Communicating with the New Electronic Libraries

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1. Introduction

It is not news that technology is offering new ways of operating and using libraries. Continuation of trends already begun, which have introduced such innovations as online reference searching, computer and communication based interlibrary loan systems, and computer readable data becoming part of library holdings, can lead to all or primarily electronic libraries. These changes would lead to a library fundamentally different from today's—not merely different in the shape of the storage shelves or the mechanism for storing the card catalog. And the services offered would be fundamentally different. Technological libraries can be expected to be the first to 'go,' because they have a greater need for responsiveness to fast-changing materials and user requirements and because they have less of a tradition of dedication to classical works and their use.

2. The New Challenge to Users

If we can picture a library automated to the maximum extent that might be feasible in, say 10-15 years, we can identify at least some of the likely problems of this new institution:

1. The normal way to search for information is through a computer. I find it interesting that in addition to the impetus toward this provided by the pull of technology, there is now added impetus provided by recognition of the vulnerability of the card catalog to vandalism and human error. All file searches will be interactive, leading not merely to a faster way of doing today's job, but to a whole new meaning, for most users, of 'library search.'

2. With automated exchanges among libraries of elements of their collections and descriptions or catalogs of collections, the distinction between the collection and the catalog will gradually diminish, as will the importance of who actually 'owns' an item.

The concept of 'the collection' is, in effect, changed by the many interconnections between this library and others. We must include booksellers and publishers in the network of libraries since it is a defensible position that there is no significant difference between a fee-based...
interlibrary loan and a purchase, only one of allocation of resources and disposition of the item. At any rate, as these collection-providing and -enhancing institutions become more and more interconnected and as time to transmit an item decreases, the 'collection' of any library approaches that of all the world's collection of recorded information. This makes, for the average library user, a profoundly different kind of search problem. It is massively more difficult to deal with the world's literature than to select the best available in a limited collection. In truth, the more limited the collection, the easier the search problem.

3. The concept of a successful search also changes from the recovery of a citation to the recovery of the information whose lack prompted the search. I think this may be the most profound change for the library -- that its responsibility becomes answering the original question, not merely providing the references and materials. Again, this makes for a search problem different in magnitude from today's.

4. Electronic storage and distribution of materials, including electronic publishing of journal articles and newspapers has slowly begun. Today, we see this manifested in increasing use of numeric databases as part of library holdings and the occasional experiment with electronic publishing. Photocopying of bound materials by teaching staff to create tailor-made teaching materials is a practice that encourages the replacement of the traditional text book and will lead to quick acceptance of electronically stored materials.

5. As the world's literature can be searched from one place, it will come to be expected to be searched. A truly full search will become the standard.

The library user, then, will face a bigger collection than ever, a critical world (be it colleagues or tutors) who know that everything is available and expect the user to find it, and a requirement for a high degree of technical skill if he is to use this new library. The questions we are addressing, then, are those of how the user copes with this and how the library will help.

3. Using the New Libraries

From the point of view of the average searcher of the new electronic library he will probably see four major differences from what we see when we use a library.

The first of these is location. We have been hearing for years, with only the merest sign of it materializing, that library searching would in the future be done from the home or office. Very recently, we have seen projects aimed directly at home terminal users begin to manifest themselves in Great Britain, France, Canada, Japan and the United States. In Britain there are such projects as Prestel and a new electronic journal experiment called Birmingham and Loughborough Electronic Network.
Development; in France the new terminal-as-telephone-directory can result in placing more terminals in the home than any other current system. In Canada there is an improved version of Prestel. In the United States we have a newspaper, the Columbus Dispatch, being offered to readers via electronic publishing, as well as an experimental chemical journal. So, the likelihood of remote library use is no longer so miniscule.

The second difference is in materials to be searched will change in two ways: the holdings of more libraries will be available to any user and more kinds of materials will be available in any library.

The third difference is that the scope of a library search will be changing, from a search of the local library's holdings to the world's libraries, and from retrieval of surrogates to retrieval of the content of the work being sought, without the lapse of days or weeks as now required.

Finally, the elapsed time tolerated by users (and, in the academic world, imposed by faculty assignments) will shrink. As the world's literature can be searched in an afternoon, it will come to be expected to be searched in an afternoon.

In considering the technology required to bring this about, I think the outstanding feature is that nothing on the list seems very difficult to produce or to be technologically far off. The challenge is economic and behavioral. The requirements are:

1. Abundant, inexpensive user terminals, with good quality, inexpensive communications facilities. These may be taken to exist already in the United States, although better terminals and even faster communications are still wanted, and probably always will be.

