CLIENT FUNCTIONAL ASSESSMENT DATA AS MANAGEMENT INFORMATION

WOODROW WILSON REHABILITATION CENTER'S MANAGEMENT INFORMATION SYSTEM

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Abstract

This paper describes the design of a functional assessment system, a component of a management information system (MIS) that supports a comprehensive rehabilitation facility. Products of the subsystem document the functional status of rehabilitation clients through process evaluation reporting and outcomes reporting. The purpose of this paper is to describe the design of this MIS component. The environment supported, the integration requirements and the needed development approach is unique, requiring significant input from health care professionals, medical informatics specialists, statisticians, and program evaluators. Strategies for the implementation of the functional assessment system are the major results reported in this paper. They are most useful to the systems designer or management engineer in a human service delivery setting. MIS plan development, computer file structure and access methods, and approaches to scheduling applications is described. Finally, the development of functional status measures is discussed. Application of the methodologies described will facilitate similar efforts towards systems development in other human service delivery settings.

Introduction

Comprehensive Vocational Rehabilitation (VR) includes physical and mental restoration services, counseling and vocational training to handicapped individuals. The terminal outcome of VR service delivery is the gainful employment of clients served. An enabling objective is to facilitate independent functioning and living.

Over the last two decades, recognition of the need for better measures of VR success has prompted the development of new sets of outcome measures. Increases in service levels and problems surfacing in VR service delivery suggested measures that were both diagnostic for service delivery and better indicators of program success.

These needs were partially addressed by the development of measures of client functioning, for example, ratings of the success in activities of daily living. Of numerous projects, few were aimed to supply needs across disciplines. Of these, even fewer used a scientific approach to data reduction. For example, the Rehabilitation Indicators Project developed over 700 skill indicators. The aim of these indicators was to provide information to service providers across disciplines, but not managers or program developers. Few of these efforts used computer systems for ongoing monitoring or VR clients. Computer systems in existence provide administrative information such as money expended and days of service. However, they seldom meet the needs of service providers, managers and program developers.

Woodrow Wilson Rehabilitation Center (WWRC) a comprehensive VR facility is currently developing a management information system (MIS). One strategy of this development was to resolve the measurement problems associated with comprehensive VR services. At the same time, MIS development was aimed at satisfying the needs of service providers, case, program and executive management. Another strategy of development was the minimization of software changes to meet the changing needs of program accountability.

The MIS plan for WWRC addresses some of the more generic information needs of a comprehensive VR facility. The noteworthy specifications of WWRC' MIS are the client functional assessment requirements. Rather than a straight-forward process where specific data are required as management information, measures of "program success" and "client outcomes" are required.

The purpose of this paper is to describe the development approach used in constructing a client based functional assessment subsystem. The environment is unique due to the comprehensive range of services and the integration requirements of comprehensive case management. Finally, the development approach is unique requiring input from physicians, psychologists, other health care professionals, medical informatics specialists, statisticians, and program evaluators. Description and rationale are provided for four development activities; (1) MIS plan development strategies; (2) file structure and access methods; (3) scheduling and implementing applications and (4) reporting measures of success to users with variable information needs.

MIS Plan Development Strategies

Plan development began with a series of training efforts for supervisors of various departments. The difference between "management information" and "information management" was explained and demonstrated. It was explained that an MIS is an information delivery system of which the computer was an integral part. Management included program developers, service providers, program managers, agency executive management, and audiences external to WWRC. Information included measures of organizational activity, client data typically required by a school and hospital, and measures of the success of services in producing measureable differences in client functional ability.
was defined as a data collection, storage and retrieval methodology, amenable to ongoing self evaluation, remaining relevant to a rapidly changing service delivery environment.

An interview approach to gathering MIS specifica-
tions was employed. Individuals within the organi-
zation were trained in the administration of a struc-
tured interview. The area of greatest knowledge of each of these interviewers was assigned to another interviewer. Thus, each interviewer could remain reasonably objective.

The structured interview was designed to answer three major questions. They were: (a) What information is provided to you by your subordinates/superordinates? (b) What information generated by other departments is used by your department? and (c) What information would you like to have that you cannot access?

These interviews were administered using a top-down approach through the organization. Executive administration was interviewed first. They were asked to identify their information sources. The process ended when no new information was gleaned from the latest source interviewed.

Interview results were compiled into MIS specifications by the interviewer group. By identifying the logical interrelationships among information, each type of information was defined with varying specificity. As a general rule, increasing specificity was desired as one moved further down the top-down organizational hierarchy. Organization of information in this manner also allowed clear identification of inter-department information needs. For example, executive managers wanted the total units of therapy provided. The program supervisor wanted the same information broken into types of therapy, therapist and client populations. Individuals designing the therapy programs wanted the number of units by skills representing types of therapy and feedback from other programs concerning the use of these skills. Case managers wanted the same information as program designers, but for every individual. Finally, service providers wanted the number of units provided by type of unit and individuals.

