

TECHNOLOGY AND PUBLIC LIBRARIES -- PRESENT AND FUTURE

The talk will be divided into two parts. First we will have a little primer session on what are the technology alternatives currently available to libraries. And second we will get into the crystal ball area and take a look at some of the future directions that technology in public libraries will take in the next 10 to 15 years.

I will preface this discussion with some blathering about librarians and technology, and throw in a dash of Santayana.

0. INTRODUCTION

There are many quotes and claims that come to mind in discussing the present and future of libraries and technology. For one, there is Santayana's famous admonition that we must study the past or we will surely repeat it.

Technology zealots claim that libraries by the year 2,000 will no longer need books. From my long experience, I remember too well one of the profession's mavens opining at the 1973 ALA Library Automation Preconference in Las Vegas that librarians would not have jobs in 10 years unless they became programmers, too.

Having spent more than two decades in virtually daily struggle with the management of computers and related technologies, what I have to say will fit no easy category. Unqualified claims of the printed word's demise in the foreseeable future are idiotic.

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Yet militantly ignoring technology's offerings and the varied media via which information is conveyed, make the ostrich's sand-buried-head appear to be enlightened.

AS; to the claims of the technocrats that we must acquire their jargon, techniques, and protocols if we are to continue in this profession, an especially appropriate response is Ralph Kramden's hearty har, har, har.

This speech was prepared on a microcomputer with overwhelmingly greater capacity and speed than the IBM mainframe upon which my work with library automation began in 1968, at a small Massachusetts company. I cannot program to this day, but my word processor, spreadsheet, and other micro packages perform daily miracles for me!

I had to work closely with system's analysts and programmers to ensure that the firm's mainframe-based library products met library standards. This enabled me to gain an understanding of the computer's logic and functionality. Based on this knowledge and with the help of others, we harnessed the digital beast to dramatically improve library service at the Hennepin County Library and the Westchester Library System, two subsequent way stations in my career.

You do not have to know how to program, but an understanding of how the machine works and what it can and cannot do are essential if one is going to manage data processing projects in a public library.

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Optimally, such an understanding should inform the use of data processing technology, too.

No one is trying to set up straw people to burn down with simplistic arguments. The need for a reasonable perspective in viewing technology must be to the point, not the outrageous claims of technocrats or Luddites.

Let us now commence the serious part of this palaver with a view of the development and application of technology in contemporary libraries.

And we will endeavor to see what courses will be pursued in the next decade. These directions should be yielded from the technological context developed. In this respect Mr. Santayana will be given his due.

1. TECHNOLOGY ALTERNATIVES

The alternatives will be explored by first reviewing data processing and related technologies in their technological setting, and then in more detail in terms of library applications.

1.1. **Computers:** Mainframe, Mini, and Micro computers are high speed data processing devices capable of doing an incredible variety of tasks at extraordinarily high speeds.

Computers store, access, compute (i.e. process), and display information, and have been used with increasing success by libraries in the U.S. since the 1960's. But it might be noted that the late John W., Cronin as Chief of the Library of Congress Card Service installed International Business Machine (IBM) tabulating equipment as long ago as the late 1930's for fund accounting purposes.

Maintaining reasonable definitions and distinctions between these categories of computers is virtually impossible. The most powerful microcomputer of today dwarfs the minicomputer of the early 1970's and many, if not all, of the smaller mainframes of the 1960's. Mainframes, minis and microcomputers will be distinguished by use rather than by strict data processing definition.

1.1.1. Main Frame Computers are used primarily in large scale applications such as the major North American catalog networks, e.g. OCLC (Online Computer Library Center), UTLAS (formerly, University of Toronto Library Automation Systems), RLIN (Research Libraries Information Network) and others; and some of the very largest libraries, such as The New York Public Library, University of Chicago, Library of Congress and others. These mainframes have been used primarily as cataloging resource utilities.

The major exception is the turnkey local system, NOTIS. It was developed and runs on a mainframe IBM computer. It has been written down so it can run on smaller

IBM computers, but basically it was developed for and has been used by large universities and scattered public libraries who use a portion of the resources of the jurisdiction's IBM mainframe. More about local systems later.

