover optimum calendaring practice. (not POI)

## PROGRAM TWO - ENVIRONMENT AND CAPACITY PLANNING

Objective: Identify and react to trends and conditions in  
the court environment that materially affect  
the administration of justice.

- Systems:
1. Characteristics of defendants, lawyers, complainants: (POI in relation to lawyers in Civil and Criminal systems, i.e. the Connecticut Bar Directory)
  2. Statistics for Management Planning: level of demand, and consumption of resources by type of case, i.e. weighted caseload measurement of resource consumption. (POI in relation to level of demand in present Criminal, Civil, Jury, Juvenile systems)
  3. Model for predicting caseload trends based on regional demographic trends; i.e., population, economic levels, etc. (not POI)

## CJD STRUCTURAL COMPONENTS

Superior, Civil Side (Common)	reme, Criminal Side (Sup- Common)	Juvenile Court	Probate Court	Defenders (all courts)	Attorney Offices of Public	Office of State's
	*	*				
	*	*	*	*		
	*	*	*	*		
	*	*	*	*	*	*
	*	*	*	*	*	*
	*	*	*	*	*	*
	*	*	*	*	*	*
	*	*	*	*	*	*
	*	*	*	*	*	*

4. Weighted Caseload (W.C.) Model to predict space and equipment needs based on hypothesized trends in caseload. (not POI)	*	*	*	*	*	*
5. W.C. Model by which to predict judge and other personnel needs. (not POI)	*	*	*	*	*	*
6. W.C. Model by which to predict financial needs. (not POI)	*	*	*	*	*	*
PROGRAM THREE - ASSET MANAGEMENT (BUSINESS FUNCTIONS) Objective: Identify, process, and react to information required to maintain and judge the economic value of court assets as they relate to the administration of justice.						
Systems: 1. Budget: development in yearly budget cycle, processing, and control of expenditures. (not POI)	*	*	*	*	*	*
2. Funds Control: receipt of monies from local, state, and federal funding agencies; control and accounting of same. (not POI)	*	*	*	*	*	*
3. Accounts Payable Processing: for materials, equipment, fixed assets. (not POI)	*	*	*	*	*	*
4. Accounts Receivable Processing: filing fees, billing of court costs in civil and probate matters, motor-vehicle fines collection. (POI in relation to MV fines)	*	*	*	*	*	*
5. Payroll (not POI)	*	*	*	*	*	*
6. Investment Evaluation: models to determine payback, benefit/cost of given pieces of equipment, personnel, facilities, programs, and projects. (not POI)	*	*	*	*	*	*
PROGRAM FOUR - ASSURANCE OF THE QUALITY OF JUSTICE Objective: Identify and supply information useful in determining the extent to which the CJD is fulfilling the purpose of justice, and identify strategies for performance improvement.						
Systems: 1. Supply of Information for Case Determination: (POI in Criminal, Juvenile systems)	*	*	*	*	*	*
2. Measurement of Effects of Sentencing and Diversion Techniques*: purpose is to reduce recidivism. (POI in existing Juvenile System)	*	*	*	*		

# OBJECTIVES - PROGRAMS - SYSTEMS

	Civil side	Criminal side	Juvenile Court	Probate Court	Public Defender	State's Attorney
3. Measurement of Equal Justice for All*: a. sentencing standardization b. equal access to CJD	*	*	*	*		
4. Measurement of Speedy Disposition*: (POI in Civil, Criminal, and Juvenile systems as a function of Tracking Control)	*	*	*	*		
5. Measurement of Protection of Individual Rights*: includes measurement of adequacy of Defender representation, of indivi- dual understanding of court procedures and rights under the law, etc. (not POI)	*	*	*	*		
PROGRAM FIVE - PERFORMANCE REPORTING						
Objective: Report the results of operations externally (to the public, the Legislature, and other funding sources), and internally as the basis for setting performance-improvement goals.						
System: 1. Report results of PROGRAM FOUR, ASSURANCE OF THE QUALITY OF JUSTICE: (not POI)	*	*	*	*	*	*
2. Flow Statement: volume, disposition and type of case in Civil, Criminal sides and by type of court. (POI in present Civil, Criminal, and Juvenile systems)	*	*	*	*	*	*
3. Computation of Backlog: determination of the number of cases awaiting process at each step, on each side, and in each court. (POI in Civil, Criminal, Juvenile)	*	*	*	*	*	*
4. Computation of Mean Case Life: from date of entry to date of disposition. (POI in Civil and Criminal systems)	*	*	*	*	*	*
5. CJD Outlook Model: predicts ability to fulfill court or general CJD purpose in the future given expected demand and re- source levels. (not POI)	*	*	*	*	*	*

## CODE KEY

POI: Planned or Implemented

\*: Here we assume that the measurement of justice would be more objectively  
performed by the courts than by the adversary units (Defenders and State's  
Attorneys).

\*: Indicates that system is suitable for extension into that CJD organization unit.



#### 5.4.4 Budgeting

After the DP group has settled into its desired program structure, it will be the responsibility of the Development group to inform Accounting of any necessary budgeting changes. As already stated, the first year of the rolling five-year plan provides the basis for each year's budget. These are prepared by the Program and Operations groups with the aid of the Development group. Development will, with the aid of the DP manager and Steering Committee, provide liaison with the accounting department for budgeting and later for accounting purposes.

The first step in the budgeting process is to estimate the appropriation that the organization is likely to receive for operating purposes during the budget year. The next step is to budget expenses that equal this appropriation. If its desired or estimated budgeted expenses exceed its likely appropriation, the difference may need to be sought from federal funding, or other income sources. If the first approximation of budgeted expenses exceeds estimated appropriation, the prudent course of action usually is to reduce expenses rather than to anticipate that revenue can be increased.



Quantitative statements of planned objectives should be included in the budget, as well as planned revenues and expenses. The budget is structured in terms of program units, either support (Development, Operations) or line operation (the several programs of the Programs group).

Budget estimates are prepared by program managers within the guidelines (goals and constraints) developed in the updated 5-year plan or more recently propagated by superiors. Managers negotiate approval of these estimates with their superiors. Agreement is regarded as an agreement to by the manager to perform according to plan and in expectation of evaluation by the organization's formal incentive system.

Because time and resources often do not permit a more thorough analysis, the level of current spending is usually taken as a starting point in these negotiations. However, every two, three, or at the most five years, each function and its cost are examined from start, its usefulness and cost questioned, and alternatives proposed. This is the Zero Base Review which requires that each program again be planned from start to finish with the purpose in mind of expanding benefits while reducing costs.

Internal systems provide the basis for determining to what extent DP and its sub-parts have fulfilled their budgeted objectives.

#### 5.4.5 Systems

As mentioned elsewhere, the Development group will not undertake its liaison with Accounting for the reorganization of the accounting and budgeting systems until after the program structure has been conceptualized, implemented, and modified.

But accounting is only one type of system which deals with control and performance improvement of the organization.

Managers are provided with information about their own responsibility centers, new areas they should consider developing, areas for refinement, and how to relate to the planning system, management, and other responsibility centers. That information concerning their own responsibility center compares actual performance with planned performance with respect to both costs and outputs (benefits).

Thus, other systems to be developed include:

1. Design review of current computer systems. Undertaken by the Development group with the cooperation of the Programs group, this addresses cost-reduction and benefit-expansion in existing PPBS programs. New projects can be reviewed by a consultant or by the entire DP group when the specification of final design is completed. In the same manner, mature programs can be reviewed frequently either by the whole group or by a consultant.

EXHIBIT 67:

CRITERIA FOR DEFINING AREAS FOR COMPUTER-BASED REFINEMENT\*

1. There is need for data not now available to meet requirements for control of the court, that is, new requirements.
2. Additional, improved, or more timely information can be used profitably by management.
3. A high volume of individual transactions is processed and relatively large numbers of people are being used to do clerical work.
4. Significant peaking of data flow or transactions exists, requiring staffing to handle these peaks.
5. Information flow is of a court-wide nature and files are commonly used in many operations.
6. The work is characterized by routine posting, transcribing, or simple arithmetic.
7. Lengthy computations for scientific or statistical problems are required.
8. Source data is used repetitively for several reports or purposes.
9. Much time is spent in sorting and classifying data.
10. Record-keeping or data-handling is costly and subject to serious errors.
11. Reports are being prepared where a high degree of accuracy is required or timeliness is critical.
12. Similar work has been successfully mechanized in other areas of the court or in other organizations.
13. The present system (manual or mechanized) has been in use for many years without revision.

\*McFarlan. Information Systems Management. Chapter 2.  
Framework for Allocation of Resources to Information Systems.

One simple, but often effective, approach is to ask naive questions about why operations are performed in the way they are. Another is to compare costs of an activity with costs of similar activities in other organizations. Another is to apply work measurement techniques that have been developed by profit-oriented companies, and still another is to develop models of cost and output relationships. The possibility that certain functions could be performed more efficiently by a private sector company should be carefully explored.

