
Silicon Dreams and Silicon Bricks: The Continuing Evolution of Libraries

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ABSTRACT

THE DIGITAL REVOLUTION WILL EVENTUALLY LEAD TO DRAMATIC CHANGES in libraries as print is eclipsed by electronics. However, while some changes, especially in research libraries, are imminent, others will be drawn out over several decades. To survive, libraries will have to rethink their basic mission.

INTRODUCTION

Communication and computing technologies are leading to “a mixture of excitement, nervous anxiety, and paranoia” among librarians (Young, 1996, p. 103). It is widely expected that substantial changes are imminent. The Benton Foundation report, *Buildings, Books, and Bytes: Libraries and Communities in the Digital Age* (Benton Foundation, 1996), is a valuable snapshot of library leaders’ current thinking about their role and also of the public’s views of libraries. It helps to discuss this report along with two other recent publications about libraries, the special issue of *Daedalus* entitled “Books, Bricks, and Bytes” (*Daedalus*, 1996) and the book “Future Libraries: Dreams, Madness, & Reality” by Walt Crawford and Michael Gorman (1995). I will present just a few impressions gleaned from reading these works.

All three publications provide a wealth of concrete information as well as a diversity of perspectives. What seems not to be sufficiently emphasized in these publications are several key points that are likely to be crucial in determining the evolution of libraries:

1. The desirability and inevitability of dramatic change. Printed matter will eventually be relegated to niche status.
2. The contemporary library is a relatively recent institution, resulting from a combination of the awkward print technology and the sizes of modern information collections.
3. Research and community libraries have different functions and will be affected by the digital revolution on different time scales. It will be necessary to recognize, for example, that the main function of community libraries is to provide entertainment.
4. Evolution of libraries will be determined by competition with other institutions just as much as by technology itself.
5. Adaptation to electronics is not a matter of one-time change, but an evolution that will take several decades. This implies prolonged upheaval and simultaneously offers opportunity for gradual adjustment.

The points above are explored at greater length in the next five sections. The last section discusses the Benton Foundation's report in greater detail.

THE DIGITAL REVOLUTION AND ITS PREDECESSORS

The attachment to the printed word is surprisingly strong. Peter Lyman (1996) declares that, "[t]he computer will not replace the book any more than the book has replaced speech" (p. 4). James Billington (1996) writes that: "The book, that most user-friendly communications medium, has a long life ahead of it. I do not believe that our great-grandchildren will be reading the plays of Shakespeare or 'Moby Dick' on computer screens." Billington also claims that: "Free democratic societies were born out of the book culture and may not survive without it" (p. 51).

For a historical perspective, it helps to consider the reaction of the scholarly community to the invention of printing. Bernard Hibbitts (1996) has pointed out in detail the analogies between current critics of electronic publishing and the defenders of handwritten works. Thus history records statements such as the following paraphrase by Martin Lowry (quoted in Hibbitts, 1996) of Filippo di Strata (late 15th century): "the world has got along perfectly well for six thousand years without printing, and has no need to change now."

Johannes Trithemius, in his tract "In Praise of Scribes," declared: "Printed books will never be the equivalent of handwritten codices....The simple reason is that copying by hand involves more diligence and industry" (an amusing observation is that Trithemius's tract, which was written and first circulated in manuscript format in 1492, owes its widespread notoriety to its printed edition of 1494 and later reprints).

In addition to the analogies that Hibbitts shows between critics of

printing of five centuries ago and those of electronic publishing today, we can go even further back in history. Writing came before printing and is more important. However, writing also had its critics. Here is how it was treated in a classic of world literature:

this discovery of yours will create forgetfulness in the minds of those who learn to use it; they will not exercise their memories, but, trusting in external, foreign marks, they will not bring things to remembrance from within themselves. You have discovered a remedy not for memory, but for reminding. You offer your students the appearance of wisdom, not true wisdom. They will be hearers of many things and will have learned nothing; they will appear to be omniscient and will generally know nothing; they will be tiresome company, having the show of wisdom without the reality. (Plato, "Phaedrus")

If Plato had the benefit of what we have learned in the last two and a half millennia, his indictment of writing would surely have been much more sweeping. There is environmental degradation (through deforestation, for example), physical maladies (such as extensive nearsightedness), and psychological problems (as seen in the plague of social bookworms), all caused by writing and its descendent, printing. With such evidence of its harm, would any government allow writing to spread were it to be invented today?

