

## Automation of Technical Services: Northwestern's Experience

*Library automation requires significant adjustments in attitudes and procedures to work effectively. When Northwestern University Library made a commitment to develop computer support of the entire technical processing system, a chain of basic decisions was necessary, each with an individual impact on staff outlook and system productivity. Key decisions involved reassessing manual operations prior to automation; defining resources—human and financial; determining on-line and batch processing requirements, hardware usage, and necessary modifications; considering essential staff reorganization and retraining; and assuring communication. These decisions, the resulting on-line interactive system, and its impact are described.*

WHAT DOES A UNIVERSITY LIBRARY ENCOUNTER when it makes a commitment to develop computer support of the entire technical processing system? Northwestern's experience began with the need for a chain of basic decisions involving determination of the potential for basic operational improvements, identification of available hardware capabilities and possibilities for modification, and examination of financial implications within the university as a whole and directly related to library priorities. Total library systems analysis, reassessing existing manual operations, and identifying possibilities for staff reorganization became essential.

A primary aim of any automated system is to reduce per unit costs for acquisitions and cataloging while allowing the library to handle more material without a proportional increase in staff size in years to come. Hardware costs

are decreasing as personnel expenses soar. Northwestern University's operational system owes its existence to university and library administrative recognition of this essential fact.

### BACKGROUND

As libraries have become rather painfully aware, automation does not arrive instantaneously. Reaching the implementation phase requires substantial advance planning. At Northwestern, university administrative interest was given added impetus by a librarian-faculty-student Library Planning Committee which served as an advisory group during the design and construction phases of a new library building. In the early 1960s this group projected the development of an automated library support system and indicated the strength of its confidence by providing a special room for a "dedicated" library computer as the blueprints developed. This special room, which was not removed from the plans by the eventual decision to share a computer already available elsewhere

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on campus, has proved most useful as a typewriter terminal center for the library project.

As planning progressed, recognition that a "dedicated" library computer was financially impractical resulted in a decision to utilize the hardware at the Administrative Data Processing Center, which already maintained payroll, student registration, and alumni records. This machine has text handling capabilities which are superior to those of the larger computer at the scientific research computing center, and the library also was assured priority in usage. Unlike many library systems which share a computer with other campus applications, Northwestern University Library has always had sufficient computer time for both operation and development. Although the equipment limitations of the very small capacity 96K IBM 370/135 computer cause occasional irritation, the use of such a machine keeps computer costs down to the bedrock level the library can afford.

An important early decision was to develop the system in an on-line mode. Unlike batch processing, the on-line interactive mode provides for immediate access to and modification of information in the computer file and prevents the automated system from becoming as unwieldy as the previous manual system. One unified computer record replaces a multiplicity of order and processing control slips formerly filed in separated sequences. Printed purchase orders, claim forms, worksheets for catalogers, catalog cards, pocket labels, circulation charge cards, and various indexes are batch produced; but inquiry and update operations for some 100,000 in-process and recently cataloged items are all on-line. Order, receipt, payment, location, call number, and internal processing data are immediately entered in the computer record via direct terminal input.

#### THE TECHNICAL SERVICES SYSTEM

The technical services system, implemented October 4, 1971, after nearly two years' successful operation of the computerized circulation system,<sup>1</sup> currently utilizes nine IBM 2740 typewriter communication terminals linked to the computer via two telephone lines. This is a total system in that it is designed to cover every aspect of acquisition and processing. Library computer records include all monographs on order, in process, and recently cataloged; bibliographic and holdings information for some 35,000 current and noncurrent serial titles held by the main and branch science libraries; and the circulation file. These records were originally stored on data cell, long the most inexpensive form of computer storage, but after approximately one year of library system operation disc packs were installed to increase general operating efficiency. At the project's inception the computer had no tape drives, a situation which necessitated transfer of MARC records from tape to disc at another institution. This arrangement was most inconvenient and often resulted in considerable delays. Both the disc pack and tape drive hardware alterations were instigated because of library computer usage.

The small size of the computer has challenged the impressive talents and ingenuity of the programmer, while the constraint of limited core and disc storage available for the teleprocessing program has kept on-line data validation and index development to a minimum. Limited file capacity has also resulted in the necessity to "dump" data onto historical file tapes for monographs cataloged at least nine months and without added copy orders. Operationally, the most significant current equipment limitation is the display rate (only 14 characters per second) of the typewriter terminals, which is far from ideal when long bibliographic records are involved.

