MANAGEMENT INFORMATION SYSTEMS: BRINGING THE M AND THE IS TOGETHER

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The requirement to effectively integrate the needs of organizational management with the technology of information systems, presents a challenge to the system designer. In a community mental health center the process can be compounded by fluctuations in organizational structure, funding, and reporting requirements. This paper discusses some of the system's technology used and describes the Mental Health Management Information System (MHMIS) as implemented in Waco, Texas.

INTRODUCTION

Management information systems have matured greatly in the medical and health care industries over the past ten years or so. As with most applications of computers, the earliest use of the technology began in the areas of financial processing and reporting -- billing, payroll, and accounting. These areas were generally well defined, and automation required primarily the mechanics of translating the financial processes into computer files and logic. It may have been simple in concept, but it was not necessarily easy, as many health care practitioners and systems people will attest. Still, these were the "obvious" candidates for automation since they represented money in the form of increased revenue and (occasionally) decreased cost.

Other speciality areas in medicine have seen very dramatic advances in automation in recent years such as automated laboratory analysis, electrocardiogram analysis, and digitizing scanners. The technology available is overwhelming to most; our use of that technology is limited only by our imagination and resources ... and by our understanding of the need.

We are concerned here, however, with the management information system and its place in the community mental health center. Many have regarded the MIS as simply another use of the technology -- another set of programs to write. This is true in a sense, but the way in which technology is brought to bear is dramatically different. Historically, the primary concern in developing computer applications has been convert the objective complexity of the process into program logic. In the development of an MIS, the problem becomes one of taking the subjective management process, and restating it in terms of system's logic. In other words, the requirement may well include the bits and bytes of program logic, but goes beyond this into the gray area of system structure, interface, and information control. Most important, however, is the awareness of the management process -- that amorphous quality by which organizations succeed or fail. Our goal is not to automate management itself, but through system technology to support management. This requires the "systemization" of such vague processes as decision-making, planning, and evaluation.

Fundamental to the whole philosophy of management information systems is the understanding of management -- what it is, how it works, and how it does not work. It seems trivial to say that the MIS must interact with management process; but what is it, really, that the system must interact with the manager? the organization? the goals of the organization? Whether the interaction is well defined or not, it is vital to realize that the MIS will indeed impact all of these areas and more. Even if we cannot accurately define all levels of interaction, we must strive to make the impact as beneficial as possible.

Above all, the MIS is dependent on management. The system often acts as an "amplifier" of the management process; with a strong MIS an effective manager can become more effective, but the ineffective manager's weaknesses will be highlighted. We therefore have an implicit responsibility to control the system's impact as best we can to capitalize on the benefits, and immunize the organization against the possibility of detrimental effects.

We have found that, in order to deal with the impact of an MIS on management in a Community mental health center, we must extend the classical definition of management beyond the role of the individual manager. In the design of an MIS, we need to consider not only the normal centralized management functions but also the distributed management functions. As a category, distributed management includes those control responsibilities which exist throughout the organization such as case management and time management. A failure of the system to support distributed management functions is as potentially damaging as the failure to support central management.
The management information system is, then, an organizational analog; it reflects, complements, supports, and emulates the organization it serves.

INFORMATION AND ORGANIZATIONAL STRUCTURE

A management information system must have a defined structure in the same sense as, and compatible with, the organization it emulates. Aside from being an interesting philosophical point, this concept has very real implications in the design and implementation of an information system. We must be able to translate the structure of the organization into the structure and control of its information. Given the assumption that an organization can be defined in terms of authority, responsibility, and flow of information, the following analogies will prove useful:

- **Organizational Authority**
- **MIS Data Control**
- **Responsibility Accountability**
- **Information flow Data Interface**

Defining the terms used above:

- **Data Control** - The process of establishing data policies of the organization and assuring that data complies with that policy. These policies should stipulate the content, format, and validity considerations of the data.
- **Accountability** - The process of assuring that data is representative of the actual event being documented, and that the data can be reconstructed and substantiated if necessary.
- **Data Interface** - The process of transferring data between organizational units, and assuring that the transfer is complete, consistent, and accountable.

The management information system must support the operation, management, and decision-making processes within the organization. It must, therefore, constitute a model of the actual information flow within the agency. The extent to which the automated system models the organization will depend on the degree of automation designed and implemented; however, the total management system, i.e. the automated functions and the associated manual processes, must represent a complete picture.

