Technology and LIS: a historical perspective

A portrait of Vannevar Bush

In his prophetic 1945 article *As We May Think*, Vannevar Bush envisioned a machine called a *memex*, a collective memory machine that would make knowledge more accessible. The author begins his argument by discussing the growing amount of information in the world. The increasing amount and complexity of information along with the time gap between creation and dissemination requires a new technology. Bush's technology would focus on greater usability in information retrieval, allowing users to create their own "sort of mechanized private file and library". Through the

miniaturization of data using photocells or microfilm, great amounts of information could be stored in very little space. Traditionally information is stored in index or hierarchical form, but this is not how the brain stores information. The memex would arrange things associatively, mimicking the way the human brain stores and contextualizes information.

This memex is remarkably similar to a modern day computer, in that it would be a new technology designed for personal use that would allow for the creation, storage, and organization of different materials and data. This is a fascinating article as it explains how the need of a new way to store, organize and retrieve increasing amounts of data led to the idea of modern day computers. It is a particularly interesting article in the modern context, where information and data continue to expand at an exponential rate. What new technologies and changes in data organization will the future hold? How will libraries adapt to these changes?[1]

Technology began to transform libraries in the 1950s with microfilm and in the mid-1960s with the Xerox machine. Computerized databases were developed in the 1970s and offered more information and better ways to search and obtain it. Networks such as OCLC and RLIN made it easier to share resources. Although this article predates widespread use of the Internet, it is correct in predicting that technology will continue to change the future of libraries. Technology has allowed greater access to information for more people, but it was too early for the author to accurately predict the digital divide. He argues that libraries must innovate to stay alive and that change is happening so quickly that it often appears "chaotic." The World Wide Web, however, is often described as chaotic, unorganized, and confusing, but its benefits greatly outweigh its risks. Because new technology often helps libraries keep people connected to information, libraries must strive to make sense out of the technological chaos. The author makes a strong case for businesses' need to compete but states that libraries' structure and rules "inhibit us from making the kind of innovation that is needed to compete and survive." The challenge, he concludes, is not in introducing new technology but in creating new management structures for libraries. This plan seems to push libraries toward behaving like businesses, but I think this would restrict access and introduce new economic, cultural, and political problems.[2]

Implementing information technologies in libraries

According to John Bushman, the implementation of information technology requires librarians to ask two basic questions:

- Why is the technology good for libraries, librarians, or the public?
- Where will the technology lead us?

It is the librarian's duty to ask these questions and become involved in finding the answers. All technological advances need to be approached critically, with the knowledge that they may have both social and political consequences. Librarians need to be able to evaluate technologies to determine whether a given technology will harm or help the library and its community. Funding, getting the public involved with the change in technology, getting them to deal with the positive and negative effects of change, and making sure the librarians are able to handle the pressures are all ways of becoming involved with finding the answers about information technology and the future of libraries.[3]

Digital libraries and services

Digital libraries

The Digital Library Federation looked at what it sees as the major issues regarding digital libraries in the future. These are the five challenges the organization have outlined: architectural and systems in libraries, standards and practices, collection development, how communities will use a digital library, and long-term access to digital libraries. In terms of designing and implementing new technology, information sharing about new technology is vital because few employees in libraries actually manage technological change. Libraries need to have a plan so adopting technology and training employees and users is a smooth transition. The library is simultaneously a consumer and supplier of information and needs to have standards to critique itself. Issues involved in collection development include costs, copyright and licensing, all facets of computerizing, support services, and the impact on the rest of the library. How information is presented online can determine whether and to what extent it is used by the public. The sources of digital information are coming from all kinds of places and shared resources can help defray costs. Making the decision about what information to digitize and anticipating the costs of preserving the information is the last of these challenges.

