

EVALUATION WITH LIMITED RESOURCES

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Abstract — Over the past eight years, the Alcoholism and Drug Dependency Commission of New Brunswick, with the assistance of the School of Computer Science of the University of New Brunswick, has developed a sophisticated information retrieval system utilizing available resources (i.e., university research grants, graduate students in computer science, and existing software packages). We present the advantages of the research grant arrangement to both the sponsoring institution and the university, while pointing out some of the concerns that have been faced in the design of an information retrieval system.

Résumé — Au cours des huit dernières années, la Commission de l'alcoolisme et de la pharmacodépendance du Nouveau-Brunswick a été responsable, en collaboration avec l'École d'informatique de l'université du Nouveau-Brunswick, du développement d'un système de recherche documentaire complexe, qui utilise les ressources disponibles, à savoir: les bourses de recherche universitaires, les étudiants diplômés en informatique, et les logiciels actuels. On s'est efforcé de démontrer, à l'organisme commanditaire comme à l'université, quels sont les avantages de l'arrangement consistant en l'allocation de bourses de recherche, tout en soulignant certains des problèmes que l'on a rencontré lors de la conception d'un système de recherche documentaire.

THE ALCOHOLISM AND DRUG Dependency Commission of New Brunswick was established in 1978 by an act of legislation charging the Commission to provide treatment, education, and research services for the people of New Brunswick.

THE COMMISSION

The Commission in its present form has an operating budget of approximately \$7 million. This small department employs roughly 200 staff persons, the majority of whom are involved in the provision of treatment/rehabilitation services in seven locations around the province.

The treatment centers are detoxification units, with medical and nursing components providing acute care for individuals voluntarily seeking detoxification services. The Commission's rehabilitation centers provide 28-day programs aimed at helping individuals learn to live without the use of

chemicals. The Commission also provides prevention services in the community, such as school programs, employee assistance programs, and education programs for impaired drivers.

Information Needs

As an agency of the provincial government, the Commission is accountable to the Province of New Brunswick, through the Minister of Health and Community Services. Information relating to the number of clients served, bed days, and occupancy rates is required for budget and program planning. Data pertaining to client profiles and program evaluation issues are also needed to fulfill the information requirements of the Commission.

The Commission recognized the limited resources available in-house to meet its information needs. Hence it approached the University of New Brunswick's School of Computer Science with a proposal to provide a research grant to support a graduate student research project: the development of an information retrieval system that could process and analyze demographic and behavioral data from clientele admitted to inpatient facilities.

System Development

Graduate students have been involved with the project since 1977. By 1981 a prototype of a production system was in operation. This model was designed to use data from 1,000 simulated clients in producing dummy reports. At the request of the Commission, the University began using this prototype system to process and analyze actual client data, entering the data at a rate of 5,000 to 6,000 data-entry forms per year. In effect, the system's capacity was being stretched far beyond what had originally been intended.

Over the five years that data were processed and analyzed by means of this prototype system, the management team at the Commission had come to rely on the reports that were thereby supplied. The systems limitations, however, became increasingly more apparent; a plan to develop a new, production-oriented system was developed. In 1984-85, with the approval of the provincial Treasury Board, money was allocated to begin work on the first phase of the redesign project. This involved increasing the research grant, then running at \$13,000 a year, to \$32,000 annually for two years. The increase covered the costs of additional graduate student involvement and the purchase of a new piece of equipment.

Phase 1 required the development of three new data-collection forms, the purchase of an optical mark reader (OMR) to replace key punch operators, and the design of up-load and down-load programs for the OMR.

The design of appropriate data collection instruments was pivotal to this project because the service providers were also the data collectors. The collection instruments had to be easily completable by field workers, and the output had to be meaningful to program planners and senior managers.

Three forms were designed:

1. The Client Information Form set up a file and collected demographic data on each individual admitted for services. Information collected via this form can provide both profiles of individual clients and profiles of entire populations using Commission services.
2. The Client Questionnaire Form was completed for each individual at admission. It updates a client's file by collecting information such as the admission date, the substance used, and the contacts made within the community resource network prior to admission.
3. The Client Service Record was used by outpatient counsellors to update outpatient client files at each counselling session and to record the time involved in service provision.

Phase 2 involved the design of data manipulation and report systems. The objective was "to design and implement a user-friendly, user-oriented system which [would] allow the Commission to query its collected data and generate demand and scheduled reports for administrative and research purposes" (Hyslop, 1986).