Exhibit 67 demonstrates criteria which prove helpful in identifying existing systems where a new design promises significant payoffs to the organization.

2. Fulfillment-of-objectives review. Here a status report for every system, developing or mature, is required every three months, and a Phase Checkpoint report is required as a developing system reaches its scheduled milestones. These are used to determine whether the expected costs and benefits are actually being obtained (costs having been provided by accounting and benefits by the Programs manager and his staff.) The continuation vs. termination decision is made for each project on these bases. The Development group receives these reports from the Programs group, reviews them for accuracy,

and passes them on to the DP manager with recommendation as to the continuation vs. termination issue, that decision being made immediately by the DP manager, subject to review by the steering committee.<sup>63</sup>

Much effort is devoted to finding useful, reliable measures of output (benefit). If the attainment of objectives cannot be measured directly, approximately valid surrogate measures are sought. For instance, justice is the goal of the CJD, but, being difficult to measure, it can instead be broken into its sub-parts. Some of these might be:

"equality": perhaps defined as equal access and treatment;

"speedy disposition": which is easily measured once the criteria "speedy" is developed;

"comprehension of individuals of their rights": those individuals being defendants, plaintiffs, and victims. (This is easily measured although the link with justice is more tenuous);

"recidivism": it would seem that it is quite proper for the court to seek to determine how best to motivate the criminal to reform. Corrections carries out that determination. Therefore, the recidivism

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<sup>63</sup> McFarland, *Information Systems Administration*, Reading 10-1, Effective Project Costing and Killing Techniques. New York: Holt, Rinehart and Winston, Inc., 1973.

tendencies of those who have been tried and sentenced by the court would seem to provide a measure of how successfully the court fulfills its role.

However, only those measures of output which are actually used in the management control process should be used. The above set of measures would be less than useful as output measures for the work done by the accounting department.

Lastly, internal audit effort is pursued to minimize the possibility of loss and to insure that necessary information is recorded accurately, whether it be information as to the number of filings in New Haven, or the cost of pencils in Norwich.

3. The incentive system. The incentive system makes explicit the rewards of living up to envisioned cost/benefits. On the other side of the coin, however, it deals with sanctions for continued failure. This is made apparent largely through the efforts of the DP manager who will have developed it with the cooperation of his superiors.

## 5.5 SUMMARY

In concluding, we stress a number of points relating to the use of PPBS.

1. Support of the executives of the CJD must be forthcoming if PPBS is to work. These administrators must satisfy themselves that the system is consistent with their own management style. Further, they must convince operating managers that the new system will in fact be used, and the former system (here we are mainly speaking of planning as it is associated with the present budgeting and accounting system) discarded.

2. In developing PPBS, the Development unit relies primarily on an analysis of the information needs of its operating managers. Existing operating data is used to the maximum extent feasible. The staff spends a considerable fraction of the available time on education efforts.

3. PPBS should be developed in this order. The first stage in the development process is the description by DP management and the Steering Committee of Data Processing organization goals as measured against desired results. The next is the conceptualization by the Development unit with

the aid of DP management of blocks of effort (programs) related to those desired results (benefits). The next stage is to have annual budgets prepared by programs and responsibility centers. The most important thing to remember in this implementation effort is that accounting is to be involved last, after all conceptualization is concluded and all programs are poised and ready to progress towards the goals of the organization. Next, the accounting system is revised so that it matches the new structure. Better output measures and accounting refinements are instituted. The Development unit's task of improving the planned ~~system~~, particularly finding better output measures, is a never-ending one and continues hand-in-hand with their objective of discovering methods of attaining better results while reducing costs.

Again, as in the beginning of this section, Mr. Brown's comments are appropriate.

Administrators are constantly faced with having to make decisions with less than complete information on a subject. It is very doubtful that this problem will ever be solved. However, if PPBS can provide the ability to fill in this information gap to some degree, then it seems ridiculous not to develop and apply the tool. Our experiences have indicated that the types of questions which we are able to develop and ask of agencies and their programs through utilization of the PPBS tool serves a catalytic purpose in those agencies to instill in the operating people the same interest, concern and desire to



question the programs which they are undertaking; to develop the rationale and justification for the allocation of our resources to those programs; and to give them a more effective framework in which to discuss with the Governor and the legislature, the press and the public, the reasons why their programs are important and why limited resources should be assigned or reassigned to fund them.<sup>64</sup>

Although our recommendations are couched in terms of a specific planning technique, PPBS, the adoption and use of which we vigorously recommend to the CJD, our real concern is that the CJD adapt some formal planning technique. Another choice might be made on the basis of priorities and needs not known to the consultant, but the important point is that formal planning takes place.

Finally, the accomplishments of the CJD with respect to the use of computerized information systems are substantial. As substantial as these gains might be, the opportunities for future gains are greater. Both in terms of the use of computer based information systems, and the planning structure relating to their applications, the CJD could be one of the most distinguished public sector organizations in the United States. It is a worthy goal.

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<sup>64</sup>Address by Paul L. Brown, An Operational Model for a Planning-Programming-Budgeting, (Presented to the Post Audit Seminar, Lexington, Kentucky, June 17, 1970).

APPENDIX I: LIST OF STUDY RECOMMENDATIONS



RECOMMENDATION 1: THE CJD SHOULD INVESTIGATE THE COST EFFECTIVENESS OF RE-WRITING THE JURIS I (CIVIL) SYSTEM WITHIN THE NEXT YEAR. THE AIMS OF THIS CONVERSION SHOULD BE TO REDUCE FILE SIZES AND INCORPORATE MINOR ALTERATIONS WHICH HAVE BEEN SUGGESTED SINCE THE FIRST IMPLEMENTATION. CONSIDERABLE DELIBERATION SHOULD BE GIVEN TO THE CHOICE OF LANGUAGE. THIS CONVERSION SHOULD BE ORIENTED TOWARD WHATEVER HARDWARE SOURCE IS OPTED FOR FOR THE NEXT FIVE YEARS.

RECOMMENDATION 2: THE CJD SHOULD IDENTIFY THEIR PERCEPTIONS OF THE SIGNIFICANT INDICATORS OF EACH BENEFIT AND MAKE EXPLICIT THE VALUES BY WHICH THESE INDICATORS SHOULD BE JUDGED. USING THIS INFORMATION, THE CJD SHOULD PERFORM THEIR OWN ANALYSIS USING THE PERCEPTUAL WEIGHTING TECHNIQUE. THE CENTER'S SUBSTANTIVE RECOMMENDATIONS BASED ON THIS WEIGHTING SHOULD BE EVALUATED BY THE CJD IN LIGHT OF ANY DISCREPANCY BETWEEN THEIR RESULTS AND THOSE OF THE CENTER.

RECOMMENDATION 3: FACILITIES MANAGEMENT SHOULD BE REJECTED AS A VIABLE OPTION AMONG THE ALTERNATIVE SOURCES OF INFORMATION PROCESSING CAPABILITY FOR THE CJD.

RECOMMENDATION 4: THE BEST LONG-TERM COURSE OF ACTION FOR THE CJD IN RESPECT TO ITS COMPUTER BASED INFORMATION SYSTEM OPTIONS IS TO ACQUIRE SOME FORM OF IN-HOUSE COMPUTER CAPABILITY.

RECOMMENDATION 5: THE CJD SHOULD IMMEDIATELY OBTAIN SEVERAL BENCHMARKS FROM COMMERCIAL COMPUTER SERVICE AGENCIES. IF A SIGNIFICANT SAVING CAN BE OBTAINED, THE CJD SHOULD MOVE THE JURIS I SYSTEM TO THAT AGENCY'S FACILITY. BY 1977, THE CJD SHOULD TAKE APPROPRIATE STEPS TO ACQUIRE AN IN-HOUSE INFORMATION PROCESSING CAPABILITY. IF A COMPETITIVE BENCHMARK CANNOT BE OBTAINED, THE CJD SHOULD HASTEN ITS EFFORTS TO ACQUIRE THE IN-HOUSE CAPABILITY AS SOON AS POSSIBLE.

RECOMMENDATION 6: THE MAN/MACHINE INTERFACE FOR ALL FUNCTIONS IN THE PLANNED UNIFIED INFORMATION PROCESSING SYSTEM SHOULD BE DESIGNED AS SOON AS POSSIBLE. USING THESE SPECIFICATIONS, AND KEEPING IN MIND THE CURRENT FORMAT REQUIREMENTS, THE CJD SHOULD REPLACE ITS CURRENT CARD READER DATA ENTRY SYSTEM WITH STATE-OF-THE-ART CRT TERMINALS WITH INTEGRATED FLOPPY DISK OR CASSETTE UNITS. THE CURRENT RENTAL EXPENDITURE SHOULD BE DIVERTED INTO ACQUISITION OF THESE NEW TERMINALS, WHICH WILL BE THE TERMINALS UTILIZED BY THE EVENTUALLY ACQUIRED SYSTEM.