In terms of economics, the sole ownership of mainframe computers is fiscally beyond the finance of all but a few of the very largest public libraries. What's more, who would want one? They are far more expensive and more complicated to operate than the other computers to be discussed. And beautiful and wondrous applications have been developed to run on machines which the average public library, on its own or in consortium with other libraries, can reasonably afford.

1.1.1. ONLINE CATALOGING NETWORKS

OCLC is the biggest of the online cataloging networks. OCLC is used by over 6000 libraries to search for cataloging copy, to enter individual library catalog holdings, to obtain catalog cards and other catalog products, for interlibrary loan, and to maintain and produce union list of serial holdings (including full serial cataloging). All of the OCLC functions are performed online through interactive telecommunication between the local library and the OCLC computer facility in Ohio. (Recently, CD-Rom products derived from the OCLC database have been options added to the OCLC workstations. It should be noted that OCLC actually employs a variety of computer devices. The database of over several 10s of millions of records has been stored on the original Sigma mainframe computers upon which the network began in the late 1960s, and the telecommunications traffic is handled by Tandem computers, which, depending on their size, can be viewed as mainframes or minis. In the ver near future, unless I missed it already, the Sigma will finally be carted away from OCLC and be replaced by current generation computing equipment.)

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Other networks such as Utlas, *RLIN*, and *WLN*, have shifted with the times. *RLIN* will have replaced its IBM mainframe with the *CRAY* computer, supposedly the single most powerful machine in functional captivity today. Utlas replaced its Sigma mainframes in 1985 or so with Tandem computers. These networks use their behemoth equipment to serve thousands of libraries and store their holdings

ONLINE BIBLIOGRAPHIC DATABASE SERVICES

The ONLINE BIBLIOGRAPHIC DATABASE SERVICES are different. Local holdings generally are not an issue, but what is important is the for-pay access these services provide for a myriad of databases. Mainframe computers are used also for maintenance of, access to, and searching of such online bibliographic database services as **DIALOG**, **ORBIT**, **BRS**, **WilsOnline**, and others. Such data bases are searched by users from all over the world, typically gaining access via some form of telecommunication device and a local terminal or computer.

Some pros and cons need to be indicated here, and can be elaborated upon later.

Even though these databases are online, they are not online in real time the way *OCLC* and the others are. The individual databases serviced by *DIALOG*, for example, are updated monthly, quarterly, or even more slowly than that. *OCLC* is updated instantaneously.

When a library enters a holding to the database, it is immediately made available to all 6,000 users. For want of a better definition, this notion of instant updating and record availability is a way of understanding "real time".

A second major deficiency of DIALOG, ORBIT and BRS is that the various databases to which they provide access, all have different search rules (protocols is the fancy word for rules). This means that someone who knows how to speedily and effectively search ERIC may not have any idea how to search Predicasts.

On the other hand WilsOnline, being a service offered by a single company for all of its databases-a couple of exceptions notwithstanding-does not require a different set of protocols for each of its databases.

This is an important issue and points to a major direction for the future, that is, the normalization of databases. Lets continue with technology review.

1.1.2. minicomputers are smaller, but still quite powerful computing devices which have been quite effectively used in local library or regional automation efforts. They have been especially effective in such applications as online circulation control systems for individual libraries (as with many college and university libraries, plus some public libraries), and libraries in combination (e.g. public libraries with many service outlets; regional

public library systems consisting in many individual public libraries; and consortia, i.e. several libraries in combination, sharing a single minicomputer.)

1.1.2.1. For almost twenty years the **MINICOMPUTER** has been successfully used to maintain control of all of the books (and other library materials) held by all of the libraries participating in the system. It indicates where they are located (i.e. on the shelf, in circulation, or any other status), who has them, reserves or holds them for use by library patrons when they are not immediately accessible; it maintains a complete record of all of the registered library users which includes their name, address and other appropriate information so that the user can be notified if he or she has overdue books, a reserved book is available, or for other information pertaining to library service; it also keeps track of the amount of money owed by individuals who returned their books late.

