

COMPUTERIZED MANAGEMENT INFORMATION SYSTEMS
IN HUMAN SERVICES: AN APPLICATION IN
MENTAL HEALTH

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COMPUTERIZED MANAGEMENT INFORMATION SYSTEMS
IN HUMAN SERVICES: AN APPLICATION IN
MENTAL HEALTH

BY

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PART I

INTRODUCTION

Since the mid fifties computerized information systems have received more and more attention, initially in business literature but since the early sixties in human service literature as well. A review of the literature provided innumerable descriptions of systems and issues in design and implementation, but little agreement as to a definition of information systems. A major point of difference concerns the degree to which decision making is considered part of the information system itself (Seward, 1973).

Blumenthal (1969), for example, offered a working definition of management information systems which incorporates the decision-making process as part of the system. He describes the system as "an evolving organization of people, computers, and other equipment, including associated communication and support systems and their integrated operation to regulate and control selected environmental events to achieve system objectives" (p. 17). On the other hand Seward (1973) points to authors such as Emery who exclude or omit the decision-making process from their definitions. Emery's definition as referenced in Seward (1973) states that "the information system thus represents a distinct system, designed to furnish information to the various decision modes within the organization" (p. 6). Saba and Levine (1978) offer a similar definition to Emery's stating that a Management Information System is "...an organized system that manages the flow of information in the proper time frame and thus assists the decision making process" (p. 79).

For the purpose of this report the latter perspective was adopted, more specifically Seward's (1973) definition of an effective information

system as one which "delivers the correct information to the decision-maker in the proper format, in the proper level of detail, and with the proper frequency for the optimal resource commitment" (p. 7).

Following the introduction, part II of the report reviews the literature on Management Information Systems with a specific focus on application in human services. This includes a brief historical overview of the development of computerized management information systems and their application to human services. In addition, the objectives of Management Information Systems in human services in reference to program planning and development, program monitoring, and evaluation and research are elaborated. Issues in system development are discussed in general and the special issues of privacy and confidentiality, human factors, and utilization are given specific attention.

Part III reviews some of the major applications of Computerized Information Systems in the mental health field in Canada and the United States. These systems are described with respect to the facility and setting, data collection, output, confidentiality and human factors.

Part IV describes the practicum experience which encompassed the planning and development, design, and initial implementation of a Computerized Management Information System for the Psychological Services Centre, a clinical training centre for the Department of Psychology and the School of Social Work at the University of Manitoba.

The description of the practicum will emphasize aspects of system development as reviewed in Part II of this report. A similar format will be used in both sections to facilitate this comparison. Part V of this report will summarize and highlight the major elements of the practicum.

PART II

MANAGEMENT INFORMATION SYSTEMS (M.I.S.) AND HUMAN SERVICES

HISTORICAL OVERVIEW

Development of Computerized Management Information Systems:

Prior to the 1950's information systems were fragmented on functional lines. While businesses and organizations had systems for gathering and sharing information, no one was able to picture the whole structure. In addition, no one held responsibility for fitting the various pieces together (McRae, 1971). It was not until the introduction of the digital computer in the early fifties that this frame of reference changed.

The digital computer was recognized as an information processing machine for some time but it was not until the fifties that business began to appreciate information as a "specific input to the production process" (McRae, 1971, p. 10). The economic advantages of computer processing became apparent, and businesses were persuaded to centralize their long standing but highly fragmented and, in many cases, dysfunctional information systems. Computerization not only offered economic benefits but also provided flexibility which made it possible to generalize its application to almost any business or organization (McRae, 1971).

In early applications, primary emphasis in development was placed on the computer systems themselves, that is, the technical application of the computer, rather than on the information system side. This changed with the involvement of social scientists in system development during the late fifties. Members of the business world began to realize that the technical achievements of the computer could not simply be added to but must be integrated as part of a total systems approach. To accomplish this end,

business turned to the management consultant and the social psychologist. Over the next few years the information system side of automated system's achieved recognition as an integral component in the development, design and successful implementation of the total system (McRae, 1971). With this recognition, the necessary personnel and skills took form and developed to achieve the overall goal.

Application to Human Services:

The post war boom and the economic prosperity enjoyed in the fifties began to decline in the early sixties and continued into the seventies. With this period of economic decline, demands for human services increased while financial resources to meet service needs became more and more strained (Fein, 1975). No longer could those responsible for providing human services expect to be provided with substantial funds to be spent wherever and whenever they deemed appropriate. (Elpers and Chapman, 1978). This realization raised the issue of accountability (Fein, 1975).

It became apparent that the public's demand for accountability went beyond simply providing good accounting practices to prevent the embezzlement of public funds. Accountability meant providing the assurance that services were being provided to those who truly needed them, in particular the poor, minorities, and the disadvantaged, and demonstrating that the needs of these often-hard-to-reach groups were being met (Elpers and Chapman, 1978). In addition, programs were required to demonstrate that they were doing so in a cost-effective way. Elpers and Chapman (1978) note that even beyond the public's demand for accountability there lies "the personal, professional, and ethical requirements for human service providers to integrate their services with those of others in meeting the variety of social needs that arise" (p. 174).

The issue of accountability placed pressure on human service organizations to increase the quality and quantity of information collected and produced, to facilitate a more rational decision-making process, to improve program planning, and to assist in allocating limited staff and financial resources (Fein, 1975). The growth of computer technology coupled with the need for information led to the development of automated information systems in the early sixties (Laska and Bank, 1975). With respect to computerized systems in mental health, Laska and Bank state that "generally these systems were initiated on a research and demonstration basis and though some are funded through service delivery organizations, many are funded through research oriented agencies" (p. 41). The application of computerized systems in human services has increased significantly since the early sixties, although they remain innovative, and although they are often economically unfeasible for smaller agencies, "systems utilizing computers have been established in many countries on federal, state and regional bases as well as in individual facilities" (Laska and Bank, 1975, p. 41).

OBJECTIVES OF M.I.S. IN HUMAN SERVICES

Accountability has thus become a crucial issue in human services. "The demand for greater accountability has pushed those within the field to look for more efficient and effective ways to evaluate social service programs" (Hoshino and MacDonald, 1975, p. 10). In an attempt to become more accountable, agencies have had to assess what they are doing and what they can do. It is in achieving this goal that computer technology has and will continue to be a vital tool (Hoshino and MacDonald, 1975). The objectives of automated systems in human services include providing management with the data necessary to assist in program planning and development, program monitoring, evaluation, and research.

Program Planning and Development:

Elpers and Chapman (1978) note that "without good information, planning becomes no more than speculation" (p. 175). It is within this framework that the application of computer knowledge has offered exiting possibilities. The advantage of a computerized system, according to Fuller (1970), "is its capacity to store large volumes of data and to make data available for use on demand.... (The Human service administrator) may utilize the computer to help...save the considerable time that is required to sift through the thousands of details of his agency's operation, which is an imperative task for effective decision-making" (p. 606).

Sorenson and Elpers (1978) see the computerized information system as the "principle tool" (p. 128) and key to effective program planning and development. They note that for many human service programs, the planning process has been almost non-existent because managers and administrators frequently lack necessary information. They state:

The exigencies of launching programs, day-to-day program survival and continuous funding crises have thwarted many efforts to engage in creative long-range planning. Consequently most service programs have only perfunctory planning and development capacity: those that seriously attempt to plan find that events and programs seldom go as planned, something always goes wrong... Most frequently, planners and administrators fail because they lack the requisite information and corresponding information processing capability (p. 128).

Computerized information systems have assisted the planning and development process by providing information that helps administrators assess the pattern of service delivery and by outlining how current resources are being used (Sorenson and Elpers, 1978). In addition, Fuller (1970) points out that computers can be programmed to handle many of the routine and repetitive tasks of human service administration. This then may free up the necessary time for administrators to be more fully involved in planning and development activities.

Program Monitoring:

Computerized information systems have also been shown to be an effective tool in program monitoring. Over and above providing necessary information on the quantity of services being delivered to assist in planning activities, they provide both managers and helping professionals with information on the quality of that service (Elpers and Chapman, 1978). For example, a system can provide monitoring which will assist in assessing how appropriate particular admissions or client entries into a program are. An integrated information system can also organize data for the multiple reporting requirements of a program or agency for the purpose of fulfilling both internal and external monitoring requirements of boards, funders, government and the public at large (Sorensen and Elpers, 1978).

As a monitoring tool, the computerized M.I.S. has offered numerous possibilities to assist in meeting the overall goal of agency accountability. The extent to which it is used and how it is used in monitoring performance however, must be weighed against the threat it may pose to staff and its overall effect on working relationships among agency staff (Trute, Tonn and Ford, 1980). Consideration of the human factors involved in system application is an essential ingredient in developing and implementing an effective and efficient computerized system (Hartman, Matthes and Proeme, 1968). Due to the importance of human factors for the total system, they will be reviewed separately under the title of Special Issues in this report.

Evaluation:

Hoshino and McDonald (1975) note that agencies must begin to evaluate their own programs if they hope to justify their services. They state, "evaluation implies creating, processing, and using information. Computer technology offers a tool that will greatly facilitate these processes while

also acting as a catalyst to encourage ongoing program evaluation"(p. 10). A computerized information system can contribute necessary data and provide the processing capability to produce essential program feedback which, in turn, can provide program managers with the ability to compare program outcomes with objectives in order to evaluate their practice (Elpers and Chapman, 1978). Accountability requires the capacity to ascertain and report the true nature and effects of practice; that is, accountability requires evaluation (Reid, 1974).

Human service programs "traditionally have been carried out without systematic accumulation of information concerning their operations or outcomes" (Reid, 1974, p. 586). The introduction of the computerized information system in human services has made it possible for agencies to develop more accurate and informative ways of evaluating their services and thus accounting for their actions. Attkisson, Hargreaves, Horowitz and Sorensen (1978) go so far as to state that "if one had to pick the most important technical development in the evaluation field in recent years, it would probably be the concept of the integrated management information system" (p. 468).

The integrated M.I.S. cannot solve all the problems inherent in program evaluation; however, it can help in making effective evaluation possible. The utility of the M.I.S. in carrying out evaluation is related to the quality of the system. Installing a computerized system does not, in and of itself, create a useful tool for evaluation. The usefulness of the tool is dependent on the quality of the system (Hoshino and MacDonald, 1975; Attkisson, Hargreaves, Horowitz and Sorensen, 1978).

Research Applications of Data:

Computerized information systems have opened up radically new possibilities for research to human service agencies (Reid, 1974). They offer agencies an incredible wealth of data upon which to draw for clinical and administrative research. Information processed in the way of reports provides data for identifying and defining research problems (Elpers and Chapman, 1978). In addition, the computer can extend the "researcher's ability to organize and reduce statistical data, and to test hypothesis through modelling and simulation" (Fuller, 1970, p. 608).

For most human service organizations, a computerized system makes data available, which were either impossible to collect or access prior to its introduction. Research for most agencies was carried out on a limited scale if at all. When it did occur, the findings were often untimely, or, for the most part, irrelevant. Computerized systems, while also open to the same pitfalls, offer possibilities in its design to overcome or at least minimize these problems (Mintzberg, 1976).

It is hoped that by meeting these objectives automated systems may assist human services to more effectively evaluate their programs with the ultimate goal being more effective intervention with a wider range of people, in particular the disadvantaged and disinfranchised groups within society. By providing data for program planning, monitoring, evaluation and research the automated system can assist in identifying who is being served, and by exclusion who is not being served, the services provided and the effectiveness of those services as well as stimulating research into alternative programming and services. The automated system, as a tool, in human services if used effectively may help meet both the short and long term goals of these services which in essence is to assist people in developing their human potential.

ISSUES IN SYSTEM DEVELOPMENT

Attkisson, Brown, and Hargreaves (1978) have noted that there is no "royal road" (p. 78) for introducing an automated information system to a human service organization. The road in fact is a very rocky one, with serious obstacles blocking successful design, implementation, and maintenance. Although not insurmountable, the problems remain serious. Some of these include: less than adequate software, computer science professionals who are unfamiliar with human services, problems of data reliability and validity, and redundant systems which intrude on the provision of services. This section focuses more specifically on issues which arise in the development of an automated system. Some preliminary considerations will be discussed, followed by a review of the phases in the development of such a system.

Preliminary Considerations:

The management information system as a tool for management "depends for its acceptance and use upon an operating climate that incorporates planning, organizing and control as essential functions" (Elpers and Chapman, 1978, p. 185). Three overriding issues related to these functions are: management commitment and involvement, development of the project team, and general staff involvement.