RECOMMENDATION 7: THE CJD SHOULD ACTIVELY PURSUE THE FORMULATION OF ADDITIONAL OPTIONS AND WEIGHT THESE ALTERNATIVES. BENEFITS SHOULD BE TUNED TO CORRESPOND TO MANAGEMENT'S PERCEPTIONS OF ITS PRIORITIES. THE WEIGHTING ANALYSIS PERFORMED AS AN EXAMPLE BY THE CENTER SHOULD BE RE-DONE BY THE CJD, AND THIS LATTER WEIGHTING COMPARED AGAINST ANY FUTURE WEIGHTINGS. A FULL SPECTRUM OF PERSONNEL SHOULD BE INVOLVED, INCLUDING BOTH SENIOR-LEVEL MANAGEMENT AND DATA PROCESSING PERSONNEL.

RECOMMENDATION 8: THE CJD'S DATA PROCESSING GROUP SHOULD ADOPT AND USE THE PLANNING TECHNIQUE PPBS. THE SPECIALIZED PERT-CPM PLANNING TOOL SHOULD BE INCORPORATED INTO THE PPBS PROGRAMMING FUNCTION.

RECOMMENDATION 9: PPBS SHOULD BE IMPLEMENTED IN THE EXECUTIVE SECRETARY'S OFFICE IN TWO STEPS (SEE EXHIBIT 59). FIRST, THE DATA PROCESSING GROUP SHOULD BEGIN USING PPBS; AFTER THE DATA PROCESSING GROUP HAS ONE YEAR'S EXPERIENCE IMPLEMENTING PPBS, A MANAGEMENT PLANNING UNIT SHOULD BE CREATED WHICH WILL REPORT DIRECTLY TO THE EXECUTIVE SECRETARY.

RECOMMENDATION 10: IN ORDER TO ACCOMMODATE PLANNING IN THE DP GROUP, THAT COMPONENT'S ORGANIZATION STRUCTURE MUST BE CHANGED. THE APPROPRIATE STRUCTURE OF THE DP GROUP IS ILLUSTRATED IN EXHIBIT 60.

RECOMMENDATION 11: IN ORDER TO ACCOMMODATE THE OPTIMAL PLANNING AND RESOURCE ALLOCATION IN THE DATA PROCESSING GROUP, THAT COMPONENT'S COMPUTER BASED INFORMATION SYSTEM'S STRUCTURE MUST BE ADAPTED TO REFLECT THE OBJECTIVES OF ITS SYSTEMS. THE PPBS STRUCTURE, DISPLAYED IN EXHIBIT 64, SHOULD BE IMPLEMENTED, WITH REFINEMENT AS NECESSARY, AS THE DATA PROCESSING GROUP IS REORGANIZED.

APPENDIX II: TECHNICAL NOTE: CIVIL  
TRANSACTION  
FLUCTUATIONS



The total transactions for the 1975-76 court year will probably exceed 2 million; the number of bytes\* this represents is perhaps 100 million. In daily terms, 7,000 transactions were being processed daily as of March 1975. This is an increase of over 133 percent over the 1974 average. The weekly transaction loads for the opening months of 1975 are shown in Exhibit 68... Stabilization of daily transactions at around 8,000 to 8,500 per day is predicted for early 1976.

For the purposes of capacity planning, the fluctuation in this load is of crucial importance. Analysis confirms the subjective impressions of Data Processing division personnel that a wide variation exists from day to day within any given week. An average variance of 18 percent from the weekly average and a 62 percent variation from the highest to lowest day were found in three sample weeks which are summarized in Exhibit 69. . . Analysis of one week in June 1975 confirms this to be an established trend.

Further examination revealed little difference between the fluctuation for Superior transactions and Common Pleas transactions. See Exhibit 70..

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\*A "byte" is a unit of measure in data processing. In IBM 370-series equipment, it is equal to 8 "bits" (the basic unit), or one-quarter word.



Note that if 8000 transactions occur daily, a substantial workload would be imposed on the data entry personnel. The increase in load experienced thus far due to the merger has already forced training of new entry personnel. Assuming that six (6) hours of entry work actually takes place daily, and each transaction takes one minute to enter (an assumption based on the Center's observation of entry procedures used for motor vehicle cases), this would keep slightly over 22 operators and terminals constantly busy.

The number of bytes per transaction has remained relatively stable since the merger at between 50 and 55. It exhibited only a 2.8 percent fluctuation from day to day on the average. In a random sample of 100 disposed of cases from each the Common Pleas and Superior courts, we found that the mean case in the Superior Court had seven (7) transactions, and in Common Pleas ten (10), besides the transactions required to "set up" a case (names of involved parties, their attorneys, type of case, etc.). In the higher court, 20% had only one or two transactions (standard deviation was 6.56), and in the lower court only 15% had less than three (standard deviation was 9.75).

EXHIBIT 68: TOTAL CIVIL SYSTEM TRANSACTIONS  
1975 (WEEKLY).

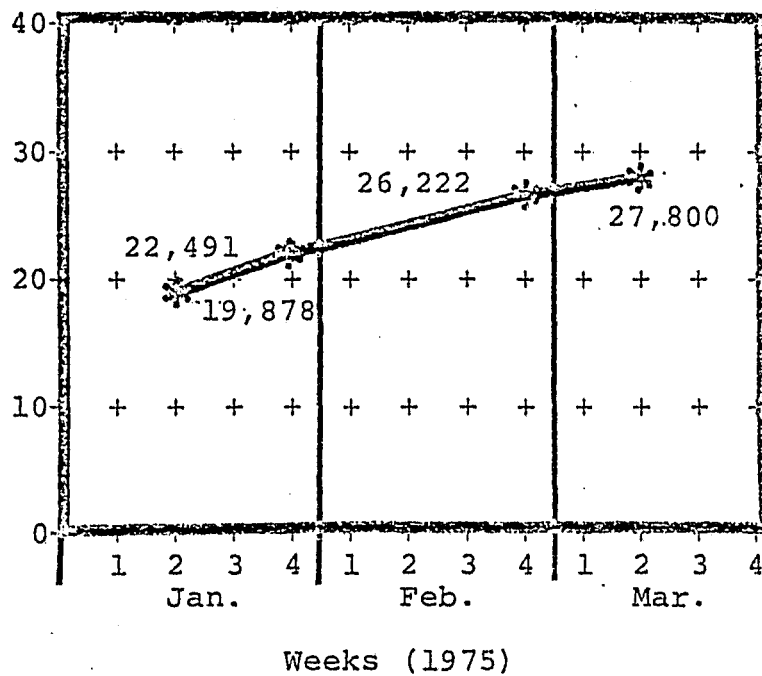
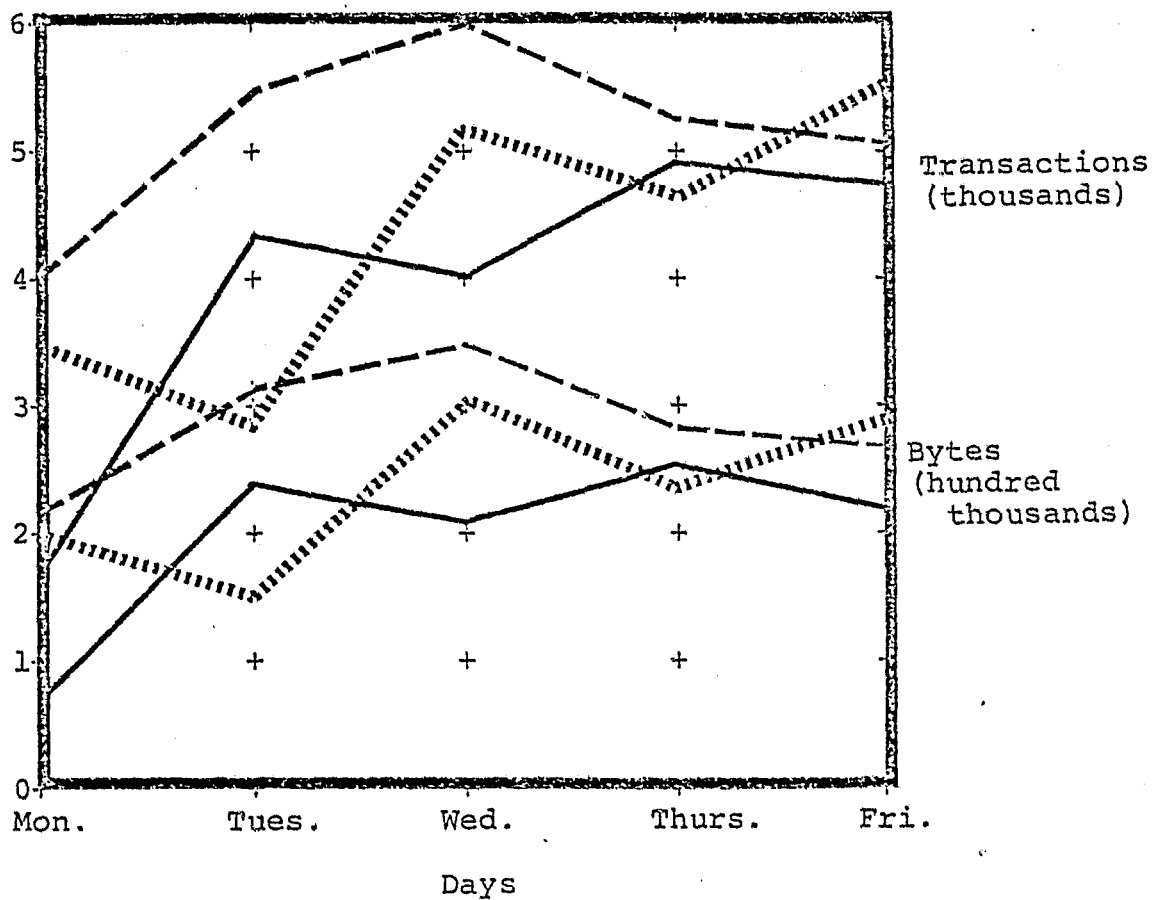