It is easy to argue that Plato was right, that something precious was lost when writing replaced oral transmission and memorization. Still, all those who quote T. S. Eliot's, "Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?" in arguing against electronic publishing, should bear in mind the similar sentiments of Plato. And where would we be if Plato's argument had led to the abandonment of writing?

The simple reality is that, while oral traditions did give us the Agricultural Revolution as well as the poetry of Homer, they would not have sufficed for much more than that. Similarly, handwritten works brought us the Renaissance, but printing was needed for the modern era with its more complicated society and therefore greater information needs. To handle the information needs of the future, we will have to use electronic forms of information.

We will not only have to use information in electronic forms to deal with the variety and volume of it, but we will prefer to use it that way. Lyman (1996, pp. 1-33), Crawford and Gorman (1995) and others argue that the computer will not replace the book, just as the book has not replaced speech and television has not killed radio. However, writing is a different medium than speech and television differs from radio. A better analogy is that of the replacement of vinyl LPs by music CDs (a point grudgingly conceded by Crawford and Gorman), where the two fulfilled the same function, and one was clearly superior to the other. Currently

paper is far superior to the screen for sustained reading. To quote from Crawford and Gorman (1996): "Print is not dead. Print is not dying. Print is not even vaguely ill" (p. 14).

That will change, though. Electronics is advancing rapidly, much faster than print technology. While the number of books sold each year is growing, it is growing at rates that are a tiny fraction of those for electronic information. Eventually we will have high resolution displays that will be light and flexible, and we will prefer to curl up in bed with them rather than with bulky printed volumes. Creating such screens does not require discovery of any new laws of physics. Once they are created, print will be truly obsolete.

Some foreseeable events are not worth worrying about. The Sun will eventually become a red giant and incinerate the Earth, but this event is too distant to concern us. The arrival of electronic displays that will almost completely replace books will come much sooner—during the lifetimes of most of us—and so needs to be planned for. Contrary to the Billington quote above, we cannot leave the decisions to our great-grandchildren. However, the transition will take several decades and will be gradual. The flexible high resolution screens that will be needed have not yet been demonstrated even in laboratory prototypes. After they are shown to be feasible, it will take several years for them to show up in specialized applications, and then after awhile in devices costing a few thousand dollars, aimed at the power users. Judging from the history of technology, it might then take a decade to bring screen prices down to the \$300 range of the mass consumer market. Another decade might be required for them to become inexpensive enough that people will have several such screens around the house and will allow their toddlers to play with them.

Although the complete replacement of printing by electronics (aside from niche markets, such as are occupied today by hand-crafted documents) will not occur for several decades; the transition will be gradual and is already noticeable. As displays improve, the material available in electronic form grows, and people get accustomed to working with digital data, usage will be shifting to electronic forms.

This will require libraries to change to prevent them from becoming "a kind of museum where people can go and look up stuff from way back when" (a quote from Benton Foundation, 1996, p 30).

THE LIBRARY AS A RECENT INSTITUTION

It is necessary to recognize that the modern library is a recent institution, and its future is not guaranteed. The phenomenon of the free (i.e., tax-supported) public library in almost every town in the United States dates only to the beginning of the twentieth century. Funding and stimulating this development is surely Andrew Carnegie's greatest contribu-

tion. For most of the preceding two centuries, libraries in the United States were primarily private operations, either operated for profit or by voluntary associations that charged dues. The Library of Congress, one of the greatest in the world, also did not start out as a public institution and is not one even now. It exists primarily to serve Congress. While James Billington (1996), the Librarian of Congress, says that the knowledge in libraries "must be openly accessible to all people" (p. 37), his article also reveals that it was only in the last quarter of the 19th century that the Library of Congress was opened to the public (for the first few years of its existence, it was not even open to the President of the United States). For a long time our civilization survived without public libraries.

