Technology and Organizational Metamorphoses

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THE RAPID INTRODUCTION of new technologies into libraries has been widely expected to lead to sweeping changes in the ways that libraries are organized and managed. However, few organization charts indicate that such sweeping changes have occurred. The Association of Research Libraries (ARL) Office of Management Studies has published two Systems and Procedures Exchange Center (SPEC) kits on organization charts—no. 1 in 1973 (updated 1977) and no. 129 in 1986. Comparison of the two collections of tables of organization does not reveal a large number of radical changes in the ways that this admittedly limited number of libraries are organized.

Might the significant changes have taken place at a level which is not apparent on a graphic representation of an organization? B. J. Busch (1985) prepared a SPEC kit (no. 112) which inquired into the effects of automation and reorganization of technical and public srvices and concluded that: "There has been some experimentation with modifications to traditional organizational structures. Yet libraries seem reluctant to make significant changes to organizational structures which technology may be rendering ineffective. Few models for the 1990's and beyond exist...."

Nevertheless, the belief in the likelihood of significant organizational change persists in conversation, in conference programs, and in the literature. Rather than survey the literature detailing changes and experiments, the authors chose to query library directors about their perceptions and expectations for changes in organizational structure as a result of technology. Directors, we reasoned, have the broadest perspective on their entire organizations and also have the greatest control

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over the magnitude of organizational metamorphosis. Since we were seeking ideas and perceptions and not a controlled nor statistically valid sample, the inquiry took the form of a letter to colleagues outlining the issue and asking for observations, experiences, and expectations for the future based on the following questions:

1. Are technical and public services being restructured at a micro level which is not readily apparent to the casual observer?
2. Are incremental changes and experiments taking place rather than major reorganizations?
3. If changes are taking place, are they the result of technology, or are they the effects of general democratization of the workplace, quality of work life programs, and the like?
4. What is the extent of changes in the public and technical services organization in your own institution?
5. When did changes, small or sweeping, take place?
6. How has job design or work assignment among librarians, paraprofessionals, and clerical staff changed?
7. What brought about the changes?

Fifty-three directors, representing large and small colleges and universities, wrote or telephoned with thoughtful and analytical comments, histories, and expectations for the future. Remarkably little consensus was found about the extent, scope, or the future of change. On the other hand, the intensity and depth of the replies indicated great interest in the topic. It was apparent that not only is organizational change evolving, but also that directors' thoughts and expectations are doing the same. The discussion which follows draws heavily upon their insightful contributions.

THE IMPETUS FOR CHANGE

"I believe many of us would *assume* that the technological changes *should* demand organizational changes but those assumptions need to be tested, and, like any major changes, they will tend to bring an entire group of related problems with them...," wrote one director of a large research library. Others see technology as a cause of change, and one which cannot be avoided. "I am convinced that [changes] are the result of the so-called technological imperative...as changes at the micro level cumulate, we will begin to see some marked changes in organizational structure"; and "I think the driving force has been the technology..."; replied two directors from different parts of the country.

Technology, however, is only one cause of change. Academic libraries are faced with a host of present and anticipated external forces to which they must respond.

1. The mere *availability* of information technology impacts libraries. Few if any can ignore the capabilities of the electronic revolution. The expectations of faculty and students for information and for speedy and nearly global access have risen dramatically and will continue to do so.

2. Academic libraries are subject to the pressures for qualitative improvement which are affecting all of higher education.
3. Closely related is the general pressure for greater economic and output accountability in a long-term period of stable or declining resources and continued rising costs for labor, materials, and technology, and the simultaneous existence of print and electronic resources.

Of course, changes occur for many reasons. Cautioning against too readily ascribing change to technology, one director writes: "Technology, service demands, and staff efficiency can individually and especially in combination lead to organizational changes." Several directors remarked that changes, from whatever cause, must necessarily follow from the need to improve efficiency and services to users. Another director reflects: "Technology has indeed helped us make some of the above gains through speeding up what we do, but most importantly by causing us to raise questions of why we do what we do."

TECHNOLOGY FACILITATING SOLUTIONS

Beyond the self-examination brought about by technology—alone or in concert with other motivations—are the changes resulting from the use of technology as a solution to library problems. One very large library, reeling from drastic budget cuts at the same time as the online system was being implemented, restructured with several goals in mind:

> In order to try and decentralize and to take advantage of the ability of smaller groups to respond to changing information environments...[we created] five groupings, what we call clusters, on subject grounds....A second change was to reconceptualize the composition of printed materials on campus through the creation of resource libraries for each cluster....Again, this was in response to an effort to decentralize, and thereby enhance, the decision making process in relation to the shifting of printed materials among campus libraries...to meet a growing need for space flexibility....Since the library is implementing a high level of automation in several areas simultaneously, it has also been useful to bring into the program new staff with the technical expertise in the application of both mainframe and microcomputer technology.

