1.0 Introduction

The virtual library, this vision of the library of the future, conjures up a variety of images to each of us. [1] To some, the virtual library connotes the ultimate fear: obsolescence of the librarian. To others, the virtual library offers the promised land: the utopia of information access to all. We have all heard the term virtual library used in a widely varying set of scenarios, with equally diverse concepts of what it is, how it will come into being, what it will mean for each of us as librarians, and what it will mean for our patrons. But what exactly does the virtual library encompass? For the purposes of this paper, I'm going to confine my definition to the more generally accepted components of the emerging virtual library. The most fundamental precept of the virtual library is the universal application of advanced high- speed computing and telecommunication capabilities to the access and delivery of information resources. Carried to its ultimate end, the virtual library offers a universe of information to any user, anywhere in the world, at any time of the day or night through the power of a personal computer with telecommunication capabilities. While none of us would suggest that the virtual library is a fully realized concept today, I would argue that it is more fully developed than many of us realize and that many of you are contributing to the advancement and acceptance of the virtual library. 2.0 Evolution Not Revolution The virtual library is not something to be feared, nor is it the ultimate answer. It is another step in a long evolutionary process in which librarians, publishers, the scholarly community, and others have made information available for the advancement of knowledge, the joy of learning, and the mere satisfaction of human curiosity. After all, this is why we all became librarians, this is what librarians do, and this is what we will continue to do in the future. The virtual library is merely another tool to assist us in our goal of serving our patrons.

Librarians have a long history of adopting technology to enhance services. They were early users of typewriters to produce catalog cards, then they photoduplicated card sets to replace individually typed cards. OCLC introduced the exchange of cataloging data and computer-printed catalog cards, then OPACs eliminated the production of catalog cards altogether. Today, LANs, cooperative networks, and Internet access to OPACs, around the nation and the world, have provided instant access for users, whether they are in the library or in a living room half way around the world. Electronic information systems followed a similar evolutionary path. Mediated online searching of SDC, Dialog, and BRS complemented the long standing use of print indexes and abstracts. Direct end-user searching in libraries started with vendor systems such as BRS After Dark and stand-alone CD-ROMs, then added tape-loaded citation databases and networked CD-ROM databases. Computerized access to bibliographic information led to the next logical step of evolution--electronic document delivery. Full-text products on CD-ROM, such as UMI Periodicals OnDisc, and rapid delivery through telefacsimile

technology and, in limited cases, electronic file transfer, utilized by such services as CARL UnCover2 and Faxon Xpress, have brought us one step closer to the virtual library. Today, a growing body of citation, full-text, numeric, and statistical databases are available to the user without ever entering the hallowed confines of a library building. Just think about it: no freeway gridlock; no parking hassles; no opening or closing hours; no missing, lost, or misshelved information; and no due date. What a world! 3.0 Weaknesses of the Virtual Library Concept So where's the flaw in the system? The first weakness of the virtual library is the lack of information on how to access or find the specific information needed by the user. This is often referred to as "navigating" in the electronic world. The problem is that most of the time we're left without a compass or a map, and often we're navigating under a dark overcast sky with no stars. In the traditional library, patrons can avail themselves of printed guides, library instruction opportunities, and the old standby, the reference desk, to help them navigate the admittedly complex world of library tools and services. Skill levels of library patrons vary from novice to self-proclaimed expert, and librarians adjust to each along an unending continuum.

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So how well do current library service patterns and behaviors translate in the world of virtual libraries? The skills of information seekers will be equally disparate in the electronic environment as they are in the traditional library. The complexity of access mechanisms and protocols will not necessarily diminish. Help screens may substitute for print pathfinders and guides. Books and workshops offered commercially by the private sector may be a partial replacement for library instruction classes. But what mechanism will supplant the reference librarian at the desk? Will libraries establish help lines or user-support 1-800 numbers? Will we staff terminals for e-mail questions? I say why not? We are librarians! We help our patrons search for, locate, and obtain documents and information. We've adapted our skills and our services to microforms, online information, and CD-ROMs--now we will adapt to the Internet, the NREN, and whatever other form information takes. This is nothing new, it's not terrifying, it's what libraries and librarians have done for centuries. We adopt, we adapt, and we continue to serve our clientele. The second critical element to the success of the virtual library is the willingness, and probably more importantly, the ability of libraries to contribute to the shared resources and services of the virtual library. The concept of the virtual library is just that--a concept. It's lifeblood is the network of libraries and information providers that agree to provide access to the information resources within their control. This allegiance, partnership, or cooperative constitutes the "virtual collection," which is the composite of all the information available in all of the libraries on the network. Again this is not an alien concept to librarians. Cooperation and resource sharing are long-standing traditions among libraries. The concept of interlibrary loan has progressed from an informal process between librarians, to ILL standards and request forms, to the OCLC ILL subsystem, with over six million transactions per year. Library resource sharing has incorporated such concepts as cooperative collection development, reciprocal borrowing, and document delivery systems within local, state, and regional networks of member libraries. The local library has long established mechanisms to provide its patrons with access to resources outside its own walls. The mechanisms have changed in some cases from mail to UPS to fax, but the principle remains the same: to meet the information needs of our clientele as efficiently and as thoroughly as we can. The emerging virtual library is merely another step in the same direction.