EXHIBIT 69:      NUMBER OF TRANSACTIONS AND VARIANCE FROM AVERAGE  
BY DAY OF WEEK

WEEK OF:	DAY:	WEEKLY AVERAGE: # OF TRANSACTIONS	# OF TRANSACTIONS	VARIANCE FROM AVERAGE
Jan 6-10 1975 RANGE: 81 -56% to +25%	MON	3975	1719	-56%
	TUE	3975	5348	+10%
	WED	3975	3944	0%
	THURS	3975	4984	+25%
	FRI	3975	4873	+22%
Jan 20-24 RANGE: 68 -39% to +29%	MON	4498	3583	-20%
	TUE	4498	2929	-39%
	WED	4498	5788	+29%
	THURS	4498	4677	+ 4%
	FRI	4498	5514	+22%
Feb 24-28 RANGE: 38 -23% to +15%	MON	5244	4027	-23%
	TUE	5244	5716	+ 9%
	WED	5244	6041	+15%
	THURS	5244	5251	0%
	FRI	5244	5187	- 1%

EXHIBIT 70: FLUCTUATIONS IN CIVIL TRANSACTIONS



— Week of January 6-10, 1975  
 ..... Week of January 20-24, 1975  
 - - - - - Week of February 24-28, 1975



APPENDIX III:

AN ANNOTATED BIBLIOGRAPHY OF PUBLICATIONS  
ON THE MANAGEMENT AND DESIGN OF  
COMPUTER BASED INFORMATION SYSTEMS



Adams, James L., *Conceptual Blockbusting*. San Francisco:  
W.H. Freeman & Co., 1974 , 137 pages.

While the title of this book may seem pretentious to some, a reading of its text, a lively, clear discussion of how we solve (or attempt to solve) problems, will persuade otherwise.

The author, who is a professor at Stanford University, suggests that we often do not consider enough solutions when confronted with a problem, i.e. our backgrounds and education suggest a few rather than many approaches to a problem. His ideas for remedying this problem are applicable not only to data processing problems, but to all sorts of problems we face at work or at home. This book is recommended to all.

Anthony, Robert and Herzlinger, Regina, *Management Control in Nonprofit Organizations*. (Unpublished manuscript, Harvard Business School).

A complete discussion of PPBS. Includes special attention to new and ongoing programming, the development of the proper control and account structure, and implementation. The budget cycle is examined as it ties to long-term planning and programming.

The manuscript is available through the Case Clearing House, Harvard Business School, Boston, Mass. 02163.



Baumol, William J., *"On the Appropriate Discount Rate for Evaluation of Public Projects."* Statement from the Planning-Programming-Budgeting System: Progress and Potentials. (Hearings before the Subcommittee on Economy in Government of the Joint Economic Committee. Congress of the United States, 90th Congress, 1st Session, U.S. Government Printing Office, Washington, D.C., 1967), by William J. Baumol, a Professor of Economics, Princeton University.

Demonstrates how to calculate the proper discount rate for evaluating capital expenditures in the public sector.

Dorfman, Robert (Ed.) , *Measuring Benefits of Government Expenditure.* Washington, D.C.: Brookings Institute, 1965, 203 pages.

A good source book for various approaches to the cost/benefit analysis problem with theoretical and empirical discussions, description of principles, and critique of process. Deals with the problems of quantitative vs. qualitative analysis and the necessity for a formalized evaluation method.

Fields, Craig, *About Computers*. Cambridge, Mass.:  
Winthrop Publishers, 1973 , 133 pages.

This book describes how computers work. The author assumes the reader has no prior knowledge of computers. He proceeds from that point to describe the workings of programs, the computing machinery (e.g. a teletype, a television-like display unit) and the interaction between man and computer systems..

The book is well-written and lucid. The author's examples, such as the similarity between a player-piano and a computer, are good. The book takes a bit of concentration at times, but it is worth it. .

Fitzgerald, John M. and Fitzgerald, Ardra F., *Fundamentals of Systems Analysis*. New York: John Wiley and Sons, 1973, 531 pages.

Fitzgerald and Fitzgerald outline the basic concepts of systems analysis. The topics progress from feasibility study through system study to system analysis techniques. The material presented is clear and accurate and is understandable without a technical background.

Laudon, Kenneth C., *Computers and Bureaucratic Reform: The Political Functions of Urban Information Systems*. New York: John Wiley and Sons, Inc., 1974, 325 pages.

Within historical and theoretical frameworks, Laudon focuses on the impact of computerized information technologies on political and bureaucratic structures employing them. Rather than an abstract intellectual treatise, his observations are grounded in four extended case studies of governmental information systems at county, regional and state levels. The study concludes that technological innovation "appears as a political process characterized by conflict and compromise among the parties involved," rather than as a product of inherent technological capabilities. Apart from occasional lapses in theoretical organization, the work stands as a solid presentation of the political and bureaucratic implications of computerized information systems.

Levinson, Harry, "*Management by Whose Objectives?*", Harvard Business Review, July-August 1970. pp. 125-134.

This article discusses the usefulness of Management by Objectives from the organizational behavior standpoint. Important for understanding the exact conditions which complement its implementation, as well as the innate conflict of individual goal-setting vs. measurement by an incentive system. This last conflict theoretically causes MBO to be self-defeating in the long-run. Its other drawbacks are elucidated as well.

McFarlan, F. Warren, Nolan, Richard L. and Norton, David P.,  
*Information Systems Administration*. New York:  
Holt, Rinehart and Winston, Inc., 1973, 596 pages.

For those desiring a comprehensive exposure to administrative issues involved in information systems operation and development, McFarlan et al. provide a readable and well organized text. Systems frameworks, resource selection and systems and operations management comprise the major topics which are supplemented with cases and readings.

Planning computer systems is discussed in chapters 1 through 4 and 13. McFarlan's writing on this subject is authoritative and well worth reading.

Martin, James and Norman, Adrian R.D., *The Computerized Society*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970, 560 pages.

A highly readable exploration of the inter-relationships between computer technology and society: from the society-wide practical applications of computers to the fascinating legal and ethical issues their increasing use raises. The ever-changing nature of computer technology is stressed, with many predictions for the future.

Technical detail is kept to a minimum; many photos help the reader visualize the forms computers take in daily life.

Martin, James, *Design of Man-Computer Dialogues*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1973, 559 pages.

For anyone considering the design of a terminal oriented computer system, where dialogue between the user and the computer will be a key part of the design, reading this book is a must. Martin discusses both the technical and psychological aspects of man-computer dialogues in very clear prose.

Martin, James, *Computer Data-Base Organization*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975, 558 pages.

In his comprehensive work on the logical and physical organization of computerized data bases, Martin describes data base management schemas and structures, data description languages, data structures, addressing and index organizations, and file structures. The writing is clear and authoritative. Throughout the text, illustrations supplement explanations. While detailed description is abundant, the emphasis is on data base design and the comparative advantages of various techniques in coping with inherent design problems. Much of the writing may be beyond the scope of the casual reader, but the programmer or system analyst will be phased by the readability of this book.

Miller, Robert W., *"How to Plan and Control With PERT"*,  
Harvard Business Review, March-April, 1962. pp.  
93-104.

A straight-forward examination of the use of the project planning tool known as PERT (Project Evaluation Review Technique), and its complement, CPM (Critical Path Method). This article first explains the purpose of PERT-CPM, its usefulness, and proceeds with a "how-to" approach.