Technology has permitted staff shifts in some instances. The reduction of professional technical services staff facilitated by the national bibliographic networks is undoubtedly the most sweeping example. The reassignment of positions, with new or retrained staff, to other functions helps to cope with growth in programs and added responsibilities in such areas as public services, collection development, and systems management.

Regroupings such as those described earlier are simplified by availability of access to a single online database. Staff in widely dispersed locations with disparate functions have access to information which previously was difficult to obtain, at best, and begin to develop their own methods of coordinating their activities. One director emphasized

that rather than requiring centralization, the automated system had in fact made true decentralization possible:

> What [the system] has done—in a big and noticeable way, is to create a "virtual" library out of the dispersed enterprise. The database is created, managed and used by everyone and because it is so dynamic...everyone knows what is being done everywhere in the system...because all units use one system, staff members may be moved around more easily—upward mobility is increased for those who want to make working in the...library a career....Job content has changed, although in large measure many people are doing what they did before, but are now using computer terminals, not typewriters and file drawers.

STAGES IN THE USE OF AUTOMATION

As we tried to understand if, and in what way, technology has influenced library organization, it seemed important to explore and review the manner in which automation was and is being adopted in libraries. Typical stages in technological innovation include an initial period during which the individual manual processes, that may or may not be combined, are emulated. During this first experimental stage, the mechanized or automated mode is "layered on" to the manual process, and both are in use. In a later stage, the manual process will be abandoned. Automated processes then substitute for manual ones but typically in the same context as before. The total system will not be completely rethought for some time, and advantage is not taken of new possibilities for fresh sequences and combinations. The new paradigm emerges later.

Have these stages occurred in the automation of libraries? How far have we progressed in technological innovation in technical and public services, and what impact has office automation had in libraries? Has automation occurred simultaneously, at the same pace, and is the character of the automation identical in all areas of the library?

Automation was precipitated in technical services in the early seventies by the emergence of the earliest of the bibliographic utilities, OCLC. Although many processes have now been computerized in cataloging and acquisitions, there is still considerable layering on as card and paper files continue to duplicate machine-readable files. This is the result of two factors: (1) lack of confidence in the new technology, and (2) the needs of other departments in the library that are not automated. While individual tasks in cataloging and acquisitions have been automated, the two functions have not been integrated in most libraries.

Technical services staffs, however, have long been accustomed to detail and specificity of the kind required by the very literal computer. It is not too different from the precision which has always characterized the art or science of cataloging. Exemplified by the bibliographic record in MARC format, now a de facto international standard in library automation, the high level of standardization in technical services activities distinguishes them from public services tasks.

The history and character of automation in public services has differed, although the same general stages are apparent. Automation of circulation occurred early, prompted in large libraries by an increasingly overwhelming volume of transactions. Circulation automation differed from automation of cataloging in that there was little standardization and less attention was paid to the completeness and integrity of the bibliographic record or to the development of a permanent database. As in technical services, the pattern of layering on was evident to some degree with the retention of paper files and manual activities. In the case of circulation though, tasks were now manageable that had not been for some time in the largest libraries, for example sending out overdue notices. Circulation systems, in most cases, remained stand-alone systems existing side-by-side with automated processes in the cataloging department, although sometimes they interfaced. In contrast many libraries presently report systems which integrate circulation with the online public access catalog.

Reference services are at a much earlier stage of automation than either technical or circulation services. (Parenthetically, four of the respondents—all larger libraries—report that, organizationally, circulation is now part of technical services.) While it is true that automation has had a place in reference since the late seventies in the form of fee-based database searching, the activities of reference have lent themselves less easily to precise analysis and definition. Now, in the late eighties, expert system technology derived from artificial intelligence work is beginning to be seen at least on an experimental basis. The 1988 American Society for Information Science (ASIS) Mid-Year Conference, which focused on artificial intelligence and expert systems, included presentations entitled "Progress and Problems in Expert Systems Development for Library Reference Service," "Construction of a Menu-Driven Automated Reference Program Utilizing dBASE III," and "Generation of Decision Rules for an Expert System Used in Document Supply."