Management has a critical role in achieving a successful and effective system. Not only must there be "strong effective, sustained executive leadership, but there must be total commitment and support of the agency's management staff including the director" (Rubin, 1976, p. 447). The backup of an adequate management system includes "organizational arrangements, structure and procedures for adequate planning and control, clear establishment of objectives and all the other manifestations of good organization

and management" (Murdick and Ross, 1975, p. 166). Martin and Perkins (1973) note that "the use of a computer is not a panacea for poor management...The use of a computer is likely to make poor management more apparent and good management even better" (p. 593).

Management support must be translated into involvement. Murdick and Ross (1975) state "one major reason for the failure to utilize the potential of information systems is the lack of managerial involvement in the planning for system development and the design activities" (p. 422). Elpers and Chapman (1978) observe that a manager's hesitancy to become involved is often a result of feelings of inadequacy when dealing with computer technology. These feelings can be reduced through the introduction of a competent consultant who can "help the administrator understand what he or she needs to know about the technical side of a M.I.S., and data processing, in order to be able to obtain and operate an information system" (p. 186). Management involvement varies according to the level of management and the stage of development, with analysis and operations stages requiring the highest levels of involvement (Martin and Perkins, 1973). This does not mean that a manager does not have to understand how a system works, for ultimately it is the manager's responsibility to evaluate the system and take control of it. Ackoff (1967) states that "no management information system should ever be installed unless the managers for whom it is intended are trained to evaluate and hence control it rather than be controlled by it" (p. 340).

Agency control of the system is a critical issue which must be established from the beginning through management involvement. Detailed responsibility for the system must be assigned high in the agency's administrative structure so that clear policy guidelines are established for the system and its design (Rubin, 1976; Saba, 1973).

An important aspect in the overall development of a system is the

selection of a project team whose members plan, design, and develop the system. They should be responsible for consulting with and introducing the system to agency staff. It is important that the team be strategically positioned within the organization for this purpose, with clearly defined authority and decision-making ability (Saba, 1973). The team members should include the agency directors, representatives from management, data processing specialists, persons with systems and business operations skills, as well as persons with an intimate knowledge of the agency and its particular focus (Ackoff, 1967; Saba, 1973; Dearden, 1971).

The project director or co-ordinator must have excellent communication skills and the ability to co-ordinate the multi-disciplinary team and facilitate constructive team-staff interaction (Saba, 1973). In addition, he or she must share in the skills and expertise of the team components described above (Saba, 1973). It is the co-ordinator's responsibility to develop specifications for the project and ensure they are met within the original cost estimates (Lucas, 1975).

A crucial element in the successful development and operation of a system is staff acceptance (Hartman, Matthes and Proeme, 1968). Elpers and Chapman (1978) observe that "the key to acceptance is staff participation in determining the kinds of information needed for decision making and how these can be met" (p. 185). Haase (1972) states "it is essential that a participative system design approach be adopted. All line and functional staff elements involved in key decision making processes to be served by the system should be involved in its design" (p. 53).

The staff members who should be involved and the amount of involvement are highly dependent on the impact the system will have on them. Coursey, Mitchell and Friedman (1977), in discussing staff participation in program evaluation, state that "in a general sense, the need for staff involvement

probably should covary with the predicted impact of the decision on their lives" (p. 308). They suggest that involvement in decision-making should depend on: (1) the type of decision, (2) the type of organization, that is, whether or not it is hierarchical or dynamic, whether or not there are set ways of handling decisions in the organization, (3) the extent to which staff may disagree with a particular outcome of a decision, and (4) the expectations staff have about their role in decision making. For example, it would be very important to have a higher level of involvement in a dynamic organization in which staff expect to have a say in decision making than in a hierarchically oriented organization in which staff are accustomed to having decisions made for them and do not perceive themselves as having a role in decision making. This is not to suggest that staff in the latter system should have no involvement, but only to note that the type and level of involvement would probably be different.

Planning Phase:

The first step described in development of an information system involves gaining an understanding of the agency and its information needs (Martin and Perkins, 1973). This means reviewing the existing information system, patterns of service delivery, and output produced by the existing system (Elpers and Chapman, 1978). The review process includes identifying objectives and becoming familiar with how decisions are made and the major decisions made by managers.

Systems development begins with an understanding of the structure of the agency, that is, what activities must be performed, and by whom, for the organization to function effectively (Martin and Perkins, 1973). This should include a review of the information currently being collected, its flow and use, and a review of existing output in terms of reports and statistics generated at all levels of the agency (Saba, 1973). In gaining an understanding

of the existing structure it is essential to identify the overall objectives of the agency and those of different levels within the agency (Saba and Levince, 1978). Once objectives have been defined, information needs can be determined.

Murdick and Ross (1975) emphasize that a clear statement of information needs is fundamental and necessary, for unless managers can provide the specifications for what they want, the effort will produce less than optimum results. The role of the consultant is to assist management in the evolutionary process of developing this statement. In determining what information is required to satisfy the objectives of the agency, it is necessary to assess if current information is sufficient, what new information is necessary, and what existing information is unnecessary (Saba, 1973).

Also important to the process of identifying needs is the development of a thorough understanding of the major decisions that managers make at various levels in the agency. Zane (1970) states, "it is these decisions that define the kind of information required and hence define the basic parameters of the system itself" (p. 95). Ackoff (1967) suggests that important decisions required by the organization be identified and the relations between them be determined and flow-charted so as to also disclose interdependent decisions being made independently, which may indicate changes in managerial responsibility. Haase (1972) reiterates the importance of understanding the decision-making process in an agency for system success. "An information system is not an end unto itself. To be relevant the information system must serve day-to-day decision making processes" (p. 48). Therefore, it is important in identifying information needs to focus on how the output of the system will relate to the decision-making by members of the agency and, in the end, the agency's goals and objectives (Haase, 1972; Saba, 1973).

Documentation is an important part of the entire development process, but is particularly important in the planning phase (Blumenthal, 1969). The planning phase should be well documented with a detailed system plan including cost estimates. Documentation can provide a detailed plan of action which includes the type of system and ways of obtaining data processing services feasible for the agency in terms of cost, availability, and practical operation (Saba, 1973).

The initial plan for system design should be presented to management and staff for a decision to undertake a more detailed design, to modify the initial design, or to abandon the project entirely (Sorensen and Elpers, 1978). When the detailed plan is eventually accepted, it will also serve as an initial control for management in determining if all procedures are leading to the achievement of agency goals. The control function is important and must continue throughout the project if the system is to be effectively evaluated and serve the purposes of management. Ongoing documentation is also a major consideration in this process (Saba, 1973).

System Design:

Information systems are described by Sorensen and Elpers (1978) either as hierarchically oriented, with the data base and processing geared to specific interests such as functions of departments and divisions, or as system oriented, with the focus on a systems perspective, making available to users a broad base of information for observation, reaction and decision making. In a hierarchically oriented system there are separate data bases for each function, department or division, controlled by the unit to which the information is reported. A hierarchical approach can be centralized or decentralized; in a centralized system the separated data bases of various departments or functions are processed by a common unit. In a systems

oriented system all levels of decision making, together with planning and controlling activities, are incorporated into an interlocking network of subsystems. The systems approach, if integrated, channels all data into a common data base and services all processing and information functions for the organization from that data base. A distributed system orientation uses a group of information systems providing a system of subsystems (Sorensen and Elpers, 1978).

The first step in the detailed design phase, is to select the type of system which will best serve the objectives and needs of the organization in question (Martin and Perkins, 1973). Once that decision is made, the organization, as a whole, should be informed as to the purpose and nature of the system and the design effort itself (Murdick and Ross, 1975). Haase (1972) notes, "it is essential that a participative system design approach be adopted. All line and functional staff elements involved in key decision making processes to be served by the system should be involved in its design" (p. 53). However, when presenting the system to staff and inviting their participation Haase cautions over-selling the technology by promising a complex system which will be "all things to all people" (p. 53).

The next step involves defining the individual systems and subsystems within the context of the overall design and establishing information requirements and data flow. Included in this step is the assessment of the degree of automation for each operation (Murdick and Ross, 1975; Sorensen and Elpers, 1978).

Although strict adherence to this process will vary in human services, Murdick and Ross (1975) and Sorensen and Elpers (1978) note the importance of human service information systems following the key guidelines of any good system design. The guidelines described by Sorensen and Elpers (1978) include the following: (1) In order to reduce redundancy and error, source

data should be collected only once, although it may be used several times by the system. (2) In order to increase accuracy the number of steps involved in collecting data should be kept at a minimum. (3) Data should be coded such that data from one sub-system are compatible with other subsystems and that one subsystem should not have to recode data received by another sub-system. (4) Reports should be geared to the timing and processing of supporting data. (5) Source data should be thoroughly edited so that only valid data will be input into the system. (6) Audit trails and record production should be available on demand.

An important issue and a serious concern in the design of human service systems is the question of confidentiality. A human service system must ensure confidentiality of client records (Hansen, Johnson and Williams, 1977) such that, this concern must figure predominantly in the overall design of the system. Because of its importance, it will be dealt with separately under the title of Special Issues.

In designing the collection instruments themselves, Sorensen and Elpers (1978) recommend the use of techniques demonstrated to be effective in item coding, item format, and form layout. This will assist in reducing the burden of recording data and enhance accuracy and completeness. Hansen, Johnson, and Williams (1977) note that data collection instruments should be designed with the user in mind: methods of collection must be uncomplicated, and form design should be simple though ensuring the collection of all necessary data. Forms and instrumentation should also be flexible, such that it is conducive to modification when necessary. Routine data gathering should be primarily the responsibility of clerical and support staff rather than of clinical staff, when possible, while ensuring quality and completeness of the data collected. Saba (1973) adds that the design of forms and selection of input methods should be economical, acceptable to staff, and arranged so

that recording errors are kept at an absolute minimum. A system for updating and/or correction of errors when they occur should also be included.

As the collection instruments are developed, the preparation of data processing specifications should begin. This includes edit criteria, procedures for undertaking selected computations, and statistics summaries. Formats and guidelines for reports should be developed; performance criteria for data processing, including programming deadlines, confidentiality, and financial arrangements should then be made (Sorensen and Elpers, 1978).

Establishing an effective error control system is essential. "Errors must be corrected before the current run or by the processing cycle." (Wasserman, 1972, p. 209). Output from processing must be checked in order to ascertain that the system is performing properly (Lucas, 1975, p. 5). As many checks as possible should be built into the program. Written instructions should be prepared for all machine operators, and an updating process should be designed to ensure instructions are complete and current. Backup computer files should be developed such that a limited number of persons would have complete access to master files and to operating or internally stored programs. Identification and authorization codes should be developed and changed frequently (Wasserman, 1972).

As part of the control system, documentation plays an important role. In the design phase, documentation includes forms, user reports, and feedback development as well as descriptions of the design process. Documentation helps management and users to cope with the complexity of the system, provides communication from stage to stage, and assists them to modify and adapt to such things as operating and agency staff changes (Martin and Perkins, 1973).

The last aspect of the design phase prior to implementation is testing

the system. Testing the system may be done either by simulation or under actual working conditions (Saba, 1973; Murdick and Ross, 1975). Following the testing period, it may be necessary to redesign and retest prior to implementation. Murdick and Ross (1975) note that for small systems the best test may be conversion to actual operation.

System Implementation:

The phases in system development, as presented here, are distinct and separate. In fact the lines between system planning, design, and implementation are often somewhat hazy, in that the degree of detail involved in each phase may vary from one situation to another (Martin and Perkins, 1973). It is important in each phase to plan carefully the steps in the process. This is especially true in implementing the system. In implementing the system, it is essential that the project team not promise data and analysis which are not feasible under the system as designed (Dorn, 1972).

A detailed plan of implementation should be prepared. This includes the preparation of procedure manuals and orientation and training sessions for staff, management, and operations personnel (Murdick and Ross, 1975; Sorensen and Elpers, 1978). If it is decided that both current caseload data and historical data are to be entered, they should be thoroughly edited to ensure that data going into the system is as complete and error free as possible. As part of the overall monitoring plan, a quality control unit may be established to ensure the accuracy of data before and after it is processed (Wasserman, 1972; Sorensen and Elpers, 1978).