As an example of the relationships described above, consider the sample organization chart shown in Figure 1. The blocks at the lowest level, points B1, B2, B3, B4, D1, and D2, have responsibility only for the specific functions assigned them and are, therefore, only accountable for the information associated with those functions. To the extent that they have authority over
their functions, they may also serve as a control point for the corresponding data. A therapist in a mental health center, for example, is responsible for recording direct service time and thereby directly accountable for that time. The policies governing staff time, however, are normally a personnel management function, so the therapist has no authority over his time and therefore does not serve as a control point for that data. The same therapist may have the authority for case management over some clients (a distributed management function as described earlier). If so, the therapist is not only responsible for the associated clinical data, but also has authority over it and therefore controls that data.

In describing the therapist's organizational role in terms of the equivalent system's terms we would make the following statements:

- Responsibility for service time - The therapist prepares, signs, and submits his own service time records.
- Accountability for service time - The therapist maintains whatever back-up documentation and supporting information to account for and, if necessary, to reconstruct his time records.
- Responsibility for clinical work - The therapist signs and submits his own additions to the case record.
- Accountability for clinical work - The therapist must be able to defend his additions to the case record both professionally and programmatically.
- Case management authority - For those clients for whom the therapist is case manager, the therapist has authority to control all data for that case, i.e. to assure that the information on file is in compliance with center policy, even if the data is supplied by another staff member.

Of course, the statements above are only representative. The actual specifications would be governed by local policy.

Referring again to Figure 1, organization point B has, within overall policy, authority over points B1 through B4, and therefore has control responsibility for all data generated below that point. Point B, therefore, would receive reporting of subordinate data sufficient to assure correctness and compliance with established policy. Note that authority and its control process does not necessarily imply detailed reporting of all data (even though entitled to it). In fact, the most effective control reporting deals with exceptions to policy or validity. On the other hand, without explicit authority, point B would receive no control reporting of data associated with points C or D, or their subordinates.

As another example of organizational impact, consider point C on the chart. This could be representative of a research and evaluation unit. Note that with no specific authority over the direct service providers, C would receive no control reporting. This implies that evaluation data could only be controlled via policy administered through points B and D.

The executive director (point A) has implicit authority and responsibility for the whole organization. This does not imply, however, that he would routinely receive data control reporting for the entire process. He would only be directly responsible for data control in those cases where authority is not delegated to a subordinate function.

Summarizing the preceding discussion:

- The point in the organization which is directly responsible for collecting (or generating) data is accountable for that data, and must maintain back-up and supporting information as necessary.
- The point in the organization which has direct authority over the collection or generation of data has control responsibility for the data, and receives reporting of invalid data and policy exceptions. Note that if the authority over a particular function is split, then control reporting of data collected by that function must also be split.

TIME CYCLE ANALYSIS

In addition to the system structure considerations discussed previously, the MIS design requires some special techniques. Although it is beyond the scope of this paper to develop these techniques to any degree, one approach is significant in its relationship to the organizational reporting and data requirements. This method can be called a time cycle analysis.

The concept of "real time" is frequently referenced in the discussion of information systems. It is often used to describe a system which is accessed directly via on-line terminals. Whereas an on-line system may, in fact, be operating in real time, the terms are more coincidental than synonymous in that case. Specifically, "real time" may be defined as the condition where data in a system is always current with respect to requests for that data; that is, the data can be entered or updated at least as frequently as it is reported. Note that this does not necessarily imply that the data must be updated instantaneously. For example, a payroll function which prepares checks and labor reporting monthly is operating in real time if the data is only entered at least monthly. However, if the same system is called upon to prepare weekly labor distribution reporting, then the data must be entered and processed weekly to meet real time. If the data must be accessed "on request" with no specific schedule, then real time can only be assured if the associated direct service and general time records are processed as soon as the time is expended, i.e. immediately and continually throughout the day. There are two considerations for the time cycle analysis in designing a system to operate in real time: 1) data must be collected and processed as frequently as the reporting cycle for that data, and 2) data should not be collected and processed more frequently than required due to the inherent cost of additional handling and processing.

The time cycle analysis when applied to a single isolated function in the organization is almost trivial. However, the functions in an organization are rarely isolated and independent. For example, assume that the payroll is
prepared bi-weekly based on employee time records, and that a report must also be prepared at the end of each calendar month for analysis of service time distribution. Since the two time cycles never necessarily agree (except at calendar year end when the payroll period may be cut short for tax reporting), the system design or must consider one of three alternatives assuming that the same data is to be used for both functions:

1. The data must be collected and processed daily to enable a cut-off on either bi-weekly or monthly points,
2. The data must be prepared for both schedules (i.e. duplicate recording),
3. The payroll system must be equipped to handle a split period whenever a monthly cut-off intervenes.