In reference we see a good deal of experimentation with new services and the layering on phenomenon is very evident. Traditional reference tools, especially indexes and abstracts, are used alongside librarian-mediated database searching and user-directed or end user searching. What is being searched may be a machine-readable file based on the same material as the printed source or it may be information which exists only in machine-readable form. Information may be accessed by telephone (DIALOG, BRS), through dedicated terminals (OCLC, RLIN), or on-site via CD-ROM technology. Neither access to these services nor the equipment they require are standardized. While the automation of technical services, particularly the development of standards for the bibliographic record, was strongly influenced and developed by librarians, the development of machine-readable databases and CD-ROM technology has been directed by the commercial

sector. The end result is that libraries struggle to run several incompatible systems simultaneously. Little substitution has yet occurred, but issues of availability, both physical and economic, will need to be resolved in the near future as these multiple access modes increasingly strain library budgets.

Reference services are likely to move more swiftly to the integration stage of technological evolution as the online public catalog becomes available and later as it serves as a gateway to other databases. Signs that a new model for reference services will soon emerge include the preoccupation in many public service departments and entire libraries with discussions about, and experimentation with, alternate and more responsive ways of providing information services in light of multiple and sophisticated alternatives. In contrast to technical services departments, reference services need to increase rather than reduce the number of professionals required in response to the availability of technology to provide more and greater expertise in assisting the faculty member or student both within and outside the library with information needs. Many users have increasingly sophisticated needs and the library is no longer necessarily seen as the prime information resource.

Before automation arrived at the reference desk, but after the introduction of bibliographic utility services in the cataloging department, word processing and spreadsheet software were being used in many library offices. The use of both microcomputers and telecommunications provided for some of the very smallest libraries the only opportunity to automate, and software programs were adapted to many uses. For these and many other libraries, office automation demonstrated the possibilities inherent in a common database and in decentralization. Office automation in many libraries is now at the end of both layering-on and experimentation stages and has become routine.

BLURRING OF PUBLIC AND TECHNICAL SERVICES LINES

There has been a much-discussed trend toward less clear-cut separation between the traditional divisions of the public services (PS) and technical services (TS) functions. Is this the result of automation alone or of multiple factors including automation and the democratization of the workplace? Directors of small libraries are quick to point out that small size facilitates close cooperation between library divisions, and that this is a historic pattern: "In many college libraries, the so-called PS/TS split hardly existed before automation came into the picture." Several college libraries reported that all librarians have combined public, technical, and collection responsibilities, as do those in a few larger libraries. The present blurring of lines goes far beyond the long-standing practice in small college libraries of scheduling all librarians for time on the reference desk, which is prompted by the impossibility of one and two person reference departments covering all the needed service hours.

Since the automation of the cataloging function by OCLC in the early seventies, fewer professional catalogers have been employed in cataloging departments. Many libraries were initially able to justify and finance OCLC services and equipment by reducing professional cataloging staff, and, in many cases, thereby also reducing the total staff. While the reduction of the entire technical services staff has not continued at the initial rate, there has been a continuing decline in the number of professional librarians employed in technical services functions, while, simultaneously, demands in the public service areas have increased.

An environment which includes the proliferation of new formats and sources and a concomitant renewed emphasis on user education has led not only to heavier workloads for public services departments but also to expanded and diversified responsibilities for individual staff members. As important as the current environment are the forecasts by directors of research libraries (as stated in a recent Council on Library Resources report) of an increasingly "important participation by the library in the scholarly research activities of faculty and graduate students." This expectation is echoed in a statement from the director of a leading liberal arts college: "If change is, indeed, more of a norm in college libraries perhaps the impact of automation in college libraries can be found by looking at productivity and user patronage." Libraries are moving further away from the warehouse philosophy toward an access and client-centered approach. The availability of remote electronic access to information means fewer people need to come to the library and, in addition, that others are competing with librarians as suppliers of information, with the result that librarians are adopting a proactive role in reaching out to potential users or clients.

What are the models currently in place which merge public and technical services functions? In the "compleat librarian" model in one library, almost all librarians regularly perform all professional activities except cataloging, which is handled by one cataloger and support staff. All librarians participate in collection development and in the assignment of subject headings. At a large research library, newly appointed department librarians spend six months in the catalog department before starting work as departmental librarians. Other academic libraries, both large and small, are advertising for librarians who will work in both public and technical services areas.

A number of library directors who said there was no continuing merging nevertheless describe joint efforts. The demands of preparation for integrated online systems in the eighties have led entire staffs to become involved in major one-time projects in areas which (except for the magnitude of the tasks) would have once been considered the sole province of technical services—e.g., retrospective conversion and bar coding collections.