There are essentially four types of system implementation: (1) a new installation, (2) the cutting off an old system and the installation of a new one, (3) the cutting over from an old system by segments (phasing in), and (4) the operating of parallel systems and then cutting over. The method chosen will depend on the size and type of system as well as the size and type

of agency (Murdick and Ross, 1975).

The conversion step, no matter which process is used, is important in that it often involves significant changes in the way information is processed by personnel in the agency. The system must be integrated into an organization composed of people. "Not only is it difficult to foresee all of the consequences involved in the changes that are necessary, it is also imperative to understand that success of the computer's use may depend upon human factors outside the mechanized producers" (Martin and Perkins, 1973, p. 553-554).

Thus, throughout the implementation phase, the project team must provide consultation and support to all persons involved so that they understand how to complete input forms properly, how to submit the forms to be processed, how to correct errors, and how to utilize output reports. This includes consultation in the use of data (1) as a supervisory tool, (2) in determining staffing patterns, (3) in assessment of time and cost for statistical justification of funds, (4) in resource allocation, and (5) in research (Saba, 1973).

Once the system is in place with the appropriate reports and feedback being produced, the system should be evaluated (Saba, 1973; Martin and Perkins, 1973). In evaluating the system, three dimensions must be considered: (1) System performance is evaluated in light of the performance criteria developed in the planning phase; that is, does the system meet the agency's objectives and meet the needs of staff and management? (2) The time and cost factors involved in operating the system are assessed. (3) The use and acceptance of system by the organization must be considered.

System Maintenance:

The final phase in system development is system maintenance. This is

no less important than any other phase in creating a successful working information system. As Attkison, Hargreaves, Horowitz and Sorensen (1978) note, "information procedures drift into misalignment and obsolescence if not actively maintained" (p. 468).

Maintenance of the system is closely related to control and "the person who controls the computer information controls knowledge, which is power" (Saba, 1973, p. 9). Ultimately responsibility for the system, therefore, should rest with the director so that it is managed effectively and knowledgeably (Saba, 1973). The responsibility for the day-to-day operation of the system should fall on the line manager (Murdick and Ross, 1975).

However, because a vital organization is continually in a process of change, management's perceived needs for information also change. This means that the system must continually adapt to changing conditions (Murdick and Perkins, 1973). In addition, there may be a time when the need for improvement to the system will be discovered. Established formal methods for changing and documenting changes must be provided (Murdick and Ross, 1975). Meeting these ongoing needs requires the constant involvement of the project manager and staff (Saba, 1973). It is essential that the cost for these personnel be planned for in the ongoing budget for the system (Martin and Perkins, 1973).

The relationship between operations and user personnel also continues to be a crucial determinant of the success of the system. Attention must continually be paid to the human element, for, although activities associated with the maintenance of the system are often more routine than those involved with other phases, they are equally important (Lucas, 1975).

An important maintenance issue is related to the flexibility of the system. Due to the volume of data generated by a system, staff often begin to feel innundated with computer printouts or reports. Once utilization

patterns of existing data become stable, it is possible to program useful statistical reductions or eliminate some tabulations. It may also become desirable to limit data specifications; while compromising the specifications may seriously limit the retrievability of some data, rigidly following the initial specifications may, in the end, detract from the purpose of the system, that is, to be responsible to program needs (Elpers and Chapman, 1978).

SPECIAL ISSUES

In reviewing the literature on the development of computerized information systems three special issues were evident. These issues are: privacy and confidentiality, human factors, and data utilization. All three were mentioned and briefly discussed in the previous section; however, because of their overall importance to the successful use of computerized systems, especially in human services, they will be dealt with specifically in this section.

Privacy and Confidentiality:

Kelly and Weston (1975) note that the need for accountability, which has led to the introduction of computerized systems in human services, has created problems in the area of privacy and confidentiality. As computerized information systems are developed in human services, the old and comfortable organizational boundaries, within which human services providers in the past exercised control over information, are becoming blurred (Noble, 1974). Trute, Tonn and Ford (1979) state that one effect of computerization of systems "is the movement of the control of personal information into an arena that operates to a large extent without the same level of professional ethical guidelines that existed in the environment in which the information was formerly held" (p. 8). Sterling (1974) suggests that "the more information a system has about the individuals who are affected by it, the more likely it

is that the system can be humanized;... (however) the more information about individuals, that is available in such systems, the easier it becomes to misuse that information and to violate needs and desires for privacy and confidentiality" (p. 11).

Confidentiality and privacy are defined by some authors as different aspects of a single concept. Thompson and Handleman (1978), for example, define confidentiality as "a duty owed by individual or organization to preserve the privacy of data or information by not disclosing the data or information outside a specified set of people and organizations" (p. 280). They go on to define privacy as "the right of an individual or organization to control who uses and has access to data and information about that individual or organization" (p. 280). Other authors, however, define confidentiality and privacy as two separate ethical concepts. Trute, Tonn and Ford (1979) define confidentiality as a term "referring to how information, once collected, will be treated" (p. 3). Privacy, on the other hand, is defined as "the right of the individual to control the amount of information he divulges about himself" (p. 3). For the purpose of this report the latter set of definitions will be used.

Computerization has created unique risks to privacy. The speed and flexibility of recording and analysis of data, together with the computer's capacity for information storage, access, and transfer of data at relatively low unit cost, makes it possible to investigate client records in a way which was previously impossible. The possibility of the misuse of data is also increased. Because the computer maintains and makes accessible information over time, the data may have lost their relevance (Trute, Tonn and Ford, 1979). Kelly and Weston (1974) point out that many things can happen to information once it becomes part of a computer file. For example, information given for one purpose may be used for another, unintended purpose.

Unauthorized persons may gain access to data banks and copy information to another bank. Key punch or coding errors may create inaccuracies in records which the client has little or no way of checking or correcting. Finally, the mystique of the computer, that is, the aura of infallibility and authenticity surrounding it, makes it difficult to question.

Trute, Tonn and Ford, (1979) point out that different types of systems and different types of data are susceptible to different risks. Statistical data in which respondent identity is immaterial, is intended to be aggregated and summarized. Risks occur, however, when personal identifiers are not removed, data are not sufficiently aggregated, data from one data bank are linked with data from another, or unnecessary data are collected. In the case of administrative data, which are subject to analysis on individual cases, the risks are higher because of the presence of personally identifying information. The risks include the possibility of inaccurate, incomplete, or irrelevant data appearing on the file, breaches to security through the access of data by unauthorized persons, or unauthorized disclosure of data.

Privacy and confidentiality form the cornerstone of effective therapy (Kelly and Watson, 1974). It is, therefore, essential in developing effective computerized systems for human services that the security of data be ensured. Security is defined as "the actions, protections, and safeguards taken to protect data and information against loss of confidentiality, loss of privacy, loss of meaning, error or theft" (Thompson and Handleman, 1978, p. 281).

Trute, Tonn and Ford (1979), state, "the same technology of computers that create the unusual threat to privacy also allows the machine to provide security systems beyond those available to normal record-keeping systems" (p. 8). They suggest a number of ways of increasing security: The computer can be programmed to print only information aggregated at specified levels.

Access codes can be developed and the data itself can be encoded with scrambling algorithms, making it sensible only to persons having the key to the code. Numeric identifiers may be used in place of names. The computer may be programmed to record all users of the system and all programs. Hardware may be secured and kept in a secure building. Administrative provisions which ensure security should be developed in respect to the gathering, processing, and dissemination of data. Lastly, the client or person about whom data are being collected should have some control as to what information is being collected, its use, and its dissemination.

Computers can be an effective tool in human services; however, their effectiveness is highly dependent on the quality of the security they present to both clients and staff. For agency staff to conscientiously collect data and support the system, it is essential that they are confident with the controls built into and placed on the system.

Human Factors:

The human element has been noted as a critical aspect in system development that must be considered carefully during all phases of the system effort. Hartman, Matthes, and Proeme (1968) state that "in most man-machine systems...an average of well over half of the errors (or system malfunctions) are caused by the human element" (p. 1). They go on to note that the motivation and performance of individuals depends on the total job environment and on the reaction of individuals to that environment. Information system technology is not the major problem in system development or operation, but rather "human behavior and the organizational environment in which information systems must operate represent the most important elements" (Haase, 1972, p. 53). Lucas (1975) goes so far as to state that "the major reason most information systems have failed is that we have

ignored organizational behavior problems in the design and operation of computer-based information systems" (p. 6). According to Trute, Tonn and Ford (1980), "the quality of data entering the system and the ultimate utilization of its products will be dependent on the competence and commitment of people directly involved in the ongoing functioning of the information system" (p. 2).

A variety of factors influence behaviour with respect to computerized systems. Williams (1974) suggests people are resistant to change because it upsets their established patterns of behaviour so that change is often seen as a threat to their security. In terms of economics, they may fear becoming temporarily displaced or unemployed. They may be concerned about a reduction in their working hours or resent an increase in their work load. On an emotional level, they may have fears and biases towards new equipment or new methods of operation. There may be cultural barriers, limitations or concerns which are products of their cultural background. There can also be perceptual barriers such that individuals perceive the system as a criticism of their work. Dickson and Simmons (1974) in their discussion of the issue support Williams and list a variety of factors. New systems often result in changes in organizational boundaries and divisions. New systems can affect informal structures, as well, such as working relations, ethical codes, and value systems. Personal characteristics of individuals such as a person's age, personality, or historical background may also influence reaction to a new system. The method of introducing change, the way resistance is dealt with, and management's attitudes can all affect the system and its success. Mumford (1972) sees the degree of stability in the organization prior to initiating the system and the role perception of the team introducing the system as also having relevance to staff reactions to the system.

Dickson and Simmons (1974) note three general types of dysfunctional behaviour which may develop as a result of these factors: aggression, projection, and avoidance. Aggression may take the form of sabotage or attempts to beat the system. Projection can result in individuals blaming the system for personal or organizational problems. Avoidance often takes the form of ignoring output, particularly when it does not fulfill perceived information needs: for example, managers may ignore computer output and develop other sources for obtaining the same information.

With respect to the phases in system development and implementation, Trute, Tonn and Ford (1980) comment on a number of ways that may assist in minimizing staff dysfunctional behaviour. In the design phase, they recommend that system objectives be clear and realistic and be adequately presented and understood by staff. The effect of the system on staff workload should be considered, and staff should be prepared for changes. Overplanning is better than underplanning. Forms should be properly planned prior to being presented to staff. During implementation, True, Tonn and Ford suggest the development of flexible timetables which allow for setbacks rather than setting rigid schedules which may increase staff resistance. Outside consultants should reinforce the notion that the system belongs to the agency by maintaining a low profile and placing primary responsibility for the system in the hands of management. Premature testing with inadequately prepared forms should be discouraged. Management posture is also important, in that their attitudes can make a substantive difference in staff attitude toward a system. Staff incentives for becoming familiar with the system may be considered so as to reinforce staff commitment. During both the design and implementation phases, staff involvement is crucial and must be planned for and encouraged: the more controversial an issue is to staff, the more they should be involved. Consultants should be familiar with the

work of the agency. They should be direct without being patronizing, taking care not to disguise information gathering as consultation. Time should be allowed for feedback from staff on the systems progress. Appropriate and sufficient training must be provided to appropriate staff members. Practice opportunities with adequate supervision are highly recommended to ensure successful data collection. Finally, with respect to system maintenance, Trute, Tonn and Ford emphasize that the system must be flexible and open to regular review. Implementors should expect and plan for system "sag" and staff turnover.

Data Utilization:

An information system, no matter how technically sophisticated, can not be considered a success if it is not utilized by the people for whom it was designed. Ackoff (1967) identifies what he calls, "five erroneous assumptions implicit in management information systems" (p. 335). He notes that systems are designed under the assumption that: (1) Managers suffer from a deficiency of relevant information, (2) Managers know what their information needs are, (3) Given the information they need, their decision making will improve, (4) Information about other managers and departments will assist integrated decision making, and (5) Managers do not have to understand how systems work only how to use them. He argues that, in fact, management often have too much information, relevant or irrelevant; that managers often do not have adequate understanding of their own decision making processes in order to make their needs known or to adequately use information when it becomes available; that integrated data do not necessarily improve organizational decision making; and that an insufficient understanding of the system results in insufficient control. Each of these assumptions has effects on utilization of data and the system itself.