The use of cathode ray tube (CRT) terminals, now in a testing phase, will greatly speed inquiry displays and be particularly advantageous for the individual issue check-in operation for serials.

#### STAFF RELATIONSHIPS

In the development of a viable computer support design, the importance of a strong, direct relationship between librarians and systems staff is impossible to overemphasize. More than five years prior to automation implementation a systems analyst was officially appointed to the library staff, a decision which allowed the development of thorough familiarity with both the theories and specific applications of library operations. The mutual confidence which evolved was a significant factor in facilitating the massive retraining project necessitated by systems implementation. The library also gained a unique and inestimable benefit by interesting a member of the university's Computer Sciences and Electrical Engineering Faculty in the automation project. On an official half-time appointment to the library staff, he singlehandedly designed and programmed the teleprocessing system and wrote most of the assembly language batch programs which allow the best possible utilization of the limited amount of computer memory available to the library. The official library staff appointments of both systems analyst and faculty computer expert have been vitally important in insuring essential communication, developing designs tailored specifically to meet the library's sometimes rather peculiar needs, and allowing quick action when problems are detected.

One of the most important aspects of the automated system implemented by Northwestern is that it was put into full operation without the addition of any extra line staff. This proved to be a considerable accomplishment since techni-

cal services had been demonstrably understaffed in the most recent years of manual operations (based on the University of Washington formula in *Model Budget Analysis System for Libraries*, 1970, as well as in-house calculations). The decision to add no new staff to aid in the transition was partially a result of the tight financial restrictions under which the project must operate. Northwestern's automation program has developed as a "shoestring" operation with a need to justify its existence and methods to the university administration, which provides its sole support. No grant funds have aided the development. This was mainly due to a general feeling that there would be less trouble suiting Northwestern's individual needs if the library faced the realities of university funding from the outset. Otherwise, it might plunge into a potentially overambitious project using special funds which would eventually run out and leave operations in a position where a retrenchment might be necessary.

Since new staff were not added, it was necessary to redefine or reallocate certain positions within the technical services division. Interdepartmental procedural coordination has been ably managed by a professional also serving as head of the Search Department. A vacancy from the Catalog Department provided the nonprofessional supervisor for a newly established Data Center where the six 2740 terminals for monograph processing are located (the room in the new building originally intended for a library computer). Terminal operators from the general staff have been assigned in short shifts, returning to their regular departments with a broader understanding of the total system. This arrangement provides variety in job assignments and helps sustain the peak efficiency which is difficult to maintain in any long-term typing assignment. It also has been important to avoid cre-

ating an "elite" group of Data Center staff. Another advantage of using general library personnel as terminal operators lies in their grasp of the format and importance of bibliographic data. Since these staff members work with the same data as it applies to their regular assignments in the Search, Order, Catalog, and Bindery & Marking departments, they are less prone to make mistakes at the terminal than new typists without such additional experience. Unlike administrative keypunch operators who are trained to operate their machines as a primary objective and understand the material only secondarily, the library terminal operators have been trained to deal with the bibliographic data first and then given part-time terminal typing assignments.

#### PREPARATION

A number of procedural and organizational changes in manual operations resulted from anticipatory planning during the years immediately preceding implementation of the automated system. Preorder and precatalog searching were consolidated in a special Search Department. Cataloging with LC copy was organized into a Fast Cataloging Unit staffed by nonprofessionals under the supervision of a professional cataloger. The Acquisitions Department was split into monographic Order and Serials departments. These staff organizational patterns prevented a number of potential bottlenecks during system implementation and lent themselves effectively to group retraining. After the inauguration of the automated system, the need to face several other long-standing problem areas became clear, and two additional specialized units were organized. The first deals with problems in correctly identifying and handling added copies. In the second, serial bindery preparation procedures have been reorganized. Automation sometimes makes a library face up to

problems which previously could be ignored but were significant nonetheless.

Perhaps the most difficult problems encountered involved transitional procedures rather than equipment and program limitations. Since the library implemented a total system, all aspects of the technical services operations were affected simultaneously. The change-over was not done on a "piecemeal" basis, and everyone became immediately involved. Misconceptions about various aspects of the system were rampant, in spite of an extensive informational campaign which began during the summer preceding implementation and continued intensively throughout the first year. The strain of simultaneously dealing with materials still tied into the manual system while inaugurating new methods of handling items ordered via the automated system, shifting responsibilities among individuals and departments, giving up treasured files, and getting used to looking at the same information in a new format (e.g., log and work sheets instead of LC card copy) proved a major challenge.