To understand the modern library, we have to appreciate the extent to which it is a response to the modern scale of publishing. The Library of Alexandria is supposed to have had approximately half a million scrolls. However, that was the only institution of such size in antiquity. Collections have tended to be much smaller until recently. When the Library of Congress was burned by the British during the War of 1812, it contained about 3,000 books. To replace it, Congress purchased Thomas Jefferson's private collection, "the largest and best in America" (Billington, 1996, p. 41). It consisted of 6,487 volumes. For contrast, let us note that the Library of Congress contains around 100 million cataloged items today (with approximately 20 million books). Amazon.com offers to supply any of 2.5 million books in days or weeks.

It will be helpful to list the current annual production rates of various "information goods":

major movies	500
books	50,000
scholarly articles	2 million
newspaper articles	100 million

These numbers are only rough estimates. The book figure, for example, is only for new English-language books, and the newspaper article figure is a conservative underestimate based on the UN statistic of almost 10,000 daily newspapers in the world. We do not need precision for our discussion.

University administrations and even scholars complain about the costs of running libraries. Let us therefore consider a thought experiment in running a research library. Suppose we fire the librarians and tell the scholars to run the library themselves (purchases of books and journals consume only a third of the budget of a research library, so the savings would be immediate and substantial). When scholars need a book, they can order it themselves, catalog it in, and put it on the appropriate shelf. When they borrow a book, they are to be responsible for bringing it back

and putting it on the shelf it came from. Also, each time they come to use the library, they should pick up a wet mop and clean 100 square feet of floor. It is ridiculous to even think of such a proposal. It certainly is ridiculous when dealing with a library of a million volumes.

However, it is not a ridiculous idea when the library has, for example, 1,000 volumes. That is how some small private departmental libraries in universities operate today (aside from the wet mops). It is also how most libraries operated two centuries ago. What has changed is the scale of operations. It was this change in scale that led to the invention of such standard tools as the card catalog (in the nineteenth century).

“Librarianship as a definable occupational category began in the fourth quarter of the nineteenth century” (Carpenter, 1996, p. 80). The first library school opened at Columbia University only in 1887. Through the middle of the nineteenth century, librarianship was a low-status occupation: “[T]he librarian’s function was clerical: recording books loaned and returned, accounting for fines, copying out brief records for catalogs, and the like” (Carpenter, 1996, p. 82). This should not be a surprise. We don’t require specialized higher education institutions to train the clerks for Blockbuster Video, and we do not need a Dewey Decimal nor a Library of Congress classification scheme for movies. The annual production of videos is comparable to the annual production of books a century and a half ago and does not require much sophistication to handle.

While current libraries and librarianship are the products of the scale of the volume of information in our society, they are also products of the print technology that dominated in the past. When reaching a book in the stacks of a major research library takes a five-minute walk or an hour wait for it to be brought from closed storage areas, it makes sense to have classification schemes that minimize such waits. That may not be necessary for digital data. Either automated searches or else links informally provided by scholars may suffice. I am not saying they will, only that they may (these two approaches are named the Warren Weaver and the Vannevar Bush strategies by Lesk). The 100 million items cataloged by the Library of Congress is not much more than the 31 million pages that AltaVista indexes. However, even if automated searches and informal links do not suffice, the economies of scale that digital libraries offer are huge. In an earlier article (Odlyzko, 1995), I projected that fewer than fifty professionals (many trained librarians) employed by *Mathematical Reviews* could provide, in a fully digital scholarly publishing environment, all the services that over a thousand librarians working in mathematics libraries currently do.

Libraries have to expand to cover the torrent of new information that is becoming available in a variety of new media. Otherwise they will have to shrink as their traditional functions become increasingly automated.

