Library Management and Emerging Technology: The Immovable Force and the Irresistible Object

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SCENARIO: Professor B., a member of the History Department faculty, sits at his PC, located in his departmental office and linked to the campuswide Local Area Network (LAN), to consult the library catalog by scanning the holdings for definitive works in his area of interest. He finds that three items are on the shelf and then he sends a computer message to the library requesting that they be charged out and delivered to his office. Finding that a fourth item is already charged out to another user, he places a hold on it. He is disturbed to find that two desired books are not in the collection so he files an order request with the acquisitions department. Another book is not in the local catalog, but he is able to switch his request to a national database where he locates the item at Princeton. He then places an interlibrary loan request. He also finds an article in a journal held by the University of Michigan and requests telefacsimile transmission of the article.

Without setting foot in the library building, Professor B. has thus perused the holdings of dozens of libraries, has made arrangements to secure desired material, and has received a copy of a pertinent article, all in a matter of minutes. Indeed, he continues by using the library's online system as a gateway to external full-text databases of interest to him.

Libraries and librarians have been involved with automation for decades; the concepts are no longer new, and people now coming into the library profession cannot imagine cataloging books without OCLC or relying only on hardcopy indexes for a reference search. The technologies discussed here are, for the most part, commonplace in medium-sized and large libraries. Technology, once the special preserve of the

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LIBRARY TRENDS, Vol. 37, No. 3, Winter 1989, pp. 374-82

catalogers and information retrieval specialists, has moved throughout the library and has become familiar to both staff and users of libraries.

A key question relates to the rate of change of the tools and processes of the library and to the need to restructure the library's organization to accommodate these emerging technologies. There are those who believe that wherever appropriate, libraries and computer centers will merge (Neff 1985, pp. 8-12, 16). These people believe that the fundamental nature of library use and research will alter so radically in the coming years that the only logical step is to combine computing and libraries, otherwise libraries as we now know them will disappear or become museums. Others believe that only the walls of the library will disappear, and that the traditional library function will become less and less relevant (Lancaster 1985, pp. 553-55). Holders of this point of view believe that electronic data will soon supplant the printed word. I suggest that neither of these views is completely accurate nor is the view that states that the library's traditional role will be retained. In fact, since no two institutions are alike, no two libraries will cope with information technologies in the same way: some will move rapidly to adopt an aggressive posture, and others will remain as traditional as possible for as long as they can.

Now, in the late 1980s, implementation of innovative technologies in the library as well as in other institutions within society is widespread. About a decade ago, we had already heard of optical disc (but not of CD-ROM), telefacsimile, and microcomputers. Optimistically we thought that the full use of these innovations would take only a few years—perhaps two or three at the most. We were wrong; and it was the entertainment industry with the compact disk which really led the way to the practical application of optical disc for information support. As is often the case, it takes much longer than anticipated for new technologies to reach the market and then to enter our homes and workplaces. The reaction of the library as a social institution does not need to be dramatic, and often librarians overreact to society's expectations of them. However, the steady change of libraries in response to technological innovations is obvious and cannot be ignored.

Libraries are in the process of absorbing a variety of these technologies—into the budget, into the organizational structure, and into the behaviors of both users and staff. No really new information technology is on the drawingboard for implementation in the next five years or so; therefore, we will now have the opportunity to become fully acquainted with today's innovations before moving on to tomorrow's.

There is a focal point for the innovations. Specifically, libraries of all sizes are beginning to use local online catalogs (Walton & Bridge 1988). With these catalogs, they are experimenting increasingly with telefacsimile, optical disc, end-user searching, and microcomputers for patrons. The opening scenario described earlier is by no means science

fiction; all aspects of the professor's system are technically feasible, and each is already in place in one library or another in some form.

A Tool or a Revolution

A recent report issued by the Boston Library Consortium (BLC) (1986) points out an interesting dichotomy which has significance in the way that emerging technologies affect libraries and librarians. On the one hand there are those who regard information technologies only as a tool to assist in providing more information more rapidly and successfully to library users. These people undoubtedly look back to the invention of the typewriter and the electric light and perceive an evolution of library and information services over a period of time with the library embracing each new technology as it becomes available. Hugh Kenner (1986), scholar of Irish literature at Johns Hopkins, has said:

> People nervous about the future are by their own definition open to lessons from the past; and one lesson the past has to teach is that every new technology, when it applies for admission to a citadel of the intellect, has invariably received its first welcome from the librarian. Nearly a century ago, libraries were the first buildings to be getting incandescent lights; a half-century ago they were among the first buildings to be air-conditioned. When copying machines escaped from corporate offices, the first place they became accessible to the public was the library. (pp. 1-3)

His point is well taken; in an almost haphazard way libraries have incorporated the new into their buildings and procedures. CD-ROM, for example, has become a tool in the reference area with little fanfare and no organizational change.