Individual suppliers of these minicomputer based systems have addressed such applications as online acquisitions; online catalogs (confusingly referred to as PACs (Public Access Catalogs)); serials acquisitions, cataloging and check-in; film control and booking; and special collection control (an important application for libraries which have special collections such as videos which may circulate only for one or two days at a time).

More and more libraries are using these minicomputer-based systems for full public access catalog use and

complete circulation control. Note well that the precondition for such applications to run on the minicomputer is the creation of a machine readable database of the library's holdings. The conversion of library holdings to machine readable form has been the biggest obstacle to the complete and successful automation of libraries. Invariably the conversion of the data to a form manipulable by the computer is the most problematic, difficult, and expensive part of automation.

MARC

Things would be a hell of a lot worse if there were no standardized format, the MARC format. Because of MARC everyone can use and share the same data for conversion purposes. Of equal importance is that a competitive market exists of automation purveyors, all of whose systems are predicated on MARC-based databases. All of the software for these minicomputer systems is written to operate on MARC records. There is no way to adequately explain within the time constraints how incredibly important this standardization of cataloging data, the MARC format, is.

Let's move on to the most exciting and fun machines to use.

1.1.3. **MICROCOMPUTERS** are used primarily in single library and single function applications. There are a variety of microcomputers available and in use by U.S. libraries.

1.1.3.1. **Microcomputers** are being used in such administrative applications as fund accounting, word processing, and data base management. The kinds of microcomputers used to perform these functions typically are based on the Intel chips, that is, the 8088, and the 80286 - 80486 chips which are on the IBM PC, XT, AT, and compatibles; and the Macintosh, which is based on the Motorola 60000 series of chips. From smart toys and hobbyists' enthusiasms, micros have evolved to become devices with as much as 16 to 64 million bytes of random access memory, and which store over 600 million bytes of data on a single hard disc drive. Devices of such monstrous capacity (and smaller ones, too) can support sophisticated local area networks of PCs and/or terminals.

1.1.3.2. **Microcomputers** are being used to perform such library functions as acquisitions, cataloging, serials control, and circulation control. In the last couple of years they have been used, too, as public access catalogs and sophisticated database storage and searching devices.

Typically, most micro based systems do not accept, process or output cataloging data in conformity with library standards, that is, the MARC record. However, there are exceptions, and definitely more are coming along.

What has made the big difference in capacity for micros is the storage medium, CD-ROM, which will be discussed at greater length below.

CD-ROM stands for Compact Disk - Read Only Memory. The CD-ROM platter is capable of storing over 16,000 pages of information, and is approximately 5 1/8 wide. The combination of the PC, a CD-ROM reading device, and a CD-ROM disk with a database on it, have made possible unprecedented extensions of automation, and more specifically have made possible the distribution of databases on to PCs which heretofore could only be stored on mainframe computers with massive disk storage.

With all of the equipment required to use a CD-ROM now costing less than \$2,000, a library now has the hardware for storing and accessing the entire U.S. MARC format database. The compaction of data, the relative inexpense of the CD-ROM storage medium, and the reduction in unit cost for data processing as represented by the PC have made it possible to provide the most sophisticated applications to operate wholly self -sufficiently in the most remote and tiny locations. The only requirement is a stable power source compatible with the equipment.

CD-ROM is the extremely powerful solution to the tremendous costs of remote site online telecommunication charges to a host computer. With CD-ROM the database sits out there in Timbuktu. With terminals online, we have to pay the phone company for providing the connection between the terminal where we are and the computer at some remote site.

Many public libraries have several databases that are on CD-ROM at their disposal: Books In Print Plus and Ulrich's from R.R. Bowker, Dissertation Abstracts, WilsOnline, InfoTrac, etc

In addition to such bibliographic databases, companies such as the **Library Corporation of America** make the MARC database available on CD-ROM as well as software to search it and prepare catalog cards and labels from the MARC records. This particular product is called **Bibliophile** and it has been very successful in as a source or medium for inexpensively capturing Library of Congress cataloging data.

Bibliophile also provides for the printing of catalog cards and labels from the Library of Congress catalog record. No more typing catalog cards and labels.