We discerned a difference of opinion among library directors about the extent of blurring. Several respondents agreed with B. J. Busch's

statement regarding little probability of integration of both technical and public services because of "significant differences in work attitudes, values, performance and behavioral styles." Nevertheless, in libraries where no ongoing blurring of lines is occurring, comments such as "automation makes you look at the whole picture" and "possibly because of putting aside turf considerations" speak to the influence of technology in bringing about cooperation and greater understanding of the organization. Furthermore, the library director of one liberal arts college writes:

> There is evidence of a blurring of the classic bureaucratic structure, directly flowing from the demands of the technology. Step by step as modules are implemented, each department "internalizes" the relevant portion(s) of the online system, in the process becoming more aware of the interrelations of library functions to a degree well beyond their previous experience....There seems to be a growing ability, willingness, even desire, to see the library as an organic whole, while, at the same time, the traditional department structure continues and remains essential to the ongoing work.

"Indeed, we may not be too far from the time when the formal structure may be far less important than temporary coalitions formed to attack a certain task," writes another. The trend implicit in this director's speculation is widely apparent. "People in technical services who are involved in implementing new systems are working closely with public service librarians to get their input and make sure that we are going in the right directions from both the technical and public services points of view," says a director who also reports no major reorganization between public and technical services units. "Team" management is practiced, not only at the top: "The process...was intended to be part of an effort to decentralize decision making and to enable more staff members at various levels and in various capacities to take part," the director of a large library with multiple branches reports. Committees and task forces are common, as this director indicates: "We have established intersystem committees to deal with automation specifications and details; task forces to evaluate specific applications...we have committees that act outside the normal administrative structure in order to effect change quickly."

Can we attribute the changes that have occurred solely or even principally to automation? All who commented on democratization of the workplace felt it was a contributing but not a guiding influence. For example: "Concerns relating to democracy and quality of worklife are shaped in the context of technology." Other factors are seen to be at work as well, in particular the changing demographics of the library profession. As they reach their fifties, members of what has been called a "graying profession" are less desirous of moving and seek new and enhanced job experience in the same institution. This is also true for younger members of the profession, notably partners in a two-career family. One director reports: "We are apt to get a calibre of staff member

who is capable and needs to be challenged in their work. Routine tasks are apt to be shared if a smaller library unit is to be run well."

Shifts among the roles of librarians, paraprofessionals, and clerical staff are yet another factor in the equation and are discussed later. The conclusion is clear—blurring of the lines between technical and public services has occurred and has been principally in the direction of technical services librarians performing public services functions such as reference desk service, user education, and database searching rather than reference librarians being initiated into cataloging. Since fewer technical services librarians are needed, the migration to public services or into other roles has been an opportunity as well as an accommodation.

SHIFTS OF ROLES AMONG LIBRARIANS, PARAPROFESSIONALS, AND CLERICAL STAFF

Another migration has been observed among the roles of librarians, paraprofessionals, and clerical staff. Many respondents from all sizes of libraries reported a shifting of responsibilities among the traditional categories of staff as well as new positions emerging. There is a fairly strong sense that technology and automation at least accelerated this trend. One librarian writes:

> I think that the level at which most library technologies have operated until recently has had more influence on changing work patterns of clerical staff than of librarians. The early record keeping applications in acquisitions and inventory control were intended to replace hours of filing and typing and to decrease errors in record handling. They did exactly that, enabling clerical staff to give more time to a broader range of duties.

The current shortage of librarians in some areas also contributes to the shifting of roles. Many library school graduates have acquired information skills that can be put to use in other job areas so that fewer graduates are choosing traditional library positions in academic libraries. Positions in special libraries and other organizations often command higher compensation. This shortage has led to the delegation of tasks traditionally performed by librarians to other staff. While librarians are in short supply, in academe at least there is available a number of highly educated people without library degrees. A number of directors wrote about involving paraprofessionals in reference work: "Paraprofessionals successfully assumed some of the daily responsibilities for bibliographic instruction and similar reference services." Another reported that for all paraprofessional and clerical staff "any position which comes open is being rewritten to include the necessity for ability to use microcomputers and training in some form of searching."

The roles of professional librarians have been redefined in response to the new demands placed on libraries and in order to attract and/or keep qualified staff. One library uses "multiple patterns in defining new jobs—unique combinations of tasks and responsibilities." Another is looking at job rotation. Yet another, speaking of reference librarians,

expects "fewer 'routine searches' and more specialized and complicated ones, and more training of patrons to do their own searches." A number of directors commented on the process of filling redefined or new positions from among current staff. "Change for us is managed by adapting needs and personalities and by having personalities who share the responsibilities without worrying about titles"; "[The systems position] began as a part-time assignment, taking advantage of the interests and background of the then music librarian."

