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Graduate School of Management

Rochester-Monroe County
Criminal Justice Pilot City Program

University
of
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RESEARCH AND MANAGEMENT UTILIZATION
OF A COURT INFORMATION SYSTEM

by

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ABSTRACT

This study, undertaken in partial fulfillment of the obligations of the PROSPER demonstration project Phase I study effort, explores the potential for incorporating up-to-date research and management techniques into a computerized criminal justice information system, and specifies a design for evaluating the information system after is is operational. Section I discusses the applicability of simulation and related models for the study of the use of court resources and delay. Previous efforts to apply modelling techniques to the criminal justice system are reviewed, and three computerized court system models developed for other localities (JUSSIM, PHILJIM, and LEADICS) are analyzed, with detailed information on their scope, limitations, and cost. One of the recommendations made is to develop a comprehensive computer simulation model for the local court system, and the data items necessary as input to such a model are specified. In Section II, the specifications for a post-implementation evaluation design can be found. An economic model for the evaluation of computer systems is developed, which consists of guidelines for both a cost-benefit and cost-effectiveness analysis. Factors to be considered in the analysis, including the necessary pre-implementation data elements, are specified along with techniques to be employed and a work plan for effecting the evaluation.

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FOREWORD

In June, 1973, the County of Monroe received an award from the Law Enforcement Assistance Administration for PROSPER - PROgram for System Performance, Evaluation, and Research. The PROSPER grant proposal, developed by the Pilot City Program in collaboration with the Departmental Coordinator of the Fourth Judicial Department and the Crime Control Coordinator of Monroe County, calls for the design and implementation of a computer information system for the courts and related agencies in Monroe County. Besides providing accurate information to users on active court cases and performing tasks such as report generation and trial scheduling support, the PROSPER system will utilize modern information technology and research techniques to capture data on the operations of the court system which will enable managers, agency heads, and researchers to study the criminal justice system and further improve its efficiency.

The staff of the Pilot City Program have always felt that most criminal justice information systems have been underutilized in that many possible research and management applications were being ignored. To assure that PROSPER would address the needs of researchers and management, three features were included in the original grant proposal. First, the county agreed to permanently hire a systems analyst who would devote himself to helping the criminal justice community use PROSPER. Second, it was agreed that the data collected by PROSPER would be extracted and maintained for management and research use by means of an inactive case file. This file will contain every record and data element from the active case file, with the exception of name, address, and perhaps some other identifiers. Thirdly, the Pilot City Program agreed to do further study into some particular aspects of the research and management possibilities. This report represents two of the four areas which were part of that study effort. We have taken the existence of the county systems specialist and the inactive case file as given, and have tried to examine some possible uses of PROSPER.

The PROSPER research team consisted of Richard Thaler, who acted as coordinator, Warren Hausman, Lois Horwitz, Lee Mairs, and M. R. Rao. Their work was done concurrently with the work of the PROSPER system team who prepared the information system specifications and implementation plans. The work commenced in May, 1974, and the report was completed and submitted to L.E.A.A. in September, 1974. Although this work has been a combined effort, there has been a division of labor. Horwitz and Rao were responsible for the simulation study (Section I), and Mairs and Thaler, the evaluation design (Section II). A report by Hausman and Thaler on a third study area - a statistical examination of the validity of the Pre-Trial Release Program point prediction system - will be available soon.

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Special appreciation is extended to Jeffrey Lasky and Warren Hausman, both of the Graduate School of Management, University of Rochester, who have been a frequent source of valuable advice.

I. Applicability of Simulation and Related Models for Study of the Use of Court Resources and Delay

by

Lois K. Horwitz and M. R. Rao

A. Introduction

Recently, there has been a considerable interest in studying the criminal justice system in general and the courts in particular. This is in part due to the rapid rate of increase in reported crime which has in turn resulted in clogged courts causing excessive delay in the judicial process. Efficient use of the resources in the court system is necessary in order to be able to reduce court delay. In addition, policy changes that are likely to lead to speedy processing of the case would be desirable.

Several studies have been undertaken to analyze the court system. Some of these, e.g., JUSSIM[1] and PHILJIM[2] have been primarily concerned with aggregate analysis in which the different court cases are categorized by crime type and all cases of a particular crime type are assumed to be identical with respect to the time and resources required to process the case at various stages of the court system. Besides providing an understanding of the court system such an analysis gives an indication of the resource utilization in the aggregate. Often a

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[1] Jacob Belkin, A. Blumstein, W. Glass, and M. Lettre, "JUSSIM, An Interactive Computer Program and its Uses in Criminal Justice Planning:, Urban Systems Institute Working Paper; Carnegie-Mellon University, October, 1972; Published in Proceedings of the International Symposium on Criminal Justice Information and Statistics Systems, Project SEARCH, 1972.

[2] B. Renshaw, C. Goldman, W. Braybrook, and E. Mitchell, "PHILJIM, The Philadelphia Justice Improvement Model, Proceedings of the International Symposium on Criminal Justice Information and Statistics Systems, Project SEARCH, 1972.

a side benefit of these attempts is that the descriptive data collection effort which necessarily precedes the model-building can itself suggest important policy changes.

Causes of court delay have been analyzed and various suggestions have been made to reduce delay in a study called LEADICS undertaken at Notre Dame University[1]. However, the basic assumption made in that study is that the court under consideration is not clogged and each part of the system can be altered independently without affecting the other parts. Needless to say, such an assumption appears to be a strong one and its applicability to local data must be verified before one could utilize the approach suggested by the Notre Dame study. The scope and limitations of the three studies, JUSSIM, PHILJIM, and LEADICS, referred to above are discussed in detail in the next section.

B. Relevant Models

Efforts to apply modeling techniques to the criminal justice system and especially to the problem of reducing court delay were recommended back in 1967 in the Science and Technology Task Force Report of the President's Commission on Law Enforcement and Administration of Justice. In response to the Commission's urging that the techniques of systems analysis and operations research be used to test the viability of various solutions to court problems offered by judges and lawyers, many computer programs and packages have been developed to simulate various aspects and subsystems of the criminal justice system. These routines range in scope from comprehensive simulations of the entire

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[1] Systems Study in Court Delay, LEADICS, University of Notre Dame, Law School, College of Engineering, September, 1971.

system, such as COURTSIM[1], to models of particular modules, such as Kansas City, Missouri's model of the jury selection process[2]. They range in complexity from GPSS models which take 40 minutes of run time to simple models written in Fortran which run in less than 15 seconds. We have selected for analysis three of the most popular court system models which we feel are fairly representative of those in current use.

1. The JUSSIM Model is a computer program developed by the Urban Systems Institute at the School of Urban and Public Affiars, Carnegie-Mellon University. It was developed to assist criminal justice planners in <u>quantifying</u> certain attributes of the criminal justice system. JUSSIM is a simple deterministic model[3], not unlike many financial planning models in general use, and although JUSSIM falls far short of being a simulation, it can be an effective tool in answering such questions as, "What will be the savings to the county of establishing a pre-trial diversion program?" or "How much judge time is freed up by the misdemeanor screening program?".