Nolan, Richard L., *Managing the Data Resource Function*.  
St. Paul, et al.: West Publishing, 1974, 394 pages.

This book describes how the data processing department in a large organization might be managed. This is especially valuable for a manager, whose responsibilities do or may include the data processing function.

Chapters 1-2 ("Executive Functions and Organizing to Manage Resources") and 2-1 ("Managing the Computer Resource: A Stage Hypothesis") are good. Chapter 5-2 ("On Costs/Benefits of Computer-based Systems") is excellent.

Pyhrr, Peter A., *"Zero-base budgeting"*, Harvard Business Review, November-December 1970. pp. 111-121.

Texas Instruments, Inc. has had a certain amount of success with the Budgeting technique known as Zero-Base Budget Review. In this article, the Manager for Staff Control at Texas Instruments, explains the organizational context within which ZBBR is used, the process for its implementation, the prioritization of effort method (called the 'package ranking process'), and the Review's specific benefits. A very good introduction to ZBBR.

Sanders, Donald H., *Computers and Management in a Changing Society*. New York: McGraw-Hill Book Co., 1974, 597 pages.

In a broad view of computers and management, Sanders integrates text, readings and case materials into an interesting presentation of the need for management information and its managerial and organizational implications. Diversity and clarity characterize the writing covering areas such as planning, organizing, staffing and controlling computerized resources. Although intended as an introductory text, it may be read profitably by an administrative head or a system analyst.

Snow, C.P., *Science and Government*, Cambridge, Mass.:  
Harvard University Press, 1961, 88 pages.

Considered by many to be a classic, this work is based on lectures about the role of the scientist in government, given by the author at Harvard University.

Juxtaposed are the roles that two scientists, Sir Henry Tizard and F.A. Lindemann (Lord Cherwell), Winston Churchill's scientific advisor, played in the English government during World War II. After describing the actions of these individuals, C.P. Snow draws a number of inferences from their performances, a sampling of which follow:

On responsibility being  
vested in one man:

"We ought not to give  
any single scientist the  
powers of choice that  
Lindemann had."

On the proclivities of  
administrators:

"Their tendency, which is  
strengthened by the nature  
of their job, is to live in  
the short term, to become  
masters of the short term  
solution."



On viewing the  
future:

"I believe scientists have something to give which our kind of existential society is desperately short of, so short of that it fails to recognize of what it is starved. That is foresight."

Thierauf, Robert J., *System Analysis and Design of Real-Time Management Information Systems*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975, 607 pages.

Concentrating on practical planning, design and implementation considerations, Thierauf applies an operations research approach to real-time management information systems and the environments in which they must exist. Feasibility studies are emphasized in discussions of system analysis and system implementation. Using a manufacturing firm as a case focus, eleven modular subsystems are detailed including corporate planning, marketing, research and development, engineering, manufacturing, inventory, purchasing, physical distribution, accounting, finance and personnel. While the modules are developed separately, their integration is apparent. Both administrator and system designer will find parts one, two and four interesting; however, part three is more oriented toward the designer.

APPENDIX IV: DESCRIPTION OF SELECTED COURT COMPUTER BASED  
INFORMATION SYSTEMS



## FEDERAL JUDICIAL CENTER

### I. Overview and Environment\*

With respect to its use of computers, the Federal Judicial Center (FJC) in Washington, D.C., is currently (1975) in a period of transition. Several years ago they initiated a low-budget computer based judicial information system (designated "COURTRAN I") based on rental of batch-mode computer time from outside agencies. Although cost-effective, this approach soon proved cumbersome, unresponsive to the courts' needs, and lacking in security, and was replaced by a distributed minicomputer network (COURTRAN II). This approach also failed to fulfill the desired requirements, due not only to technical problems arising from the large geographical dispersion of the federal courts, but also from a lack of vendor support for the minicomputers. A massive influx of congressional funds allowed the FJC to hire numerous computer experts away from prestigious universities, and this team set about analyzing the FJC's hardware needs. They are currently in the process of converting to a network

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\*The Center gratefully acknowledges the assistance of Charles W. Nihan, Esq. (202-393-1640) in providing up-to-date information on the development of the computer based judicial information systems at the Federal Judicial Center.

of intelligent terminals linked to a central large-scale, in-house computer and data base.

## II. Caseloads, Equipment and Costs

The annual federal caseload is about 700,000 cases, of which half are bankruptcy cases, and the remaining half about evenly split between civil and criminal cases.

The only significant information processing function not supported by the FJC's system is automatic case scheduling. All other functions are run on a Digital Equipment Corp. PDP-10, with dual KL (fast semiconductor) processors. The PDP-10 is linked via a teleprocessing network to remote CRT "intelligent" terminals, most of which are equipped with hardcopy printers, located in the federal courts. Depending on the ultimate demands of the system -- the FJC plans on supporting more than 700 terminals -- two more PDP-10s with dual KL processors might be added to the configuration. These would probably not be centralized, but distributed in other major cities. The current data base was estimated to take up "at least" two (IBM-type) billion bytes. Users are currently enjoying a less than a three second response time. No microfilming is used; instead, disposed-of cases are retained on magnetic tape.

The cost of this project is enormous--Congress allotted more than \$10 million to the FJC. The FJC expects to expend about \$6.8 million in the next two and a half years on computer hardware alone.

### III. Observations

Over the last few years, the FJC has enjoyed the financial resources to experiment extensively with computer based judicial information systems. A number of their experiences could well be taken as lessons by state judicial departments with more limited budgets.

(1) Acquisition of in-house computing capability is more desirable (for large-scale systems) in the long run than rental of time from outside agencies. Rental is insufficiently responsive, either to management control or user's needs, and is fraught with privacy and security problems.

(2) Computerization of judicial information processing is a cost-effective tool, due largely to its displacement of less efficient manual effort. The FJC anticipates that a "direct result [of computerization] will be a considerable dollar savings to be achieved primarily through the reduction of the staff in the clerk's office."\*

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\*"COURTRAN II (An Assessment of Applications and Computer Requirements)," Federal Judicial Center, 1974, p. 3.

(3) The type and placement of computer hardware -- especially terminals -- is best finalized through trial experimentation rather than detailed analysis. The FJC designed their basic configuration without regard to the location of the CRT terminals, and then placed the terminals as experimentation and experience dictated. To facilitate this process, they employed small, totally portable units.

(4) Interactive, on-line systems are better responsive to the demands of the judicial environment than punched card-based, batch operations.

## BEAVER COUNTY COURT OF COMMON PLEAS

### I. Overview and Environment\*

The Beaver County Court of Common Pleas is of medium size (five judges) and is located near Pittsburgh, Pennsylvania. The local court retains the responsibility for managing its own case-load and reporting statistics. To facilitate this, the judicial department in Beaver County has planned, developed, and implemented automated systems within the last five years, and now maintains its own in-house computer and makes extensive use of microfiche. The use of automated technology is intended to serve several purposes, foremost among them being (1) providing the ability to meet statutory obligations in respect to the expediting of criminal cases, (2) facilitating the provision of timely and comprehensive management control information, and (3) stabilization or reduction of case processing costs.

### II. Equipment, Caseloads and Costs

The caseload of Beaver County is, by Connecticut standards, slight. Criminal case dispositions average about twenty-five (25) a day on a regular basis, while civil cases (which average

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\*The Center thanks Mr. Clifford P. Kirsch, the Court Administrator of Beaver County (412-774-5000), for his assistance in furnishing us the bulk of the information contained in this review.



25 to 100 daily) sometimes peak to around 200. (This correlates closely to the number of entrances, as there is no appreciable backlog.) To manage this caseload and provide management control information, the court has developed systems for docketing, scheduling, monitoring, file retention and retrieval, and statistical reporting for both civil and criminal cases. In addition, juvenile court and probation department reports are generated regularly.

These functions are run on a small core in-house IBM 370/115 computer with associated peripheral devices. All processing is performed in batch mode and no teleprocessing is supported. It is interesting to note that the bulk of the judicial programs are written in the sophisticated--and somewhat rare--PL/1\*, and none in COBOL. Both filing of active case dockets and permanent retention of disposed-of cases are done on microfiche. Automatic retrieval of the microfiche frames (pages) is provided by small desktop carousels, with a maximum storage of about 70,000 pages and a maximum access time of less than four seconds.

The total cost of this automated information processing

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\*An acronym for Programming Language One. It utilizes the best features of COBOL and Fortran, providing a full range of file-handling capabilities.

capability was estimated to be about \$100,000\* per year. Rental of the 370/115 costs \$172 per day (including compilers, peripherals, etc.), which is partially offset by the renting out of computer time and programming services to non-judicial organizations. (The Beaver County judicial data processing facility serves the DP needs of a local hospital.) Microfiche has proved to be competitive with other filing methods on a cost-per-page basis; in 1974, Beaver County paid \$6200 for processing, cutting, and clipping 215,000 frames, or about 2.8¢ per page.\*\*

### III. Observations

A number of general observations about automation applications in the judicial environment were made based upon Beaver County's experiences.