A decision to emphasize communication encouraged cooperation, promoted special efforts, and reduced anxieties. General orientation sessions, progress reports, and demonstrations, as well as specialized training, occupied a considerable amount of staff time but amply repaid the investment in boosted morale both within the technical services division and in other areas of the library. A general meeting for all library staff was held shortly before the time of implementation, followed up by a staff announcement briefly describing the extent of the project and requesting patience and cooperation during the transitional period. During the first three months of operation an almost continuous string of information-discussion-problem-solving meetings was held. Demonstration sessions were arranged to allow divisional staff not normally

scheduled at the computer terminals to receive basic instruction and have a chance to perform some actual operations at the keyboard. These sessions preceded a slide-illustrated description of the automated system presented for the whole staff under the aegis of the Library Staff Association. In turn this was followed by another set of terminal demonstrations for nontechnical services personnel. Although some of the detailed slide narrative presentation presumed a fairly clear understanding of technical processing operations under any system (manual or automated) and therefore was not completely comprehensible to every staff member, the general reaction was very positive, indicating intense interest. The slightly threatening mystery disappeared.

#### ADJUSTMENT

During the early adjustment period, lasting approximately three months, occasional negative remarks came from nontechnically oriented staff impatient with the slow-up in ordering and processing evident while training was in progress. Much material still arrived which had been ordered under the old manual system, and Thanksgiving and Christmas holidays intervened. By January 1972, when out-going firm orders had reached a normal level (over 2,500 per month), objections diminished. One phenomenon demanding alertness during the implementation of the new system, particularly because it involved a computer, was the tendency to blame the system for unrelated or marginally associated problems arising during the same time period. Although automation can be held responsible for certain amounts of stress and strain and resulting conflicts, it is little understood by many librarians. Thus it often serves as a scapegoat for other kinds of difficulties (e.g., slow-downs resulting from staff turn-over, problems related to absorbing processing for additional

branch libraries). Faced with possibilities of this type, the only way to implement any system successfully is to have the full cooperation and dedication of the library staff who must make it work. A superbly designed system, excellently programmed, will fail if personnel lack understanding or are unwilling to contribute the extra effort needed to accomplish a major change in procedures. Although an excellent system is a necessity, Northwestern's experience indicates that attitudes are at least equally important among the many requirements for successful implementation.

#### RESULTS

While certain key people bear the brunt of responsibility for systems planning and explanation, general staff acceptance, based on a perception of the project's actual worth, determines ultimate success. The immediate workload was certainly not lightened during the early months of operation. Some of the filing drudgery was, however, quickly eliminated, and the increased accuracy in record-keeping became obvious as a long-term benefit. From the standpoint of improved operations, the greatest immediate impact was in catalog card production. Cards are produced once a week at the rate of over 6,000 in two hours, thereby equalling the production of the original typing pool for approximately seven-and-a-half work days. Cards are printed in correct filing order, sorted to the eighth character, and grouped for each of the various catalogs. Another system benefit, automatic punching of charge cards, has reduced the workload of the Circulation Department, which formerly had a staff member operating a keypunch. The increased accuracy of these cards is another plus.

Among the possibilities offered for the future by library automation is the chance to share files of cataloging data beyond those provided by the MARC project. Such sharing will reduce the

need to enter full non-MARC data via the terminal keyboard and spare the time currently spent tagging information for input. The computerized serial holdings records have potential for a regional serials data bank and promise for an expanded interlibrary loan operation. Naturally a cost savings can be anticipated if other libraries choose to join Northwestern's system in cooperative acquisitions and processing arrangements.

Regardless of the cooperative potential, Northwestern has decided that automation is the only way to deal with the problems to be faced by technical services operations in a large research library now and in the foreseeable future. The ever-increasing volume of material to be acquired and processed without additional staff and the demand for the rapid preparation of items and

accompanying cards for use permit no acceptable alternative. Northwestern's experience has confirmed the value of a direct systems and library staff relationship, close attention to fiscal realities, development of on-line capabilities, complete utilization of available hardware and personnel, and a primary emphasis on communication. With full attention to library needs and informed enthusiastic staff cooperation, automation can and does succeed.

#### REFERENCE

1. James S. Aagaard, "An Interactive Computer-Based Circulation System: Design and Development," *Journal of Library Automation* 5:3-11 (March 1972); Velma Venezia, "An Interactive Computer-Based Circulation System for Northwestern University: The Library Puts It to Work," *Journal of Library Automation* 5:101-17 (June 1972).