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Library Systems Analyst—
A Job Description

With the increased use of system analysis techniques in libraries, the time has come to consider the extent of systems analysis in librarianship and the duties of the analyst. This is a discussion of the job description, prerequisites, and functions of a library's principal analyst.

SYSTEMS ANALYSIS has become an important part of librarianship. Courses are being offered in schools. Librarians want to add analysts to their staff, and the term frequently appears in library research and development literature.

There can be little doubt concerning the reasons for interest. The continuing pressure to introduce automation, especially electronic data processing, into the profession has caused librarians to look to the computer field for techniques. At the same time, there is an increasing awareness of the weaknesses in the traditional methods of library evaluation, design, and operation. Finally, operating costs within libraries are increasing to such an extent that libraries are being forced to look for improved methods of cost analysis for justification of budget requests.

Despite the common use of the phrase "systems analysis," very little has been written in library literature concerning it, its nature, the qualifications of the analyst, and the relationship of these two to librarianship. The following is intended partially to satisfy a need for a better understanding of systems analysis within the library profession. It is also a suggested working paper for those in-

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volved in establishing professional standards. Although the presentation is in the form of personnel qualifications, it is done within the context of the nature of systems analysis and the relationship to librarianship.

JOB DESCRIPTION

A library systems analyst can be described as a staff person with the responsibility of applying the principles of scientific management to the library environment.

The restriction of an analyst to a staff position is significant for four reasons. The analyst has no direct relationship to the routine operations of the library. He stands apart and, it is hoped, observes these operations with an unbiased eye. He also makes these observations from at least two points of view. At the minutiae level, he may be expected to do time and cost studies of an operation in the smallest details. At the same time, he is expected to relate the minutia and their synthesized sets into a single unit. Such breadth of interest requires independence from operations activities.

This need for breadth implies a need to cross over organizational lines. This carries with it the need for authority or backing from a higher level. For example, a study of the catalog department cannot be complete without relating the department to its inputs, outputs, and place of department within the whole li-

brary organization. Such a study cannot be accomplished without freedom to study in depth the departments and managerial operations external to the catalog department.

This need for authority to conduct broad studies does not imply that the analyst should always operate at the highest managerial level—rather, at some particular level higher than the operation being studied. For example, a particular study of descriptive cataloging techniques may have relevance only to the internal activities of the catalog department. During such a study, authority may only be necessary at the departmental level.

Limitation of the analyst to a staff appointment formally excludes him from policy-making responsibilities. This responsibility belongs with management, including operating supervisors.

This lack of authority and responsibility may limit the short-range effectiveness of the analyst because he may not be able to overcome the lethargy, hostility, and weaknesses of operating personnel. At the same time, such lack of authority will help surface these weaknesses and serve as a warning of others more serious to be expected when plans become operational.

This possible hostility to systems analysis techniques and the implied need for personnel education rather than legislative action cannot be underestimated. Systems analysis has not been a recognized part of library training until quite recently. Supervisors are likely to continue to prefer the subjective judgment and *ad hoc* decisions about which they have considerable knowledge.

Scientific management is a term used to describe a whole new field of applying mathematical and scientific techniques to aspects of management traditionally considered to be creative in nature. It does not replace the decision-making functions of management. Rather, it provides management with better data in a syn-

thesized form so that better decisions can be made. Scientific management also attempts to separate the truly creative decision-making operations from those that can be handled automatically or reduced to the clerical levels through the use of new tools and techniques.

Management science is also used to assist the analyst in reducing complex systems to the essentials, building new systems around these essentials, and then efficiently communicating these studies to library management.

Embodied within these general statements of scientific management is the implied use of probability and statistics, dynamic programing, time studies, flow diagraming, human engineering, and a host of other analytical tools. It would be misleading to define the field as only operations research or industrial engineering as suggested by these topics; however, these professions are the most prominent proponents of managerial science methodology.

Full justification for the use of management science within the library cannot be explored in this article. By way of partial justification, it might be stated that the library has most of the elements common to the disciplines where management science has been useful. Perhaps the only really major difference lies in motivation. For example, business is profit oriented, whereas libraries are service oriented. The library systems analyst exploits the tools developed in business applications and applies them to his own environment.

During the 1950's, considerable attention was given to the study of information retrieval. Research during this period tended toward theoretical studies of the statistical or mathematical nature of information and related topics. A hope was to develop ways to use the computer in the handling of concepts rather than the routine manipulation of alphanumeric data. More recently, the pendulum has swung toward the less glamorous,

more traditional areas of technical processing, personnel records, and simple bibliographic compilations.

Systems analysis has often been assumed to enter the library as a tool to be used in the development of computerized systems, especially in the more mundane areas suggested above. This view is far too narrow.