Mintzberg (1975) sees utilization as being determined by a complex relationship "between the information made available to the manager, the pressure imposed on him by the organization in which he works and the ways in which his brain received and processes the information available" (p. 1). Like Ackoff, he relates utilization to the quality of data received, the organizational climate, and decision making, but he emphasizes how managers gather information for decision making. He stresses that managers prefer verbal channels of communication, often neglecting documented sources or reports. Because of cognitive limitations, the manager restricts the amount of information which can be considered in terms of its relevance to the decision at hand, personal patterns of experience, and political realities.

In relating utilization to human services, in particular mental health services, Cohen (1977) notes that utilization of evaluation research findings is related to a variety of variables which also have relevance in terms of information system data. He notes that data are not evaluated in an unbiased way. Methodological issues are often raised to discount findings when data are controversial or disagrees with management expectations. Often administrators vary on the degree to which they value and understand scientific data. Clinicians are often skeptical of data and may find them threatening to their theoretical framework and practice. Differences between researchers and clinicians or managers, either real or perceived, may also create resistance to utilization.

In summary, data and system utilization are highly dependent on the relevance they have to decision making. Although information system data will never be the sole source of information about an event or program, they will be utilized to the degree and in the way in which they are relevant to an issue of interest to managers. Manager's interest will be specific and concrete and tied to political realities (Cox, 1977).

This has several implications for improving utilization. System planning must include not only an assessment of agency goals and objectives but also an assessment of the decision procedures and its information requirements (Ackoff, 1967). System control must be rooted in the management structure through the involvement of management in the development and implementation of the system (Murdick and Ross, 1975; Ackoff, 1967). Management involvement will also affect the credibility of data with both staff and management (Lucas, 1975; Cohen, 1977).

Glaser (1972) notes the importance of training managers to use information. However, in addition to training, managers need the necessary support or as Mintzberg (1975) refers to it, an "alter ego" (p. 19) which will assist in filtering "intelligent" information to be used in the decision process. Communication to management by back-up staff should be done verbally, whenever possible, with information and reports being stored in such a way that they are readily available to the manager (Mintzberg, 1975).

It is not enough to simply maintain a system with the hope that it will be utilized. Managers must be provided with the ongoing resources which will facilitate management utilization. Improving utilization of data may be not so much a matter of changing managers but more a matter of changing information specialist and researchers (Polivak, 1978; Cox, 1977). "It is not going to be so much a matter of training managers in the subtleties of research methodology and interpretation of results as it will be training evaluators in organization and political realities and communication skills, and having them placed in organizations so that they are in extensive contact with relevant administrators" (Cox, 1977). This contact is necessary both to assure that data reaches management in ways which will facilitate its use and to assure that researchers and information specialists can understand

organizational problems and thus ensure that information will be responsive to the real needs of the agency (Cox, 1977).

PART III

MENTAL HEALTH SYSTEMS

This section focuses on practical applications of computerized information systems in the mental health field as reported in the literature. Because of the large number of systems in operation, only a sample of systems in the United States and Canada are described. The systems are compared with respect to the facility and setting, data collection, output, confidentiality, and human factors. The sample includes regional systems, state and provincial systems, as well as individual systems.

MULTI-STATE INFORMATION SYSTEM (M.S.I.S.)

Facility and Setting:

The M.S.I.S. serves mental health programs run by state departments of mental health, individual mental health facilities, and some overseas countries. M.S.I.S. serves the New York State Department of Mental Hygiene, the Connecticut Mental Health Centre, and mental health facilities in Israel, to mention a few. Information is entered by terminals linked by telephone to the M.S.I.S. computer at the Information Sciences Division, Rockland Research Institute, Orangeburg, New York, where data are processed and stored. "Reports are generated from the central computer to a facility through its terminal. Mail or hand delivery are at times substituted for telephone linkage from terminal to computer. In some cases the system is set up on independent computers with liaison personnel from the centre system" (Laska and Bank, 1975, p. 71).

Data Collection:

M.S.I.S. gathers data on patients and direct and indirect staff services. Demographic data is collected through the "Admission Form". Administrative data is collected through the "Admission Form" as well as the "Change in Status Form" and "Termination Form". Patient problems and progress are collected through the use of a variety of forms which record clinical appraisals of a patient's psychiatric condition including mental status examination, periodic progress evaluations, diagnosis, appraisals of problems and case history. Treatment and service data are collected on the "Patient Service Form", the "Drug Order Form" and the "Direct Patient Service Form" which record the types of services given, time spent, prescriptions, and other treatment modalities. Other patient data, such as fiscal and dietary data, and other staff services performed by staff of a facility not directly related to patient care, such as indirect service encounters and education activities, are recorded on a number of other forms (Laska and Banks, 1975).

Output:

A variety of reports are produced by the system. Most forms submitted with patient information result in automatic reports being produced by the computer. Once the data are accepted by the computer as valid, a report is produced on the individual patient. Several commonly used reports are specially programmed, including the "Patient History Report" and the "Summary of Direct Services Received". Both reports are produced upon request for the time period requested. A number of other reports and lists can be generated to satisfy the requirements of the different facilities and different disciplines. Two techniques referred to as the "Generalized Alphabetic Listor" and the "Statistical Report Generator" allow users to design and request reports tailored to their own needs (Laska and Bank, 1975).

Confidentiality:

Numerous measures are taken to ensure the confidentiality of records. There are safeguards to limit access to records. Technical precautions such as internal programming checks and the use of identification codes are built into the system to prevent unauthorized access to files. Physical security measures are also in effect at terminal locations. In addition, a statute in the Civil Rights Law of New York State protects the confidentiality of data stored at the Rockland Institute: this law prohibits subpoenaing computerized records. Users of the system are encouraged to include identifying information on forms. Many facilities have retained the right to use numeric identifiers which can be linked to patients only by the facility itself (Laska and Bank, 1975).

Human Factors:

Little or no mention is made of human factors in the literature on the system. However, in a description of the system, as implemented by the New York State Department of Mental Hygiene, two issues are presented. The first deals with the need to balance the value of collecting certain data and the effort required to record it. Mention is made of attempting to reduce reporting requirements which are described as having become a burden and an interference with the provision of service. The second issue relates to confidentiality. Both staff and clients are reported as voicing strong objections to the reporting of client names; in fact they have brought suit against the department in an attempt to stop the department from assembling this information centrally (Weinstein, 1975).

SASKATCHEWAN PSYCHIATRIC SERVICES INFORMATION SYSTEM (S.P.S.I.S.)

Facility and Setting:

The S.P.S.I.S. serves all mental health programs provided by the Psychiatric Services Branch of the Government of Saskatchewan for the Province of Saskatchewan with computer services in Regina. Data is sent from regional offices to the central office where it is keypunched. Reports are generated at the central computer facility and then forwarded by mail to the regional offices (Saskatchewan, 1979).

Data Collection:

The system was first implemented in 1967 and was designed to maintain a register of the psychiatric patient population in Saskatchewan and to collect data on services delivered to the out-patient population. The revised system, implemented in 1979, was designed to collect data on services provided to both in-patient and out-patient populations, including both direct and indirect services provided by staff. Data are collected through the use of three forms. The "Registration/Termination Form" is used to collect basic socio-demographic data on all persons receiving services from the Psychiatric Services Branch. The form includes identifying data such as client name and address, as well as diagnosis and termination information. The second form, "The Change of Status/Update Form", is used to inform the central facility of changes to the "Registration/Termination Form". The "Activity Form" is designed to record the daily activities of staff members as they relate to services delivered within the program areas recognized by the Psychiatric Services Branch. Patients are again identified both by name and hospitalization number.

Output:

The system produces both routine and special reports. Regional centres receive reports on a monthly, quarterly and annual basis. They include information summaries on an administrative, departmental, or worker basis. Reports are also prepared for other agencies such as the Health Department, Administrator of Estates, and Statistics Canada. In addition, special statistical reports can be generated on either an ad hoc or scheduled basis. A description of the kind of data and tables presented in the routine reports or the capabilities for special reports are not presented in the user's guide or related literature.

Confidentiality:

A number of procedures are mentioned to protect the confidentiality of patient records. The procedures include the Oath of Office of the Public Service Commission and the Hospital Standards Act both of which limit release of information without patient consent. At the branch level, demographic data is released in aggregate form for administrative purposes. This does not include treatment data. Treatment data is released to the Administrator of Estates to assess eligibility for free psychiatric care. It is stated that this information is received as confidential. Master file tapes are housed at the Sask Comp tape library where security measures prevent unauthorized access; however, these measures are not described. A data release committee of the Branch assesses all requests for information other than requests from workers for the worker's own centre. It should be noted that data are exchanged between centres with the permission of the Branch Data Release Committee but not necessarily with the knowledge of all the centres involved. It is also noted that the Branch office will ordinarily consult with facilities affected before generating information relating to

particular clients for its own use. At year end, Statistics Canada is sent a tape file of information on persons admitted to and separated from in-patient facilities. This file excludes names but includes hospitalization numbers and diagnostic data. The Psychiatric Research Division is given a copy of the year-end master tape file but will not release information that can identify a particular client or worker without approval of the Branch Data Release Committee. No mention is made of obtaining release of information from patients at any stage in the process.

Human Factors:

Little mention is made of staff problems in the literature. The User's Guide for the 1979 system does, however, provide Staff Comment Forms to facilitate staff feedback on the system. With respect to the earlier system established in 1966, Neufeldt (1970) mentions the difficulty in obtaining compliance from professional staff although efforts were taken to keep recording by professionals down to a minimum with the bulk of recording being completed by clerical staff.

SALT LAKE COMMUNITY MENTAL HEALTH CENTRE SYSTEM

Facility and Setting:

The system is a functional subset of the on-line psychiatric assessment system developed in co-operation between the College of Medicine of the University of Utah and the Salt Lake City Veteran's Administration (VA) Hospital. The system provides a management information system which includes psychiatric assessment services. The Community Mental Health Centre provides both out-patient and in-patient services, including children's behaviour therapy, crisis intervention, consultation, training, and research. The Centre has a CRT terminal and electrostatic printer which are connected

by telephone lines to the computer at the VA Hospital. Data is typed directly into the terminal by clerical staff and reports are produced on the printer (Hansen, Johnson and Williams, 1977).

Data Collection:

Three basic documents and several ancillary forms are used for data collection. The "Admission Form", which is completed by an intake worker, is used to collect demographic, historical, and billing information as well as to change or to up-date information about the patient. The "Termination Form" collects data on client terminations and includes data for outcome and follow-up studies. The form is completed by the therapist. The third basic document is the "Day Activity Record" which is completed daily by staff members to record services performed and to act as a record of time development.

Output:

Reports may be produced at any time during normal business hours and content may be comprised of information on any of the variables in the data base. Mandatory reports for federal, state, and county agencies are automatically generated at fixed intervals. Reports for management about careload, services rendered, the cost of services, number of contacts, and patient characteristics are produced periodically at three levels; that is, a cumulative report based on the entire centre, reports on the individual service units which comprise the centre, and individual staff reports. Monthly patient billing statements, staff payroll listings, and financial reports are also generated. Budgetary and caseload data are up-dated and remain on-line for constant monitoring.

Confidentiality:

Client names and social security numbers are collected by the system and kept on file. Security codes, which are changed regularly, are used to prohibit unauthorized access. Patient data are stored off-line on magnetic tapes which must be mounted by computer operators and are only accessible during normal business hours.

Human Factors:

The system is described by Hansen, Johnson, and Williams (1977) as being designed "around the user" (p. 140). Terminal operators do not need knowledge of programming or computers. Input options and report menus are presented on the terminal including the necessary in-between steps. Detailed documentation for installation operation and maintenance of the system are provided. The system is designed to be flexible and is compatible to change in order to meet the evolving information needs of management and of the Centre. The system also includes interactive training programs that facilitate training both of staff and volunteers.

ORANGE COUNTY DEPARTMENT OF MENTAL HEALTH SYSTEMFacility and Setting:

The Orange County Department of Mental Health offers services to all age groups with both centralized and decentralized services covering the entire spectrum of mental health. Centralized services include acute in-patient care and alcoholism and drug abuse services. There are 25 service locations all situated in Orange County, California. Key punching and data processing are contracted out. Multicarbon forms are used for collecting data, with each service unit preparing its own forms and submitting them to a management information system control unit for manual editing, assembly, and transmission to the contractor (Elpers and Chapman, 1978).