The structure of JUSSIM is not very complex. Basically, the inputs to the model are:

1.) A current "snapshot" of the flow of defendants through the court system. All paths, nodes[4], and branching ratios must be specified. Branching ratios may differ by crime type.

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[1] Jean Taylor, Joseph Navarro, Robert Cohen, Data Analysis and Simulation of the District of Columbia Trial Court System for the Processing of Felony Defendants, Institute for Defense Analysis, HQ 68-8723.

[2] Frederick Merrill, Linus Schrange, "Efficient Use of Jurors: A Field Study and Simulation Model of a Court System," Washington University Law Quaterly, Volume 1969, Spring, 1969, PP. 151-183.

[3] A deterministic model is one in which all inputs and parameters are known with certainty.

[4] A node, in this context, refers to a criminal justice processing stage.

2.) Type and amount of resources utilized per case by crime type at each node (e.g., Preliminary hearing for burglary - Judge time = 2 hours).

3.) For each type of resource, an associated cost per unit of time, a total annual time available for each resource, and the total number of such resources available (e.g., for Judge time, 1,000 hours/year/judge, 6 judges).

These are the only inputs to the JUSSIM program. One should note that:

-There are no probability distributions. All quantifiers are averages.

-There are no arrival or interarrival rates. All caseloads are aggregated.

-There is no mention of the flow time through the system or time in queues. The model addresses questions of resource utilization, but not questions of processing delay.

Notwithstanding its simplicity, JUSSIM can be and has been used to handle very pragamatic questions, all involving either personnel or cost levels, and which can be placed into two categories:

1.) Questions on current levels of expenditures of time or money on any subclass of defendants or subsystem of the court system, such as, "How much money does it now cost to arraign public intoxicants?".

and: 2.) Questions hypothesizing a policy change and seeking its impact on current levels of expenditures. This capability could have been quite useful a year ago to answer such questions as "How many additional district attorneys and public defenders would be needed to handle the impact of the new drug laws?".

Regarding both categories of inquiry, it must be pointed out that the quality of output is directly dependent upon the quality of the input. In hypothesizing a policy change, the user must also estimate resultant changes (or non-changes) in the branching ratios. The output is limited by the accuracy of these estimates.

The feature which distinguishes JUSSIM from other applications of computer technology to the courts and which makes JUSSIM such a useful planning tool is its interactive feature. This means that the user sits at a computer terminal and can ask question after question of this model, each time receiving immediate feedback. It is felt that this type of man-machine interaction induces the user to fully exploit the services of the model.

The limitations of this system are probably apparent by now. Questions of delay and through-put time cannot be addressed. Bottlenecks arising as a result of policy changes cannot be predicted. Priorities cannot be assigned to classes of defendants (e.g., detainees) to afford them more speedy processing. Generally, many realities of the criminal justice system that can be simulated with a more sophisticated model cannot be represented in this model.

In short, JUSSIM should be viewed as an inexpensive[1] complement to, not a substitute for, a comprehensive computer simulation model.

The basic JUSSIM model does not allow for feedback and hence cannot incorporate the recycling of individuals in the criminal justice system. However, an extended model that does include this feedback feature has also been developed[2] by the Urban Systems Institute at the School of Urban and Public Affairs, Carnegie-Mellon University.

2. PHILJIM, another simple deterministic model of the criminal justice system, developed for the Philadelphia Regional Planning Council, can be viewed as an expansion and extension of the JUSSIM model discussed above. The PHILJIM computer system requires input data similar to those of JUSSIM, and similarly can be used as a diagnostic tool to probe current operational problems and to analyze the effects of proposed court system changes.

The variations in PHILJIM have been incorporated to increase both the degree to which the representation of the case flow parrellels the actual flow and the flexibility of user inquiry. In the first sense, the PHILJIM program can make distinctions between people and cases and treat their flow individually. This leads to a more realistic model of the court system workoad in that you can represent cases going to trial vs. defendants acquitted. Additionally, the PHILJIM model allows for

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[1] The software for JUSSIM may be purchased for $100. Run-time costs of JUSSIM in Allegheny County, Pennsylvania have been estimated at $5/run. Once loaded, the core requirements of the JUSSIM computer program are 30K on a PDP-10 and 64K on an IMB-360.

[2] The software for this feedback model is also available. Although no price tag has yet been set, it is expected that the software may be purchased for $500 to $1,000.

input flows to be initialized at stages other than the first processing stage. This mechanism is quite important to reflect previous court backlog at various stages or cases entering the system via a grand jury sealed indictment. It can also be utilized to reflect workloads handled by court personnel that do not apply directly to case processing. For example, new "cases entering" at the Probation Department investigation stage can actually represent the department's supervisory workload. These refinements to the model of JUSSIM enable a more accurate representation of the criminal justice processing system, and hence more reliable output.

PHILJIM has also incorporated features to make it easier for the user to extract the information he seeks from the program. Thus, in formulating a policy change which would affect case flow through a given stage, one may inquire <u>either</u> about the backlog that has built up at that stage <u>or</u> about the additional manpower resources necessary to process all cases without backlog. Other options along this vein are also available.

Although many useful improvements have been incorporated into the PHILJIM model, it should be pointed out that PHILJIM is not interactive, but rather runs in batch mode. The output reports are characterized by a high degree of readability. The program is written in Fortran, and typical runs simulating 29 processing stages and 38 crime types cost about $11. The PHILJIM program, together with documentation, user manuals, and sample data deck, costs $200, and is available from Government Studies and Systems, Inc. This batch program required 256K of storage to compile and run on an IBM-370/165.

3. LEADICS, one of the more advanced court system models developed to date, was the product of a joint effort of the School of Law and the School of Engineering at Notre Dame University. After an extensive study in which a great deal of time was devoted to data acquisition, data processing, and data analysis, the LEADICS computer model, an analytic[1] (or mathematical) model of court processing, was built to focus on problems of court delay. This system is currently operative at the University of Notre Dame, and has also been recommended for implementation in the superior court of Hudson County, New Jersey[2].

The system was developed to answer questions of "How long?", not questions of "How much?". For this purpose, the criminal justice process is viewed as a succession of steps with each step consuming a portion of the total time from start to finish. The model is based on some detailed configuration or flow diagram, demonstrating the various paths a defendant may take through the process. For each activity that takes place along the way, there must be a point of initiation (in time) and a point of conclusion which must coincide with the point of initiation of the next activity. No distinctions are made between processing time, preparation time, or waiting time.

Representations of time in LEADICS, unlike representations of time in the deterministic models, are not merely observed averages.

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[1] An analytic model is one in which the solutions are determined using a mathematical expression.

[2] Superior Court of New Jersey, "A Mini-Computer-Oriented Court Simulation Study". L.E.A.A Grant #72-DF-02-0022.