2. All library indexes and catalogs to be in machine readable form. While this is by no means achieved, we are progressing toward it at a fairly rapid rate through the several systems of shared, computer readable library catalogs and the many subject indexes and booksellers' lists now routinely searched by computer.

3. Multi-media terminals and multiple-display terminals for the searcher. Today's terminals provide a rather small 'window' on the data bases, i.e. they permit only small amounts of data to be on view at any time. Future terminals are likely to have several display areas and to provide graphic images as well as text, and audio as well as video output. While technologically possible today, the expense of such elaborate terminals will retard their general availability for some time to come.

4. Better control by users of the search process, post retrieval processing of information and administration of copyright regulations. Woe unto him who promises automated copyright compliance, but the other aspects of extended user control are possible and routinely practiced in institutions other than the library. For example, accountants do not content themselves with retrieval of data, they routinely expect to process it as well, perhaps.
statistically, perhaps only to organize it into different formats more pleasing and meaningful to the reader.

5. More assistance to users. Users require, even if they do not always like to ask for, procedural assistance in the use of libraries, and there is no reason to expect this to change. They can also use subject matter help in interpreting retrieved information, which is not normally a library service. But subject matter help can be made available from various sources, such as information analysis centers, some libraries, professional societies, trade associations, government agencies, professional consultants, and tutors. Such help can be brought to the library user by including the sources in the expanded library network. Yes, someone has to pay for it, but where there is the demand, there is usually the provider.

4. Conducting the Search

Today, a library user more or less has to decide first what he shall search, or at least the order of searching the various catalogs and indexes available to him. The future searcher could start with the statement of what he wants and ask what is available to help him.

A characteristic of bibliographic searches is that the searcher cannot define his own subject matter precisely enough on the first try to assure a successful search. Hence, the search becomes a series of trials and revisions. This is, in fact, what makes bibliographic searching such a fascinating process, and I see no reason for it to change in this respect. It is my opinion that today's library user experiences his greatest sense of dissatisfaction with the library when trying to cope with initial problem definition or when a librarian offers to help, but is unable to speak the technical jargon of the searcher. There has been enough progress in mechanized diagnostic systems; in automated interrogation of persons, say for medical histories; and in natural language interpretation by computer; that we should be able to provide our new searcher with a system that can help him to formulate his search and to understand his major options and the costs associated with each.

Hence, before he even starts looking for specific subject headings, our new searcher will have had two forms of computer assistance not now available: help in formulating his search and help in understanding what collections and catalogs search and why.

The manner of describing the subject matter, or of formulating the search, would probably best be enhanced by toleration for a greater number of ways of doing it. The so-called boolean search is not the only way to describe a subject. Other methods include weighted searches and natural language searches (which are converted by the computer into one of the other methods). The new user will use the method or combination of methods most comfortable to himself and will, at any time, have a computer
ready to teach and explain other methods. A library search system will have a component which is a user interface, devoted to assisting the searcher to use the retrieval system and, in order to know what to do, assessing his performance as he tries to use it.

Browsing remains a critically important part of information searching. Searchers like to browse not only the bibliographic surrogates but the documents, themselves. Today's typical situation, in which we can search surrogates for large numbers of documents not actually available in the library, compounds this problem. The searcher is faced with large numbers of references which he can retrieve quickly, and then he faces delays in terms of days or weeks to see the documents. To this may be added a fee for photoduplication of the item, to which he must be committed before he has a chance to be sure he actually wants it. Thus, we are at a point of imbalance now between surrogate and source item browsing.

It is technically feasible, today, though too expensive, to enable searchers to browse collections by microfilming reports and articles cited in the major subject matter-oriented information retrieval systems and to do the same within each library with the tables of contents and indexes of books. These could then be browsed from an integrated computer-microfilm terminal. If we look forward to electronic publishing, browsing the source item can actually become cheaper and easier, because its availability is simply a by-product of publishing. We have become so used to coping with the walk between catalog and book stacks, with stacks that are closed or with books that are out on loan or lost, that it may not seem to some as a problem to be overcome. But these can be quite frustrating to the searcher.

Making so much information available for browsing and reading will call for both new search techniques and new display terminals. I have mentioned that new terminals will be needed, and this is one of the reasons. Easier-to-read characters than we now usually get on VDU's are available (but expensive). Larger screens will be needed that can hold at least the printed page we are used to looking at, perhaps several of them, and the text of the conversation between the searcher and the computer -- its solicitation of instructions and his provision of them. In-view storage of pages would be desirable -- the electronic equivalent of spreading out books and notes on a table top to rapidly scan from item to item. Display of graphics as well as text will be expected by users.