Obviously the simplest solution would be to change the payroll schedule to semi-monthly which forces both cycles to agree at month end; this solution may not be available, however.

The time cycle analysis becomes more complex when the organizational structure is considered. It is generally true that lower organizational levels require more detail reporting, that frequency of reporting will vary in accordance with the types of decisions to be made, and that higher organizational levels require reporting of combined data. These factors, coupled with the delineation of data control and accountability described earlier, create the need for carefully detailed data requirements analysis and data policy guidelines.

ADAPTABILITY ISSUES

Another inescapable quality of a management information system is that it must be adaptable to the organization. No organization is static in its structure over time. Mental health centers always seem to be in a state of flux due to changes in funding requirements, program goals, staffing requirements, and the whims of management. For the system designer to expect that the MIS can remain static is fantasy. Unfortunately, however, many systems are developed without adequate provisions for change; the result is an MIS which becomes less effective with time, and is generally expensive to maintain.

While it is certainly unreasonable to expect that all areas of system change can be anticipated, some are obvious and should be provided for. The MIS should be designed so that the most probable, and most frequent, changes can be implemented with minimal changes to the computer programs and data files. The following are the more common types of change likely:

- The addition or deletion of account numbers from the chart of accounts.
- The addition, deletion, or consolidation of organizational units.
- The addition and deletion of funding sources.
- The addition or removal of data items from transaction documents.
- The addition, removal, or consolidation of data items on "standard" reports.
- The requirement for "special" reporting.
- The addition of new transaction documents.
- The addition, deletion, or change to "standard" data codes.
- Changes in frequency of reporting.
- Changes in Federal data requirements.
- Changes in State data requirements.
- Changes in other agency (interface) data requirements.

THE MHMIS

Beginning in February of 1977, we began the development of a mental health management information system for the Heart of Texas Region Mental Health and Mental Retardation Center in Waco, Texas. Our goal was to create a mini-computer based system which was small enough to be affordable by a CMHC, and comprehensive enough to serve all aspects of the organization. The design criteria were:

- Confidentiality was to be tightly controlled
- The fiscal component must be able to track expenditures to the source of funds.
- The clinical recordkeeping functions should be able to manage all types of clinical data (except progress notes).
- Evaluation requirements should be supported.
- The organizational structure should be incorporated as much as possible into the accounting and service delivery components.
- Client outcome data should be incorporated into the record, and cost outcome reporting should be available.
- Reporting should be highly selective.
- The system must be operable by clerical level personnel.
- The system should not require the services of a full time programming technician.
- Routine system modifications should not require program changes, and should be implementable by a trained clerical person.
- The system should be able to handle a caseload of
In the initial design of the system, we reviewed all levels of management and reporting requirements including those requirements external to the CMHC (generally funding agencies). The study soon revealed that one of the major concerns should be the way in which the MIS supported the day-to-day requirements of the staff. In this regard we carefully reviewed clinical and business procedures to assure that the resulting system would effectively interact with the operating needs of the entire agency.

**DATA STRUCTURE FOR ACCOUNTING**

In order for the system to support the financial management process, the accounting function must enable the processing and reporting of data in a manner corresponding to the organizational structure. In its simplest sense, this means that the system must be able to record the identity of the organizational unit incurring expenses, earning revenue, or delivering services. There are, however, two compounding factors: first, the actual organizational units exist in a hierarchy implying that a true picture of one unit should incorporate not only that unit, but all those which report to it as well. Second, there are, in fact, alternate reporting structures in one of CMHC's which are not necessarily hierarchical. For example, consider again the chart shown in Figure 1. From the standpoint of management organization, a report of Program B (e.g. expenses) would include the consolidation of B3 data with that for B1 through B4. However, a report of overall alcohol abuse treatment would be a consolidation of B3 and D2 which is not an organizational hierarchy. Of course, the example is oversimplified. Many CMHC's have multiple levels of program structure spread across counties, satellite locations, and contract service providers. The data necessary for grant reporting, state reporting, and Federal reporting often must be collected from such non-hierarchical consolidations.

In designing the system for Waco, we had to develop a method for providing both types of consolidated reporting. To do this, the MHMIS incorporates the organizational structure of the center in terms of reporting units (RU). This structure, provided by the user, conveys to the system the hierarchy of the organization — the way in which the various organizational components relate to one another, and their identities. The structure is defined such that each reporting unit represents a point in the organization where budgeting and/or financial reporting is desired. In most agencies the organizational chart can be used directly as the RU structure.