THE DIVERSITY AND FUNCTION OF LIBRARIES

Many writers discuss libraries as if they were uniform (typically thinking of either academic research libraries or neighborhood public libraries). However, there is a whole spectrum of libraries between those two types, as well as many other, more exotic libraries. Crawford and Gorman (1995) and Kent (1996) are especially effective in describing the variety of functions that libraries fulfill (for an interesting historical account that emphasizes the variety of libraries, even in the early years of these institutions, see Carpenter, 1996). There is no single prescription that will fit all these institutions. Research libraries are the ones that have been affected by the electronics revolution the most so far, and they are the ones that will lead the transition to the digital world. At the Science, Industry, and Business Library of the New York Public Library, digital information already accounts for about 20 percent of the acquisition budget (compared to about 2 percent in 1987). At most research libraries, that fraction is 5-10 percent, and at public libraries it is much smaller. The main function of research libraries currently is to provide access to scholarly journal articles, and in that area modern technology provides much less expensive methods for operation, and the economic and sociological incentives are likely to lead to drastic changes within a decade (see Odlyzko, 1997, for example, for a fuller discussion and references).

Public libraries are in a different category. Their evolution will be much slower for a variety of reasons, some of which will be mentioned in later sections. First, though, let us mention a fact that is seldom emphasized. While libraries are usually presented as dedicated to uplifting the public, in practice public libraries are primarily providers of entertainment. Most of their lending is of fiction.

Furthermore, they have increasingly been developing collections of music CDs and videotapes. I am not making this point to reproach librarians for this course of action. It is helpful in developing a wide constituency for libraries and also serves to make people familiar with more respectable information sources that libraries provide. Also, fiction can be an effective educational medium.

Still, it is helpful to remember the dominant role of entertainment among the functions of public libraries. (The tension between "the best books" and "the best that people will read" in libraries is old. See Carpenter, 1996 for a brief account and references.)

In a similar spirit of reconsidering the function of libraries, let me quote from an earlier publication (Odlyzko, 1996): While librarians do not think of themselves as providers of inferior data, to a large extent that is what they have been doing since the beginning. Personal possession of a book is usually far superior to borrowing a copy from the library. (The qualifier "usually" is used advisedly here, since in some situations, especially in academic research, libraries can provide a much bet-

ter service than a personal collection. A friend of mine told me that his father, a famous historian, started selling off his large book collection when he realized that he was often taking an hour to travel by subway to the New York Public Library to look up information in a book that he owned but could not locate.) That is largely what allowed libraries to coexist with bookstores. For publishers of fiction (and novels are, and traditionally have been, over 70 percent of what the general public borrows), libraries help in segmenting the market, charging different prices to different users and thus maximizing revenues. A novel is typically published in hardcover first with the aim of extracting high prices from those willing to pay more to read it right away. Once that market is fully exploited, a cheaper paperback edition is made available to collect revenue from those not willing to pay for the hardbound copy. Libraries coexist with this system since, to use library copies, patrons have to put up with the inconvenience of waiting for their turn on the reservation list, going to the library to pick up the book, having to read it in just a week or two, and so on. Thus libraries serve a different segment of the market than bookstores (the used book stores serve yet another part of the market).

One finding of the Benton Foundation report was that the public is very supportive of library purchases of electronic materials, but assumes that such materials will then be easily accessible from homes. If, as I suspect, that will not be the case, and instead there are requirements for inconvenient physical visits to the library for many materials, then public support will be harder to sustain.

COMPETITION AND COOPERATION

A finding of the study in the Benton Foundation (1996) report is that: "While some library leaders fear that computers and bookstores will increasingly draw library users away from libraries, at least for now this concern appears groundless—one market seems to draw sustenance from the other markets" (p. 6).

Similarly, Mason (1996) states that: "Some libraries. . . have been offering Internet access to the public for several years and have found that instead of replacing the conventional use of the library, electronic access (even to full texts) has stimulated book borrowing, browsing, and use of printed reference material" (p. 168). The whole world is moving toward an information economy, so the information business is booming, and at the moment all its segments are benefiting.

It might be best to think of the information industry as an ecology. Libraries are a genus that fills some ecological niches, and publishers, bookstores, newspapers, TV, and computer companies fill other niches. They all depend on each other. (The preceding section discussed how libraries evolved to coexist in the print world with bookstores. For an

interesting historical study that compares evolution of libraries to that of video rental stores and how they interacted with their sources, see Varian & Roehl). It is useful to point out just how small the niche is that libraries occupy. In the United States, annual purchases of books are as follows:

individuals	\$20 billion
public libraries	\$1 billion

This is somewhat misleading in estimating impact, since library books tend to be used much more than those purchased by individuals. Also, total public library costs come to about \$5 billion. Still, the basic conclusion is that libraries are a significant, but not a dominant, factor in providing information to the public (another fact is that newspapers collect about \$12 billion per year from subscribers and around \$35 billion from advertisers).

