THE DEVELOPMENT OF A MANAGEMENT INFORMATION SYSTEM FOR A LOCAL PUBLIC HEALTH DEPARTMENT

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The Oakland County Health Division was desirous of having a single management information system that could serve all its varied programs and in doing so all types of disciplines that were employed. The primary objective was to provide a system that assisted in case management and quality assurance. Greater accountability would result as a by-product of this system through standardized and ad hoc reports.

One of the constraints going into this project was the centralized policy for computer services held by the county. Current operational systems not compatible with the county's IBM mainframe could not be adopted. After a considerable search whereby a prototype meeting the specifications of the Health Division could not be found, the decision to develop a system was made.

CHAMPS (Comprehensive Health Analysis, Management, Planning System) is a research and development project addressing the need.

The Health Division operates on the principle of management by participation. The disciplinary types, doctors, nurses, sanitarians, health educators, nutritionists, epidemiologists, substance abuse personnel, administrators, planners, clerical personnel and technical types are represented within the Health Director's Office by seven people. Through a system of upward communication and downward feedback, the needs and desires of all types of personnel, 368 in total, are considered by these seven people sitting as the Administrative Workgroup. This workgroup is the policy-making organ for our agency which serves a population of slightly over one million people and which renders approximately 1.5 million services per year.

After much deliberation, the workgroup set four major policies as follows for revising our current data management methodologies:

1. The new system would be developed for all programs and all disciplines.
2. Case management would be the primary function of the system.
3. The system must have a case evaluation or quality assurance component.
4. The eventual model would allow us to carry out the above three policies without having to change the organizational structure of the division.

Having arrived at this point, we sought help from the County's Computer Services Department. They responded by giving us a systems analyst who initiated the proper and acceptable process that it takes to develop a management information system.

A Status Committee reviewed and documented the current operational information systems, both manual and automated. This committee catalogued all previous forms studies and all the forms currently in use. Approximately 1,300 officially recognized forms were discovered and placed in a three-volume set of binders. In addition, approximately 400 "unofficial" forms were found to be in use by...
individuals or categorical program staff to meet what they determined to be their own needs.

A Charter Committee, which ran concurrently with the Status Committee, had the job of identifying the type of systems components needed and which would be worked on first. The components they identified were: (1) service delivery, (2) management, (3) personnel, (4) financial management, (5) administrative, and (6) computer resources allocation.

The component we chose to attack first was the service delivery component for the following reasons:

1. Improving case management was a very high priority in the conceptual phase.
2. The development of a data base would come from information collected on clients, who served them and how they were served.
3. The sharing of common data on clients activated program lines in number. The first component was that of administration. This component would have systems for inventory, order entry, billing, cost accounting, time studies and other features that would assist in personnel and financial management. The last component named was administration. This component would consist of software programs for health planning and research, evaluation, reporting and health resource allocation.

The component we chose to attack first was the service delivery component for the following reasons:

4. The methodology of building a data base can be developed at the program level on a program-by-program basis. In this way, priorities can be established by the organization on the basis of cost benefit or critical need.
5. Starting at the service delivery level allows more staff to be involved early on.
6. Computer Services personnel could become more familiar with the work of public health by starting with the service delivery aspect.

Following the acceptance of the reports of these two committees, both the general and specific requirements of the system were looked into. During the course of the requirements study, while keeping in mind the policies governing the conceptual phase, the system model was emerging slowly but surely. For example, in looking at the requirements among different programs and different disciplines, a thread of commonality appeared among all of them in terms of how they operated. These commonalities were followed by the staff mostly in a formal fashion as evidenced by case records while some were followed routinely in a subconscious way in the management of clients they were involved with. The common factors noted in current case management were essentially that of obtaining demographic information, taking a multifaceted health history, listing the problems, planning services to meet those problems, implementing the plan, evaluating the effect of that plan and closing the case if the problem was solved. If the problem was not solved, a new plan was usually generated.

Thus, we were convinced that a system could be constructed that is truly comprehensive from a public health point of view. We believed that a universal data base could be collected by all disciplines whether they serve in the clinic or in the field. That data base can be arranged in a consistent manner, such as use of the problem-oriented approach.

We also became convinced that there is validity in treating all users of Health Division services as a client. The basic reason for this is the potential of such a uniform system to develop relationships. It is desirable, for instance, to have a system that interrelates family members who are in a clinic setting or when a public health nurse is making a home visit. Why then do we not relate a facility where a foodborne illness has occurred to the people who became ill? Both the restaurant and the people are or will be our clients. The same would be true in a hazardous waste incident. Our concern would be twofold; one would be get the site cleaned up and, therefore, the site would be a client with a problem; the second concern would be for the people drinking well water near that site who would also become our clients because of their potential problem. If indeed we were to develop these relationships, we would necessarily need a technology that allowed for the management of data base. Thus, the emerging model was seen to be a comprehensive, client-centered, problem-oriented approach using a data base system technology.