Time is regarded as a random variable, defined by its probability distribution function. In fact, one of the most useful and impressive features of the LEADICS system is the "pre-processor", a unit of computer software which converts the observed raw data into probability distributions. This representation of parameters by random variables clearly increases the model's usefulness by increasing its accuracy in representing the realities of court system flow.

The LEADICS model does not require as input the definition of any parameters corresponding to system resources, since only questions of delay are addressed. What the model does require is that the court system flow-diagram of branches and nodes be specified, along with the branching ratios[1] representing the proportion of cases following each path. Additionally, raw data on a case-by-case basis, hopefully part of an on-going data collection effort, is needed to reflect the time between all court processing stages. The LEADICS pre-processor programs were developed to "fit" these observations to statistical distributions, which then feed into the LEADICS major program.

The LEADICS model can be used to answer all questions about court processing which can be translated into terms of delay. One use cited by its developers is to find out the effect that reducing time lag at one function stage would have on the entire system. For example, the answer to questions like "How would placing a statutory

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[1] This figure is an aggregated average since crime types are not distinguished in this system. This limitation will be discussed at length later in this report.

time limit on a change of plea motion effect the court system?", might be sought with this model. Or one might be interested in what would happen if the flow diagram were altered and a stage were totally skipped. Along these lines, the LEADICS research team determined, through the use of this simulator, that in Marion County, Indiana, the mean time of felony flow from arrest to arraignment could be reduced from 121 days to 80 days if the grand jury stage were eliminated. One might also be interested in the effects on time lag of changing the branching ratios at some stage, as in the problem of "How would average throughput time change if more felons pled guilty at arraignment?".

To use the model one must be able to phrase proposed policy problems in terms of time lag. Sometimes this is quite straightforward. Suppose one desired to analyze the effects of banning those who initially pleaded not guilty from changing their pleas at a later time. One could choose to make the assumption that those who previously pleaded guilty at some point before trial will now plead guilty at arraignment. This situation would be represented in the simulation model by reducing the time from the arraignment stage to the change of plea stage to be constantly zero. The model would then be run with this alteration and the outputs could be compared to outputs derived when the "real" situation had been reflected.

Unfortunately, this "translation" of the problem into delay specifications is not always as easy as reducing some time lag variable to zero. Situations to be tested usually require that a new distribution of delay be given to allow for variation among cases. In order to run the model, the user must be able to specify the new time distribution function to be input, or at least its characteristics (i.e., a histogram).

The outputs of the LEADICS program are also distribution functions, graphically displayed on X-Y coordinates. The graphs represent delay distribution between any two processsing stages that the user specifies. These output functions convey all the information, but much orientation will be needed before typical court personnel[1] can interpret them.

Although the LEADICS system would be of interest to court planners who view the reduction of court processing delays as a priority issue, there are some serious drawbacks to its use that one should note. There are limitations on the applicability of the LEADICS programs based on the model's underlying assumptions about the court system. The model first assumes that the court system in question is not clogged and that time spent just waiting for processing is negligible if any. This assumption implies the absense of queues in the model, since if all cases moved directly from one activity arena to another, queuing certainly would not be a problem. This assumption of an unclogged court also implies that the time spent at the various processing points is not a function of the volume of transactions going though. With this assumption, it would be inappropriate to pose the question, "What changes in average throughput time would occur if drug offenses

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[1] The Hudson County Court Study stresses the need for improvements in the output reports, and the members of the Pilot City Program staff concur that the outputs are difficult to interpret.

were decriminalized?", because the response would necessarily be, "No change".

Although we realize the difficulty inherent in attempting to separate delay due to queuing time from delay due to preparation time, one should not blindly accept the assumption of the uncongested nature of a given court system. One should first observe and analyze local court data to test the validity of this strong hypothesis.[1] A method to accomplish this would be to perform a sensitivity test. For example, one could collect observations in February and then in June, when there is typically a 30% increase in Rochester arrests; and, utilizing statistical analysis, test for significant differences in the delays at processing points as the volume of transactions varies.

A second assumption of the model is the independence of the time distributions. The hypothesis is that the time a case spends at one stage is unrelated to the time it spends at the next or any other stage. This may or may not be true in our local courts, and again, the assumption must be tested before the LEADICS model could be implemented here.

It is this assumption of independence, together with the absence of queues, that allows one to examine the time distributions separately and to correctly use the mathematical techniques that the model incorporates. These techniques, which can estimate the delay in the whole system if changes are made in the time distributions at some particular stage, do not "work" if these assumptions are not met. Therefore, the recommended testing is essential.

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[1] Even if such an analysis on the current operational court system supported the hypothesis of "uncloggedness", it would still be unknown whether this situation would remain under the proposed modifications.

The Hudson County, New Jersey, study asserts that the model's drawback in not allowing delay distributions to vary as a function of court caseload volume can be circumvented. They put forth the recommendation that a table of distributions be assigned to every processing point, with different distributions relating to different ranges of caseload volumes. However, no mention is made of how these distribution functions could be arrived at. This seems to be a very difficult task, especially for input volumes outside the realm of local experience.

Another deficiency in the LEADICS system, when compared to a full-scaled simulator, is the lack of capacity to specify different crime types or to make distinctions in the branching ratios for different crime types. (Probably this is due to the fact that the initial development effort was undertaken to probe questions of felony delay only.) Therefore, one cannot properly use this model to investigate the impact of a program set up to screen or divert only certain classes of offenders. Presumably one can circumvent this drawback by specifying a separate model for each of several crime categories and using them individually, but then the effects on the total system cannot be captured.

The pre-processing unit, a quite sophisticated feature which converts the raw data into probability distributions, also has its flaws. The mathematical approximation techniques which dictate the output may give negative probabilities which, needless to say, are meaningless. Unless this is corrected, an unsuspecting court planner, trying to study the effect of procedural change, might be faced with output which could only by interpreted as "a -4% probability that the time from arrest to arraignment is 10 days".

The LEADICS computer programs are interactive and run in Fortran IV. Costs of implementing LEADICS in Monroe County would be about $80,000.[1]

C. Simulation and Recommendations

Among the various approaches that have been explored to study the court system, a simulation[2] model, e.g., COURTSIM appears to be the most comprehensive one. The use of any model, especially a simulation model, would enable one to understand the court system better. Furthermore, the complexity and the stochastic nature of the system can be incorporated into a simulation model. A distinguishing feature of a simulation model is that we do not have to assume that all cases of a particular crime type are identical with respect to time and resources required to process the case at various stages of the court system. Instead, for each crime type at each processing unit of the court, an appropriate probability distribution is fitted to the available raw data concerning the processing time. By generating random samples from the fitted distribution, the variability in processing the different cases of a particular crime type is explicitly incorporated into the model. Furthermore, the dependency of the various stages of the system is also taken into account by providing the queuing (or waiting line) of the cases at any stage of the system when the required resources are not available. It is also possible to incorporate priority rules for processing the various different cases, so that, for example,

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[1] Cost figures based on Hudson County estimates. Naturally, OBTS (Offender Based Transaction System) input data is assumed.