Even in a stable biological environment, there is constant evolution, and some species do better than others. In information dissemination, though, we do not have a stable environment, but instead are going through the early stages of the digital revolution. This revolution involves explosive growth. However, that does not have to translate into proportional growth, or any growth at all, for all players. Cars and airplanes were the primary beneficiaries of the growth of the transportation industry in this century. Railroads survived, while Pullman, which was a prominent and profitable transportation company around the turn of the century, is gone. One of the first major casualties of the digital revolution might be the newspaper industry. So far it has been growing in revenues and profits (although circulation has been roughly steady), but it could easily be forced into major restructuring. The most likely immediate cause of such change might be less the shift of readers to electronic information sources (which is likely to take longer, although it will happen eventually) than a move of classified advertising online where it can be used much more efficiently. (I am not predicting that newspapers will not survive, just that they will have to go through a painful transformation. Their news gathering and filtering functions will be salable products in cyberspace. However, the economics of paying for such services will have to change.)

Libraries, especially research libraries, face the problem that information sources are proliferating. As one small example, I do use the Library of Congress online catalog (which has become available in the last few years). However, for current books, I prefer to use Amazon.com. It has a better user interface, has information about forthcoming books, and facilities for alerting me to books in areas I am interested in. Not infrequently the convenience of being able to do this from my study leads me to buy a book through Amazon.com that formerly I would have obtained through a library.

Library usage may not be decreasing, but general usage patterns appear to be shifting. Relative declines are likely to be concealed by the general growth of the information industry. Unfortunately we do not have current updates to the valuable studies that were carried out in the 1970s, such as by King, McDonald, and Roderer (1981) and Machlup (1978). There is much greater use of informal sources of information facilitated by the Internet. What is most dangerous for libraries is that users appear to be able to compensate for cutbacks in library services by relying on other sources. As Susan Rosenblatt aptly put it at a recent conference, "available information drives patterns of usage." When some research libraries had to drastically cut back on their journal or book purchases, or else when large parts of their collections had to be moved to much less accessible off-site storage, there were protests, but they were limited. Scholars somehow managed to adjust, and nobody has been able to document any serious damage to the research enterprise. Corporate libraries in particular have been cut back severely, and again there is little evidence of grave consequences.

This is likely to lead policy makers to demand a faster transformation of libraries than might have occurred otherwise (Odlyzko, in press). The task for libraries will be to show not only that their services are useful, but that they are provided better and more economically by libraries than other institutions.

It has been almost universally true that established players were not the leaders in taking advantage of new technology. Apparently only between 4 and 6 percent of the printers who worked before 1500 had started out as professional scribes (see footnote 20 in Hibbitts, 1996). Newcomers, unburdened by tradition, overheads, and old expectations, have usually been the ones to take over. That is the danger facing libraries. One often hears librarians bemoaning the chaotic state of the Web. The implication seems to be that some large grant should be provided to allow librarians to study how to cope with the new phenomenon, and in the meantime development of electronic information sources should pause. Yet Yahoo! is providing a classification for the Web. Another frequent complaint is about the lack of archiving on the Net. Well, aside from all the small private archives that are being set up, we have Brewster Kahle's project. What these new players do may not fit the traditional requirements that librarians would have insisted on, but it may be sufficient and even more appropriate for a new medium.

Even in low-tech areas, new competition is springing up. The Benton Foundation report mentions the perception that the new giant bookstores from Barnes & Noble and Borders, with their attached coffee shops and an atmosphere conducive to browsing, can be serious competition to libraries. That seems to be a well-founded fear. Bookstores of this type do not have to fill all the functions of a library to draw away some of the

usual attendees. Further, while some of these bookstores are already branching out into computer software, there is nothing to stop them from offering access to electronic databases, or even from lending books for a fee.