Efforts in staff education spanned four months. Interviewing took five months and required 1.25 FTE interviewer time and half that in interviewee time. The major strength of the approach was that more information was available to the interviewer group than was necessary for developing MIS specifications.

The major weakness with the plan development approach was the resource-intensity of the effort. Many hours of effort were exerted and resulted in too much information for specifications, but not enough information for program designs. During the development of specifications, discrepancies between interviewer knowledge of a program and interview gathered information resulted in efforts toward clarification.

If WWRC were to use this plan development approach again, several of these strategies would probably change. Preliminary identification of staff as executive or case management would probably reduce interview effort and results to those most relevant to generating MIS specifications. Finally, while a trade off between interviewer objectivity and resource use would result, plan development would probably be more efficient by assigning interviewers to the areas they represent. Discrepancies between interview information and prior knowledge of interviewers would be minimized.

A data base management system was used to increase the flexibility of information retrieval. A generic record structure in the data base, along with record formats on support files accommodated easy changes in required information, one of the MIS design strategies. This file structure and access method allowed the MIS design to include concurrent access to identical applications and the same files. It was allowed a distributed processing approach.

Scheduling and Implementation

Psychometric testing became important in defining measures for the functional assessment system. For example, "program outcomes" and "program process" were different for each service area. The continuous evolution of these measures had to be accommodated for development and maintenance purposes. Finally, in a comprehensive rehabilitation setting, similar services had overlapping information needs. Thus integration of reporting had to be considered for development scheduling.

Departments with the most easily definable measures of skills were scheduled first. Measures were based on the treatment goals in the department. For example, physical therapy (PT) has one treatment goal as independence in wheelchair transfer. They have established types of processes such as mat exercises. At the same time development was being pursued in functional assessment in departments with easily definable processes, other departments were receiving assistance by a team of non-computer professionals for developing measures of process and outcomes. For example, head trauma therapy was assisted by a psychologist, neurologist, and psychometrist.

The approach was similar to the use of a Gantt chart in research project management. The activity requiring the longest time commitment was scheduled so that its completion coincided with the availability of computer development resources. This approach provided preliminary development of measures by departments requiring this development and, at the same time, allowed other departments to begin to benefit from information provided by functional assessment.

The problem with forms and measures evolution was addressed by the file structure within the database. Figure 1 depicts the file structure for the functional assessment system. Note that all client data is grouped together. Within each client's set of records, information is further ordered by type of functional assessment. Within each type of functional assessment, data is further organized by assessment date, due to the importance of chronological retrieval of information. Finally, form number identified a record format. Each record format associated with department and form number is unloaded during retrieval to a record formatted file. Thus, the data base always recognizes a functional assessment data area and is stable with respect to changes in forms or measures. The formatted files identify specific elements within a functional assessment area. When a form changes, a new form number is
Two types of integration of information needs. The personal management program is interested in teaching a client to consistently honor social commitments. The discharge document contains ratings of skills learned. These ratings provide an opportunity to examine the probable interrelationships among skills on the two instruments.

A method for weighing the importance of variables describing skill attainment by VR clients is factor analysis. Factor analysis was conducted on both FT and OT functional skill items. Factors were then used for both reporting and system evaluation. One factor structure indicated high loadings on strength in upper extremities, level of ambulatory function and physical conditions limiting function. Reported was a composite score generated from the factor pattern for each statistically significant factor. System evaluation consists of a periodic replication of the factor analysis based on more current data. This method is a commonly used research and program evaluation tool in the social sciences.

Program Success to Different User Audiences

The global requirements of WWRC's MIS included the provision of management information to program developers, service providers, management and external audiences. MIS specifications suggested that at higher organizational levels, less detailed information was desired. Factor scores could provide some of this information, i.e., organizational goals that underlie VR service delivery. The factors described above can be used to develop client outcomes and program success measures. How to manipulate these factors for program success measurement is described below.

For clients with similar disabilities, linear regression of intake ratings on discharge ratings provides predicted skill levels on discharge. Aggregates of these measures represent program success. Factor scores used in regression are generated separately for intake and discharge functional skill ratings. These scores are substantively similar. By then using these factors to generate gain scores the variability characterizing changes in clients is more clearly due to changes occurring during treatment. Thus measurement is held constant. Factors representing VR goals are manipulated through regression analysis, providing an indicator of treatment impact on client rehabilitation. The next question is: If a client shows a significant change in his functional ability, what was the cause of this change?

This question can be answered by relating the amount and type of service delivered with skill gains. This relationship is documented through another regression equation. Questions of service program developers can be responsibly addressed in this manner. The series of indicators resulting from ratings of functional ability and their relationships provide several levels of information detail for management. Presentation of this information to users allows them to decide the level of detail they need. Information is available concerning both success in rehabilitating clients, and relationships between success and the process of rehabilitation. Replications of analysis provide insight into the impact of service delivery changes on client success.