If we have all this capability, then the process of taking the work out on loan can be greatly simplified. It can simply be copied onto the searcher's magnetic tape or disk, at high speed. Obviously, copyright problems intrude here, but I shall continue to assume that if those problems can be solved politically, they can be solved technically. It would, in fact, be of no particular difficulty to record who asked for a work to be copied, and to bill the person or institution accordingly.

To summarize to this point, I am proposing a searching system characterized by a wider range of languages with which to
describe one's search objective, more files to be searched, more complex terminal and recording equipment than we now have, and the capability (and need) to extract information from text (be it words or numeric tables -- or, for that matter, graphics) for subsequent processing. I have also suggested the need to do this faster than we are now used to and possibly from the home or office, rather than the library building.

These largely mechanical changes will require two corresponding non-hardware changes. The first, briefly mentioned above, is in user control of the search process. The second, to be addressed below, is the way in which the library and its staff organize to support the user.

Query languages of today are almost pathetically weak in their ability to direct an information system to produce what the user wants, in the form wanted. They are weak even in terms of today's bibliographic data bases, but they are completely inadequate for tomorrow's multi-data base, content as well as citation, high-speed, multi-media terminal systems. The future searcher may face a task more like today's television director or airplane pilot than like today's searcher, in that he must cope with a wide range of inputs coming to him in parallel. Hence, I feel safe in predicting vastly enhanced languages for control of the system, whether natural language or complex and powerful artificial ones. Either way, the user will have to be a much more skilled searcher than he is today. These skills can be acquired in three ways: more user training, use of the computer to augment and team with the user's skill, and focusing more of the library's resources on direct user support.

Both the need for computer or information literacy and the rapidly developing practicality of computer coaches or expert systems have been covered in the literature. Let us now address the problem of the library's new role.

5. Role of the Library

There will remain problems of two kinds for the library staff, as regards the searcher. There will always be some users who do not know how to search and who need the same kind of help, from the beginning, as today's searchers do. Even the skilled searcher will sometimes need help, but his questions are likely to pose sophisticated problems to the library staff. The staff are now presumed to be dealing with almost all the world's literature and much of its data. Finding just what any one person wants and putting it in the appropriate form is a problem of immense difficulty which will fall to the equivalent of today's reference librarian. I was pleased to note such a special 'information' unit in the library of Loughborough University. The specifics of the new librarians' tasks would require more time and space than we have here, but it seems clear that the advances described will have an impact on the skill requirements of the library staff, particularly in terms of its ability to help the user solve a problem. The need for help will not disappear in the foreseeable
Principally, the library must come to see its major role as that of a communications center, rather than a repository. Its primary job is to help users find and use information, not necessarily to acquire and care for it, in whatever form it may be packaged. Libraries must make their facilities more readily available to users, including to those who are not now users. Both distance and time barriers must be lowered. Many libraries are not good communication centers today and the growth of literature makes a difficult job approach the impossible. Can a typical university library, severely limited in funds, cope with the increase in materials and the decrease in time available without significant changes in its philosophy of operation? For example, for how long can libraries maintain the fiction that their reference staff can always provide the assistance needed to users of any background?

As technology enables libraries to be effectively used by remotely located users, the importance of the building must decrease, which will further emphasize the need for the library to modify its current central role.

Library staff must become as concerned with the content of information packages (currently known as books, journals, etc.) as with their identification, description and location.

Librarians must migrate, in ever greater proportions, into reference work.

As noted earlier, the scope of the reference assistance will not be limited to the library's own collection, but to all collections; not limited to location of works, but to include location and evaluation of information within the work. The skill and education required to perform at this level will be far beyond what is generally now required.

Ultimately, the library must become an almost pure service, rather than a physical materials handling organization.

6. How These Changes May Be Brought About

While money is always an important factor in governing change, attitude of the staff is another. The major change must be for the library to come to see its principal focus not as the book or the package, but the content, and to derive its satisfaction from providing service rather than from ownership of materials.

Step by step changes should be made with the long range objective in mind. New mechanization acquisitions should be made with an eye to such matters as interface with others, ability to make use of work of others, and future expansions in use.

Inter-institutional cooperation must become a way of life. No library, save perhaps the British Library Lending Division, can declare itself independent of the need for assistance of others,
and the BLLD exists only to provide such service to other libraries. In order to serve its users as a communications center, the library must, first, become a communications center within as large a network as indicated by its user needs.

7. Conclusion

In conclusion, while I share with many of my technological colleagues a long distance view of the library as a largely mechanized institution, no longer housed in a marble building, and probably rarely visited by its users, I see no diminution of the role librarians. But, there is an important set of conditions attached to that statement: no diminution of the role of librarians IF (1) they are willing to accept fairly inevitable changes and change with them, (2) they accept service rather than custody as the principal mission and (3) they accept problem-solving as opposed to package location as the goal.