Through Bibliophile a database of MARC records could be created for the books cataloged. Library Corporation will take the records created locally from its Bibliophile product and create a CD-ROM catalog of the library's holdings. Public and other libraries all over the country have availed themselves of this service.

1.2. **Micrographics:** The two major areas of micrographics employed in libraries today are the traditional photographic micro reduction of hard copy documents, and computer based micro reduction. With photoreduction, the hard copy document is photo-reduced to microfilm, 16x, 24x, reductions all the way down to 75x and 150x in some ultrafiche reductions.

Computer micro-reduction is usually 42x or 48x, that is, a reduction to 1/42nd or 1/48th of the size of the original document, had there been one.

1.2.1.1. Both microfilm and microfiche have been used for storage and/or preservation of: deteriorating materials, infrequently used materials, and those items which suffer from vandalism, misuse, or for some other reason need this protection. The other reason is simply to save space.

1.2.1.2. In addition microform is an alternate and cheaper means of subscription to some materials, i.e. many libraries with limited budgets in an inflationary economy find it acceptable to acquire given serials in microform rather than hard copy. The disadvantage is that the serials cannot be received on a timely basis.

1.2.2. **COMPUTER-OUTPUT-MICROFORM (COM)** is a medium used by libraries since the 1960's which successfully utilizes both the data processing and microform technologies. Instead of photoreducing hard copy documents, the information displayed on COM is converted into machine readable copy from hard copy format or directly keyed into machine readable form, thus manipulable by the computer to suit the given library application. The machine readable data, instead of being displayed (i.e. printed) in hard copy form by the printer, is input to the COM device. The COM device, also called a "camera" because of its camera-like

function, converts the machine readable data into its visual analog format, i.e. it displays it on a cathode-ray-tube (CRT) screen in a human readable (not digital) form. The CRT display is then projected through a lens onto reel microform at extremely high speeds. In this manner either 16mm microfilm or microfiche are created. (Note that the microfiche are created as a single roll of film and cut into the individual sheets later.)

1.2.2.1. There are a large number of libraries in the U.S.A. which have COM catalogs, but since the inception of CD-ROM, their number is diminishing. It is an extremely compact medium, a given sheet of microfiche can contain the equivalent of 224 pages of 11 1/211 x 1411 computer printout. It is relatively inexpensive, as the largest costs are associated with the data processing effort required for organizing the machine readable data into the desirable manner of display, i.e. the way the catalog is to look. The costs for the COM master and the copies from which it is made tend to be modest, assuming the catalog is not too large. Many libraries have found that COM catalogs are a viable intermediate step between the card catalogs which still exist, and the online catalogs which require far more expensive equipment to use, host computers with online terminals.

Libraries also are choosing CD-ROM catalogs as final options which are replacing the COM catalog, and eliminating online catalogs as a goal. The cost of online catalogs and the problems of telecommunications have provided the basis for the success of the CD-ROM catalogs in competition with online catalogs. Note that they are not a panacea.

CD-ROM catalogs are always out of date, and the frequency of updating is a function of the size of your pocket book.

1.2.2.2. Getting back to COM, it generally has functioned as an inexpensive storage medium and it has eliminated bulky and comparatively expensive paper listings. It is used best as a disposable product, and is not thought of as an archival medium. For example, many libraries use COM microfiche for current on-order information. Since libraries tend to order, receive and cancel (orders for) books on a frequent basis, a COM listing of the status of the orders must be fairly frequent if it is to be of value. Hence the disposability of the COM on-order file and its regularly being supplanted by a more current edition. It is also the case that libraries use COM as a substitute for any necessary computer generated report that involves a large amount of paper.

Finally **COM** does not enjoy a great future; as the cost of computing storage and processing continue to drop, the viability of online interactive systems increases, thereby eliminating a major reason for utilizing COM.

The other major reason COM will further erode as a remote display medium is the aforementioned CD-ROM. Major COM catalog manufacturers now offer CD-ROM catalogs to customers with increasing success in selling the medium. All of the costs associated with CD-ROM are far greater.