The reporting unit is identified by its reference number, up to four digits long. The numbers may be assigned in any manner desired by the user; there is no required dependence between the numbering scheme chosen and the organizational structure. The control table which carries the RU number and its organizational relationship also provides for a descriptive name of the RU. This name may be up to 30 characters in length and is used in reporting.

During system initialization, the user enters the RU structure into the system, corresponding to his organization. The entry process prompts the user by first requesting the highest level RU, i.e. the RU which represents the total organization. The prompting proceeds downward in the chart, moving from left to right. At the conclusion of the process, the entire structure has been built.

The reporting unit number represents the highest order (left most) component of the account number. Therefore, within an RU, a complete chart of accounts may be defined — if appropriate to that organizational point. More specifically, however, this capability enables the user to stipulate which objects are to be allowed for each reporting unit. In this manner, the accounting system can be structured to confirm with organizational intent, funding, budgeting, and management reporting.

With the RU structure thus defined, the system may be requested to prepare financial reporting for either an individual reporting unit or for a hierarchy of RUs, i.e. a composite report of an RU and all those which report to it. Of course, a hierarchical report prepared for the top level RU would represent the entire organization. Any sub-structure within the organization (e.g. department, program, division, satellite, etc.) may be similarly reported.

The RU definition also enables reporting which is not hierarchical in structure. For example, each program in a CMHC may have administrative units which are not directly related to one another. Furthermore, there may be multiple administrative functions at different organizational levels within a program. Hierarchical processes will obviously not enable a combined report of all administrative units only. For this reason, the system provides a second type of RU relationship, called the category-code structure. The user may, at any time, define these relationships for special reporting. The category denotes a collection of RU relationships; the code references the RUs comprising a given relationship. For example, assume that the user has defined category "1" to mean interprogram reporting. (The example mentioned above could be considered one of these reports.) The user would then provide the code which is to identify the RU relationship necessary for reporting. The code may be any identifier up to eight characters in length. For this example, the code could be "ADMIN" (or any other name chosen). For the code "ADMIN" the user would then enter the RU numbers to be combined for reporting, for example,

<table>
<thead>
<tr>
<th>CAT</th>
<th>CODE</th>
<th>REPORTING UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ADMIN</td>
<td>137, 215, 4920, 87, 300</td>
</tr>
</tbody>
</table>

Once this has been entered into the system, the reporting function would summarize and print the financial data for reporting units 137, 215, 4920, 87 and 300 whenever
"I-ADMIN" was requested. The specification is stored by the system indefinitely; it may, of course, be changed or removed by the user at any time. The user may define a virtually unlimited number of such RU relationships.

The reporting unit is also the vehicle by which clinical and service data are tied to management reporting. The RU identifies the organizational unit delivering the service, the unit which initially contacted the client, the unit to which the client is admitted, the unit responsible for treatment planning and case management, the unit from which the client is discharged, the unit to which each staff member is primarily assigned, and the spread of time budgeted by staff member. Through these relationships, processes such as costing and resource allocation planning can be performed.

CLINICAL DATA

The MHMIS is designed to be a comprehensive record-keeping system for clinical information. The clinical data is in two categories: service-related data, and client/program data.

Service related data exists at three levels which correspond to the schedule status of the activity:

1. The services which are planned for future dates (e.g. next appointment, eligibility recertification review, length of stay review, etc.) are kept in a planned event file which identifies the case, planned date, provider, RU responsible, and type of event. Staff members are notified via system reporting of their planned events; events which are past due are highlighted.

2. For services which are imminent (typically within three days -- governed by local policy) the planned event moves into pending event status. At this time, a unique number is assigned to the event, and a document is printed to be used to account for the resolution of the event (completed, cancelled, or no-show). The document serves also to account for the staff time expended, the clinical record additions, client billing for the event, and to clear the corresponding planned and pending events.

3. The actual event data is created as the pending event is cleared, and carries the record of time spent, service rendered, and reporting unit delivering the service.

From a management reporting and control standpoint, the service data processing described above enables the tracking of plans and assures that scheduled events are accounted for. The process of case management is also greatly facilitated through the implicit abilities for tracking and follow-up. For example, the system can automatically schedule a planned event for 180 days after intake to recertify a Title XX eligible client.