[2] Simulation is a technique of performing sampling experiments on a mathematical model of the system.

defendants incarcerated could proceed to trial sooner than those bailed. These features make simulation techniques superior to the use of analytic models in addressing court system questions.

Simulation of a court system permits a planner or a court administrator to evaluate the effectiveness of various alternative systems and policies. The following is a list of some of the questions that could be answered by a simulation model. The list is intended to provide an indication of some of the uses of a simulation model and is by no means exhaustive.

1. What would be the effect on backlogs if 10% more misdemeanants pled "not guilty"?
2. How would decriminalization of gambling affect throughput time of all other cases? What would be the cost savings to the criminal justice system?
3. What would be the impact of round-the-clock arraignments?
4. How would processing time differ if preliminary hearings were totally eliminated?
5. What resources would be freed up by a pre-trial diversion program for larceny offenders?
6. What happens to backlogs if one judge is added to City Court?
7. Would backlogs form in County Court if a third Grand Jury were initiated?

It is usually a difficult task to write a simulation program. Various simulation languages (for example GPSS, SIMSCRIPT, GASP, etc.) are now available to reduce some of the difficulties associated with writing a computer simulation program. However, in general, the more complex the system is, the more difficult it is to write a computer program. Furthermore, with most of the available simulation languages, modifications to the system under consideration would require considerable reporgramming. Due to the complexity of the system and need for flexibility to modify the system easily, writing a simulation program of the court system using one of the currently available simulation languages would be difficult and a time-consuming task. Furthermore, many of the languages would require extensive training before one could write a program, especially a complex one.

There are basically two alternatives available. The first one is to utilize the simulation program written in GPSS by Stochastic Systems Research Corporation for the Monroe County Court System[1] in 1972. This program would require substantial revisions and modifications especially in the input data provided to the program. The main advantage of this alternative is that time and effort has already been invested in developing a reasonable simulation program. As pointed out above, the main disadvantage is that since is written in GPSS, any modifications to the court system would require considerable reprogramming by someone who is quite well versed with the GPSS language. Essentially, this would require, on a continuing basis, a systems analyst who is well trained in GPSS.

The second alternative is to utilize the Generalized Network Simulator (GNS)[2] currently under development. The advantage of this simulator is that it is very flexible and modifications to the program are easily accomplished. The simulator is expected to be modular and easily interfaced, if necessary, with user-written programs. The modular design facilitates debugging and understanding the structure of the program. Moreover, such a design is expected to reduce the core requirements for GNS.

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[1] Final Report: A Systems Study of the Monroe County Criminal Courts, Volume II, Stochastic Systems Research Coproration, May, 1972.

[2] Gary Hogg, M. Dessouky, K. Tonegawa, "GNS: A Simulation Model for Generalized Stochastic Networks", Working Paper, University of Illinois at Urbana - Champaign.

The user need not actually write a program but merely provide as input the flow diagram and other relevant data such as time, cost, and resources used for processing at each stage by case type as well as queuing parameters.

The main disadvantage of recommending the use of GNS is that it is still under development and consequently it is difficult to fully comprehend its features and limitations. Furthermore, it is difficult to estimate what the computer time and storage requirements for GNS would be. In general, the time and storage requirements increase as the simulator is more flexible and easy to use. However, the flexibility of GNS and the drastic reduction in effort required to produce a usable computer simulation program is expected to outweigh the increased computer time and storage requirements of GNS.

A simulation model would require as input the distribution of processing times at various stages of the system. Consequently, the available raw data would have to be converted into statistical probability distributions. A comprehensive package that appears to do this conversion effectively is SIMFIT[1]. This package, available at no cost, is written in Fortran and is easy to use.

D. Data Requirements for a Simulation Model

The information collected by PROSPER, which is based on transactions and activities relating to an offender as he moves through the various stages in court processing, is necessary for a simulation

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[1] Robert Dineen and Carl Gordon, "SIMFIT II, A Frequency Distribution Analysis Program", A School of Systems and Logistics Technical Report, Air Force Institute of Technology, Wright-Patterson AFB, Ohio, August, 1973.

model. However, a simulation model also requires the duration of certain court processes in time units such as hours and minutes. Under the proposed system design, this information will not be available in PROSPER which will record only the date an offender enters a processing unit. As indicated below, there are at least two ways in which such information could be captured and preserved by the PROSPER system.

The first way is to notate, for each and every court procedure and for each and every defendant, the start and end time of each court appearance and to include such data as part of the active case record. This procedure is expected to be time-consuming and costly, but would provide the most complete information, and might prove useful for other purposes.

The second and the recommended way would be as follows:

a.) To indicate on the offender record the Court Part number for each court appearance or case activity.

b.) To maintain a computerized "Master List" by date and by Court Part indicating: Date, Part Number, Start Time, End Time, etc.

With this information available as part of PROSPER, it is possible to utilize regression analysis to estimate the duration of time for processing the various types of court appearances (trial, PTC, Preliminary Hearing, Motion Hearing, etc.) by charge category. It should be noted that with regard to the precise information stored in the Master List, several alternatives strategies are possible. For instance, instead of storing both the start and end time, it would be sufficient to store the duration of time (end time - start time) the Court Part is in session for that morning or day. This information would be sufficient for the regression analysis to estimate the duration of time for processing the various types of court appearances by charge category. Alternatively, one could maintain separately the information regarding the duration of time each Court Part is normally in session each morning or day (e.g, 8 a.m. to 12 noon Monday through Friday) and note in the Master List only the exceptions.

Proceeding on the assumption that the PROSPER OBT system will "lose" a defendant after sentencing, we see a need for saving information regarding the several court proceedings which are <u>not</u> direct consequences of a defendant's movement through the court system from arraignment to disposition, but which nevertheless absorb a good deal of court system time and resources. Such activities would include cases applealed to County Court from a lower court and hearings and/or resentencing for violations of a conditional discharge, violations of the terms of commitment to the Drug Abuse Control Commission, violations of the terms of an ACD disposition, and violations of probation. (All of these activities involve a case that has somehow "looped" back into the system, sometimes over a year after the case was disposed of by the court.) In order for a model to accurately simulate court resource utilization, backlogs, or queues, data on these court activities must be available in a computer based information system. We recommend that a catalog of such activities be maintained by Court Part in the Master List mentioned above.

Basically, three categories of information would be needed to feed a comprehensive simulation model They are:

a.) Distribution of processing time by charge type at each stage of the court system, and a measure of interdependence between these distributions.

b.) Distribution of the number of motion hearings by charge.

c.) Branching ratios by charge type at each stage of the court system.

Below is a list of data elements to be included in the PROSPER offender based transaction system for the purpose of building a simulation model of the court system. Many of the items are already included in the list of operational system data requirements.