Standard reports are now produced quarterly and annually, and include regional and provincial summaries, and reports on special populations such as females, natives, youths, and seniors. Demand reports can be generated by using a report component menu that allows users to interactively design their own reports.

Design Considerations

A primary consideration when planning this project was that data processing and analysis would be off-site. Because the Commission provides confidential treatment services for drug and alcohol problems, security of personal information is essential. Any breach of confidentiality would jeopardize the Commission's credibility. The security plan devised involves restriction of

access to the system and encryption of data that is stored on the master file and on the backup tapes.

Other factors taken into account when designing the Client Information System (CIS) were:

1. The adaptability of the system to organizational change, a major concern for a young, developing organization that is adding new programming and new staff over time;
2. The ability of the system to produce both standard and demand reports;
3. The portability of the system, because it is possible that this system could at some time be moved from the university computer to the government mainframe;
4. The issue of deliverables in a non-production environment, that is, in the university. Although the Commission utilizes the system's reports for planning, forecasting, and budgeting, the students responsible for the system work in a learning rather than a production environment. Because these situations are not necessarily complementary, expectations concerning such things as working hours and turn-around times had to be adjusted;
5. The turnaround time on processing and reporting. This was a major concern. The use of an OMR has solved some of the problems by eliminating the need for data entry persons, but has created others by making accuracy of form completion the responsibility of Commission staff;
6. The integrity of the data. This was another important consideration, because of the large recidivist population with which the Commission deals. It is necessary to ensure that the information collected on each client record is consistent within that client's file. An exhaustive error-checking procedure was required to detect and resolve errors;
7. The need for contingencies for disaster recovery to be incorporated into the design. This included such things as multi-level backup, off-site storage of tapes, and a backup log;
8. The requirement that the system be flexible and expandable. To this end, it was to be modularized, with complete, detailed documentation prepared.

The aim was "that a system be built so that a user can sit down at a terminal, sign on to an interactive environment, proceed through a series of menus, find the relevant information or report desired, and then depress a function key to have the output printed" (Hyslop, 1986).

Benefits of the Arrangement

As earlier mentioned, the Commission provides the University of New Brunswick with a research grant rather than a research contract. The Commission makes the sum of \$16,000 available to the University annually. This money is used to support the work of a graduate student. There is no additional charge to the Commission for data entry, CPU time, report generation, or consulting fees. The commission is responsible only for the purchase of the printed forms used by Commission staff. With this arrangement, students can write papers and receive academic credit for their work.

The Commission considers that it has gained three benefits: a sophisticated system designed to meet its needs at a low cost; access to the type of expertise and enthusiasm that can only be found in the university environment; and an innovative product that the Commission owns.

The university has also gained from this arrangement. The research grant money has supported the work of seven graduate students to date and has provided for the purchase of an optical mark reader. Theses, senior reports, and publications have resulted from this project, and invaluable "real-life" experience in system design has been gained by the students involved.

Disadvantages to the Arrangement

The primary disadvantage to the relationship with the university was touched on briefly in the Design Section: the issue of deliverables in a non-production environment. Although there has to date been no problem in producing reports at the time required, the Commission is somewhat at the mercy of the university's schedules. Because this is not a contractual arrangement, project completion times are jointly set by the professor and graduate students involved and Commission staff.

The Commission has attempted to deal with this situation by appointing an Information Systems Committee. This committee is chaired by the Director of Treatment Services for the Commission and has, as members, the Director of Support Services, the Coordinator of Research, the researcher responsible for the maintenance of the system, and the professor who is coordinating and overseeing the efforts of the graduate students involved in the project.

The monthly meetings of this committee serve a number of important functions. They provide all key players involved in the development and management of the system with a forum to discuss issues related to the

well-being of the CIS. They involve senior managers in the workings of the system. They also ensure that the university representative is aware of the issues to be faced and the deadlines to be met by government employees.

Issues of data integrity and turn-around time have also been of concern. Although extensive error-checking procedures have been conceived both within the Commission and at the University, the root of the problem appears to be the staff members delivering the service, who are responsible for recording that service. This human element has proven to be the weakest link in the informational system. Until error rates are reduced, turn-around time on reports cannot be improved. Attempts have been made to respond to this situation by placing the onus for form correction back onto the individual staff member.

USES OF THE SYSTEM

Program Monitoring

The first use of the system is program monitoring. The data collected via the CIS have been the basis of annual statistical summaries and special reports that provide demographic, behavioral, and assessment information on the various populations served by the Commission. Changes and trends in the characteristics of populations are monitored over time (e.g., increases or decreases in admission rates, patient days, occupancy rates of centers, changes in employment rates, and incarceration rates). Areas of particular concern include the monitoring of characteristics of female admissions, youth admissions, and use of services by seniors and natives.