(1) Computerized case scheduling can be an effective tool for limiting caseload backlog and meeting obligations such as the speedy trial rule. Since the implementation of the scheduling function, only "perhaps a handful" of cases have been dismissed as a result of the operation of the rule.

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\*This includes most, but not all, data processing personnel.

\*\*This does not include equipment acquisition costs.

(2) Microfiche is a cost-competitive alternative to filing and storage of paper dockets. Filing time, retrieval time and storage space are all appreciably reduced, resulting in a similar reduction in associated costs.

(3) Adoption of computer based information systems is a viable method of controlling personnel expenditures. While no reduction (in absolute terms) in the number of persons employed was possible after the implementation of the computerized system, the need for additional personnel to process the increased caseload has been lessened. Despite increased caseloads and processing demands, no additional personnel have been hired since the implementation of the computerized systems. This stabilization in manual processing costs is expected to continue for the foreseeable future.

## PHILADELPHIA MUNICIPAL AND COURT OF COMMON PLEAS

### I. Overview and Environment\*

The Municipal and Common Pleas Courts of Philadelphia, Pennsylvania, serve the nation's fourth largest city, with a populace about three-quarters that of the State of Connecticut. Operating primarily in a teleprocessing environment, the computer-based information system is run on an in-house medium scale IBM computer which is linked to more than 50 remote terminals used by a wide variety of agencies (police, prisons, juvenile, probation, jury selection, etc.) and individuals. A full range of functions is supported, including: attorney and room case scheduling,\*\* docketing, generation of appearance notices of all kinds (including prisoner delivery lists), selection of jurors from the Voter Registration Commission's data base, statistical compilation, and instant on-line retrieval of active case information. Both the civil and criminal areas of the courts are computerized. The Philadelphia system's most striking feature--on-line access to active case data available at over 50 sites--is complemented by the use of microfilm to store dockets of disposed of cases.

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\*The Center thanks Mr. Larry Polansky, Deputy Court Administrator, and Mr. William Fisher, Director of Data Processing, Court of Common Pleas, Philadelphia, Pennsylvania, for their assistance in familiarizing us with the operation of the Philadelphia computer system.

\*\*Pre-trial conferences are scheduled for the 6000 attorneys on the master files.

No paper docket sheets are maintained.

## II. Caseloads, Equipment, and Costs

The total caseload managed by the computerized information processing system is larger than that managed by the JURIS systems in Connecticut, but the vast majority of these cases are of a type not automated under JURIS--small claims, summary process, etc. These are mostly in the Municipal Court (108,000 cases entered in the 1973 calendar year), but others are Family (31,300) and Orphans (65,000) Court matters. The more complex cases in the Court of Common Pleas are significantly fewer than in Connecticut: about 16,200 civil and 10,500 criminal entries in 1973.

The systems are run on a large-core IBM 370/145 with associated peripheral devices. Many of the remote CRT terminals have thermal printers for production of paper hard-copy when desired. Several different languages are used: DL/1\* for the data base file structure, APL\*\*, and CICS\*\*\*, operating under VS/DOS\*\*\*\*. Very little COBOL is employed. A full range of microfilming equipment is rented, although no automatic retrieval devices (such as possible for microfiche) are used.

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\*Data Language/One, an IBM data base language.

\*\*Acronym for A Programming Language (IBM's Assembly Language).

\*\*\*Acronym for Customer Information Control System.

\*\*\*\*Virtual System/Disk Operating System

We were unable to obtain costs for the 370/145,\* or make any comparison to the judicial department's total budget. It has been estimated that considerably less than 10% of the budget was expended for automatic information processing. Rental of all microfilming hardware, and its operation, cost about \$25,000 per year.

### III. Observations

The most notable feature of this computer system is that it significantly enhances the ability of the participants of a trial to determine the status of their trials. Attorneys routinely stop off at an inquiry station to determine when their trials will be held. In a large urban court, this increased communication among trial participants, while difficult to measure precisely, certainly has a salutary effect on the movement of cases. The extent of the benefits might be fertile area for further study.

It was also found that demand for information rose to meet supply: while only 38,000 inquiries were satisfied by 25 terminals in August, 1971, 168,000 inquiries were entered on 50 terminals in the same month in 1973, a rise in usage disproportional to the increase in the number of terminals.

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\*A 370/145's purchase price is around \$1,250,000; associated costs are reduced through use of non-IBM terminals, and other manufacturer's IBM-compatible memories.

Use of CRT terminals in conjunction with an on-line system drastically limited the amount of paper output, without any detrimental effects on usage. Permanent retention of closed dockets on microfilm has proved cost-competitive with the retention on paper.

APPENDIX V: TECHNICAL NOTES: DESIGN OF ACQUIRED SYSTEMS





This appendix contains notes on the two examples of acquired systems designed by the Center which would be of little interest to the non-technical reader. It should be mentioned that the hardware specifications listed below are only rough sketches of the systems, and may be inappropriate due to the technology available by the time the CJD is in a position to acquire such configurations.

Technical specifications for components common to both the acquired systems designed by the Center follow.

*-Disks*

The disks envisioned are IBM 3330-type, single density units. Each stores about 100 million IBM bytes (characters), or 400 cylinders, of data. Access time should be about 45-50 milliseconds (average), not to exceed 70 msec. maximum access time. The number of disks required will depend on the efficiency of the file organization finally employed in the comprehensive information processing system, but we assume 3 spindles at both New Haven and Bridgeport, and 8 more in Hartford, for a total of 14 spindles. If indeed CJIS does not require 24-hour full access, considerable savings could be realized by using fewer spindles, and re-mounting them for batch operation. We have assumed the larger capacity requirement (14 spindles), to be conservative.

## *-Terminals*

The terminals are full-page CRTs with integrated intelligence (4 to 8K) and floppy disks.\* Cassette units of known reliability could replace the floppy disks. Video features should include full page (80 x 24 characters) screen, cursor control, blinking, reverse letters (black on a white background) if desired for eventual use, and a selection of screen colors (green, grey, black, etc.). A numerical keypad should be included. The terminal must possess programmable intelligence capable of accessing the floppy disk, and hold formats for both the terminal operator and also for controlling the printer. It must be able to operate over a complete range of line speeds, from 150 to 4800 bits per second; ability to operate at 9600 bits per second is desirable but not imperative. The floppy disk need meet no special requirements, save storing at least 800,000 bytes, a rather modest demand. The intelligence should be programmable in a high-level language, preferably the same as used for the CPUs' programs.

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\*A floppy disk is a type which resembles a long-playing phonograph record, but it is much more pliable and more resilient than is either the home record or the rigid disk.

#### *-Printers*

The high-speed printers at the processor sites should be able to accept forms as well as regular computer paper. A moderate speed, not less than 300 lines per minute, is the absolute minimum, but more than perhaps 800 lines per minute is probably not worth the extra expense.

The low-speed printers located in each court could be of any of a variety of types: thermal, matrix, chain line printer, etc. Desirable features include upper and lower case letters, good legibility, low noise, ability to print on forms if necessary, and use of standard (i.e., untreated) paper. Speeds should be determined accurately by an investigation of the exact quantity and timing of output required, but at least 30 lines per minute will probably be necessary.

#### *- Magnetic Tape*

Since the tape units are used only for slow-speed sequential logging and for backup of the library, great speed and density are not required. Thus, savings could be attained by employment of 800 bits per inch (rather than 1600) equipment.

The minicomputers envisioned for Acquired System #1 could be either 16 or 32 bit machines, with between 128 and 256 K of fast (semiconductor rather than strict "core") memory, preferably with bit error detection features. Each must be able to access up to 550 megabytes of direct access disk storage. Their compatibility with the other hardware mentioned above, especially in regard to support of telecommunication between 100 and 4800 bits per second is of course necessary. If the microprogramming of the assembly instruction set favors the use of certain high-level languages it should not do so at the expense of reducing the efficiency of either FORTRAN or COBOL, the two prime choices for any system's language. (It should be noted here that, as mentioned in Appendix IV, DESCRIPTION OF SELECTED COURT COMPUTER BASED INFORMATION SYSTEMS, judicial programs in Beaver County, Pennsylvania, are written in the somewhat rare and very sophisticated PL/1; the ability to employ such progressive languages in the future should not be taken away by the choice of hardware.)

Sub-option A of Acquired System #2 calls for a single large processor of between .5 and 1 megabyte of (semiconductor) memory. It must be able to address the entire data base, or the equivalent of twelve 3330-type (single density) disks, i.e., 1.2 gigabytes of storage. Most CPUs in this category employ integrated minicomputers as front-ends;

this would be an inexpensive and desirable addition to any processor which did not already incorporate such a feature. All other requirements are similar to those mentioned for the CPUs in Acquired System #1, which would be common to any processor.