As noted the CD-ROM requires a PC and the CD-ROM player. With COM all that is required for display is a \$150 - \$200 reader. The preparation of the COM masters and duplicates are appreciably cheaper as well. Typically the master costs from \$10 - \$25, and each duplicate fiche is about \$.25 depending on the supplier.

MORE ABOUT CD-ROM

This leads to a discussion of the CD-ROM medium. The more comprehensive term is laser recording and display media. By the use of the laser technology the information is encoded on to a silver platter of varying size and varying storage capacity. There are **Optical Disks** and **CD-ROMs**, the two laser media prevalent today.

1.3. **Optical Disks** are relatively new as regards library usage. Experimentation is proceeding with this medium as a storage device capable of holding much more information than is found in microform; two gigabytes (i.e. **2 billion bytes** or more than **65,000 pages**) stored on a single optical disk; they are capable of producing appreciably clearer images on playback or display; and lastly, they are capable of combining on a single optical disk both digital and analog (i.e. pictorial) information. The Library of Congress and other major research libraries are studying this closely as another means of preserving deteriorating books.

Since optical disks, as noted, include digital information much work is being done to find applications which will combine the computer's indexing, searching and control capability with the laser disk's capacity for accessing pictorial information through digital data encoded on the disk as well. Note that the optical disk is read or examined by a laser device and displayed on a television monitor or some other form of cathode-ray-tube display device such as a computer monitor.

One company has taken huge medical databases and placed them on optical disks, and reduced the storage device costs of the databases by many factors. Some optical disks are known as **WORM** disks, i.e. **WO** for **Write Once**, **RM** for **Read Many** times. These applications are usually tied to devices significantly more powerful than microcomputers.

CD-ROM: This disk, to which reference has been made several times, especially in the microcomputer discussion, has become a hot item in United States library discussions, and its impact is just beginning to be felt. **CD** stands for **Compact Disk**, and **ROM** means **Read Only Memory**. Each disk can hold about **500 million bytes** of information, which means that over **16,000 pages** of data can be stored on a single platter.

The extraordinary impact of CD-ROM is that it provides the distribution of massive databases, including sophisticated retrieval capability, while at the same time requiring **none** of the prohibitive telecommunications costs normally associated with the distribution of databases to remote sites.

All that is required for access to a database, such as the Library of Congress MARC database, is a PC compatible microcomputer with a CD-ROM reader and control card, and the CD-ROM platters with LC' MARC, which is several million records large at this point.

In the past libraries would incur major phone line charges to call the computer upon which resided the database to be searched. Plus the library had to pay toward the cost of storing that database on the computer online. As noted here and earlier, tremendous cost savings are thus realized, and the CD-ROM is sitting there waiting to be used whenever one chooses to use it. Several libraries have chosen the Bibliophile product over membership in OCLC because it is so much cheaper for them to catalog with Bibliophile.

Many U.S. library systems or consortia, rather than face tremendous telecommunications charges, are putting their public catalogs on CD-ROM, rather than connecting terminals via dedicated phone lines to the circulation system computer.

This application strikes one as particularly valuable when one thinks of regional or distributed networks where resources may be scarce and access to sophisticated telecommunications technology may be either limited or prohibitively expensive. If CD-ROM would be the primary distribution medium, there would always be a built-in delay for the time required to create and duplicate the platters from the machine readable data (four to eight weeks).

Most recently, with the help of consultants or specialized in-house staff, libraries are creating Local Area Networks (LANs) which connect several micros and/or terminals to a host microcomputer which has the CD-ROM product. In this way, many people can simultaneously (almost) have access to the single CD-ROM station. This is a high tech way to make the lean dollars of the 90's stretch even further while still providing cutting-edge service.

Perhaps one last point should be made about CD-ROM and its advantages over COM. COM is a much cheaper medium, but one cannot utilize the indexing and searching capability that the computer and CD-ROM provide in combination. Boolean searches on keywords, subject terms, names, parts of names, etc. all are possible with CD-ROM based systems. So the extra cost of CD-ROM

versus COM pays for appreciably greater search and retrieval. capability, a capacity far exceeding that of the traditional card or book catalog.