Actually, systems analysis is a tool to be used in all departments of the library regardless of the computerization potentiality. It can be as effective in the analysis and design of a broad selection program as it is in the development of an efficiently run computerized technical processing department. For example, a real measure of the library's effectiveness is its ability to supply non-ambiguous responses to users' information needs within a time and cost limitation competitively set by other information media. The computer is considered in the analyst's study only insofar as it might contribute to the over-all solution.

The phrase "library environment" is meant to imply that any part of the library or its interfaces with sources, users, and parent institution are legitimate areas of study. The proper placing of book return boxes on campus or a study of the overlapping between two reference tools are no less of interest than the design of a completely computerized technical processing department.

PREREQUISITES

The prerequisites for the position of library systems analyst is approached with some degree of trepidation. It is rather hard to state categorically what makes a good analyst. Perhaps the only thing that can be said with any certitude is that he must be a born skeptic about the status quo, a dreamer about the future, and a realist in the implementation of these dreams. This is hardly adequate for a recruiting brochure! Despite the implications that an analyst can only be evaluated in terms of his temperament, there are some general guidelines that can be helpful. The following is a statement that seems to include the major qualifications that he should be able to demonstrate.

The curriculum in modern industrial engineering appears to supply most of the technical background for a library systems analyst. It emphasizes applied statistics and probability, work analysis, management organization, the design of abstract systems, automation, and systems evaluation techniques. Most of these topics are used as tools by the analyst. They require a certain amount of formal classroom study and development. For this reason, formal classroom exposure to these subjects is desirable.

One need not look deeply into librarianship before he sees a large data base, many repetitive operations, and highly systematized set of operating rules. It is in such systems that computers are potentially useful tools. We are only now beginning to exploit this potential, however, and the library profession is not fully aware of the possibilities. The systems analyst should be adept in the use of the computer because of its usefulness as a library tool, not as an end in itself.

This suggests a requirement of some training in electronic data processing. This should include at least a good understanding of the basics of computer design, construction, and operation. It should also include flow charting and the ability to program one of the common computers in one of the common languages. Depth in programing and hardware understanding is not necessary, since the analyst is more interested in knowing applications than he is in actual programing efficiency and computer design. It should be emphasized, however, that some programing experience is invaluable. The effect of actually programing a computer is somewhat like swimming. You can read about it, but you will never really learn it until you jump

into the water and swim. The actual depth of training necessary in programing is an open question. Probably this training should stop short of real proficiency so that the analyst does not lose his perspective. To him, an efficient program is an efficient tool, not an end in itself.

Electronic data processing training is valuable for other reasons. It develops the student's ability to formulate problems and think in a formal deductive way. It also teaches him to communicate by using a formalized, well-defined language.

The prerequisite that will meet with the least acceptance concerns the amount of required training in librarianship. Industrial engineers and operation research specialists can be expected to demonstrate the close similarity between librarianship and business or military problems. Thus, little training is required. On the other hand, librarians frequently complain that outsiders do not understand the uniqueness of the library. Thus, a degree in librarianship is required.

Both are right and both are wrong. To be sure, the library has a classical management and operating structure; however, its standards of economy and service have no parallel in other fields. What company would accept a million-item inventory with an average use expectancy of once every five years? The tendency of outsiders has also been to criticize the library profession for its ignorance of the information problem and lack of creativity in the search for solutions. On the other hand, the record of success by outsiders has left a lot to be desired. There are numerous examples of their unused automated systems, re-inventions of the "book" (though now automated), and systems that violate the most basic axioms of information handling and service.

Perhaps the most outstanding recent example of this last item was demon-strated at the Airlie House Conference on Library Automation.[1]

The nonlibrarians repeatedly stated that the design of an automated library system must be done as a unit. That is, all the inputs, outputs, and internal operations for the whole library must be determined before implementation begins. Yet such an approach is not possible in the library because the system as a whole is open, not closed, and the specifications are never static. A library system must be open-ended and designed to adjust easily to change while in an operating environment. It is the uncontrollable and unpredictable outside factors, such as changes in the organization of knowledge by scientific advancement, that negate the applicability of the closed-unit systems design axiom.

At the same conference, both sides displayed a deep dependency on the other. In effect, one side said—tell us what to automate and we will build the machine to do it. The other's reply was—tell us what the machine will do, and we will define the jobs to be done. They left without even resolving the impasse. Ideally, the systems analyst should be a catalytic agent between the two.

It is obvious from this discussion that an education in librarianship and in the technical tools is essential. Recognizing the fact that it is unrealistic to expect degrees in both, however, it is far better to have the formal training in the technical fields with experience in library problems, rather than the reverse. Insight into library problems can be gained through experience and observation. The technical tools must be acquired in formal training.

FUNCTIONS

The job description and prerequisites suggest that the library systems analyst has responsibilities beyond the analysis of existing operations and the introduc-

[1] *Libraries and Automation, Proceedings of the Conference on Libraries and Automation held at Airlie Foundation, Warrenton, Virginia, May 26-30, 1963.* (Washington, D.C.: Library of Congress, 1964).

tions of automation into the field. Consistent with the analysts' philosophy of broad vision and unity of operation, the following list of functions is suggested.