On the other hand, there are those who, as the BLC report says, see the advent of information technologies as an opportunity to totally restructure the work environment. Some view a blurring of the distinction between technical and public services as a necessary part of this organizational change, although studies to date have shown that alteration of organization charts along these lines simply has not happened (Busch 1986).

Probably more critical, for all types of libraries, are the changes which are taking place within the institution as a whole which in turn put pressure on the library to evolve to serve new structures. Many institutions are extending their services to adult learners and have determined that the establishment of remote sites or campuses is a positive way to reach this population. As a result, the library must identify the appropriate way to deliver information services to these remote sites; new information technologies such as telefacsimile, microwave, and satellite links can be used to achieve this objective. Often, new organizational structures within the library may be the only way to cope successfully with the change.

Who is right—the advocates of evolution or those of revolution? The answer cannot be framed as a simple response to such a dichotomy. Too many factors intrude in each circumstance to allow anyone to

dictate either that technology is a tool, to be viewed precisely as such, or that it provides opportunity for full organizational review and restructure. Of course, both are true. Information technology is a tool. In addition, it provides opportunity for full organizational restructure. Rather than presenting a dichotomy for selection by the library manager, these two views represent the two ends of a continuum where, for every library, technology is at least a tool. The degree of movement toward one end of the continuum or the other depends on a variety of factors, including the nature of the institution, the characteristics of the library staff, the leanings of library management, reactions of the users, timing, and the resources available, to name only some. Experience shows that most libraries remain fairly close to the conservative end of the continuum; a few libraries have reorganized radically, among them the University of Illinois, Columbia University (about fourteen years ago), and the Library of Congress in the sense that it has deployed a matrix management structure.

Window of Opportunity

The introduction of technology into the operations of a library has the potential to provide a window of opportunity—a series of activities and decision points which can, if desired, frame organizational and functional plans and changes which might otherwise be politically, financially, or administratively extremely difficult to contemplate. For example, changes in staffing patterns in the technical services departments are common adjuncts to the introduction of computerized systems. Moving the bulk of copy cataloging to paraprofessional staff is an obvious step which can ultimately alter the personnel requirements for the library and allow it to reallocate funds. Another case for change, minor though it may be, is the circumstance in which the interlibrary loan staff is overburdened because of the success of its resource sharing with other institutions. An argument can thus be made for adding to the staff of that unit.

But this author believes that there is another, more fundamental, level of planning needed for libraries, whether or not they are heavily involved with information technologies. This level is the planning which identifies the direction of the library—i.e., what kind of institution it wishes to be in the future; how its users will relate to it; what strengths will be needed; and what level of funding will be required. Accomplishing this exercise will give the library administration—and the institutional administration—a strong sense of the role of the library within the institution and the resources needed to move from here to there.

The formulation of this kind of organizational concept need not have anything at all to do with automation and technology, while at the same time being fully responsive to the question of the future of the library. However, most would incorporate information technologies as

a rather important part of the institution's future, but that is because enough is known about the information marketplace to recognize its own future relationship to technology. Basic to this premise is the belief that technology is a tool; that it is a means to an end and not an end in itself.

In 1984 a program of the Association of Research Libraries (ARL) focused on the characteristics of libraries of the future and the resources and staff development required to become particular kinds of organizations. Several types of libraries were described; the suggested models ranged from the traditional library, with relatively little automation, to an organization which is highly automated and relies very little on human intellect to serve the needs of the users. This exercise was brought back to the author's library and administrative staff were asked to discuss the several models as they related to the library. A model was developed for the future which was a composite of two of the models used at ARL; the library will need more staff who are expert bibliographers and reference librarians, but also needed will be the technical capacity to provide access to many machine-readable databases which will serve as a link between the campus and remote computer-stored information.

Delivery of Information and New Technologies

Naturally, the goal of scrutinizing new technologies in the library environment is ultimately to improve the delivery of information to the user. The extent to which full text in computer-readable form will permeate the library is a controversial issue. Butler (1986) says: "It is important not to generalize about primary publishing from developments in the publishing of information databases. To do so creates an unrealistic expectation of the speed with which electronic publishing will become common among primary publishers" (p. 49). He believes that optical disc will be used for long runs of periodicals, but that these products will not generally cover the retrospective volumes. In other words, the economic impact of scanning and mastering will be perceived as excessive by publishers as well as by librarians.