Client/program data in the MHMIS is stored in two data files:

1. The client master file consists of one record per client containing approximately 150 data items. These items include the case status, client's name and address, census tract, socio-demographic data, third party payor's name and address, presenting problems, diagnoses, case manager identification, etc. The record also contains "pointers" to the individual client detail records (described below) to enable concatenation of all data regarding a single client.

2. The client detail file is a repository of those types of records which either do not necessarily exist for each client (e.g. MR profile and those types of records which may occur multiple times for a client (e.g. medications). Below is a list of these record types:
   - Case-related individuals' names and addresses - emergency contact, responsible party, legal correspondent, guardian, spouse, etc.
   - Medications
   - Problem Oriented Record - problem statements
   - Problem Oriented Record - goal statements
   - Clinical assessments - diagnoses, level of functioning, goal attainment, etc.
   - Billing summary
   - Program assignment
   - Eligibility determination
   - Alcohol abuse profile - NIAAA data set
   - Drug abuse profile - NIDA data set
   - MR profile - general status and medical factors
   - MR profile - testing and placements
   - MR profile - behavioral and social assessment factors
   - MR profile - developmental history
   - Referrals - in and out
   - Service summary - by month and by service
   - Key indicators at intake (for each intake)
   - Key indicators at discharge (for each discharge)
   - Treatment plans

Where multiple records occur in the detail file, they are organized so that the most current is retrieved first, then proceeding backward chronologically.
TABLE DRIVEN LOGIC

In order to minimize the need for modification to the computer programs as changes occur in the Center's operation and organization, the MHMIS was designed to utilize table driven logic wherever feasible. This process involves replacing some aspects of computer program logic with parameter tables that lie outside the program and can therefore be revised by non-technical personnel, and without jeopardy to the program structure or logic. Below we list these tables:

- Reporting Unit (RU) table - (described earlier) - This table contains the structural relationships of the reporting units, their identifying numbers, and corresponding names.
- Category/Code table - (described earlier) - This table contains the user-defined relationships between RU's for non-hierarchical reporting.
- Allocation Rule table - (described earlier) - This table contains the base factors for allocation and distribution of financial transactions between RU's.
- Funding source table - This table contains the identifying numbers and names of the various sources of funds for the center. In addition, the table identifies the manner in which revenue is "earned" from teach source.
- Data Dictionary - This table contains the identification of each data element in the clinical and service data bases. Each element is assigned a number which becomes the unique identifier by which the element is referenced throughout the system. The table provides the descriptive name, the file in which it is contained, the record type, the location in the record, the format in storage, the editing rule, and the number of occurrences.
- Transaction Control Table - This table is used to provide the formatting, sequence, and content of transactions for data entry, inquiry, or update. The table references data items to be accessed according to their data dictionary identifier.
- Target Group Specifications - This control table drives a generalized report program by providing the data element identifiers based on which the MHMIS selects from the data base, then lists, tabulates, or crosstabulates the records selected.
- Clinical Profile Generator - This system facility is driven by a control table of data elements to be shown on the profile, the descriptive name to be reported for each, and the data value or range of values to be tabulated.
- Data Code Table - This control table is used to establish the allowable values of various data codes for editing and reporting purposes.

Through the use of these parameter tables, the MHMIS is able to prepare a wide variety of reports, and can be adapted to the changing structure and requirements of the organization.

CRITICAL ISSUES FOR THE CMHC MIS PROCESS

As with any implementation project for a management information system, we have learned some lessons - some new, and some re-learned. This discussion would certainly not be complete unless we identified the conditions which were the most critical. Below we list those issues which presented the greatest "opportunities" for planning, control, and problem solving during the MHMIS design and implementation (listed in no particular sequence):

1. Conversion - The process of building the data base initially was, as expected, time-consuming and expensive. Our experience, however, indicated several issues which should be considered. A magnetic tape of the client data base was available from the state's computer system which contained some of the new system's data items. Although it was known that the tape contained a percentage of errors, it was assumed that 90% to 90% accurate data was better than no data. We found, however, due to the errors, the differences in data code structures, the differences in data format, and the fact that the state tape provided only part of the MHMIS data items, that the process of filling in the missing items, correcting the errors, and reformatting sometimes incompatible codes, was probably more time consuming and expensive than it would have been to start from scratch building each client's record from the case folder.