Without further belaboring the CD-ROM technology's virtues, one will now discuss telecommunications, the big giant to which the little CD-ROM seems to be providing an alternative.

1.5. **Telecommunications** is an area of great specialization and, as a major technology, has its own discipline to be mastered. No attempt will be made to indicate just how complex this area of

technology is, nor even to explain the various telecommunications processes. It will suffice to indicate the kinds of roles telecommunications may play in a distributed information network.

The use of telecommunications in the contexts discussed here means the use of phone lines as the means by which a user at a remote site communicates with the central site computer or anyone at another remote site. (Much less frequently, other means for transmitting messages such as satellite, microwave dish, or radio frequency transmitters may be used.)

If there is a phone line specifically established for such communication, and if it is used solely and exclusively for that purpose, then it is called a **dedicated line**. If a phone line can be used for a variety of calling purposes, one of which is calling the computer from a remote site, then the remote terminal has **dial-up** capability.

For both dedicated and dial-up lines to be used, special equipment is required on the terminal and on the computer that will permit the data to be converted into a form that can travel between the computer and the terminal, and then converted back so that it can be displayed on the terminal or processed by the computer—depending on the direction the data is headed.

The telecommunications equipment is expensive, but even worse, the telephone charges themselves are extremely dear. And worst of all, the weakest link of all online systems is the phone line.

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WLS has non-stop transaction processing equipment, that virtually never goes down. But, our library users are connected to this computer via phone lines which go up and down far too frequently. It is pathetic how much we are at the mercy of Ma Bell.

The library of which I am the director has a telecommunications bill of over \$10,000 per month. It would have been double that price if we had been unable to take advantage of a special federal tariff. What is painful to realize is that there is nothing in the actual usage of the lines that has any bearing on the doubling or halving of the charges. It is simply a matter of our escaping the local billing policies and coming under the jurisdiction of the federal tariff.

The telecommunications equipment was approximately 1/4 of the price of the total system, that is \$350,000 of a \$1.4 million dollar purchase price. The system currently supports 220 terminals at 45 sites, those being all WLS member libraries, plus the Bedford Hills Women's Correction Facility.

These astronomical costs are why U.S. libraries are turning to CD-ROM and other non-phone line alternatives for distributing data.

The interesting trend that seems to be emerging is that online terminals are used and will continue to be used where the data must be accessible in real time and must be maintained and current to the moment.

Online circulation systems which keep track of who has which books and which books are in or out, are examples of the justification of online communication with the computer.

Online catalogs are harder to justify. For example, if a library's database consists of 500,000 volumes, if it adds twelve thousand volumes per year, and its CD-ROM catalog is updated quarterly, then the most someone will be denied access to will be 1% of the library's holdings. And there are alternate ways of making that three to six months of information available so that it is not entirely inaccessible to the library user. In this way the library is spared the substantial telecommunications bill for online public access catalogs, while the users will still have access to most of the titles held by the library.

The discussion of technologies would not be complete without briefly touching upon **Video and Cable communications**.

1.4. **Video and Cable communication** are technologies being used by libraries in a variety of ways.

1.4.1. Video and cable communication are being used simply as entertainment and educational media within libraries much the same way they are used in the home. Libraries have extended this function by either videotaping, broadcasting or otherwise making available information of value to the local community not otherwise accessible to that community.

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1.4.2. Public libraries have been especially exploiting the home videocassette market by buying and circulating to their clientele entertainment and educational videocassettes.

1.4.3. The potential for this medium as an information dissemination tool is great. It is not yet being used very effectively in this manner. Libraries have focused on theatrical videos as a boost to circulation. It is hoped that they will find a way to promote the growing wealth of information and programming available on video that goes beyond the box office hits.

WLS uses cable communication as an educational, political and entertainment medium. I host a monthly cable show. Guests have ranged from the WLS Board President, to the County Executive an Assemblyman and other politicians, to Arthur Ashe, Roger Kahn, Alan Arkin, Paul Schrader, the President-Elect of NYLA, your speaker tomorrow, and many others. It is shown regularly by the County's several cable companies.