Of course, more information will be made available online or on optical disc. However, the process of assimilating this technology into document delivery services is much slower than most expected. Librarians began talking about the potential of optical disc in the mid to late 1970s. Now it is the late 1980s, and very few products are yet available either on 12 inch optical disc or CD-ROM. Most of the products currently on the marketplace are information-locating tools—i.e., indexes to periodicals and other literature.

Why hasn't the technology moved more rapidly? There are several obvious reasons:

1. Cost. The impact of cost upon libraries and publishers has recently received much publicity; we must not disregard the impact upon

users who may now be asked to pay in order to access an online database or to search an optical disc file and print out abstracts.

2. Lack of standards. Until recently the hardware manufacturers used differing standards. Now the High Sierra standard seems to be making it easier for software publishers to deal with CD-ROM equipment, but standards remain to be developed in other areas such as telefacsimile.
3. Lack of perceived market. Publishers do not perceive a library market for new products based upon new technologies. As an example, relatively few libraries and hardly any individuals own optical disc or CD-ROM drives for their PCs. The originators of Bibliofile sold the product with the drives, and this technique of selling hardware as well as software now has several imitators. It is still not a large market.
4. Content of disc. Even a 5 inch CD-ROM contains more than 500 megabytes. That is a lot of information, and publishers are having some difficulty determining logical groupings of information to assemble on a disc.
5. Graphics and color are only now beginning to be widely available.
6. Users are not yet ready to move from the printed page exclusively to electronic data.
7. Articles solely in electronic form are not yet perceived as valid contributions in the publish-or-perish cycle; these may not receive the same stringent scholarly review, and electronic articles are not yet trusted by scholars.
8. Copyright. The 1976 copyright law did not address emerging information technologies, and the library and publishing communities are attempting, with only some degree of success, to effect a compromise between the interests of the two groups. The copyright issue will become even more intense as full-text documents become increasingly available in electronic form.

Colbert has outlined some of the difficulties of relying exclusively on online full-text information retrieval; that is, of going through a broker such as Dialog to gain access to full text. She cites the lack of ability to reproduce graphs, pictures, charts, and color; the need to have access to many different online services with the attendant subscription fees; the need to have the user keep up to date with the changes in search strategies in order to perform a competent search; and the limitations of using electronic databases to follow up page citations (Colbert 1988).

In a superb paper, Govan (1987) projects an expanded information base which will indeed incorporate increasing amounts of electronic data. He suggests that, as in years past, libraries and librarians will accommodate these new information technologies side by side with all the information-bearing technologies which are already supported to provide users with the documents they need (pp. 15-25). Together with other wise and experienced administrators such as Vartan Gregorian

and Daniel Boorstin, he believes that libraries will gradually increase their access to electronic publications but not to the exclusion of print. They postulate that print collections will continue to grow but perhaps at a less rapid rate than has been the case in the past three decades.

Technology and People

The BLC report showed that most people believe that the implementation of technologies in the library requires widespread staff participation. The role of library staff in planning and managing automation has been emphasized. Clearly, people would not only like to know what is going to happen to them and their jobs; they would also like to have a voice in the way that technology is adopted by the library.

Three groups of parameters are essential for the manager and leader of a library wishing to introduce innovative technologies:

1. First, it is not wise for the library to pull too far ahead of its parent institution's culture and tendencies. Libraries could install many interesting technologies, databases, technical devices, but if the users are not ready to accept them, the library will not succeed with those innovations. In many universities the culture is mixed. Some segments of the community cannot wait for the advent of higher technology than is currently available, while others cling to 3 x 5 cards. The resulting approach for the library is likely to depend on the strength of feeling of both sides. A compromise is possible: to the extent feasible, keep the traditional means of access while implementing new technological tools. Some universities such as Carnegie-Mellon or M.I.T. are steeped in technology; in these cases, on the other hand, the library must strive to keep current before it is left behind as a museum. The library manager has to gauge the parent organization and plan library developments accordingly.
2. A second area relates to fairness to the library staff. Although managers cannot promise a stable environment—technological change is making most libraries seem chaotic at times—the staff needs to know what is happening, to participate to varying degrees in the decision-making process, and to retain a position with the library if they so choose (and if the library finds their performance sufficient to warrant keeping). With or without technology, the role of the professional is gradually being redefined so that an increasing number of formerly professional tasks are being assigned to paraprofessionals and library assistants. With technological developments, librarians can now be trained or retrained to specialize in methods of accessing or using information, thereby becoming vital links between the user and the information.