The digital library service environment is defined as a network online information space in which users can discover, locate, acquire access to, and increasingly use information. There is no distinction about the information format. The identity of a digital library is the way the library discloses, provides access to, and supports the use of its increasingly virtual collection. Managing, administering, monitoring and ensuring fair use of its collection are a part of the mix, as well as keeping up with new technologies to support education and cultural engagement so that the library can evolve and sustain itself. The prospect of a completely virtual library still seems in the future, but we seem headed in that direction.[4]

The National Digital Library Program was created by the Library of Congress so libraries, schools and homes will have access to original documents of American history and culture. The goal by the year 2000 was to digitize over 5 million items. The challenge is selecting from over 110 million items and converting to a technological format that will last. Some funding is coming from private donations. The article is descriptive, informative, but at the same time unclear about how the selection of information to be digitized was made. The Library of Congress is a leading repository of information. Is their selection of information for this digitizing project representative of the body of knowledge that Americans and world scholars can look to understand what has shaped American history? Should we be questioning whether American history is more important than other cultures that have been influential in world history? For instance, the book, In Search of the Cradle of Civilization, (Frawley, et al) places east Indian settlements earlier than Sumerian, Mesopotamian, and Babylonian societies. India, the largest democracy in the world today, has been ignored by the rest of the world. Books like In Search of the Cradle can be found at The Theosophical Society which has been a part of Wheaton's local history for over 100 years. A part of my role in the Olcott Library is to apply for a state grant that will digitize important elements of the collection that contribute to Illinois history.[5]

Virtual reference

In an effort to reach patrons accessing the library via computers, many libraries and library consortia offer virtual reference services. These services can be either real-time or offset, and are offered via email, instant messaging, web form interfaces, SMS, and even virtual reality games. According to the Reference and User Services Association, "Virtual reference is responsive to patrons' need for convenient access to reference service." [6]

Though virtual reference is a great convenience for library patrons, its implementation introduces several challenges for traditional libraries. Most individual institutions don't have the staffing levels necessary to monitor an IM service regularly enough for the service be attractive to users. For real-time virtual reference, many libraries are part of chat co-operatives or consortia, some of which are able to offer reference services 24 hours a day. However, this does mean that reference workers from other institutions, who may not be as familiar with the patrons' home institution's resources, may not be able to provide services of as high a quality as the home institution might.

In his introduction to *Digital Reference Service in the New Millennium: Planning, Management, and Evaluation*, R. David Lankes examines the emerging field of digital reference, how it affects the traditional reference staff and service, and addresses two key issues, "scalability" and "ambiguity".

Lankes makes the argument that the availability and use of digital resources are fundamentally re-defining the role of reference services. According to Lankes, library reference staff are now becoming "information brokers", because of the nature of the digital environment and changing user expectations. He discusses two issues, scalability (the ability to service growth), and ambiguity (identifying resources needed to meet user's needs). He describes several differing initiatives that have been or could be brought into play to address these issues, both alterations of existing reference practices, and new methods of providing relevant reference services in a digital age.

His arguments are sound, and pose fundamental questions as to what defines a “Library” and “Reference Services”, as one would expect in the introductory chapter of a book on the changing role the digital world plays in the reference field. Some of the questions and possible solutions, however, seem very radical and unrealistic given the fragmented standard reference environment based on local libraries, both from a funding and staffing perspective, and assumes that some “entity” (modeled on the private sector) will provide a more centralized construct more appropriate for the digital age.[7]

Access to technology

Gordon Flagg explains how the FCC unanimously passed a new rule on May 7, 1997 that decreased the charges of telecommunication services to schools and libraries throughout the nation. The discounts range from 20-90% (the highest percent going to libraries and schools in low-income, rural, and high-cost communities). In order to raise

the $2.25 billion needed for this plan they increased fees ($1.50 for residential and $3.00 for business) and taxes on second phone lines.

This decision was praised by the ALA because it allows more schools and libraries to access the internet where in the based it was too costly to do so. That way everyone has the opportunity to use this service even if they cannot afford it in their homes. Some experts feared that this reduction would be difficult to sustain in the long run, because it is such a big undertaking and that there may be legal challenges they might have to deal with.[8]

Physical libraries in a cyber world

Rapidly-deteriorating materials create an urgent need to focus on preservation, particularly in research libraries. Preservation decisions often fall into two major categories: *selection* and *medium*.