Data Collection:

There are six basic documents plus some ancillary forms. The "Entry Form" collects conditions of admission, background information, history of previous mental illness, and other identifying data. The "Financial Form" collects information to establish the patient's account and sources of financial responsibility. The "Evaluation or Transition Form" serves two purposes: for new patients, it gathers diagnosis, treatment plan, and therapist's name; for patients transferred to another service, it gathers diagnosis, services rendered, status at transition, referral information, and therapist's name. The "Services Rendered Form" includes date of services, therapist, type and amount of service, next appointment, and the payment received. The "Exit Form" gives status of discharge, adjustment estimate, needed support systems in the community, and therapist's name. The last major document is an "Indirect Services Form" which gathers the kind and amount of indirect service provided by the facility (Elpers and Chapman, 1978).

Output:

A number of reports are produced by the system either on a monthly, quarterly, or annual basis. The control report, generated monthly, indicates the number of documents processed and rejected, identifying the reasons for rejection, and errors and gaps not serious enough for rejection. The locator file report, also generated monthly, gives all the data about each patient in the system alphabetically by name at the end of each month. The annual data base report produces data on patients registered during the previous year. Management reports are produced monthly and quarterly with summaries of admissions and discharges, including direct and indirect service hours in patient care, diagnosis, and a variety of other information. In terms of financial reports, patient ledgers and bills are generated monthly

with financial summaries produced on a monthly, quarterly and annual basis. Statistical reports with crosstabulations on any five variables in the system and monthly indirect service reports are produced. Other statistical reports are generated on a monthly and annual basis (Elpers and Chapman, 1978).

Confidentiality:

Very limited information is presented about confidentiality controls in the Orange County system. The California Lanterman-Petris-Short Act is mentioned as a safeguard. The act spells out requirements for confidentiality stating that prior written permission must be obtained from clients before data may be accessed in any form. Security procedures for handling data and limiting access to data are mentioned, but the actual procedures instituted by the system are not discussed (Elpers and Chapman, 1978).

Human Factors:

A variety of issues are mentioned with respect to human factors by Elpers and Chapman (1978). While staff are reported to be interested in the data produced, they are also reported as feeling inundated with computer printouts. Attempts are being made to limit the output, but this continues to be a problem. Maintenance of the system's flexibility is also cited as a problem which requires constant vigilance in maintaining this system. During the development of the system, staff from the entire department participated in determining the kinds of information needed for operating and planning decisions. This is described as being necessary in obtaining acceptance of the system and for assuring the integration of data collection procedures with other record keeping requirements. It is also mentioned as helpful in minimizing the burden of filling out forms. The active involvement of management in the development of the system is noted.

MISSOURI AUTOMATED PSYCHIATRIC INFORMATION SYSTEM

Facility and Setting:

The system was developed by the Missouri Institute of Psychiatry and the Missouri Division of Mental Health and includes 20 Missouri institutions, including clinics for the mentally retarded, state schools and hospitals for the mentally retarded, mental health centres, and state hospitals for the mentally ill. This system was designed to provide both clinical and administrative information, and data are transmitted from each of ten major mental health facilities to a computer located at the institute's facility in St. Louis (Laska and Bank, 1975).

Data Collection:

The system consists of "Census System", a clinically oriented "Standard System of Psychiatry" and an administrative system. The "Census System", which is interfaced with the other two systems, collects demographic and patient movement data. The clinical system collects information through the use of clinical instruments such as the Minnesota Multiphasic Personality Inventory, the Community Adjustment Profile Scale, and a mental status examination. The administrative system collects data for the purpose of fund encumbrance, cost accumulation, and itemized billing (Laska and Bank, 1975).

Output:

The system produces output in the form of narrative printouts. Included in the printouts are problems and positive findings from the admission checklist and the mental status examination. Details from physical examinations and a narrative description derived from other tests are included for each patient. A variety of daily and monthly formats provide census,

statistical and patient movement reports. An "Outpatient Contact System" produces listings of patient contacts, the form of therapy provided, and identification of patients who have not been seen for an extended period of time. In addition, an automated appointment roster is provided (Laska and Bank, 1975).

Confidentiality:

No information is provided on confidentiality safeguards within the system or in state law.

Human Factors:

There is only one reference to the system's accommodation to the human element. The authors note that single page checklist forms are provided to staff with space for remarks by the person completing the form (Laska and Bank, 1975).

SUMMARY

Five systems have been described here. They provide a sample of regional, state and provincial, and individual systems. The authors provide little information on the development of the systems described or about the human factors involved in system development and maintenance. With the exception of the Multi-State Information System, descriptions of procedures to ensure confidentiality are limited and little or no mention is made of system or data utilization or evaluation in any of the descriptions. Writers in the literature focus mainly on descriptions of the facility, data collection documents, and report capabilities of the systems. It is, therefore, difficult to critically evaluate or compare the systems qualitatively. Because the systems are described at the time of implementation or shortly thereafter, the authors cannot provide evaluative information or effectively comment on issues of utilization and maintenance. In general, this type of

information and the problems inherent in developing effective computerized systems are not described. This information would be useful especially to human service agencies that are exploring the possibilities of developing their own systems.

PART IV

THE PRACTICUM

Accountability in human services is, in part, a function of the ability to effectively collect and utilize information in the planning, monitoring, and evaluation of services. The impetus for this practicum grew out of this assumption together with my own experiences in the field, especially in the community health movement. The movement in Manitoba as elsewhere in the country, developed in reaction to spiralling health costs and quality of services (The Community, 1973). In 1972, amidst mounting opposition from a variety of sources, the N.D.P. government initiated a limited experiment in Community Health Centres (Manitoba, 1972). The centres, with seemingly limited planning and resources, developed as a result of the commitment and energy of staff and management along with support from segments of the community. The management and staff of the centres, however, recognized the need to collect relevant information about their services which could be used for evaluation purposes and to defend their services to the community at large. This recognition led the executive directors of the centres in consultation with Dr. Barry Trute of the School of Social Work at the University of Manitoba, to apply for a National Health Research and Development Grant to develop a prototype information system for the centres. A revised proposal which reduced the number of centres to be included in the project from the original nine to three rural and one urban was accepted in 1978, and development of the information system was begun under the name of the Health Centres Information System Project.

During this period, I was employed as a program director at Klinik Community Health Centre Inc. As a member of the management committee, I

became aware of the centre's need for relevant information in order to support funding requests, to monitor its services and to evaluate its services. The frustration of this situation generated an interest in the possibilities for a computerized system in human service settings. This interest developed with initiation of the planning phase of the Health Centres Project system in the clinic and led to my eventual employment with the project team.

PRACTICUM PROPOSAL

My employment with the Health Centres Project began midway into the implementation phase of system development. At that time, the Psychological Services Centre (P.S.C.) of the University of Manitoba was examining its own information needs and the possibility of initiating a computerized information system. The P.S.C. is a clinical training centre for the Department of Psychology and the School of Social Work and provides clinical services to the community, trains students in clinical services, and conducts research. Student therapists receive ongoing supervision from faculty advisors on staff at the centre. The staff is comprised of both full-time and part-time personnel from the Department of Psychology and the School of Social Work. The student body includes post-graduate students in psychology and both fourth year under-graduates and post-graduate students in social work. The Centre has a director, an associate director and a management committee. Funding for the centre is derived from the university budget and is administered through the university.

The practicum proposal was focused on the application of a computerized information system to a mental health setting. I developed the proposal with a view to applying some of the skills developed through my experience with the Health Centres Project and to learning new skills related to the

planning, design, and implementation phases of system development. The overall goal of the practicum was to facilitate my understanding of the role of computerized systems in human services and to gain a more comprehensive understanding of the dynamics involved in developing such a system. The practicum itself began in the spring of 1980 and was completed in June of 1981 following the initial implementation of the system.

As stated above, phases of system development have been presented as separate and distinct, when in actuality they tend to overlap considerably. This was also true in the case of the P.S.C. system. The concept of phases in development, however, facilitates discussion of the process and will be used as the principle format in describing the practicum.

PLANNING PHASE

Project Team:

In May 1980, at the request of the Director, a committee was formed to explore the feasibility of developing a computerized information system for the P.S.C. The committee consisted of three staff members and myself, with the Director of the P.S.C. as an ex-officio member. The members of the committee brought with them a variety of knowledge and skills which greatly enhanced the development of the system: the committee represented both staff and management as well as both participating disciplines, two staff being from the Psychology Department and one from the School of Social Work. The staff members had a working knowledge of the agency and its goals and objectives, as well as the political climate and human factors. The committee also included persons who had an intimate knowledge of systems in that two of the staff members were the principle and a co-investigator in the Health Centres Project.

Over the course of development of the system, the make-up of the committee went through a variety of changes. The Director, while supportive of the committee, was not actively involved in the planning sessions. The Director was informed of the committee's progress on an ongoing basis and was consulted regularly on organizational issues and funding matters. Following the planning phase, a member of the student body was added to the committee to represent student interest, and one staff member from psychology withdrew from active participation in planning sessions. A technical consultant was approached and hired following approval of the gross design process. The consultant who had also been associated with the Health Centres Project did not attend regular planning sessions but advised the committee on technical issues, reviewed all system documents, and arranged computerization and related documentation.

The committee arranged a number of meetings with the P.S.C. management and staff to inform them about the system's progress and to solicit their feedback on the system. In addition to providing the opportunity for the individual participation of different staff members at different levels and at different times, these sessions served as a means of discussing feelings and concerns of the staff and management and of facilitating their participation in the development of the system.

My role as a committee member was to share in the overall development as well as to contribute expertise from my personal experience with systems. This included participation in all phases of development, from assessing and redesigning the centre's existing information system to the initial form design, redesign, documentation, training, conversion, and implementation. I also served as committee liaison with the technical consultant. The committee experience gave me a much greater appreciation of the political and human factors which must be faced in system design, as well as of the importance

of committee make-up in dealing with organizational issues.

System and Organizational Assessment:

The planning phase began with the committee meeting with management in order to identify the needs of the P.S.C. that could be met by a computerized information system. The primary goal of the system was to provide management with a more comprehensive accounting of what clients are served, in what manner, for how long, and with what results. This information was considered necessary to assist management in making policy decisions as well as in planning, monitoring, and evaluating services to clients within the context of the centre's role as a clinical teaching unit. A secondary goal was to encourage and facilitate clinical research at the centre: the system would provide both staff and students with an organized data base which could also be used for carrying out research.

The committee next met with the administrative assistant in order to gain an understanding of existing data collection documents and the information flow within the centre. The administrative assistant was responsible for the administration of the existing file system and served a triage purposes for the clinical program. All existing documents were reviewed as to their purpose and use in the centre. I spent additional time with the administrative assistant examining the present filing system and gaining an understanding of client and information flow in the centre.

Gross Design:

It was decided by the committee to model the P.S.C. system, in part, on the existing Health Centres System. This decision was made because the goals of the P.S.C. system were similar to those of the Health Centres System. In addition, patterning the system on an already existing one facilitated the development process; adopting existing software, where possible, had obvious

cost benefits when compared with costs in time and dollars for developing a totally new system.

The system was designed to collect two types of data: socio-demographic and encounter data. Four basic documents or instruments were initially proposed to collect the data: (1) a "Socio-Demographic Registration Form" to collect basic socio-demographic data on centre clients, (2) an "Update/Correction Form" to assist in correcting errors and/or updating information collected by the registration form, (3) an "Intake/Encounter Form" to collect information on the intake assessment and ongoing therapy with individuals, couples, and families, and (4) a "Multi-Client Form" to collect information on group therapy. It was agreed by the committee that instrumentation to collect data on therapeutic outcome would be designed on an ad hoc basis when the basic system was in place and running smoothly.

Clients were identified in the system by a family-based numbering system. The numbers were to be assigned at the time of registration and correspond to file numbers. A colour-coded and consecutive numbered filing system was proposed with an alphabetical (roladex) card system to reference family numbers and cross-reference individuals within families.

It was decided that only clients being seen at the time of system implementation and following implementation would be registered. Manuals to assist with training and form completion were to be prepared for each form. Registration of clients was to be done by clerical staff and co-ordinated by the administrative assistant. Clinical staff and students were to be responsible for completion of the "Intake/Encounter Form" only.

As part of the gross design of the system, cost estimates were prepared for both an interactive and non-interactive system. The estimates included implementation costs for the fiscal year 1980-1981 and continuing costs for 1981-1982. The initial system proposal, together with the cost estimates,

were presented to the Director and management group for discussion prior to arranging for a formal proposal to staff and students.