Two-way cable communication has been used by some libraries to enhance reference service.

Libraries have placed TVs in public areas, both for cable and video playback viewing. Libraries have also served as Cable Studio or broadcasting facilities

This is an extraordinarily powerful information medium that as public library people, we must exploit more fully. We are in the information business, and we must work with all information media.

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THE FUTURE

There are a few things that have to be said, now that we have gotten this far.

First, I don't believe that I will ever read a mystery in bed that is in any form but a book. I do not believe that people will wish to read fiction, poetry, or serious literary or philosophical works in a medium other than the printed page.

Second, microforms are the worst form of displaying materials in the library. No one in their right mind, all things being equal, could possibly prefer to view or read anything on microform if the same information is available on a printed page or a CRT display, either of which are incomparably better than the microform picture. It is interesting how little the microform display has improved over the last several decades.

As artifacts and as media for protracted use, and not to mention, pleasure, books have a secure place in libraries, and for sure, in my home.

Much more can be said in addressing the future in libraries, but I'll make a few more points and turn the floor over to you for questions and comment.

1. The database services will reach more and more, and smaller and smaller public libraries, via the CD-ROM medium. Even with the growing sales of the WilsOnline product, there has been no decrease in the number of subscriptions to the parallel print products. Regarding Bowker's products, it would be interesting to know if libraries discontinued their BIP subscriptions once they subscribed to the BIP+ CD-ROM product.

In any case, over the next 15 years, libraries will add more and more micro-based products. CD-ROM (and whatever more compact medium succeeds it) will become increasingly prevalent.

Depending on the phone lines and the future of telecommunications, it is likely that public libraries will eventually have most of their bibliographic control processes accessible via online terminals. The extent to which these services will be available online to the public will be mostly a function of cost.

I would safely predict that there will be a blend of CD-ROM and online services available to the public at the local library. The CD-ROM data is the best backup for the online database, even if it is a bit pricier than COM.

2. Cataloging and technical services will fall into even greater disrepute because of the impossibility of having quality databases without attendant costs. The basest canard is the attack on the catalogers for doing what they are supposed to do.

OCLC suffers from irreversible bibliographic chaos because there is little quality control over what goes in, and all-too-little quality control over what comes out.

What catalogers called authority work, and what lay people expect simply as consistency in headings, has been deteriorating at an accelerating pace since the 1960s. It costs a great deal of money for a library to ensure that all works of an author can be presented to the user, or that all editions of a work are related properly, or that all materials on a subject are brought together. With OCLC as the chief cataloging resource for US libraries, with the decreasing numbers of catalogers, and with the increasing determination of library people to have everything online NOW, less and less will be related by human enterprise, and more and more will be lost to the unsuspecting user.

Machine searching power will compensate somewhat, by permitting searches with wild cards or question marks. But how can the computer possibly know that Donald Westlake and Tucker Coe are the same author? To the extent that local systems will have authority files, i.e. files of names and topics, and all the appropriate references to and from those names; and to the extent that those files are linked to the catalog files, the user will stand a better chance of getting all of Westlake's works displayed as the result of a single search.

The sorry story is that libraries will find it increasingly difficult to pay for catalogers to review and revise names and headings for a local database. In addition there still is a long way to go before local systems will be able to readily import the name and topic data for their internal authority files, and there still is much much more to be done to develop local system software which will integrate and refresh all of the locally resident bibliographic records to reflect correct names and topics.

The bottom line is that there will be much retrogression for the immediate future in terms of the quality online catalogs and bibliographic tools. I welcome your challenges and attacks, here. I would be most pleased to be proven wrong on this account.

The most positive note is that the unit cost of data processing technology has been decreasing dramatically each year. Computers and related technologies are there for us to use, to enjoy and to deliver essential information and recreational services to our clientele, the citizens of our community. It is essential that the public library continue to be the bulwark of our democracy that provides barrier-free access to its resources, be they print, machine-based, or human. We will continue to need all three if we are to continue to maintain a high standard of service over the next decade.

Thank you for your kind attention.