One ecological niche that librarians are naturally well-positioned to hold onto and expand is that of providing restricted access to information. As the citation in the preceding section showed, this is something they have always been doing. In the future, this function is likely to be much more explicit. Since "bits are bits," there will be no natural distinction between lending and selling digital works. Therefore we are likely to see a variety of artificial restrictions imposed, with different quality products offered to libraries than individuals (Odlyzko, 1996; Varian, 1996). Many, perhaps most, digital products are likely to be available through libraries only to those who physically come to the library in order not to inhibit sales to individuals and companies. Librarians will thus become enforcers of usage restrictions.

CONSTANT CHANGE

Library leaders want the library of the future to be a hybrid institution that contains both digital and book collections (Benton Foundation, 1996, p. 4). The current library is already a hybrid institution. It has been that way for a while and will continue to be so for the foreseeable future, since some print collections are likely to remain even in the public library for a long time. However, there is no fixed mix of digital and print collections that will be satisfactory over any length of time. Libraries face not a single adaptation to the digital world, but several decades of constant change, with books being constantly displaced (at least on a relative basis) by bits. That the change will not be sudden, especially for community libraries, reflects the advantages of books and of the current library system.

The Crawford and Gorman book (1995) argues extensively that libraries are likely to survive in close to their present form. It is a valuable work in pointing out the many strengths of the contemporary library. While the discussion is useful, it seems necessary to first say a few negative things about it. Some of the arguments in that book are ludicrous. For example, the authors argue (Crawford & Gorman, 1995, pp. 55-56) against Jerry Pournelle's idea of a "CD-ROM Library-of-the-Month Club" in which CD-ROMs with 500 to 1,000 book-length texts would be sent out each month to subscribers. Crawford and Gorman claim that this would never work since each writer would insist on royalties of at least 30 cents per work per CD-ROM. If true, this would drive the cost of each CD-ROM to at least \$150 each just for royalties, and so the price would be far above the \$20 that Pournelle was suggesting.

However, the basic argument is fallacious. I for one would be happy to accept royalties of 1 cent per CD-ROM if that CD-ROM were going out to a million customers and my work could not be expected to attract more than a couple of thousand readers in a print format (after all, how many of the 500 or 1,000 texts arriving in a participating household each month could possibly get read?). It is not the royalty rate per unit that matters but the total amount.

There are many other faulty arguments in Crawford and Gorman (1995). Many estimates about electronic information (for example, for the cost of digitizing existing books) are exaggerated. However, the basic thrust of their book is correct. Technology and economics do currently favor the book over digital formats, especially the popular book that is read in a sustained way. Practically nobody is willing to read a novel on a screen (see Hsu & Mitchell [1997, p. F12] for a detailed listing of the advantages of print over screen with today's technology). Furthermore, a 300-page novel that costs \$20-30 in a bookstore would cost that much to print on a small printer, and the resulting copy would have lower resolution, would not be bound, etc. (The economic case is completely different for scholarly articles. A typical specialized paper brings in revenues of about \$4,000 to the publisher [Odlyzko, 1995, 1997] but seldom attracts more than a couple of hundred readers who might want to read it carefully enough to print it out. In that case, it is much cheaper to distribute the work electronically and print it out only for those who need it. That is a basic reason that research libraries will change faster than public ones.) However, as display technology improves, the balance will inexorably swing toward electronics.

While Crawford and Gorman are persuasive in making the case against a precipitate move away from books, they could easily lead to dangerous complacency. Their claim that “[p]rint—books, magazines, newspapers—will survive as an important medium of communication for the indefinite future” (Crawford & Gorman, 1995, p. 180) is surely incorrect. Print does have a few more decades as a significant medium, but that is not “the indefinite future,” since most people alive today are likely to see print completely eclipsed by electronics. Crawford and Gorman assert that most thoughtful people “will also recognize that most of the library’s *information* services will be supported best by electronic technology and that its *knowledge* services will be supported best by physical collections supplemented by electronic resources.” This assignment of only the inferior information services to electronics is unrealistic. However, it does recall similar sentiments from the past. One can easily imagine that Plato might have claimed that all those marks on clay, papyrus, or parchment might possibly be good for keeping track of taxes, but all true wisdom would reside in works that people memorize. Johannes Trithemius

in his "In Praise of Scribes" did claim that: "The printed book is made of paper and, like paper, will quickly disappear. But the scribe working with parchment ensures lasting remembrance for himself and for his text."