During the development of the gross design, I was responsible for examining alternative filing and flow systems, presenting these to the committee for discussion, and assisting in the preparation of cost estimates for the alternative system. This included consulting with the health centres, the technical consultant, and community and University business concerns as to cost estimates for the filing system, forms and computer software preparation, implementation, and maintenance.

In addition, I began to prepare and design a "Referral/Information Form" (see Appendix A) to be used by the Clinical Assistant and first drafts of the registration form and "Update/Correction Form". The initial drafts were based on committee discussions and were presented to the committee for review. The proposed forms were then re-designed. This process was repeated numerous times prior to the acceptance of a final draft copy. Once a final draft was accepted, I prepared for committee discussion the accompanying manual which also went through a series of redrafting exercises. The "Referral/Information Form" was necessitated by changes in the existing system but was not part of the basic system documentation and thus did not require a manual for definition or training. The existing referral/information form of the P.S.C. was redesigned to include information from initial telephone contacts with clients. Some information which was considered no longer relevant was dropped from the form and other information which had been previously included was dropped and included on the new registration form. The initial design of the forms also included ongoing consultation with the technical consultant and the university printing services.

System Proposal:

Following meetings with the management committee on the gross design proposal, the committee outlined a specific proposal to be presented to the entire staff and student body. The proposal included a description of the system with draft forms and manuals, a discussion of issues related to confidentiality and the use of information, cost estimates, and an estimated timetable. The timetable called for the implementation of the system in the 1980-1981 academic year and the introduction of outcome measures in the following academic year. A recommendation was made by the committee for the more expensive but more functional interactive system at the end of the report.

A major issue surrounding the proposal and which necessitated the inclusion of two budget alternatives was the question of funding. At the time the proposal was presented funding for the system was very much up in the air. The existing budget of the P.S.C. did not allow for the additional costs of the system and was already strained by the normal day to day operating requirements of the centre. The possibility of grants from external private funding sources was being explored and negotiations with the Faculty of Arts of the University had been initiated. The negotiations with the Faculty of Arts, which were carried out primarily by the psychology staff member of the committee, had at first appeared hopeful. However, as time went on and no specific commitment for the ongoing funding of the system was forthcoming, the initial hope began to wane. At the end of the practicum these negotiations were still continuing but no agreement was yet in sight.

The proposal, (see Appensix B), written by the psychology staff member of the committee, was circulated to both staff and students so that they had a chance to familiarize themselves with the system and process for

implementation before a meeting of staff and students was called. The system and an outline of its development were presented at that meeting by the staff member who had written the report. The same person also facilitated the discussion that followed.

The discussion served as a valuable learning session for me. Both staff and students discussed their feelings about the system especially with respect to confidentiality, the use of data, the use of the system as a monitoring tool, and the burden it might add in terms of form completion. The discussion leader acknowledged and spoke to concerns, as did other committee members. The openness of the discussion and the acknowledgement of problems in a non-defensive way facilitated acceptance of the system and a willingness to move on to the next phase. The lack of student representation was noted by the discussion leader, and interested persons asked to contact him. The staff and student body were also encouraged to make known their concerns or problems about the system to the committee at any time during the process.

DESIGN PHASE

Design Process:

As mentioned above the design process consisted of a series of drafts and redrafts of forms and manuals. Each of the items on the forms were discussed in depth at committee sessions prior to actual form design. Staff members of the P.S.C. were consulted with respect to the applicability of items and item descriptions on an ongoing basis. This served to increase staff participation and overall acceptance of the system.

The work done previously by the Health Centres project greatly facilitated the design process. The committee modelled much of the registration form on the work done for the existing system. Items and definitions were borrowed,

when appropriate, and reworked, when necessary, to meet the needs of the P.S.C. The "Intake/Encounter Form", later retitled the "Intake/Assessment/Therapy Form", required more original design work by the committee.

My role in this process was to draft forms and manuals from the committee's discussions. This meant developing a more in depth knowledge of the principles of design and the skills involved; much of which was obtained through consultation with a senior Health Centres Project staff member who was actively involved in the form design process of that system. We reviewed drafts and, I consulted with the technical consultant on the feasibility of the form for computerization. Once a form was accepted, I was responsible for negotiating the terms of the production of the form with the printing service.

Forms:

The "Registration Information Form" (see Appendix A) was family based rather than individual or client based. It was made up of two sheets. The top sheet, with client identifying information (such as family member's names, address, and telephone numbers) was designed as a facesheet to the client file. The second sheet, with identifying information blocked out, was designed for computerization. The family was identified in the system only by the family number with individual identifiers for family members. For example, the adult male family member was identified as 00 and the adult female as 01; children were identified as 02, 03, and so on. The form was designed to collect postal code, client sex, age, occupation, whether or not the adults are single parents, the current marital status of registered adults, living arrangements, education of adult male and female, labour force attachment of adult male and female, who recommended P.S.C. to the client(s), and why the client(s) came to P.S.C. The names, addresses, phone

numbers, and relationships of significant individuals or agencies to the client's problem area were recorded on the facesheet for clinical use, but were blocked out on the second form. The date on which the form was completed and the number of the worker who supervised the completion of the form was also included on the form for computerization.

Ongoing changes to individual family structures such as the birth of a child, marriage, or separation, necessitated the development of a means for updating initial registration data. The update/correction form (see Appendix A) was developed for this purpose and was designed for clerical staff to make necessary additions, deletions, or corrections so that an accurate ongoing description of the P.S.C.'s client population was maintained. The number of the family or individual for which data were to be changed, the date on which the changes occurred, the number of the worker who completed the form, the category or item to be changed, the status of the item prior to the change as well as what it was being changed to, were included as items on the form.

The "Intake/Assessment/Therapy Form" (see Appendix A) was initially designed as an intake and therapy encounter form. Following staff feedback, the form was redesigned to include data on assessment. During the gross system design phase, it was hoped that this form could be tested during the 1980-1981 academic year. Due to the complexity of the form, however, final drafts were not available until late May of 1981. A major difficulty in the design of the form was the need for the development of a problem list which would adequately reflect the therapeutic concerns of the centre and therapeutic orientations of staff members. Initial drafts were prepared by the committee based on their own personal and academic experiences as well as the committee's review of numerous problems and diagnostic classification systems. A variety of staff members were also consulted in the process

before presenting drafts to the entire staff of the centre for feedback.

The final draft of the form was in reality a combination of three different forms used at different times: an intake form, a therapy form, and an assessment form. This met the committee's desire to maintain one form for clinical use in order to lessen the burden on staff and students of form completion.

The form was designed to collect client number(s), date of the encounter, the therapist or worker number. For intake sessions, the instrument collected: who the encounter was with, whether or not there was previous or concurrent care related to the problem area, whether or not the client(s) was in crisis at the time, the duration of the problem, the disposition of the intake sessions, and presenting problems. For assessment sessions the form collected: the type of assessment completed, who initiated the assessment, date of the first client contact, time required for the assessment, and whether or not a report was sent. In the case of regular therapy encounters with clients, the form collected: whether or not a co-therapist was involved, the co-therapist's worker number, who the encounter was with, when the encounter took place, the duration of the encounter, involvement in special programs offered by the centre, the termination of therapy, whether or not a referral was made at termination, and problems addressed during the encounter. A category called "Specialized Information" was added to the therapy section of the form to facilitate the personal research concerns of individual staff members. The problem list, entitled "Presenting Problems/Problems Addressed" was included on the reverse side of the form. The list was divided into three checklist sections, entitled: "Macro Level Problems", "Couple/Family Problems", and "Individual Problems".

Manuals:

Detailed instruction manuals were prepared for each of the three forms described. The manuals served three purposes: to document the system, to train staff and students in form completion, and to provide an ongoing reference for system maintenance. The manuals described the form, the type of data collected, form completion, and information flow. For each item on the form, examples of when and how it was to be used, together with coding lists and instructions for coding, were provided.

After the initial testing of the "Registration Information Form" the manual for the form was updated to clarify problem areas in form completion and thus ensure ongoing consistency of data.

At the termination of the practicum, I prepared the initial draft of the "Intake/Assessment/Therapy Form Manual". The manual was then turned over to the committee for discussion, revision, and rewriting. Manual preparation served an important learning function for me in that I became aware of the importance of documentation to a system. It was often only in writing the manual that I identified problems in information flow or item definition that could be dealt with prior to implementation. It also reinforced the necessity for paying attention to detail in the design process.

Computerization:

The computerization of the P.S.C. system was modelled on the Health Centre's Project which developed an interactive, table-driven system. The interactive system prompts the entry operator for each item on the form. The items are defined by the program software and include built-in checks to ensure that data, when entered, are entered correctly. For example, the system only accepts dates which are within certain ranges and, therefore, meaningful to the system. Dates outside of acceptable ranges are rejected,

and the operator is prompted to re-enter the data. The system allows for analyses to be performed more rapidly and with less effort. The system also utilized a language familiar to most social scientists, that used by S.P.S.S. (Statistical Package for the Social Sciences). This facilitates individual research ventures of both staff and students.

I consulted with the technical advisor on computerization of the forms to ensure that variables and ranges of variables were defined correctly. After an instrument was developed, the programmer developed the entry format and documentation to assist with data entry of that instrument. Once the documentation was produced, I organized data entry manuals to assist in training keypunch operators.

IMPLEMENTATION PHASE

The committee chose to stagger the implementation process as opposed to introducing the total system at one time. The approach included three steps: the introduction of the registration and update forms, the introduction of encounter data collection instruments, and the introduction of outcome measurement instruments. It was decided by the committee that phasing in the system would be less disruptive to the work done by the centre; having feedback from registration data prior to introducing part two would also reinforce the collection of encounter data and an overall commitment to the system. By the end of the practicum, part one of implementation was completed, that is, data entry had begun.

Training Process:

All full-time clerical staff, the administrative assistant, and part-time evening receptionist staff were trained in the use of the registration and update forms and in the general registration process. An initial training session was organized at which time the manuals for the forms were reviewed

in detail and staff "walked" through the registration process. This was followed by a discussion period. Two additional training sessions were organized for individuals unable to attend the first. My role was to arrange for and facilitate the initial sessions.

A second session was organized the week following the initial registration period to discuss problems encountered by the staff involved in the registration process. The session was facilitated by the psychology member of the committee and myself. Following this meeting the manual was up-dated and a form prepared for clients to assist them in registering and in the completion of the registration form.

Conversion Process:

Prior to the initiation of client registration, the conversion was planned. I worked with the administrative assistant in designing the information flow. Once the new filing system, Rolodexes, and printed form arrived, they were organized and holes punched in the forms to facilitate filing. Prior to the registration period a notice was sent to all staff members and students informing them of the conversion and initial registration procedure, and requesting their co-operation. During the first week of registration, it was my role to supervise the conversion and the evening registration sessions. This was particularly helpful to me in gaining a better understanding of the problems which occurred and learning ways to solve them.

Data Entry:

As a first step in the entry process, keypunch staff were trained in data entry. Documentation was reviewed, and each staff person received supervised experience in how to enter the data. Data entry was facilitated through the acquisition of an on-line terminal by the centre. All data entry

was completed in the centre, and forms remained in the centre at all times.

Prior to data entry, all registration forms went through manual editing. Any forms with missing information or obvious inconsistencies or mistakes were returned to the worker responsible for its completion to be corrected. The responsibility for supervising data collection and data entry was given to the administrative assistant who had worked closely with the committee throughout the development of the system.

The implementation experience reinforced the necessity of developing adequate planning and supervision for the process. Planning helped to alleviate some problems, but even the best of planning cannot irradicate all problems. Supervision was used mainly as an added support to staff members in that supervisory staff gave the rest of staff confidence and reinforced their commitment to the system.

SYSTEM ISSUES

Confidentiality:

A variety of precautions were taken by the committee to protect the confidentiality of clients, staff, and students. The system was designed so that information entered into the computer would contain no personal identifiers of any kind. The master file and all subfiles were protected by passwords to reduce the possibility of unauthorized use, and all transactions with the system were automatically recorded by the system. Access to the data entry terminal itself was governed by policies developed by the committee and ratified by the director and management group. Completed data forms were kept by the administrative assistant and locked in an office after normal business hours. Clients were informed about the system prior to registration and signed a consent form giving the centre premission to use data in an aggregate form. The use of personally identifying data required the informed written consent of the individual concerned.