With the introduction of the new CIS, monitoring of the outpatient services was initiated. The Commission's first information system allowed only for the capture of data on clients as they were discharged from care, which for outpatients could be a matter of years. The information system gathers data at the opening, updating, and closing of the file, as well as at each treatment interview. This allows both counsellors and managers to know the size of the caseload each counsellor is carrying, and also provides demographic profiles of the outpatient clientele.

Program Evaluation

The second use of the system is program evaluation. The first information retrieval system was designed as a research project rather than as a tool for

monitoring of treatment services or as a tool for management. However, that original design contained the basis for the first evaluation of the Commission's inpatient services, a simple two-year follow-up.

The goal of the first evaluation was to come up with a success rate for the Commission's inpatient facilities, that is, how many of its clients remained sober over a two-year period. Because sobriety is a limited measure of successful treatment outcome, additional behavioral indicators were considered in the evaluation: frequency of use of other services in a community services network; frequency of drinking; incidence of morning drinking, seizures, quarrels; and frequency of drinking on the job.

Follow-up data, which were collected by research staff at 3-, 6-, 12-, and 24-month intervals following discharge from a Commission program, were married up with the data collected on the individual at admission to a treatment or rehabilitation center.

The findings of this study revealed the following improvements: mental health and social services visits were cut in half; medical visits were reduced by a third; and drinking on the job and days absent from work were cut by almost two-thirds. The study also found positive relationship between AA attendance, religious activity, and sobriety (Campbell, 1987).

The new CIS came on line in 1985, the same year in which New Brunswick's Cabinet requested an evaluation of the rehabilitation services provided by the Commission. This evaluation was to include a success rate that would be used to justify the costs of the rehabilitation programs. The evaluation had to be done quickly (within six months) and inexpensively (no provisions for this had been made within the budget, and no additional funds had been allocated).

A special feature of the CIS proved useful in the evaluation of the rehabilitation program. The "sample questions" box on the Client Questionnaire provides a four-by-five, number-by-letter matrix that can be used for responses to any set of specific questions, and was used in the evaluation to ask some additional questions of a group of clients who were being followed up. Collection of the follow-up data and consolidation of files were not programming issues as the baseline data existed within the database and the marrying of files would be accomplished via the existing identifiers.

Subjects for this evaluation were randomly chosen from clients discharged from rehabilitation programs during a specific time period. These individuals

were interviewed six months following discharge regarding their lifestyle, after-care, sobriety, and use of services in the community resource network.

The evaluation found a 50% success rate; that is, half of the clients were sober and had remained sober during the six-month period following discharge from Commission facilities. A marked reduction in the reported use of other community services (hospitals, jails, social services, and mental health services) was also reported (Campbell & McHugh, 1985).

The second phase of the evaluation examined the treatment (detoxification) system. In this study, the analysis of demographic data for trends was of particular concern. The goal of the Commission's treatment service is to get clients started on the road to recovery by providing adequate assessment and referral to further care, rather than to keep individuals sober over extended periods of time. Evaluation involved review of the assessment and referral services provided to clients, and included quality assurance testing within the treatment units (McHugh & Campbell, 1986).

ADDITION OF NEW INITIATIVES

System adaptability was an important feature of design. We wanted a system that could accommodate the introduction of new services provided by the Commission and the subsequent additional data collection requirements.

The latest enhancement to the system involved the introduction of a Community Services Program Contact Form. This data collection instrument which is similar to that used in the treatment services area and collects comparable types of data, allows researchers to collect and analyze information relating to the quantity and category of services provided by Commission staff working in prevention efforts.

Plans for the future include the installation of interactive terminals in all service-provision locations. This data entry format will eliminate the need for paper forms. On-line error-checking features will reduce error rates and improve turn-around time on reports.

CONCLUSIONS

The goal of this article is to provide an overview of the development of an information retrieval system that would motivate other small organizations to investigate the arrangements that can be made with universities. We believe that use of a university research grant has been of great value to the

Commission, and is a plausible alternative for small institutions with limited resources that are looking for a means of meeting information needs.

The system described here is evolving as we gain experience with it. We continue to see its limitations, and are working on the development of innovative enhancements. Indeed, one of the students assigned to the project has described the process of designing this system as "fluid."

Our present plan is to continue to work with the university as long as that relationship remains mutually beneficial, and to continue with the evolution of an information system that will be of benefit to the Commission and ultimately to the client population that it serves.

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