List of Data Elements

Arrest charge (s) and type (i.e., felony, misdemeanor, or violation)

Jail/Bail Status - date and amount of bail if applicable

Initial Court Appearance - date, court part, plea entered, disposition (IA)[1], sentence (IA)

Pre-Trail Release Recommendation

Release Action - Jail/Bail Status, Date

Public Defender Assignment and Date (IA)

Screener's Recommendation

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[1] IA - If Applicable

Motions for Hearings (IA)[1] - date, status

Preliminary Hearing (IA) - date, court part, outcome

Grand Jury Referral (IA) - date presented, disposition, and date

For every additional court appearance preceding trial:

1.) type of session - (pre-trial conference, motion hearing, pre-sentence conference, County Court arraignment)

2.) date

3.) court and part

4.) reduced charge(s) (IA)

5.) plea entered (IA)

6.) disposition (IA)

7.) sentence

Trial (IA) - type begin date, number of jurors, disposition

Probation Department Investigation - date ordered, date received, type (pre-plea, pre-sentenced, long/short form)

Sentence Type and Duration

E. Perspectives on Costs and Benefits

While we are aware that court managers often base decisions for

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[1] IA - If Applicable

system changes on figures showing costs expended vs. costs avoided, we feel that the decision to implement simulation should not be viewed solely in this manner. In much the same way as a computer itself, once installed in a locality, usually generates demand for its services beyond those originally intended, we feel that court planners will generate ways to utilize a simulation model beyond the applications we have anticipated.

Additionally, many of the benefits of simulation seem to be unmeasurable. It is quite difficult to place a dollar value on the benefits of "more" information. It is also an unachievable task to try to measure the savings to the community resulting from the costly planning and research studies which otherwise would have been undertaken had simulation not been available. Such studies have in the past been conducted prior to institutionalizing new court programs and often as a requirement for obtaining federal funding for a program. With a simulation model up and running, some of these study efforts will be precluded. And one should also consider the impossible task of estimating savings accrued by perhaps avoiding, through information gained by a simulation analysis, the institution of changes whose impacts would not have been beneficial.

In deciding to implement a computer model, emphasis should be placed on the appropriateness of the questions that can be answered. The choice of the model should crucially depend on whether the model addresses the questions that court planners want answered.

For more comments on the evaluation design of a simulation model, see the evaluation section. (Chapter II)

Provided that there is interest in the scope of questions that JUSSIM and/or PHILJIM answers, we advise the implementation of one of these models, since the costs involved are so low. In addition to the trivial procurement and operational costs noted earlier in the text, the following is all that would be necessary for either model. (We assume throughout the existence of the OBTS data.)

A. 3-4 Man-months for data specification for the model (e.g., branching ratios, resource levels), including interface to the OBTS data.

B. 3-4 days of system programmer's time to get the program running locally.

We cannot recommend LEADICS without a prior study to determine the appropriateness of this model to the local situation. Such an undertaking would require an estimated 2 persons for 3 months, plus substantial time and resources for data collection for this study. In addition, the outputs of the LEADICS system would have to be drastically modified for user readability prior to any recommendation for implementation. The need for this modification has also been noted by Hudson County, New Jersey, in their study and if they undertake these improvements, the changes will not be an additional cost to subsequent users.

For any of the full scale simulations, a data collection effort would be necessary to determine the resource capacity at each processing stage. Each of the simulation models mentioned also requires probability distributions as input and, therefore, necessitates some software package which "fits" distributions to new data. The one mentioned earlier, SIMFIT II, is available at no cost from the United State Air Force.

It should be noted that any GPSS model will be quite costly to run, and might take as long as 40 minutes of run time. Two programmer/analysts with much experience in GPSS and with adequate knowledge of the court system could probably develop a simulation in 2-3 months. It would require one such person, working 2-3 months, to alter the model previously developed by the Stochastic Systems Research Corporation.

Because of the flexibility of GNS, it would require one person working 1 to 2 months to develop a GNS court system simulation. Because this software is so new, cost figures and run time specifications are not yet available.

It should be pointed out that the above estimates are only for getting a workable program. Subsequent changes and modifications would have to be done on an intermittent basis, resulting in additional time and expense.

II. Post-Implementation Evaluation Design

by

Lee Mairs and Richard Thaler

A. Introduction

Managment Information Systems (MIS) during the stages of their initial conception are virtually always hailed as the bearers of large benefits and future cost savings. Although effort is usually devoted to at least an *ad hoc ex ante* determination of MIS costs versus MIS benefits, seldom is the system subjected to serious *ex post* scrutiny to determine whether forecasted MIS benefits and estimated MIS costs actually obtained. Herein lies a critical area of neglect. Management requires *ex post* evaluation information in order to provide the feedback necessary to correctly assess both its own decision to initially provide the system and the contractor's performance installing the system.

The concepts necessary to identify real costs in an Automated Data Processing (ADP) environment are basic to any economic analysis. Problems occurring in the application of these concepts often result from institutional methods for ADP pricing systems or chargeback methods and difficulties in attempts to quantify benefits in the public or not-for-profit sector. Whereas businessmen have the ability to judge the success of an ADP undertaking by noting the increase in the bottom line of an income statement, no such clear-cut and easily quantifiable goal can be set for municipal government systems such as a Criminal Justice Information System (CJIS). Notwithstanding this difficulty, it is imperative in order to support rational decision making that an objective determination of the proposed system's costs and resultant benefits be accomplished. The logical starting point for a Post-Implementation Evaluation (PIE) is the initial cost-benefit analysis preceeding the decision to implement the CJIS.

The quality and scope of this initial effort has a major impact on the post-implementation evaluation. If the designers have done a thorough job, then the PIE becomes merely an extension of the first cost-benefit analysis. On the other hand, if the initial decisions were made in an ad hoc way or have not been well documented then the later evaluators have to start from scratch.

This chapter begins with a brief statement of some basic principles of Cost-Benefit Analysis (CBA)[1]. We then discuss in turn measurement of costs, cost-effectiveness analysis, and benefit estimation. We conclude with a suggested evaluation work plan.

B. Concepts of Cost-Benefit Analysis

The true economic cost of an MIS is the net addition to total costs resulting from system development, implementation, and operation. This marginal or incremental cost is the only relevant cost for decision making. An example may serve to better illustrate this important concept. If a CRT terminal is presently rented for $200 per month flat rental and the terminal is only used between the hours of 8:00 a.m. and 5:00 p.m., the true economic cost of an additional application using this terminal from 5:00 p.m. to 8:00 a.m. is zero. However, if the the new application requires a dedicated 24 hours/day terminal, then the cost of that application would be $200/month.

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[1] For a full treatment of cost-benefit analysis, see E. J. Mishan, Cost-Benefit Analysis, New York, Praeger Publishers, June, 1971, and A. Harberger, Project Evaluation: Collected Papers, Chicago, Markham Press, 1973.