- Problems of *selection* are best answered by a team of both librarians and scholars, who employ criteria that is three-fold: collection-, subject-, and usage-based.
- Problems of *medium*, on the other hand, are more subjective. Microfilm is quite stable and durable, but access is somewhat limited. Digitization, while alleviating access problems, poses concerns about cost, instability, and hardware and software change.

Abby Smith advocates a preservation strategy that includes a combination of microfilm and digital storage. To be sure, funding for this multi-pronged approach is unanswered, but Smith’s ideas in action will help ensure the selection of a broad scope of scholarly works for preservation in forms that meet researchers' needs of integrity and accessibility. Since the publication of Smith's article, however, digital storage has gained more potential. For instance, some problems of cost and changing technology can be mitigated by storing documents on, say, a one-terabyte hard drive. Drive size has certainly come down in cost since 1999, and a hard drive will not become obsolete as quickly as many removable formats. Moreover, accessibility may be benefited by the sheer amount of works that can fit on a terabyte hard drive. Nonetheless, it is clear that the mediums used for preservation should be reevaluated as digitization expands.[9]

Cost of adoption

Libraries have been transformed and modernized by the application of information technology. Users do not have to go to libraries, and have the opportunity to retrieve information via Internet. Because of all the new technology being introduced to libraries, library administrators are forced to break down the budget, in order to make wise decisions when it comes to long-term benefits for the library. If a library administrator follows a cost structure model, he/she will have more success determining the direct and indirect costs. Also, the library administrator will be able to understand the initial and recurring costs within the life cycle of implied information technologies. It is common for administrators to forget to include training and other necessary costs, which may hurt their long-term budget. It is essential for library administrators to analyze each part of the budget, so he/she does not end up wasting any money.

I agree with the author's statement about the "bigger picture" when it comes to a budget, and remembering the significance of keeping up with new technology offered. Chapter five brings up several great points about the importance of the growth of technology, and the awareness of people's right to privacy. Much of society is getting comfortable with technology, and requires the programs offered. It is the library's job to provide the programs to the public, and not go over the budget, while remembering the importance of an individual's privacy.[10]

Monetary costs are not the only costs to adopting new technology. Author Nicholson Baker is a firm believer that adopting new technologies can come at the expense of preserving history. Libraries around the country, including those at academic institutions, have replaced many of their card catalogs with online access catalogs. They are throwing out their card catalogs, sometimes with fanfare. Despite some attempts to preserve data by microfilming the cards and proofing the new records, information is being lost because of errors and omissions.

Librarians rapidly adapted to technology to cope with a cataloging crisis caused by growing numbers of items to process. The author argues that they are overlooking their mission to preserve books. Instead of being archetype librarians, they want to be seen as technology specialists.

Author Nicholson Baker contended that disposing of the card catalog was akin to tossing out history. The notations made on each card over decades, make the card catalog itself an artifact worthy of preservation. It is ironic that while the goal of libraries is to preserve information, they are keen to dispose of the catalog, which he sees as more than a finding aid. With humor, wit and irony Baker described the evolution of the library catalog. Accession dates, provenance and notes in some catalogs might be of value to scholars, but the nostalgia for well-thumbed faded cards with carefully written notes seems to be Baker's primary object.[11]

Nicholson again critiqued libraries' adoption of technologies in his 2001 book *Double fold: libraries and the assault on paper*, Nicholson Baker presents a strongly-worded critique of libraries' digital reproduction of paper materials. In one of his most compelling case studies, he examines the case of the *Syracuse Daily Standard* newspaper, which in 1858, claimed to have been printed on paper "said to be taken from Egyptian [sic] mummies." When he attempted to find the actual newspapers, he discovered that the local public library had since discarded its paper copies of the newspaper, instead offering a microfilm copy to its patrons.[12]

The book, which the New York Times described as a "blistering and thoroughly idiosyncratic attack"[13], was strongly criticized by the library community. A major argument against Baker's book was that libraries build their collections based on both current and anticipated use, rather than strictly preserving anything they can. Not every item ever published can be collected and preserved in its original format, nor will every item ever published be useful to library patrons, especially if it has disintegrated extensively. A second major argument against the book was the impracticality of maintaining print items, particularly acidic ones, on a large scale. A third argument notes that digitization and microfilm tend to enable more people access to a particular item, as microforms can be shared via Interlibrary Loan much more feasibly than can decaying print resources, and since digitized materials can often be shared with anyone who can access the Internet. For a bibliography of reactions to Baker's book, see the of Research Library's exhaustive list .