The BLC report is optimistic about the relationship of library staff to technological advances—the vast majority of staff are prepared for, if not actually excited by, the changes that they perceive in the library of the future. Increasingly, librarians are graduating from library

schools with sufficient knowledge of information technologies to be able to be productive relatively quickly, and certainly to be able to continue to learn on the job what they began learning as graduate students. However, the changes which took place in library school curricula fifteen or twenty years ago are insufficient to allow today's and tomorrow's graduates to enter the job market fully prepared. Library schools need to update their courses; these will become obsolete almost as rapidly as hardware. And they need to pay additional attention to the role and relationship of the library within the parent organization.

3. A final set of parameters revolves around the management of the library. What is the characteristic driving force behind any particular library director or management team? The answer to this question will guide the way in which the library approaches information technologies. Is the management team conservative or daring? The first library to use any particular commercial system is likely to be led by a daring management; an excellent example is New York University's use of the Geac system. Does the director want to be a pioneer? The reader may be familiar with the saying that pioneers are likely to be shot in the back; however, someone has to be first, and many pioneers are successful.

   The level of participation in the decision-making process in the library is important. Usually a library with a strong leader and few committees will be bold in its actions because that institution does not need to take time to send potential recommendations through all the committees which require a voice in the decision. On the other hand, in those organizations where much of the decision-making process rests heavily upon recommendations from advisory groups, the decisions which are made tend to be more conservative just by virtue of the group action.

Directions for the Future Library

The library of the future is at once a fascinating and large topic. Let us conclude with several projections:

1. There will be printed books for the foreseeable future, but our problem will be the management of traditional and innovative information formats simultaneously. We will need to staff and finance ourselves appropriately to handle a transition period which may be lengthy.
2. Users will not stop coming to the library unless the library is allowed to become a dull and inactive place. Normally this will not occur, and even though much information will be available remotely, people will still come to the library for books, for human interaction, and for consultation with librarians and colleagues. At the same time, librarians and administrators must learn how to support remote sites better than at present.

3. In most cases, the library and the computing center will not merge. Once again, there are some institutions and circumstances where this merger is logical, and these places are now receiving much publicity. But to generalize from these few instances to say that this organizational structure is the wave of the future is to ignore many human, institutional, political, and technical factors which militate against such a merger.
4. The library of the future will have a different organizational structure only if the introduction of technology matches the administration's desire to make a particular change; technological activities will not in themselves require reorganization in the immediate future. After all, thus far, only those applications are being discussed which are direct translations of functions which take place in a traditional structure.
5. However, information technologies may make it necessary for people in different parts of the library to communicate with each other somewhat more frequently. If the catalog department is given responsibility for a database which everyone can access and perhaps modify, the department will need to make its procedures and policies well known and understood throughout the library.

Conclusion

Information technologies are already a firm part of daily life. Rather than trying to assess how technologies will change our lives, we should accept these technologies as another set of tools and proceed to make the best use of them for the library and all of its users. We must, however, seize the initiative to ensure that we control, and are not controlled by, the technologies of the future.

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Library Management and Emerging Technology: The Immovable Force and the Irresistible Object. December 1989. Susan K. Martin.Â A management information system (MIS) is the process and structure used by an organization to identify, collect, evaluate, transfer, and utilize information in order to fulfill its objectives. It is a system that provides management with information to make decisions, evaluate alternatives, measure performance, and detect situations requiring corrective action. Object is something which moves only when an external force acts on it. We know from experience that more massive an object the stronger the force required to get it moving. Hence by definition an immoveable object cannot be moved, an irresistible force cannot be resisted. 18 views Â· Answer requested by. Jonathan Alexander. View more. Related Questions. Nothing should ever be made to suffer, true or false? What is the force that causes unsupported objects to fall to the ground? It was essentially the level at which the "irresistible force would meet the immovable object." The chart below is updated through Friday afternoon: As noted, we lifted profits at the 200-dma and added hedges to the Equity and Equity Long/Short portfolios. What will be critically important now is for the markets to retest and hold support at the Oct-Nov lows which will coincide with the 50-dma.Â If you are overweight equities, reduce international, emerging market, mid-, and small-capitalization funds on any rally next week. Reduce overall portfolio weights to 75% of your selected allocation target. If you are underweight equities, reduce international, emerging market, mid-, and small-capitalization funds on any rally next week but hold everything else for now.