Trithemius's claim has turned out to be wrong, and so will that of Crawford and Gorman. Electronic resources already support knowledge as well as information services and will increasingly dominate. What we have to prepare for is the transition.

RECOMMENDATIONS FOR THE FUTURE

There will surely be demand for the "discriminating knowledge navigator who will add the value judgement and the warmth of human mediation" (Billington, 1996, p. 39) to digital as well as print information. Whether they will be called librarians or be the current generation of librarians is another question. The aim for research librarians should be to get into that role. The tricky part will be how to use the existing large print collections as leverage to get into the new game and not as ballast holding them back. In the future, when almost all information is in digital form (a future that is likely to be held back more by legal issues, such as those discussed in Okerson, 1996, than by technology), those "knowledge navigators" will not have to be physically present in any building called a library. (The access restriction role mentioned before could be performed by another group with much lower skill levels.) However, with current rudimentary computing and communications equipment, personal contact can provide much better service. Furthermore, the physical collections still require guidance and care. These advantages should enable librarians to transform themselves into those "knowledge navigators." This would not only keep them employed but would be socially useful in a broader sense in providing a gradual evolution of our information systems.

For public libraries, change will be slower but change is unavoidable. Many of the prescriptions that are proposed are questionable. It helps again to consider the scale on which libraries operate. The current budgets for some prominent public institutions (in the United States) are approximately as follows:

elementary and secondary education	\$250 billion
religious organizations	\$60 billion
public libraries	\$5 billion

These figures all by themselves show that libraries are not major community institutions, a point that the public seems to understand much better than library leaders (Benton Foundation, 1996). Yes, libraries are important community institutions, but they are not among the dominant ones.

The idea that libraries could be used to teach computer skills to the public or to provide access to the Internet to many people is unrealistic. There is simply no space! Libraries are primarily storehouses of printed information and manage to serve as many people as they do because they loan materials to be read at length at home.

If anyone is going to teach Web surfing on a massive scale, or provide Internet access, it will have to be schools. They are the ones with the budgets, space, and people to do it. Libraries are just too small. (Even schools are not likely to be in that role for adults for long. The information revolution will provide high-speed links to the home, and that is the natural place for Web surfing and the like.)

Yes, libraries can provide a small measure of connectivity to the Internet, but only on a small scale. This might be useful for public relations purposes but is not likely to have much impact.

The idea that “librarians must become involved in community organizations” (Benton Foundation, 1996, p. 12) falls someplace between silly and dangerous. What “community organizations” would librarians be encouraged to participate in? The John Birch Society? Some value might be gained from participation in organizations that would offer librarians ways to advertise their services, but it is important to avoid partisan groups. The impartiality of the library has been a source of strength and public support, and it would not be advisable to give that up.

Most of the recommendations in the Benton Report are excellent. They are about incremental changes that draw on the libraries’ strengths and the wide public support libraries enjoy. The American public library system is a unique and uniquely effective part of society, representing a public sector service and a safety net that actually works. The newly unemployed looking for help in writing résumés or mounting job searches; those planning to start small businesses; people attempting home decorating and repair; children learning to associate reading with pleasure; those who need to learn just a little bit about a new topic; and those who want to broaden their horizons with pleasure reading of any stripe—all these and more benefit from the common good of public library collections and services (Crawford & Gorman, 1995).

The task is to build on these strengths. In addition to the prescriptions in Benton (1996) and Crawford and Gorman, (1995), there are other steps that can be taken. Since Amazon.com and Barnes & Noble are competitors (as well as allies) of libraries, why not learn from them? Make the library as inviting to visit as possible. Amazon.com offers automatic alerting and filtering functions. Why shouldn’t the library do the same? Use the data about what particular individuals borrow (with suitable safeguards for privacy and making sure customers are willing to allow it) to point them at other books they might enjoy reading (see Esta-

brook, 1996 for example). There are many other low-tech ways that can be effective and can strengthen the library as it evolves toward the digital future.

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