2. Parallel operation - In testing the validity of any new computer system, the process of parallel operation and checking against an existing system is advisable. However, unless the parallel operation against which the system is evaluated is known to be valid and well controlled, the result will be at best inconclusive. In those cases where the MHMIS was paralleled against internal center processes, it was relatively easy to verify results and make corrections or procedural adjustments as necessary. In the case of parallel testing against the results of a system outside the control of the center, however, the process appeared to be practically irreconcilable. This was caused by several factors: 1) the external system was, itself, being tested and therefore not absolutely reliable, 2) the external process was somewhat different in its data structure and coding, and therefore objective comparison was difficult, 3) the success of the parallel depended on duplication of the data capture process as well as the tabulation of results, and therefore procedural or control differences between the two agencies caused differences in data due to error correction cycles, cut-off dates, etc. Developing of the external system, and the developers of the MHMIS both made changes to their respective systems during the parallel test. The result of the above problems was a prolonged and difficult testing period. The volume of the data involved made it difficult to manually prove all results, and
therefore, we could not always be certain whose results were reliable.

3. Staff training - The need for thorough training of the center staff in all aspects of the system is absolutely vital. The training should include all staff, even if all staff do not have direct contact with the system or its output. Of course, the training will vary by job function. We recommend that four levels of training be conducted:
   - Orientation for all staff in the goals and objectives of the system and what its general capabilities will be. This orientation should include a statement of what impacts (both positive and negative) the system is expected to have on the staff and operation of the center.
   - Training of operations staff. Those personnel who will have direct day-to-day contact with the system (terminal operators, data control clerks, operations manager, back-up staff) should be trained in all aspects of operating the system, and all associated procedures.
   - Training of personnel who will be responsible to prepare input for the system. All direct service staff, business office staff, and support staff who prepare data for the system should be thoroughly trained in the documents used and all procedures which are associated with the documents, their preparation, error correction, and submittal.
   - Training of personnel who will receive output from the system. All staff and management who routinely receive reporting from the system or are involved in the interpretation of results must be trained in the understanding of the outputs. This training must be thorough and vary comprehensive. One of the commonest reasons for the failure of a system is that the users do not understand the results.

4. Control of system scope - In the development of any system, and especially a comprehensive management information system, there is a very real tendency for the scope of the system to grow during the project. This is largely due to the enthusiasm generated among the users during the design process. While the enthusiasm is desirable, control of it is essential. We urge that the scope of the MIS be stated in as much detail as possible at the outset of the project, and that the plan be carefully adhered to throughout.

5. Documentation - Unquestionably the least enjoyable part of systems design and development is the documentation. It is also one of the most important tasks. Documentation in such areas as operator instructions and procedures is essential to the training process and therefore must be developed early in the project. Documentation should be prepared according to a pre-defined set of standards to assure that it is uniform, complete, and intelligible.

6. Involvement of management - It is necessary that the management of the CMHC be very closely involved with the MIS development process. In addition to the obvious contribution of management to the system design, the support of management will tend to solidify the staff's support of the system and he staff's support of the system is critical.

There are surely other issues which are critical to the development and implementation of a management information system; local situations will cause local problems. Careful planning and control throughout the project are the best assurance of a successful project and an effective system.

CONCLUSION

Has the system been successful? It is still too early to assess the long range impact of the MHMIS on the organization and staff. (Full implementation was not complete until October 1978.) However, there are some interesting implications. First, there has been an apparent improvement in the quality of care in some areas. Although there are certainly MHMIS functions which may contribute to the quality of care, we believe that a major cause has been the implementation process itself. The staff has become more aware of the need for accountability and system-related procedures tend to force a greater concern for clinical services and records. The MHMIS's support for the problem oriented record is also a positive factor since the direct service staff now quantify the client's problem areas and specific treatment objectives in very finite terms.

Overall the staff has accepted the system and its procedures. This is a common area of difficulty for system implementation. Much of the credit for the staff's willingness to participate and contribute must go to the management of the center for their active support. The most serious staff-system issue has been the parallel acceptance process as described above; the prolonged parallel test and acceptance period necessitated a great amount of additional effort due to the duplicate records which had to be kept.

In general, the development of the MHMIS has been an extremely valuable experience for both the developers and the center, despite moments of frustration which seem to always accompany such a project. The issue of system logic as opposed to program logic became more evident and critical as the project evolved. Although there are complex programs in the MHMIS, the greatest complexity lies in the system's structure and the interrelationships between organizational functions. This underlines the need for a carefully detailed system design followed by a carefully controlled project.

The need to bring management and the information system together is indeed important to the community mental health center. The computer technology is readily available, and the technical expertise for programming is becoming commonplace. The requirements now are to apply system logic to the organizational structure of the agency, and to prepare management and staff to effectively use the MIS.