As part of the research phase of this project, an extensive search was made to identify potential prototype candidates. To make a long story short, there was no developed system which closely met the requirements and met the system desired by the Oakland County Health Division.

Since software meeting our specifications could not be acquired, we made the decision to develop our own. Because the resources to undertake development on a scale commensurate with the complexity of this public health management information system, we chose to use an iterative lifestyle approach. In this approach, a small component of the system is fully implemented through all phases. Successive iterations build upon each component until the full system model has been achieved. Since the hardware we had available to us was a central processing unit in the Computer Services Department having data-base and data-communication software tools, we adopted the central computer prototype with interactive terminals at all service locations.

A survey of the current physical model for management information was carried out through studying a representative sample of programs. In short, our current physical model consisted of very separate categorical programs using a loosely structured semblance of the problem-oriented approach with each program having a variety of data elements collected but not
necessarily in uniform brackets.

From the information gained, we constructed a diagram of the current logical model. It showed as we suspected that most personnel in most programs were in the mode of operating by a problem-oriented approach. The striking thing depicted in the diagram was the amount of redundancy that took place in the collection of common data both in and across programs. In a sense it is a misnomer to say the different programs had common data. It was only common in the sense that it was generally demographic and medical data but it was collected by different definitions.

The logic of the current model can be summarized by saying that data was collected as requested by administrators at the local, state and federal level, plus whatever the staff of a given program thought to be important. It is safe to say that there wasn't always agreement on that. It was quite apparent that data belonged to the program or individuals collecting it. Data was not a Health Division resource but a program resource being held in separate files in many different locations.

The new logical model was constructed on the basis of deficiencies found in the current model. These deficiencies bore out that the hypothesis made during the conceptual phase and overview analysis were true. That is as follows:

1. Integration and centralization of files could be accomplished by installing a systems technology.
2. Elimination of redundancy could be accomplished and consistency could be achieved using the above methodology.
3. Timeliness of data retrieval could be enhanced by using an interactive mode via cathode ray tube terminals.
4. Quality assurance could be upgraded through formalization of the problem-oriented approach to case management.
5. Reduction in the cost of program maintenance can be achieved through use of data base management system.

When a diagram was constructed for the new model, the redundancy previously noted was done away with. However, the data flow became more complicated than the current model. The reason for this is that the new logical model shared data more and allowed for greater quality assurance. Since a data base management system handles data flow faster and more accurately than the traditional or conventional technology allows for, we would not be at a disadvantage because we planned to take the data base management system route.

The new physical system for data management was constructed in a modular way so that it can be developed in the iterative fashion discussed earlier.

These modules are differentiated into two main categories, namely primary modules and secondary modules. The primary modules are six in number and comprise the main divisions of the client-centered, problem-oriented record. The six primary modules are common intake, unique intake/update, problem list, plan, implement plan and evaluation. Each of these six modules will pertain to all of the program elements that we structure. This structure is obtained by fractionating our function into specific practical subunits. Examples of a few program elements are immunization, dental care, food service, WIC, etc. We have defined 102 program elements in the Oakland County Health Division.

The second main set of modules is called assistance or guidance modules. This set of modules consists of helpful software programs such as scheduling, order entry, billing, time study, standard care plans, reporting, etc. This set of modules can apply to any of the program elements and aids personnel at all levels to use the system in a meaningful way.

Currently, the common intake module has been programmed, tested and implemented with clients being assigned their unique number and both their primary and secondary demographic data being entered. Sixteen of the proposed sixty-three CRT's have been put in place. The security system has been worked out and the training program is in operation.

Work is now taking place on the design of the remaining modules of the problem-oriented record. The unique intake/update module contains the medico-psychosocial history, the results of the physical examination, inspection or observation, and the results of laboratory, physiometric and psychometric tests. Information and data from subsequent contacts is placed into this module so that the current status of the client can always be displayed in a single, organized way. This technique does away with the need to search through lengthy progress notes to follow the client's progress.

The problem list is essentially the organization of the multiple problems or client expected outcomes encountered, with a subsidiary listing of the active problems to be worked on.

The plan module will incorporate the activities that are to be carried out to meet the problem or the client's expected outcome. This plan would register both the activities of the staff as well as the client. We will most likely use the split screen concept to actually schedule the expected date of completion and a space to note whether that activity was accomplished by that timeline which will then nicely handle the implementation module.