1. Analyze existing library policies, procedures, equipment, literature content, and human interfaces systematically in qualitative and quantitative terms.
2. Design and implement new and/or improved library systems in terms of the library's physical limitations, funds, personnel, available equipment, and available techniques.
3. Coordinate these analyses and designs with the library's management and professional objectives. Act as technical advisor at the various levels of management in the evaluations.
4. Design, implement, and operate management data systems that will provide library management, operating personnel, and designers with data to assist them in library control and evaluation.
5. Monitor and evaluate equipment, procedures, and new systems of potential value to the library.
6. Conduct technical liaison between the library and outside services such as the institution's computer facilities and equipment manufacturers.
7. Train operating personnel and library management in the characteristics and operations of the library's newly installed systems, new equipment, on the market, and new techniques being developed.

The analysis function is broader than that normally considered in the computer field. It encroaches on an area generally considered to belong under management and library operations. For example, the analyst has techniques available for the partial analysis of the subject content of a collection. He can also provide improved statistical data which the librarian can use as a powerful tool in establishing his selection policy. In virtually every area of library operation, the librarian is in need of better analyses of his library to assist with his decision-making activities. The analyst can assemble the significant data in a meaningful way.

Systems design is the synthesis of elements from the analysis function, with additional useful outside elements to form a meaningful system. Usually systems design is more than an engineering or mathematical coordination of elements. In complex systems such as those found in the library, the best solution also involves qualitative factors and subjective judgment.

Coordination with the library's policies and objectives is in many ways a part of systems design. Separate recognition is made here to emphasize the unity of technical design and management policies within the whole system. Although the two complement one another in systems design, they are separate and distinct. This separate recognition also re-emphasizes the staff rather than policy-making role of the analyst.

A management data program is understood to mean a separate subsystem designed to: (1) accept statistics and other data relating to the operations of the library; (2) correlate, synthesize, technically evaluate the data; (3) feed the results back into the operating system for its automatic modification or send the reports to management so that it can evaluate and modify library operations. This is an extension of the traditional library statistics but raised to a level where the data become an active agent in the control of the library. Management data is essential if the library is to exist as a dynamic system.

The need for a management data program (over and above traditional statistics) is frequently overlooked by both systems designers and management in the enthusiasm to get the "new system" operational. Sometimes the reasons for omitting management data go deeper.

The profession has practically no experience or background on management data systems design. Furthermore, traditional library statistics contribute very little. When contractors have over-all systems responsibility, they have little incentive to add costs that provide little evidence of a return. Also, management data could very well bring out embarrassing weaknesses in design.

The importance of evaluation data in library systems today cannot be overemphasized. First of all, every new system today is a prototype even if it is operational. We simply do not have adequate data gained from experience in order to design permanent systems, especially when automation is heavily used. Secondly, much of the data needed for making design decisions can only be obtained from observing an operating system. Yet we cannot get the data until the design is complete. In time, this first reason for management data will diminish in importance. The second reason will have a continuing role in the library.

Many byproducts of the nation's large research and development expenditures have relevance to problems in information handling. Frequently these advances are cloaked in the robes of the physical sciences, engineering, and mathematics. The analyst should not only keep himself aware of possible contributions from these other disciplines, but he should also translate these relevances into meaningful library terms. This article is such an example. It is an attempt to take some characteristics of industrial engineering, operations research, and computer technology, relate them to librarianship, and synthesize them into the profession. The analyst should do this continuously for the institution with which he is attached.

The analyst's technical librarianship bilingual capability places him in a unique position to act as technical liaison for the library. This duty comes to him almost by default.

Just as coordination between the new system and library policy is a part of design, so also the training of operating personnel is part of implementation. Beyond this, the analyst has a continuing responsibility to keep the operating staff and management up to date on new products and techniques being developed. This responsibility is especially significant at the present time, since most librarians have had no experience in technology and systems methods. Library schools are just beginning to integrate these newer tools into the profession. The systems analyst can serve a continuing education function to older staff members and at the same time feed back data to the schools for course and curriculum improvement.

Conclusion

This job description has been formulated independent of any particular institution. Special institutional requirements would most certainly impose local variations. For example, a university or large public library system with a staff to assist the analyst would probably emphasize managerial ability and ability in the art of seeing both library and technique points of view. On the other hand, the analyst for a small college might be a jack-of-all-trades. No matter what emphasis is placed on individual needs, however, it should be remembered that systems analysis is never merely part of what has been described in this article; systems analysis rather encompasses it all. Also, regardless of local variations, the systems analyst must always have one quality. He must be a catalyst between librarianship and technology.

Finally, it is probable that until the library profession solves the problem of training librarians in depth in both librarianship and technology, it will be necessary to seek analysts outside the profession. Perhaps this is as it should be. ■■