In addition the committee proposed a series of policy guidelines in the use of information. The proposal recommended the establishment of a standing "Information System Advisory Committee" to monitor the operation of the system, to consider all requests for information and advise the director concerning requests, to advise the director regarding system administration, funding and resource allocation, to issue periodic reports to staff and students in system use, and to serve as a forum for communication between all parties within the centre concerning the system. The proposal also outlined policy on the use of information for administrative, teaching, and research purposes as well as prescribing a disciplinary procedure for violations of the guidelines. This proposal was accepted by the director and management group.

The issue of confidentiality was very important in creating a system which would be viable to both staff and students. The attention given to this issue by the committee pointed to its importance. The discussions of the committee reinforced the notion that agency accountability did not lie simply in the area of financial or other resource allocation, but to be truly accountable, an agency must also be able to account to the community and its clients for the use of the data it collects.

Human Factors:

The human element also received considerable attention in the overall development of the system as well as at each phase of the development. The project committee consisted of agency personnel representing both disciplines involved, as well as staff, students, and technical advisor. The committee not only encouraged participation from other agency members but actively sought it through meetings with management, through feedback sessions with staff and students, and through individual consultation with persons at all

levels of the organization. The committee never lost sight of the fact that the system was an agency system; in recommending the establishment of the "Information System Advisory Committee" they placed control of the system in the agency and its director. The policy guidelines also served to protect staff and students within the agency for possible administrative abuses of the system. The feedback sessions with both staff and students allowed for a discussion of their feelings about the system which may have otherwise gone unheard and, in the end, created bad feelings and disruptions in system development.

During the planning and design phases, the systems goals and objectives were clearly presented to staff. The formal proposal with the accompanying discussion, ensured that these were understood and that staff were prepared for the changes the system would bring. Forms were developed with attention to any added workload they might create for staff. The forms were not tested until they were sufficiently developed and had been reviewed and accepted by staff.

In the implementation phase, staff was trained and retrained to ensure an adequate knowledge of the forms and system flow. Initial and ongoing supervision was planned for and provided. The establishment of the advisory committee helped to ensure that the system would meet the ongoing needs of the agency and be able to respond to changes in agency objectives and goals.

PART V

SUMMARY

Over a period of fourteen months, the P.S.C. system was planned, and the design and implementation were initiated. Proposed timetable estimates were revised due to the nature the P.S.C. and the complexity of the encounter data collection instrument. The practicum included participation in all three phases of development of the system with emphasis on the detailed design effort.

In May of 1980, a project team was formed which incorporated persons with system development skills and knowledge of the system setting. The planning phase included identification of the system's objectives and assessment of system flow. In line with the dynamic nature of the organizational structure, a consultative approach was used to ensure management, staff, and student participation. Regular feedback sessions reinforced feelings that control of the system were within the organizational structure. A hierarchically oriented centralized data processing system was proposed and accepted by management, staff, and students. The formal proposal included guidelines for safeguarding confidentiality and cost estimates for system alternatives. The proposal documented the planning phase and was used to facilitate centre participation in decision making and to obtain feedback on the application of the system to the centre. This consultative approach to system development acknowledged the importance of the human element in the overall process.

In the detailed design phase, the information flow for the system was defined and data collection instruments, software, and documentation prepared. A family-based file system was designed with cross-referencing of individual

family members when appropriate. Client registration and general paper flow was organized so that routine data gathering became the primary responsibility of clerical and support staff rather than clinical personnel. Socio-demographic and encounter data collection instruments were designed using demonstratedly effective design formats and techniques when possible. The forms used for data collection were kept to a minimum and designed to be as simple and straightforward as possible. The input software limited access to the system and provided editing programs to ensure that the data entered was entered reliably. Detailed instruction manuals were prepared for each form and data entry documentation developed.

Socio-demographic data collection was implemented prior to the completion of the practicum. All personnel associated with client registration were trained in form completion and information flow. Key punch personnel were trained in data entry. During the conversion to the new system, personnel received supervision and support from project team members in the registration of existing clients. The conversion was monitored, and review sessions with centre personnel were organized to identify and deal with problems before they became firmly rooted. During implementation, clients were informed about the system and the use of data and asked to sign release forms giving the centre permission to use data in an aggregate form. Prior to data entry, all forms were manually edited to ensure that the data were complete and as reliable as possible. To further ensure the confidentiality of data and establish control of the system in the centre, a committee structure was proposed by the project team to monitor the system on an ongoing basis.

The delays in system implementation were the result of a variety of factors. One major factor was the nature of the P.S.C. The P.S.C. being university based follows the university timetable. It was first hoped to implement socio-demographic data collection in the late fall of 1980; however,

due to the pressures of Christmas exams and the extended Christmas break, the committee felt that if data collection was implemented in mid-November it would have to be re-implemented in mid-January. The training and conversion process, including retraining sessions, extended over the period of a month, and it was not until late in the Spring of 1981 that all the problems were worked out of the registration process. By this time, final exams were approaching and the centre activity was slowing down for the summer. The committee thus postponed implementation of the encounter data collection instruments until September of 1981.

A second crucial factor for the delay was the complexity of the encounter data collection form. The form went through several draft sessions with input from centre staff. Initially the form was designed to collect only information on clients seen for intake and ongoing therapy sessions. However, staff members felt that since students in psychology were required to also do assessments as part of their practicum, data on assessment should also be included. The development of a problem list which would meet the different needs and orientations of the centre was also an issue which required a considerable amount of attention and time to adequately develop. As a result, it was not until May of 1981 that a final draft of the form was completed. In June of 1981 the first draft of the instruction manual was prepared. The design of the group form was then left until the fall term.

The practicum served a number of purposes: it provided a chance for me to examine the application of an automated system to a mental health setting with a focus on teaching; it allowed for me to develop skills in system assessment, planning, form design, and implementation; and it provided for me a much more comprehensive picture of the human factors in system development and how to more effectively deal with those factors.

The application of an automated system to the P.S.C. allowed for the

examination of skills learned in the Health Centre's Systems Project in terms of their generalizability to different settings. It forced me to rethink and evaluate many of my assumptions about system development. It emphasized that systems cannot simply be transposed from one setting to another but they must be developed in terms of the particular needs and objectives of the setting in question. Although many technical aspects of the system were generalizable, the crucial element involved in system planning, design, and implementation were not.

The experience on the committee or project team was particularly useful to me in gaining a more in-depth understanding of the political realities involved in the centre and in learning ways of working within those realities. The system, as designed, was very much a function of the human elements and political necessities of the centre. The planning and design of the system accommodated these factors rather than confronting them so that the necessary support could be gained in order to create a meaningful and successful system.

The future of the system will depend largely on the establishment of the proposed system committee, the funding potential, and the ability of the system to produce data which are useful to the centre as a whole. This will include data relevant to policy and decision making as well as to the utility of the system as a tool for research. Although the work of system development is not complete, the system offers a great deal of potential for management, staff, and students alike.

The practicum did not include any formal evaluation process. Evaluation would have to rest on the successful completion of the tasks involved in the practicum, the supervision of the practicum committee, and the knowledge of the area as presented in this report. It is hoped that the practicum served a useful purpose to the centre and in some way will assist in meeting

their goals as a clinical setting and also as a teaching unit.

In conclusion, this report has attempted to review the literature on Management Information Systems with a specific focus on applications in human services, in particular in mental health settings. Applications of automated systems in mental health settings were presented. The practicum, which consisted of the development of an automated system for the Psychological Services Centre of the University of Manitoba, was described. The format for this description followed the format used in the literature review to facilitate a comparison of the P.S.C.'s system development with the elements of sound system development as presented in the literature.

APPENDIX A

FILE NO:

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(for office use only)

PSYCHOLOGICAL SERVICE CENTRE
109 FLETCHER ARGUE BUILDING,
UNIVERSITY OF MANITOBA
WINNIPEG, MANITOBA
R3T 2N2

CONFIDENTIAL REFERRAL/INFORMATION FORM

To assist us in gathering some important background information as quickly and as efficiently as possible it would be most helpful if you could do your best to answer the following questions. Under no circumstances will any of this information be released to any person(s) outside of our agency unless we have your written permission or in the unlikely event that records are subpoenaed by the courts. We would appreciate your answering all of the questions but refusal to do so will not in any way affect the service you receive.

DATE: _____
 YEAR MONTH DAY

NAME: _____

ADDRESS: _____

DATE OF BIRTH:

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--	--

 Yr. Mo. Day

WHAT IS YOUR REASON FOR COMING TO THE P.S.C.? (Description of Problem)

FAMILY MEMBERS ATTENDING FIRST INTAKE SESSION:

	NAME	AGE	SEX	RELATIONSHIP
1.				
2.				
3.				
4.				
5.				

CURRENT PSYCHOLOGICAL PROBLEM:

List any previous and/or current care received related to the problem stated above (psychological, psychiatric or counselling contacts).

DATE OF FIRST CONTACT	NAME OF PROFESSIONAL AND/OR AGENCY	LENGTH OF CONTACT
1.		
2.		
3.		
4.		

Indicate any medications being taken, the name, the dosage, and how often it is taken. (If you are unsure about the name and dosage please bring the medical label with you to your first appointment):

MEDICATION NAME	DOSAGE	HOW OFTEN
1.		
2.		

OTHER PSYCHOLOGICAL PROBLEMS:

Are you or any other family member currently under the care of a physician, psychiatrist, or other counselling professional for any other psychological problem: Yes ____ No ____.

If Yes: Indicate which family member, the name and type of professional (e.g. psychologist, psychiatrist, physician, social worker or other health professional) and the nature of the problem:

Family Member:

Name of Professional:

Type of Professional:

Problem:

Family Member:

Name of Professional:

Type of Professional:

Problem:

FAMILY NO.:

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DATE:

--	--	--	--	--	--

Yr. Mo. Day

WORKER NO.:

--	--	--	--	--	--

(Do Not Complete Shaded Areas)

REGISTRATION INFORMATION FORM

HOME ADDRESS: _____

POSTAL CODE: _____

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ADULT MALE

0	0
---	---

ADULT FEMALE

0	1
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SURNAME: _____

GIVEN NAME(S): _____

WORK PHONE NO.: _____

HOME PHONE NO.: _____

BIRTHDATE:

Year _____ Month _____ Day _____

Year _____ Month _____ Day _____

OCCUPATION: _____

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SINGLE PARENT: (check one)

YES

1

NO

2

(check one)

YES

1

NO

2

CURRENT MARITAL STATUS: (check one)

EDUCATION: (check one)

LABOUR FORCE ATTACHMENT: (check one)

Married

1

Separated

2

Divorced

3

Widowed

4

Living as Married

5

Never Married

6

None

Grades 1 - 4

Grades 5 - 8

Grades 9 - 12

Tech. or Voc. Training

University Education

M F

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Employed

Full-Time, Ongoing

Part-Time, Seasonal

Unemployed, Seeking Work

Not Seeking Work

Full-Time Unpaid Homemaker

Full-Time Student

Disabled Can't Work

Retired

Because No Work Available

Other

M F

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LIVING ARRANGEMENTS: (check one)

Immediate Family

1

With Relatives

2

With Friends

3

Boarding

4

Alone

5

CHILDREN AT HOME:

NAME

SEX

BIRTHDATE

0	2
0	3
0	4
0	5
0	6
0	7
0	8

TOTAL NUMBER OF CHILDREN: _____

SIGNIFICANT OTHERS: (list other individuals or agencies who are involved with the problem area)

NAME

ADDRESS

PHONE NO

RELATIONSHIP

WHO RECOMMENDED P.S.C.? (check one)

Friend or Relative

1

Physician

2

Counselling Service U. of M.