Cost savings or benefits must also be considered in a marginal or incremental manner. The most frequently encountered fault of pre-MIS cost/benefit analyses is using average cost figures when quantifying cost-savings. Once again, an example will be used to establish this point. Suppose a jail currently holds 100 prisoners. In order to operate the jail, the municipality spends $125,000 annually on guard salaries and $52,000 on food. The average cost per prisoners is $1,770; however, a program reducing the number of prisoners by one each year would result in only $520 in savings. (A one percent reduction would probably not effect the number of guards employed; however, a logical assumption would be that food consumed is directly proportional to the number of prisoners.) Once again, the change in total costs is the relevant figure for decision making purposes.

The concept of opportunity cost is also critical to correct cost-benefit analyses of public sector projects. Opportunity cost may be defined as the highest value of the services foregone when resources are devoted to the specific project. Opportunity costs are always present, even in projects requiring no additional funds. Some examples will illustrate the concept. When a new application contends for the time of a computer central processing unit, delays are imposed on other jobs in the system. The opportunity cost of the new application is the sum of the values of all the delay time suffered by other system jobs. Given a fixed budget constraint, the opportunity cost of a court calendar and scheduling module could include the benefits that would have derived had the resources been devoted to an active warrant file. Likewise, there is an opportunity cost associated with each data element in the data base. This opportunity cost would be the value of the information foregone when the decision is made to include one data element as opposed to another element. Clearly, the rational decision maker requires at least estimates of the relevant opportunity costs. The cost-benefit analysis of the CJIS is the vehicle whereby these costs (i.e., foregone benefits) are collected and presented to the decision maker in a clear and concise manner for his evaluation. This information is critical to a rational decision and, therefore, must not be neglected.

C. Valuing Future Costs and Benefits

A CJIS will provide benefits and entail costs for several years. This presents evaluators with the problem of how to compute the current value of future benefits (and costs). Governments, like firms and individuals, prefer a benefit this year to one next year. The rate at which benefits a year hence would be exchanged for current benefits is called the discount rate. The discount rate used by firms is their cost of capital, i.e., the price they must pay to obtain funds. The correct rate for governments to use a somewhat controversial topic. The rate we advocate is that suggested by Harberger[1] which is a weighted averaged of the after-tax rate of return to individual savings and the before-tax return to corporate investments. This would be roughly 10-12%. However, since the choice of a discount rate can have a substantial effect on the outcome of the CBA, a sensitivity analysis should be included where costs and benefits are computed at several different rates.

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[1] For complete discussion, see Harberger, op. cit.

Given the choice a discount rate, r, and a series of future net benefits (benefits minus costs) $B_1, B_2, B_3 \ldots B_n$ then the correct formula to obtain the present value is:

$$B_0 + \frac{B_1}{(1+r)} + \frac{B_2}{(1+r)^2} + \ldots + \frac{B_n}{(1+r)^n}$$

Note that the discounting procedure is not an adjustment for expected future inflation. All estimates are usually made in terms of current prices. Inflation need enter the analysis explicitly only if relative prices are expected to change. For example, some experts feel that computer prices will fall in the future or at least will rise more slowly than labor costs. This would tend to increase the value of labor saving devices over time.

D. Benefits to Whom?

Before we begin our discussion of costs, a brief digression is necessary. In any CBA, the decisions with respect to which costs and benefits should be included in the analysis depend on the purpose and perspective of the evaluation. Two factors are important. The first issue is to whom is the evaluation addressed? In this case, an evaluation from the point of view of Monroe County, the Courts, the State of New York, and L.E.A.A. would come up with different measures of costs and benefits. One example is the federal funds for the PROSPER grant. To L.E.A.A. these are obviously a cost, but the County might view them as a windfall gain and only include its matching share as true costs. A related issue on the benefits side is replicability. It matters very little to the local government if anyone else ever uses the software developed for PROSPER. L.E.A.A., on the other hand, could save substantial amounts from a system which could be easily adopted by other communities. To L.E.A.A., ceteris peribus, a system specific to IBM equipment would be preferable to one dependent on say UNIVAC because IBM is more common, but even better, would be a system which did not require any specific hardware as a prerequisite.

A second factor which helps shape the analysis is the time perspective. For example, an analysis as to whether to adopt a system based on a preliminary study should not include the expenses already undertaken since these are "sunk costs". On the other hand, another city trying to learn from Rochester's experience would include preliminary design and cost-benefit expenses in its analysis if they would expect to incur these costs again.

The point of view we are assuming in this report is an eclectic one. Basically, the evaluation is aimed at L.E.A.A., but costs and benefits which accrue to the local agencies should be included. Because PROSPER is a program funded with Pilot City Program money, it is important that a national perspective be taken. This means that replicability should be an important factor. The next section of this paper will concentrate on identifying the true economic costs of system development, implementation, and operation.

E. Evaluation of Costs

Development costs are relatively straightforward and easily determined including analysis and design, programming and coding, and hardware evaluation/selection components. Analysis and design costs include primarily man hours and possibly travel expenses incurred by either formalized or ad hoc committees investigating the possibilities of a new MIS or revisions to an existing system. These efforts include the costs incurred conducting the cost-benefit analysis used in system design and justification.

Programming and coding costs are another component of development costs for in-house developed systems. This is indeed a fertile area for research. Industry rules of thumb exist (e.g., one line of code per hour) for estimating programmer productivity; however, little empirical evidence has been reported in the literature. More post-implementation evaluations will certainly improve current estimate tools. As well as manpower, programming and coding costs include hardware costs for program testing and de-bugging. Additionally, the component may even include software procurement costs. For example, if an optimizing compiler or a de-bug software aid is purchased initially for use in the CJIS development, then these costs should be attributed to CJIS development; however, such costs may be partially offset by the discounted present value of benefits resulting from the use of this specialized software in future system development efforts.

Closely associated with development costs are the costs of system implementation. Within this category are costs of dual system operation present when the new system expands or replaces an existing system. Parallel operation is often required as a final validity check. File conversion and data collection efforts required for initial file construction are implementation costs that should have been estimated in the initial cost-benefit analysis, and therefore verified during the post-implementation evaluation.

Perhaps the major (and most often ignored) component of system implementation cost concerns the education and training of ultimate users. Substantial amounts of resources must be devoted to formal and informal training as well as to preparation, publication, and distribution of manuals. This is a variable cost required for system operation; hence it should have been identified and estimated in the original cost-benefit analysis. Once again, the post-implementation evaluation served to veryify the accuracy and thus improve the decision making assistance rendered by future cost-benefit analyses of other proposed systems.

The final category of CJIS costs that must be considered in the cost-benefit analysis are operational costs. In order to compare alternative system configurations, the future stream of costs should be cast into present value terms in the same manner that benefits are handled.

If all the hardware used for the system is dedicated equipment, then measuring operational costs will be straightforward. If, however, the system runs in a shared environment, the question of allocating costs arises. One might think that one need only examine the CJIS department's annual charges for computer service. However, in many installations, computer charges in no manner reflect the marginal or incremental costs of using the computer's resources. Centers where no direct charge back system exists and centers where charge backs are determined by an _a priori_ goal to exactly balance the budget provide examples of non-optimal pricing policies. In order for computer charges to correctly reflect the opportunity cost that the CJIS imposes through its use of computer resources, a system of flexible marginal cost pricing must exist. By charging users true marginal cost, the center provides each user with the correct incentives in determing its use of the computer.