The minicomputers for Sub-option B of Acquired System #2 would probably not require more than 128K of "core" memory each; they are identical to those in Acquired System #1 in all other respects. Note that a fourth "slave" CPU has been incorporated. This unit acts as the front-end for the other three active minis, and could be used to access the disks itself if required. However, the difficulties in designing efficient software which would correctly balance the file look-up tasks should not be underestimated. The interprocessor bus\* connecting the CPUs must transfer not less than 1.5 megabytes per second, and therefore implies that the back-to-back minicomputers are located physically close to each other, e.g., in the same room. It should be noted that the CPU per se is actually inactive during a disk seek, this being performed by the disk controller; therefore, some advantage is gained in having multiple CPUs searching the files simultaneously, as a larger, "faster" CPU does not perform these operations four times as quickly as one minicomputer one-quarter its size. The technical complexity of the software required

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\* A high speed electrical channel between the CPU and peripheral units.

is the major limiting factor in the employment of systems designed around this idea. Fail-soft provisions should be integrated into the multiple mini CPU option, allowing the remaining two processors to take over the third's activities (or at least back them up) in case of failure.

The number and location of terminals remains a question mark, pending a verification of entry operator's average transaction entry time. The Center has assumed only thirty-eight terminals. Many more could be supported as needed.

APPENDIX VI: SKELETAL COST/BENEFIT ANALYSIS OF THE  
PLANNING METHOD AND ACCOMPANYING  
CHANGE





A Cost/Benefit Analysis of the Addition of a Management  
Planning Unit to the CJD

The creation of a management planning unit in the CJD would require the services on an individual, who must have a theoretical understanding of at least as many planning techniques as mentioned in this study, as well as a firm understanding of computers and their application. But his main qualification must be expertise in PPBS marked by leadership in the implementation of that technique elsewhere. An individual of this capability would necessarily require a salary of \$22,000 to \$27,000. And he would need an assistant, an individual who would allow the management planner to concentrate his efforts on overall organizational goals, proper program efforts, and integration. The assistant would need experience in cost/benefit analysis and general understanding of the PPBS technique. The assistant's salary can be estimated in the range of \$13,000 to \$15,000. Secretarial time could be borrowed from the Executive Secretary's office. This brings us a total yearly cost of this unit to approximately \$40,000.

To justify this expenditure, therefore, the management planning unit would have to produce a benefit of at least an equal amount annually. If this unit could streamline CJD operations by only .2% (of the total CJD budget of approximately \$22,000,000 in 1973-1974), or DP operations by 3% they will justify themselves. The probability of their ability to do so is near certitude as based upon the experience of the National Center for State Courts. This study, examining the DP group alone, points to potential savings of between \$100,000 - \$250,000 per year, or between 6% and 15% of DP's operation expense. Because it would be the management planning unit's full-time responsibility to review operating procedures of the automated systems of the entire CJD, it should manage to produce at least comparable benefits by reducing inefficiency or providing additional benefit through operations expansion.

If the costs of every court component can be streamlined by at least 6% (as in NCSC experience with the DP group), this represents an overall CJD savings of approximately \$1,300,000 and a benefit/cost ratio of approximately 1300000/40000, or 32/1. We are therefore speaking about a benefit/cost ratio of very good potential.

A Cost/Benefit Analysis of the Introduction of PPBS  
into the Data Processing Group

The added funding need of this alternative is zero. The cost to the organization is the time needed to organize. Through exactly the same type of systematic review which will be undertaken by the re-organized data processing division, this study has isolated potentially large benefits. Putting these elements in terms of a benefit/cost ratio, we can only expect large benefits flowing without cost.

APPENDIX VII:

CREDITS FOR AND A DESCRIPTION OF THE  
TELEDYNE COMPUTER ILLUSTRATED ON THE  
SECTION COVER PAGES

The computer represented on the cover sheets to each section is manufactured by the Teledyne Systems Company, Inc. A drawing of this computer appeared on the cover of the May 1975 edition of Scientific American. On page four of this edition of Scientific American, a description of this computer was printed; this description is reproduced below.

Permission to graphically represent this computer in this report was granted by both the Scientific American and the Teledyne Systems Company.

The photograph on the cover shows a complete general-purpose computer enlarged 3½ diameters. The actual device is two inches square and .2 inch thick and weighs two ounces. One of a family of microcomputers designated TDY 52, it is made by the Teledyne Systems Company (see "Microcomputers," page 32). The unit depicted on the cover is a programmable, parallel 16-bit microcomputer. The term "16-bit" defines the length of the "word," consisting of 0's and 1's, that the machine can handle in its arithmetic operations. Conventional minicomputers, which occupy several cubic feet, typically process words of from 12 to 32 bits and are up to 10 times faster. Otherwise the tiny Teledyne device can do essentially everything that much larger machines can do. The two largest elements are highly complex integrated circuits, each containing some 6,000 transistors on a single chip of silicon. The two chips control the four slightly smaller chips, each a four-bit "slice," that incorporate the arithmetic and logic circuits and operate in parallel. These six principal integrated circuits and various smaller ones are made by the National Semiconductor Corporation. Teledyne assembles the chips on a ceramic wafer and interconnects them with six glass-insulated conducting layers. All told the system incorporates more than 100,000 transistors. It communicates with the outside world through 120 leads, 30 on a side, the ends of which are visible at the edges of the photograph. In quantities between 50 and 500 the Teledyne microcomputer, designed chiefly for military systems, sells for \$1,295. Other companies package chips in less compact form in machines that sell for much less.



APPENDIX VIII: GLOSSARY OF TECHNICAL TERMS

The source of the information in this appendix is the glossary in Marilyn Bohl's book, *Information Processing*, (Science Research Associates, Chicago, et al, 1971.)





A

ACCESS TIME: the time interval between the instant when transfer of data to or from a storage device is requested and the instant when the transfer of data is completed.

ADDRESS: a name or numeral that designates a particular storage location or other data source or destination. Also v.t.: to go to an address.

ALGORITHM: a set of well-defined rules for the solution of a problem in a finite number of steps; for example, a full statement of a procedure for computing a rate of return.

ALPHAMERIC: pertaining to a character set that includes both alphabetic characters (letters) and numeric characters (digits) and usually special characters such as punctuation marks.

ANALOG COMPUTER: a computer that operates on data in the form of continuously variable physical quantities, such as electrical voltages or temperatures, by performing physical processes on the data. Contrast with *digital computer*.

ASCII I (American Standard Code for Information Interchange): a seven-bit American National Standards Institute standard code adopted to facilitate interchange of data between various types of data-processing and data-communication equipment.

ASSEMBLER PROGRAM: a computer program that assembles programs written in a symbolic language to produce machine-language programs.

B

BASIC: a symbolic programming language designed primarily for interactive computing.

BATCH PROCESSING: a technique in which data to be processed or programs to be executed are collected into groups to permit convenient, efficient, serial processing. Contrast with *on-line processing*.

BINARY: pertaining to a condition in which there are only two possible states. Most digital computer components (for example, vacuum tubes, transistors, and magnetic cores) are essentially binary in that they have two stable states.

BIT: a binary digit; the symbol 0 or 1 in the representation of a value in binary notation.

BLOCK: a group of words, characters, or digits handled as a unit and read into or written from main storage in one input/output operation.

BUG: an error in a program or an equipment fault.

BURST MODE: transfer of all the information in one data record from an input device to main storage, or all the information in one area of storage to an output device, in one operation.

BYTE: a fixed number of adjacent bits (less than a word in length) that are operated on as a unit. For example, in several modern computers, a byte is a group of eight adjacent bits and can represent one alphabetic character or two digits.

C

CARD PUNCH: a device that punches holes in designated locations on cards to store data.

CARD READER: a device consisting of a mechanical punched-card reader and related electronic circuitry which transcribes data from punched cards to main storage.

CATHODE-RAY TUBE (CRT): an electronic vacuum tube containing a screen on which information can be stored or displayed.

CENTRAL PROCESSING UNIT (CPU): (1) the portion of an electronic data-processing system that contains the circuits which control the interpretation and execution of instructions; (2) the control section and the arithmetic logic unit of a computer.

CHANNEL: a path or group of paths for transmitting input data to, or output data from, a computer.

C

COBOL: -(Common Business Oriented Language): a symbolic programming language designed primarily for business data processing.

COMPATIBILITY: the ability to handle programs and data from one computer system on another computer system without modification.

COMPILE: to prepare a machine-language program from a symbolic-language program making use of the overall logic structure of the program, or generating more than one machine-language instruction for each symbolic instruction, or both.

COMPUTER WORD: a sequence of bits or characters moved, used in operations, and stored as a unit.

CONSOLE: the part of the computer used for communication between the operator and the computer.