3

University Professor or Staff

4

Community Agency or Professional

5

Other (Specify)

6

WHY DID YOU COME TO P.S.C.? (check one or more)

Followed Recommendation

1

Services Unavailable Elsewhere

2

Convenient Location

3

Convenient Hours

4

Other (Specify)

5

CLIENT NO:

DATE:
Yr. Mo. Day

WORKER NO:

UPDATE/CORRECTION FORM

ITEM TO BE CHANGED	CHANGE	
	FROM	TO

PSC:01 9/80

PSYCHOLOGICAL SERVICE CENTRE INTAKE/ASSESSMENT/THERAPY FORM

For Office Use Only

CLIENT NO.:

CLIENT NO. OF OTHERS ATTENDING:

DATE:
Yr. Mo. Day

WORKER NO.:

CO-WORKER NO.:

INTAKE

CONTACT WITH: (check one)

Client ☐ 1
Client & Spouse/Partner ☐ 2
Client & Family ☐ 3
Other ☐ 4

PREVIOUS RELATED CARE: Yes ☐ 1 No ☐ 2

CONCURRENT RELATED CARE: Yes ☐ 1 No ☐ 2

CRISIS: Yes ☐ 1 No ☐ 2

PROBLEM DURATION: (check one)

Up to One Month ☐ 1
One to Six Months ☐ 2
More Than Six Months ☐ 3

DISPOSITION: (check one)

Assigned to Therapist ☐ 1
Intake Coordinating Committee ☐ 2
Referred Elsewhere ☐ 3
Resolved at Intake ☐ 4
Other ☐ 5

PRESENTING PROBLEMS: (see back of form)

ASSESSMENT

TYPE OF ASSESSMENT: (check one or more)

Behavioral ☐ 1
Intellectual ☐ 2
Neurological ☐ 3
Personality ☐ 4
Vocational ☐ 5
Psychosocial ☐ 6
Other ☐ 7

INITIATED BY: (check one)

Referral Source ☐ 1
Client/Family ☐ 2
P.S.C. ☐ 3
Other ☐ 4

FIRST CLIENT CONTACT:
Yr. Mo. Day

TIME REQUIRED FOR ASSESSMENT: (check one)

Less than 2 hours ☐ 1
2-4 hours ☐ 2
5-8 hours ☐ 3
9-16 hours ☐ 4
More than 16 hours ☐ 5

REPORT SENT: (check one) Yes ☐ 1 No ☐ 2

THERAPY

CONTACT WITH: (check one)

Client ☐ 1
Client & Spouse/Partner ☐ 2
Client & Family ☐ 3
Other ☐ 4

CONTACT PLACE: (check one)

P.S.C./University ☐ 1
Community Agency ☐ 2
Other Community ☐ 3

DURATION OF CONTRACT: (check one)

Less than 30 minutes ☐ 1
30-59 minutes ☐ 2
60-89 minutes ☐ 3
90 or more minutes ☐ 4

SPECIAL PROGRAM: (check one)

None ☐ 1
Sexual Dysfunction Clinic ☐ 2
Obesity Control Centre ☐ 3
Community Resource Unit ☐ 4
Other ☐ 5

TERMINATION SESSION: (check one)

No ☐ 1
Mutually Agreed To ☐ 2
Unilateral by Client ☐ 3
Unilateral by Therapist ☐ 4
Other ☐ 5

IF TERMINATION, REFERRAL MADE:

Yes ☐ 1 No ☐ 2

SPECIALIZED INFORMATION, IF ANY:

PROBLEMS ADDRESSED: (see back of form)

PSC:PO2 10/81

CLIENT(S) ATTENDING SESSION: _____

APPENDIX B

Proposal to Implement a Computer-Based Information System in the Psychological Services Centre

The following is a descriptive overview of a computer-based information system being proposed to P.S.C. staff and students. The overview is a working document intended to provide a focus for discussion. It is organized into six sections, namely background, system development, information flow, confidentiality, use of information, and cost.

Background

For the past two years the P.S.C. Research Committee and the Director have expressed interest in systematizing information collection at the Centre. This interest stems from two primary sources. First, the P.S.C. has no comprehensive accounting of what clients are served, in what manner, for how long, and with what results. Over time, unanswered questions concerning these fundamental issues have become increasingly embarrassing. Ad hoc efforts to determine even gross statistics have been time-consuming and often incomplete. As a result, policy decisions at the Centre are necessarily based more on impressions than on systematic information. Both ethical and service considerations clearly indicate a need for substantial improvement in our information base. Secondly, relatively little research is conducted at the P.S.C., despite the sizeable number of clients seen and apparent interest in research. Again, the difficulty involved in organizing an ad hoc data collection system is prohibitive for most staff and students.

In May, 1980 a committee was formed at the request of the Director to explore the feasibility of implementing a comprehensive, computer-based information system for the P.S.C. The committee consisted of Barry Trute, Bruce Tefft, Lillian Esses, and Mike Birmingham (an M.S.W. student), with Morgan Wright as an ex-officio member. The committee met over the late spring and summer to consider alternatives and prepare a report. The experience gained over the past three years by Barry, Bruce, and Mike in developing a computer-based information system for three district health centres in Manitoba facilitated the Committee's work. The system being proposed for the P.S.C. is modelled in part after the system presently operating in the health centres.

System Development

The core of the system is four brief, checklist forms. A "Social-Demographic Registration Form" (Appendix A) provides basic social-demographic information on Centre clients. The registration form is family-based. Information concerning all family members living at home is compiled on a single form, with each family being assigned a unique number. In other words, the family is treated as the basic social unit. Single persons living alone, of course, would only provide information relevant to themselves. Supplementing the registration form is an "Update Form" (Appendix B) which would be used as necessary to correct errors and/or keep the information on file current (e.g., reflect changes in education). We believe the registration and update forms would provide a comprehensive picture of our clients and

their social context, and would also permit simplification of the referral/information form presently completed at intake.

A revised referral/information form is presented in Appendix C.

Implementation of these forms is viewed as the first step toward a fully operational system. Once the registration and update information is flowing smoothly, an "Intake/Encounter Form" (currently being designed) would be introduced. The intake/encounter form would serve the dual purpose of providing information concerning the presenting situation at intake and later the process of therapy. Thus, the intake is conceptualized as the first in a series of therapeutic contacts. A "Multi-Client Form" for unrelated individuals (e.g. groups) would be developed to parallel the intake/encounter form for individuals and families. These forms would allow us to know the client problems presented at intake and how they are dealt with.

The final phase of system development would involve instruments to measure therapeutic outcome, beginning most likely with client satisfaction. This phase would undoubtedly be the most difficult, which is why we propose it be dealt with last. Our estimated timetable calls for introduction of the measures described previously during the 1980-81 academic year, followed by outcome measures in 1981-82.

Information Flow

Clients coming to the Centre for intake would complete the social-demographic registration form, aided by a secretary or clinical assistant. A manual (accompanying the form itself in Appendix A) would help staff define any problematic items.

After intake, the interviewer would complete the relevant portion of the intake/encounter form, again referring to a manual as necessary. A similar procedure would be followed after subsequent therapy sessions. Thus, clinical staff and students would be responsible for completing one intake/encounter form after each intake or therapy session.

Clients already being seen at the time the information system is introduced would fill out a registration form during their next visit. Intake/encounter forms for subsequent sessions would also be completed. However, no attempt would be made to obtain information on intake or therapy sessions prior to the introduction date.

The original of the social-demographic registration form would be placed in the client's file. A duplicate copy with all personal identifiers such as name and address blocked out, together with any intake/encounter forms, would be batched with forms on other clients. Information from these batched forms would be entered into a computer subfile semi-weekly (or weekly if warranted) by a trained assistant using a remote terminal. The forms would then be stored in a binder separate from client files. Subfiles would be periodically merged with a master file by a computer programmer or trained staff member to safeguard the integrity of the master file.

Confidentiality

While maintaining confidentiality is not inherently more difficult with computer-based information systems than with paper

records, the issue in either case warrants serious consideration. Confidentiality under the proposed system would be protected in four ways. First, information entered into the computer would contain no personal identifiers of any kind. Therefore, an unauthorized user would be completely unable to link information contained in the system with any individual client. Secondly, all subfiles and the master file would be protected by passwords to reduce the probability of unauthorized use. Third, information would normally be released only in aggregate form, and only then following approval of a written request. Lastly, all transactions with the system would be automatically recorded. This record would be periodically reviewed for unusual or unauthorized transactions. We believe these protections make the proposed computer-based system as safe, if not safer, than our current paper record system.

Use of Information

This aspect of the proposed system can be divided into two types, namely administrative use and research. Administrative use includes aggregate reports to P.S.C. staff, students, the Dean of Arts, etc. It may or may not involve release of information on individual clients or therapists for evaluative or other purposes. This issue is extremely important for long-term system viability and a clear policy should be established through discussion at P.S.C. meetings.

Regarding research, the Centre already has an accepted policy involving formal approval of written requests by the

Research Committee. If the number of requests increased, a priority system may have to be implemented. It is understood that information released for research would normally involve only aggregate data.

Cost

The overall cost of the proposed system can be divided conceptually into implementation costs and maintenance costs. Implementation costs are costs incurred in initially setting up the system, including form design and printing, computer hardware (equipment), computer software (programming), and miscellaneous items. Maintenance costs involve input, storage, and retrieval of information on a continuing basis. As might be expected, the former are typically greater than the latter.

The P.S.C. would realize significant savings in implementation costs relative to other service centres. Since forms are being designed by a voluntary committee, their expense is limited to printing. Moreover, we have access to the university's computer and Barry Trute has offered use of the remote terminal in his office for input and retrieval, eliminating two major hardware components. Therefore, the main implementation expense would be the software necessary to create the system. A lesser expense would involve pre-numbered files to replace our old hand-numbered files. Since family numbers would be the only link between the computer system and our paper records, it is extremely important that each family be assigned a unique number. Pre-numbered files are by far the best way to insure that duplication or omission does not occur. They could still be filed alphabetically if

desired but would be cross-checked by a wheel index containing sequential numbers and the client name assigned to each.

Once the system is operational, the primary costs would involve printing additional forms, purchasing additional files, and maintaining an ongoing computer account. As an internal university user the P.S.C. would again realize a significant savings regarding our computer account. It is difficult to know how expensive computer time would be since it depends on the number and complexity of transactions with the system. A trial period of several months would provide an indication of long-term costs. Estimated costs for the balance of this fiscal year, assuming a start-up date of December 1, and the following fiscal year are presented in Appendix D.

The budget for the last four months of fiscal 80-81 assumes that information would be entered into a MANTES file and stored on disk. This is a relatively primitive but inexpensive system compared to the health centres mentioned previously, which have an interactive, table-driven system. From a nontechnical standpoint, there are two primary differences. Concerning data entry, the former system requires the operator to define each item to the system and provides no automatic checks to insure that the information is centered correctly, whereas the latter system automatically prompts the operator for each item, which has already been defined by the system, and automatically checks to see that the information is entered correctly. Therefore, the entry process is much easier and the information much more reliable using the interactive system. Secondly, the interactive

system allows analyses to be performed more rapidly and with less programming. However, the initial programming required to set up the interactive system is more expensive and thus probably not feasible for this fiscal year.

The budget for fiscal 81-82 presents two alternatives. The first alternative is to continue the MANTES system for another year. The second alternative involves implementing the interactive system. Information from the first four months of operation would be transferred over to the new system. The committee recommends that the P.S.C. develop an interactive system as soon as possible and would be willing to facilitate obtaining the necessary funds for doing so.

Appendix D: Estimated Costs

FISCAL 1980-81 (assuming introduction date of December 1)

Pre-numbered files	500 @ 18¢	\$90.00
Printing forms and manuals		
a) Registration form	1000 @ 27.5¢	275.00
b) Intake/Encounter form	1500 @ 1.24¢	18.60
c) Update form	50 @ 10¢	5.00
d) Multiclient form	75 @ 5¢	3.75
e) Manual	30 @ 90¢	27.00
Wheel index	1 @ \$50.00	50.00
Software	8 hours @ \$12/hour	96.00
Computer account	4 months @ \$30/month	120.00
Total		<hr/> \$685.35

FISCAL 1981-82 (assuming continuation of noninteractive system)

Pre-numbered files		no expense
Printing forms and manuals		
a) Registration form		no expense
b) Intake/Encounter form	3000 @ 1.13	33.90
c) Update form	75 @ 10¢	7.50
d) Multiclient form	100 @ 5¢	5.00
e) Manual	15 @ 90¢	13.50
Software	5 hours @ \$12/hour	60.00
Computer account	12 months @ \$30/month	360.00
Computer storage tape	1 @ \$30	30.00
Total		<hr/> \$509.90

FISCAL 1981-82 (assuming implementation of interactive system)

Pre-numbered files no expense

Printing forms and manuals

a) Registration form		no expense
b) Intake encounter form	3000 @ 1.13¢	33.90
c) Update form	75 @ 10¢	7.50
d) Multiclient form	100 @ 5¢	5.00
e) Manual	15 @ 90¢	13.50

Software

a) 110 hours implementation @ \$12/hour	1320.00
b) 36 hours maintenance @ \$12/hour	432.00

Computer account 12 months @ \$75/month	900.00
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Computer storage tape 1 @ \$30	30.00
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Total	\$2741.50
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