The increasing complexity of managing library services has given rise to the need for new and different skills. Increased emphasis on financial accountability in higher education together with the introduction of library automation and higher expectations on the part of students and faculty demand skills in budgeting, strategic planning, educational technology, and time management. Also needed are personal characteristics that include flexibility and ability to deal with ambiguity.

We are witnessing the emergence of career library professionals from among nonlibrarians and what have traditionally been defined as nonprofessional ranks. New positions have emerged. Microcomputer information specialist, systems librarian, and coordinator of database search services are examples of a host of computer-related titles. In addition, bibliographic instruction coordinators, collection development, preservation, personnel, development, and planning and budget officers have been added in the last fifteen years and appear with regularity. The extent to which these positions are influenced by technology varies. While collection development and preservation are not new functions in libraries, their systematic application has been made possible through technology. The training and retraining needs brought about by continuous technological change have altered the role of many personnel offices. Fund-raising, planning, and budgeting have become more critical as the print and electronic libraries compete for scarce resources and as automation choices become million dollar-plus decisions. Library instruction, sometimes now phrased *information literacy*, has taken on the added responsibility of teaching end user searching as well as the ability to effectively choose among the broadened spectrum of information sources.

New departments have emerged as well, with some matching the new position titles. Combined periodicals/microforms departments are common. Information retrieval services, or computer-assisted research departments, have sprung up to manage both free and fee-for-service online bibliographic searching. Access services departments combine circulation, interlibrary loan, periodicals and microforms, and photocopy services, attempting to coordinate the greatly enhanced ability of libraries to provide a broad spectrum of on-site and remote access to materials to their users. At least one large library provides training and information to both public and staff users of its automated system from the same user services department.

Some of the newly-created positions and other positions are held by professionals who are not librarians. At the same time, the traditional library career professional, the librarian with an M.L.S., frequently needs to develop new skills. New staffing patterns are emerging, less by design than in response to the growing complexity of providing library services in academe. It appears that new terminology for library job categories is needed as well as new strategies for staffing academic libraries to meet the sophisticated demands of users in an online environment.

A PERIOD OF REDEFINITION: TOWARD A NEW PARADIGM

The magnitude of both technological and structural change is in the eye of the beholder. Libraries with automated systems were described as having yet to experience the full impact of automation, while others, with apparently less automation, described more sweeping organizational changes. It may be that organization charts and job descriptions are less barometers of change and more properly indicators of how the library perceives itself. For example, academic libraries at present tend to rely heavily on coordinative positions and temporary groups, such as task forces and committees, to manage complexity, yet relatively few reflect their collaborative and cross-hierarchical relationships in their formal tables of organization—relationships which are nearly impossible to express on the still widely-used pyramid chart.

Organizational changes tend to be incremental in nature rather than sweeping and dramatic. Even under conditions of large-scale automation, the library must maintain continuous access to collections and the database. Thus it is more likely that structural and job design changes will be in increments which include overlapping and redundant functions so as to reduce the risk of loss of service or staff resistance. Many directors echoed the feelings of the director who wrote: "We have not forced the old structure to change radically—rather, we have created new structures around it to accomplish our automation goals while allowing the old structure to continue to function in its traditional ways. I believe that it will eventually wither as the new structures assume more operational authority and control."

Most directors, both those who report significant organizational change already and those who see it as yet to come, expect to see significant changes in the future. The nature of information and access technology will continue to change, and the library will continue to adapt to the progression toward a world in which "information will be electronic and no longer bound by physical location. It will be at the desk top." As one put it: "I wish that I could say that we were at the end of the process of change and that the need to experiment with various groupings had passed, but that is not the case....We believe that this trend towards an increasingly rapid rate of change and the need to adapt old structures and adopt new ones will continue."

The present spectrum of changes in library organizations strongly points to today as a period of experimentation—one in which a variety of forms are being tried in an effort to increase coordination and flexibility. Many academic libraries are virtually operating two libraries in parallel—i.e., one print and one electronic. The extent to which the new will supplant and complement the old is far from clear. The advent of the paperless society has been much heralded and much delayed. If at some point economics or other forces lead to a slowdown in the rate of technological innovation in libraries, organizational forms may stabilize into standard patterns. Whether the present organizational innovations will endure is far from certain. They themselves may be transitional forms. If the rate of change continues or accelerates (as it undoubtedly will for those libraries which have not yet felt the impact of technology to any degree), even more radical and less cumbersome structures may be required for effective planning and decision-making.

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