CORE: See magnetic core

CPU: See central processing unit

CYLINDER: all tracks accessible at one setting of the access mechanism of a direct-access storage device.

D

DATA: any representation of a fact or an idea that can be communicated or manipulated by some process.

DEBUG: to detect, locate, and eliminate mistakes in a program or malfunctions in equipment.

D

**DIGIT:** a character used to represent one of the non-negative integers smaller than the base of the numeration system in which it appears, for example, in the decimal number system, one of the characters 0 through 9.

**DIGITAL COMPUTER:** a computer that operates on quantified data by performing arithmetic and logical operations on the data. Generally, the data is expressed in a numerical form.

**DIRECT ACCESS:** pertaining to a storage device whose access time is not significantly affected either by the location of the data to be read or by the location to which data is to be written (because there is no need to pass all preceding data in the file). Synonymous with *random access*.

E

**EBCDIC (Extended Binary Coded Decimal Interchange Code):** an eight-bit code used to represent specific data characters in many current computer systems.

**EDIT:** to modify the form or format of data; for example, by inserting or deleting characters such as dollar signs, decimal points, or leading zeros, or by rearranging data items.

**EDP: (electronic data processing):** data processing performed largely by electronic equipment, such as electronic digital computers.

F

**FILE:** (1) a collection of related records (in inventory control, for example, one line of an invoice constitutes an item, a complete invoice constitutes a record, and the complete set of such records constitutes a file); (2) a logical entity operated on by an EDP system.

## F

**FILE MAINTENANCE:** the updating of master files by adding, changing, or deleting data to reflect the effects of non-periodic changes; for example, the addition of new-product records to an inventory-control master file.

**FLOWCHART:** a pictorial representation of the types and sequence of operations within a program (program flowchart) or the data, flow of work, and work stations within a system (system flowchart).

**FORMAT:** a predetermined arrangement of data.

**FORTRAN (FORMulat TRANslator):** a symbolic programming language designed primarily to facilitate the preparation of programs to perform mathematical computations.

## H

**HARDWARE:** physical equipment such as mechanical, magnetic, electrical, and electronic devices. Contrast with *software*.

**HOLLERITH CODE:** a code widely used for representing data on 80-column punched cards.

## I

**INPUT/OUTPUT:** input or output or both; a general term for the techniques, devices, and media used to communicate with the central processing unit of an EDP system and for the data involved in these communications.

**INSTRUCTION:** a set of characters that specifies an operation to be performed and the value or location of one or more operands.

**INTEGRATED CIRCUIT:** a complete, complex electronic circuit, capable of performing all the functions of a conventional circuit containing numerous discrete transistors, diodes, capacitors, and/or resistors, all of whose component parts are fabricated and assembled in a single integrated process.

J

JOB-CONTROL LANGUAGE: the set of statements used to direct operating-system programs that control processing.

L

LANGUAGE: a defined set of symbols, conventions, and rules used to convey information.

LANGUAGE PROCESSOR: a program that accepts a symbolic-language (source-language) program as input and produces a machine-language (object-language) program as output. Examples are assemblers and compilers.

M

MACHINE CYCLE: the length of time required for the computer to perform one machine operation.

MACHINE LANGUAGE: a language that can be interpreted by the internal circuitry of the computer.

MAGNETIC CORE: a small piece of magnetic material that can be placed in a spatial relationship to current-carrying conductors and whose magnetic properties are essential to its use; a common component of main storage.

MAGNETIC DISK: a flat circular plate with magnetic surfaces on which data can be written by selective magnetization of portions of its surfaces.

MANUAL INPUT: (1) the entry of data into a device by manual means at the time of processing; (2) the data entered as in (1).

MASTER FILE: a file containing relatively permanent information used as a source of reference and usually updated periodically.

MICRO INSTRUCTIONS: a set of basic subcommands or pseudo-commands, built into the computer and translated by hardware into machine commands. Generally, these commands are in a special read-only storage unit of the computer.

M

MICROPROGRAMMING: controlling an EDP system by means of instructions, each of which, instead of being executed directly, starts execution of a sequence of micro instructions stored in a special read-only storage unit.

O

ONLINE PROCESSING: a technique in which data is accepted for processing as it is generated without preliminary sorting or editing and without being collected in batches. Generally, a system which has online processing capabilities also has capabilities for direct-access processing. Contrast with *batch processing*.

OPERATING SYSTEM: an organized collection of routines and procedures for operating a computer.

OPERATION: (1) the act of obtaining a result from one or more operands in accordance with a rule that specifies the result for any permissible combination of operands; (2) the act specified by a single machine-language instruction; (3) a program step executed by the computer, for example, addition, multiplication, comparison, branching.

OPTICAL CHARACTER RECOGNITION (OCR): the machine recognition of characters through use of light-sensitive devices.

P

PARITY BIT: a binary digit included in a pattern of bits to make the sum of all the 1 bits in the pattern either even or odd.

PARITY CHECK: a check to determine whether the number of 1 in a bit pattern is either even or odd.

PARTITION: an area of main storage set aside for one program and the data on which it operates.



P

PRINTER: a device capable of printing characters on paper.

PROGRAM: a sequence of instructions that directs the computer to perform a specific series of operations (often, to solve a specific problem).

PROGRAMMER: red-eyed, mumbling mammal capable of conversing with the inanimate monsters.

R

RANDOM ACCESS: *direct access*

RECORD: a collection of related data items; thus, for example, in inventory control, one line of an invoice constitutes an item, a complete invoice constitutes a record, and the complete set of such records constitutes a file.

RPG (Report Program Generator): a generator program designed to construct programs that perform report writing and, optionally, additional functions.

RUN: execution of one or more routines with little or no operator intervention, whereby the computer performs a series of prescribed operations on a given set of data.

S

SIMULATE: to represent the functioning of one system by another; for example, to represent a computer or a physical system by the execution of a computer program, or a biological system by a mathematical model.

SOFTWARE: a collection of programs and routines which facilitate the programming and operation of a computer. Contrast with *hardware*.

## S

**SORT:** to arrange data in sequence according to specific rules.

**STORAGE:** pertaining to a device into which data can be entered and retained, and from which data can be retrieved at a later time.

**SUBPROGRAM:** a part of a larger program. Usually, a subprogram can be translated into machine language independently of the remainder of the program.

**SUBROUTINE:** a routine that can be part of another routine.

**SYMBOL:** an entity that represents something else by reason of relationship, convention, or association.

## T

**TELECOMMUNICATIONS:** the transmission of signals over long distances, such as by radio or telegraph.

**TELEPROCESSING:** a process involving both data processing and telecommunications functions.

**TERMINAL:** a point (or device) in a system or communications network at which data can enter or exit.

**TIME SHARING:** a technique or system for supplying computing services to a number of users at geographically scattered terminals, providing rapid responses to each user so that it appears to each that he alone is using the system.

## U

**UTILITY ROUTINE:** a routine which performs some activity required in most EDP systems such as transferring files from punched cards to magnetic tape or preparing direct-access storage-media for use in subsequent processing.

VERIFY: (1) to determine whether an operation has been performed correctly; (2) to check the validity of data that has been keypunched.

APPENDIX IX: NATIONAL CENTER FOR STATE COURT PUBLICATIONS



PUBLICATIONS OF THE  
National Center for State Courts  
1660 Lincoln Street, Suite 200  
Denver, Colorado 80203

Number	Title	Pages	Publication Date
<u>Work-in-Progress Series</u>			
WC 01	*Administration of Court Reporting in the State Courts	35	2-73
WC 02A	*National Center for State Courts Court Services Package	55	4-73
WC003	Expediting Review of Felony Convictions after Trial (published jointly with the Federal Judicial Center)	22	8-73
WC004	Standards for Publication of Judicial Opinions (published jointly with the Federal Judicial Center)	46	8-73
WC005(T)	*Technology and Management in Court Reporting Systems	35	5-73
WC 06(T)	*Proposed Standards for Appellate Court Statistics	63	7-73
WC007	Federal Funding Assistance for State Courts	70	11-73
WC 08	*The Appellate Process and Staff Research Attorneys in the Supreme Court of Virginia	218	5-74
WC 09	*The Appellate Process and Staff Research Attorneys in the Supreme Court of Nebraska	184	5-74
WC 10	*The Appellate Process and Staff Research Attorneys in the Illinois Appellate Court	175	5-74
WC 11	*The Appellate Process and Staff Research Attorneys in the Appellate Division of the New Jersey Superior Court	93	5-74
WC 12	*A Proposal for Limiting the Duty of the Trial Judge to Instruct the Jury Sua Sponte	32	6-74
WC 14	*Proposal and Analysis of a Unitary System of Criminal Judgments	30	8-74
WC015	State Judicial Training Profile	142	11-74
	Judicial Salaries - Quarterly Survey Vol. I, No. 4	38	3-75
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