That many computer centers do not employ marginal cost pricing may practically be explained by the fact that the providing of computer services is characterized by large fixed costs and low marginal costs. These factors combine in a perverse manner, such that a center providing the optimal amount of computing services at the optimum internal transfer price may appear poorly managed as it will show an accounting figure loss. When marginal cost pricing is not practiced, the real economic operating costs of the CJIS must be estimated in the initial cost-benefit analysis and verified by the post-implementation evaluation.

Once again, the real economic operating costs of the CJIS are the addition to total cost incurred as a result of CJIS operation. This cost includes a monetary component for addition of specialized or totally dedicated hardware and a non-monetary component reflecting costs imposed on other host system users as a result of device contention. Even if system log data indicate large excess capacity, device contention will arise if the CJIS system demands are time correlated with existing applications. Further, excess capacity may have an implicit value if system users are willing to pay a higher price for their resource requirement in order to reduce the probability that high priority fast turnaround jobs will be delayed. This phenomenon will be noted only with system resources constituting bottlenecks in the system job processing flow, for example, tape drives, the central processing unit, high speed core, and output media. When the host system is near capacity or when excess capacity has real value to users (i.e., they are willing to pay), then the marginal cost equals average cost.

For example, if the CJIS under consideration operates in a teleprocessing environment, each CJIS user accessing the system imposes costs on other host system users. CPU cycles are expended processing message requests and queuing output. CJIS operating costs not only include terminal rental, communication line fees, core and CPU costs; a charge for disc space is also required. Each track of on-line disc storage dedicated to the CJIS is a track not available to other system users. If disc drives are in excess supply, then the marginal cost of on-line storage may be very low or zero; however, as new users develop additional requirements (or if excess capacity is valued), another disc storage unit will eventually be required. For purposes of long run cost estimates, a reasonable approach might be to use the average cost per track determined by dividing annual disc drive rental by the total number of tracks available including tracks required for direct storage overhead (i.e., tracks reserved for the volume table of contents, etc.).

It is important to denote the time frame encompassed by "long run". Host system existence as well as expansion requirements are dependent on the time frame considered. For example, if a controller can service sixteen disc drives and only two drives currently are used, the costs of a CJIS requiring one additional drive for on line storage should not include any of the controller rental, even though in the longest of long runs, the host system will require more than sixteen drives and therefore another controller. There exist no universal rules of thumb for determining the correct time frame for purposes of analysis. This remains essentially a judgment to be considered on a case-by-case basis.

Software maintenance is another area of operational costs that must be considered. It need not be estimated in the original cost-benefit analysis since any requested change or revision to an existing CJIS should be evaluated on its own basis. Formatting changes and new or additional reports or data elements must be justified by a cost-benefit analysis; i.e., does the discounted present value of quantified benefits resulting from the program change exceed costs required to make the change? The post implementation evaluation will serve to audit software maintenance in progress. Maintenance cost incurred as a result of latent programming bugs arising from a hardware manufacturer's release of operating system modifications need not be estimated or verified in the post implementation evaluation. Once the initial fixed cost of a CJIS has been justified, it appears obvious that the CJIS benefit stream would easily satisfy the CBA criteria for devoting resources to accommodate new operating system releases.

The final component of CJIS operating costs to be examined is the cost of error detection, and correction. Any data base can be initially envisioned as a pool of sparkling clean water. As time progresses, drops of oil are trickled into the pool causing pollution. The resources necessary to maintain a zero level of pollution cannot be justified;

however, there is an optimal amount of pollution above which the costs suffered exceed the costs required to maintain purity. An information system requires continual examination to detect and correct data element errors. Number transpositions, key punch errors, etc., serve to pollute the data base. The resources necessary for error research can and should be estimated in the initial cost-benefit analysis and, therefore, will be examined during the post implementation evaluation. As well as examining actual costs received, the PIE should conduct a random sample of CJIS records with 100% verification of the sampled record's data elements. The size of the sample must be sufficient to verify at a satisfactory confidence level the stated purity of the data base.

F. Cost-Effectiveness Analysis

Part of the design work is the specification of hardware and software technology. Although this is a crucial part of the design stage, it cannot be evaluated in the cost-benefit analysis, per se. What is needed is a cost-effectiveness analysis combined with a cost-benefit analysis in order to compare various alternatives. Included in the alternatives should be packages which already are owned by L.E.A.A. and are available at low cost. Since the evaluation we are proposing here is limited in budget, it would be impossible to review all possible alternatives and say which one is best. We suggest that a reasonable compromise would be for the evaluators to simply review those software packages and configurations which were studied by the design team. They may decide that some attractive alternatives were overlooked, in which case that judgment would be a part of their report. They should, however, try to determine whether the original design choice was rational, given the alternatives examined. This will be done by reviewing the documentation on the design recommendations relating to hardware-software selection. If possible, projected costs of untried systems will be compared to actual costs later realized both for the adopted and rejected systems. For example, if a particular system rejected here is implemented elsewhere, cost data should be gathered and compared with that estimated in the original report.

We further recommend that L.E.A.A. consider a large scale effort to compare various CJIS for cost-effectiveness. Although each system has unique aspects, most CJIS have many common attributes. With proper backing from L.E.A.A., a set of CJIS could be compared. Data on each system pertaining to hardware and software design features, modules included, and cost of development implementation and operation would need to be collected. Then, perhaps with the help of multiple regression analysis, some generalizations might be made regarding the costs of various modules and design features. We have no illusions about the degree of difficulty of this study - it would be tough. But with tens of millions of dollars being spent yearly on development of CJIS, it would seem prudent to begin to try to sort out what is working and what isn't.

G. Measuring Benefits

In order to have originally justified system design, development, implementation, and continued operation, the initial cost-benefit analysis should have delineated benefits envisioned with appropriate estimates of these values. The task of the PIE is to verify that these benefits have in fact been obtained and that the initial value estimates were correct. As with other parts of the evaluation, this will be easier if the initial cost-benefit analysis is well-specified.

There are several pitfalls of benefits estimation that fall in the "buzz word" classification. Reduction in clerical operations must be interpreted with caution. Because of tenure rules, unnecessary employees may be retained. There will probably remain some benefits from any additional tasks assigned to the now superfluous employees, but they will be less than the gain from releasing the employee immediately.

In the Criminal Justice Information System environment, real benefits can be traced to tangible reductions in the amount of resources currently required to accomplish stated tasks. If a jury selection and scheduling module can reduce the lost working hours foregone by jury members, then a tangible benefit can be ascribed to the module. Likewise, benefits of a court scheduling module might include reduced waiting time by policemen scheduled to give testimony thereby yielding more "on the street" crime prevention for the same dollar expenditure.