Conclusion: Rutenbeck's "Five great challenges"

According to Jeff Rutenbeck, the continued growth of the digital world presents five major challenges to its users: malleability, selectivity, exclusivity, vulnerability, and superficiality.

Malleability

Malleability refers to the total impermanence of digital information, from data to pictures to even people's identities. Unlike print, digital information can be reconfigured in ways that print information cannot.

Selectivity

Selectivity addresses the preference by users to only consider information available online, dismissing information available only in print.

Exclusivity

The digital divide comes to the forefront with exclusivity, since new technology is being introduced constantly, but there is no universal way to bring everyone to the same levels of competence.

Vulnerability

Vulnerability highlights the inherent problems with our interconnectedness; while we enjoy the easy and constant flow of information and ideas, at the same time, we leave ourselves open to security breaches and systems failures.

Superficiality

What I feel is the greatest challenge in the digital age is superficiality. We have access to so much information, but there is no guarantee that what we see is accurate.

Conclusion

The author identifies the issues clearly, and offers suggestions as to how we can battle these challenges, but acknowledges that there is no clear cut answer to overcoming any of them. Most users, including myself, butt against these issues in our personal and business life, and struggle with how to reconcile them, since, as the author acknowledges, any answer leads to compromises.[14]

References

1. Bush, Vannevar. “As We May Think.” Atlantic Monthly 176 (July 1945): 101-108.
2. De Gennaro, Richard. "Technology and Access in an Enterprise Society." *Library Journal* 114:6 (1989): 40-43.
3. Bushman, John. “Asking the Right Questions about Information Technology.” American Libraries 21 (December 1990): 1026 – 1030.
4. Greenstein, Daniel, Fall 2000. “Digital Libraries and Their Challenges.” Library Trends 49: 290-303.
5. Lamolinara, Guy. “Metamorphosis of a National Treasure.” American Libraries 27 (1996) : 31-33.
6. Reference and User Services Association. "Guidelines for implementing and maintaining virtual reference services." http://www.ala.org/rusa/resources/guidelines/virtrefguidelines
7. Lankes, R. David. “The Foundations of Digital Reference.” In Digital Reference Service in the New Millennium: Planning, Management, and Evaluation, edited by R. David Lankes, John W. Collins, III, and Abby S. Kasowitz. New York: Neal-Schuman, 2000.
8. Flagg, Gordon. "FCC Approves Telecom Subsidies for Libraries, Schools". American Libraries 28 (Jun/Jul 97); 12.
9. Smith, Abby. The Future of the Past: Preservation in American Research Libraries. 1999. [Online] Available at www.clir.org/pubs/reports/pub82/pub82text.html. (Accessed January 29, 2006.)
10. Dugan, Robert E., 2002. Information Technology Budgets and Costs: Do You Know What Your Information Technology Costs Each Year? Journal of Academic Librarianship. 28: 238-243.
11. Baker, Nicholson. “Discards.” New Yorker (April 4, 1994): 64-86.
12. Baker, N. (2001). Double fold: libraries and the assault on paper. (1st ed.). New York: Random House.
13. Dwight Garner (April 15, 2001). "The Collector" . *The New York Times*. http://www.nytimes.com/books/01/04/15/reviews/010415.15garner.html .
14. Rutenbeck, Jeff. "The Five Great Challenges of the Digital Age

	Introduction to Library and		***Get Involved***

Information Science

- Textbook home
- List of chapters
- LIS books on Wikibooks

- To do list
- Contributors list
- How to contribute to Wikibooks

Previous Chapter	**Next Chapter**
← Re-contextualizing Libraries: Considering Libraries within Their Communities	Transcending Boundaries: Global Issues and Trends →