When the CJIS module merely serves to automate manual transactions without reducing the resources required to accomplish the task, then the benefits are illusionary. The task of the post-implementation evaluation is to ferret out these imaginary benefits and expose the inaccuracies to management, thereby lessening the probability that additional resources will be again misallocated in subsequent MIS development efforts.

For each module in a system design, benefits particular to this module must be identified. We will cite two examples of the kinds of analyses which will need to be done. To illustrate the concepts involved in estimating the benefits from a particular module, let us examine a module of PROSPER which was proposed by the PROSPER research team to serve the local Pre-Trail Release Program. Briefly, this module calls for the inclusion of the Monroe County Bar Association Pre-Trial Release Program, Inc. as a user of the PROSPER system, facilitating the storage, validation, and exchange of data that the Pre-Trial Release office usually gathers about a defendant. Additionally, a statistical research study is proposed[1] to determine whether the variables and point-weighting method currently used as a criterion for the release recommendation is actually the best indicator of whether a defendant will return for trial.

Benefits for such a module can be classified into two sets. The first set involved so-called "cost savings". Keeping in mind the caveats discussed above, the CBA will provide estimates of savings in clerical effort including labor, material, storage facilities and space. Each will only be counted if the savings are expected to be realized, and net of any increase in clerical effort demanded to input data into the system.

The second set of benefits are those derived from the improved quality and quantity of data. Although these would not always be positive (a manual system might provide better data), in the instant case the weaknesses of the current system have been well observed and almost any automated system would be an impovement. Naturally, more and better data are only valuable if they are <u>used</u>. In this case, the improved data

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[1] This study was undertaken by the Pilot City Program and is currently in progress.

source would make possible research aimed at refining the pre-trial release recommendation. Let's trace through the effects of such research. Currently, only a portion of those defendants recommended for pre-trial release are approved by the judge. The proposed research is aimed at improving the Pre-Trial Release program's ability to differentiate the good risks from the bad ones. If the research is successful, then it is reasonable to assume that more good risks will be released by the judges. In fact, the Pre-Trial Release Program has increased the number of defendants released without bail partially by providing the judges with better information than they had before. Since many Pre-Trial Release clients could not meet bail, this leads to a decrease in defendants awaiting trial in jail. Sending fewer defendants to jail yields both monetary and nonmonetary benefits. In fact, a recent evaluation of Pre-Trial Release illustrates the basic techniques involved in estimating one part of monetary benefits, namely those which accrue from savings at the jail.[1] Other monetary benefits which must be carefully evaluated are the increased earnings of defendants who can work while awaiting trial, and resulting savings in welfare costs. The value of these benefits depends

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[1] "Cost-Benefit Analysis of the Monroe County Pre-Trial Release Program" Stochastic Systems Research Corporation, Rochester, New York, October, 1972. Unfortunately, this analysis contains two errors which should be corrected by future evaluators. First, the estimate of the average time spent in jail awaiting trial was simply the average time spent in the pre-trial release program: 3.72 months. This is quite probably an over estimate since defendants awaiting trial in jail are generally processed faster than those released. Naturally this error will bias the estimate of the benefits upwards. Second, the monthly cost of keeping a person in jail was obtained by dividing the average monthly direct jail costs by the average number of persons sent to the jail per month, 425. The correct procedure would be to divide by the average daily population of the jail rather than its monthy throughput. We do not know what this figure is but it must be less than 425 since that number is greater than the capacity of the jail. This error then acts to bias the estimate of benefits downward.

on the point of view of the analysis. From the county's perspective, the increased earnings are irrelevant (except for some small increases in tax revenues) but the reduced welfare payments are a real savings. In an evaluation with a national perspective, however, welfare payments are simply transfers from taxpayers to other members of society and are thus ignored. The increased earnings would create a benefit in the nationally oriented analysis to the extent that the wages paid exceed the individual's reservation wage - i.e., the lowest wage at which he would be willing to work.

There are, of course, many non-monetary benefits associated with releasing more defendants as well as some costs. The benefits would include the value to the individual and his family of his freedom and his increased ability to work toward his defense. Potential costs include any crime committed by released defendants and the costs associated with the few who do not return for trial. Obviously, a pre-implementation CBA cannot hope to quantify all the benefits discussed here. However, a complete enumeration of the nature of the benefits expected will greatly aid the post-implementation evaluation.

In Chapter I, several modelling techniques are described and critiqued. The decision to adopt one or more of these models should be based on the answers to four questions:

1.) Will the model be used?
2.) Will the model answer the manager's questions?
3.) What benefits will accrue from the actions taken as a result of the model's outputs?
4.) How much does the model cost to buy, install, and operate?

Obviously, no model is worth anything if it isn't used, but to be valuable it must be more than a plaything. It must provide answers to questions which can and do result in policy changes. (It does no good to know what would happen if we did X if we do not have the power or authority to do X.)

Chapter I has tried to provide the necessary background which the local criminal justice managers can use to answer the questions phrased above. Naturally, benefits may be difficult to quantify. What is value of a decrease in processing time? There will be some monetary benefits in jail savings and so forth, but there will also be an unquantifiable gain resulting from simply providing citizens their constitutional right to a speedy trial. In such cases, the correct procedure is to measure all quantifiable benefits and compare these to costs. If the difference is positive, then the program is clearly worthwhile. If not, then the unquantifiable benefits should be enumerated and a subjective decision must be made as to whether these gains are worth the extra costs.

H. Work Plan

We recommend that the evaluation be done in three stages. First, the evaluator should be hired as soon as Phase II of PROSPER begins. His initial assignment would be to complete the detailed specifications for the evaluation design, and see that baseline data are collected. The amount of work involved with the first step will depend in large part on how well the operations group has specified the expected benefits of each module of PROSPER. If these expected benefits have been carefully enumerated, then he will merely have to prepare the data collection effort. The baseline data will be "snapshot" of the current criminal justice system. For example, if expected benefits include reducing court delay and clerical effort, then measures of the current levels of these two variables are needed. In many cases, the least costly way of obtaining the data necessary for the evaluation will be to have the PROSPER system collect it. This fact underscores the importance of hiring the evaluator as soon as possible. Recommendations made by the evaluator regarding possible additions to the PROSPER data base should be adopted whenever that seems to be cost effective. Perhaps the PROSPER executive policy committee can help decide marginal cases.

The second part of the evaluation will occur during the training and implementation stage. These operations should be monitored and included in the report.

The final part of the evaluation cannot begin until the system has been up and running for a sufficient time to take effect, perhaps one year after implementation. At this point, the post-implementation evaluation will occur. This will consist of several parts. 1.) The cost benefit analysis as defined above will be completed. 2.) The cost-effectiveness study will be reviewed in light of the operational experience. 3.) Users will be interviewed to determine user acceptance. 4.) System performance measures (such as down time, etc.) will be recorded.

END

7 [illegible]/[illegible]