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Not surprisingly, the third major pitfall of the virtual library is cost. Establishing and maintaining network services involve major commitments of resources, both financial and human. Internetworking incorporates a plethora of highly complex technical issues that must be resolved through standardization, compromise, and cooperative development. As the network is expanded from a LAN to a WAN and eventually to an NREN, its cost grows exponentially and in parallel to its benefits, as a growing circle of users are provided access to this virtual collection of resources. Funding the hardware, software, maintenance, and staffing needs of the network is a major issue, but it is no different from funding the cataloging, shelving, and preservation of paper resources. 4.0 Implementation Challenges So what are some of the issues we, as librarians, need to address? First of all, we need to effect a transition or a transformation of how we think about what it is we do. How do we serve our users now and how will we serve users of the virtual library? Most of the early computer systems in libraries were developed for librarians' use. From bibliographic utilities to computerized online searching to automated ILL systems to online acquisitions systems, the end-user was primarily librarians and library support staff. With the advent of OPACs, CD-ROMs, and campus LANs, the focus of use shifted to the patron. However, with few exceptions, the user of these systems was expected to be in the library, using library hardware and software with assistance from library personnel. The advent of the virtual library will effect a major transition in how we deliver library services. We can no longer expect users to be present in the library to ask for assistance or to be available for traditional library instruction. The delivery of services to a primarily remote group of users through a networked system will mandate a fresh look at how libraries are organized, staffed, and funded to deliver services and information.

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The concept of the NREN as an "electronic superhighway" that will instantly connect users to the information they seek, regardless of its location, is a popular concept. However it overlooks a major barrier to widespread use--the user's ability to identify the appropriate electronic resource in this vast sea of information and then retrieve needed information from it. How will we train service staff who interpret the system for the public? What format will library instruction programs and educational materials take and how will they be delivered to our users? The role of the librarian in this process will only increase in importance. What we must resolve is how that role will be implemented in the virtual library. The final two areas that mandate our involvement in the emerging virtual library are the intellectual content and the technical design of this electronic library. Who is going to decide what resources will be included in the virtual collection? How will these resources be organized? How will they fit into an overall collection development plan within a library, a consortium, or a larger user community? Will profit rule the decisions, or will librarians influence the balance in electronic information sources as they have always done in developing balanced print collections, reflecting all interests of their user population? What about technical issues? How will the network be configured? Who will decide on the appropriate system architecture? As librarians do we shy away from highly technical considerations, or do we utilize our extensive knowledge of how information is best organized and accessed? How many of us have tried to use CD-ROM searching software that seemed to follow no logical searching pattern? It is imperative that librarians become involved in the technical design issues of the virtual library, or we and, most importantly, our users will pay the price of our failure. The problems confronting the continued development of the virtual library are not insignificant, but they are also not insurmountable. The key is that librarians must assume a leadership role in this development. We cannot totally abandon the shaping of the future of information access, retrieval, and delivery to the

commercial sector. Great progress is being made in libraries around the country through innovative and groundbreaking projects that are attempting to define the future of the virtual library--how it will operate, what it will include, who will have access, and of critical importance, who will have control.

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5.0 Virtual Library Projects

A brief overview of a small selection of virtual library projects will convey not only the importance of these projects and what they are achieving, but also convince you that we all can and must become involved in this vital process. One of the best known of these projects is a joint effort of Carnegie Mellon University and OCLC, called the Mercury Electronic Library. [2] Begun in 1987-88, Project Mercury is using modern distributed computing to provide users with access to a wide variety of textual databases, including citation and abstract databases, as well as basic full-text reference sources. Project Mercury is exploring the technical design issues and working to expand available content through partnerships with journal publishers such as Elsevier and IEEE. The University of Iowa Libraries Information Arcade is focusing on how best to support the "use of information technologies for research, teaching, and scholarly communication." [3] The system incorporates text, data, software programs, graphics, music, and digital video files, as well as capabilities for electronic mail and access to other library catalogs, electronic journals, newsletters, and academic discussion lists. [4] Cornell University and Xerox Corporation have formed a partnership with support from the Commission on Preservation and Access. The goal of the CLASS project is to test a prototype system for recording brittle books as digital images and producing, on demand, high-quality and archivally sound paper replacements. [5] In addition to the obvious preservation issues, the project also seeks to "investigate some of the issues surrounding scanning, storing, retrieving and providing access to digital images in a network environment." [6] In a final project, North Carolina State University, the National Agricultural Library, and eleven land grant university libraries are collaborating in the NCSU Digitized Document Transmission Project. [7] The aim of this project is to explore "techniques for electronic receipt, display, distribution and output of digitized library research materials." [8] These four projects represent only a small sampling of the efforts of libraries around the world to explore, enhance, and shape the future of the virtual library. They are doing what librarians do: seeking new ways of providing information to their users.

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6.0 Conclusion

The virtual library is not the ultimate answer to everyone's information needs. It is merely another step in a dynamic and evolutionary process. The traditional print library and traditional library services will not disappear. But, as librarians, we must accept and adapt to the introduction of new techniques and systems. We must recognize the enormous potential of the virtual library, address the issues involved in its creation, and take a leadership role in integrating these new systems and services into our libraries, for our own good and for the good of our users.

Notes

1. This paper was presented at the Ninth Texas Conference on Library Automation, Houston, Texas, 2 April 1993.

2. William Y. Arms et al., "The Design of the Mercury Electronic Library," EDUCOM Review 27 (November/December 1992): 38-41.

3. "Arcade Provides Internet Access," University of Iowa Libraries Information Arcade Bulletin (February 1993): 4.

4. Ibid., 3.

5. "Cornell/Xerox/CPA Joint Study in Digital Preservation-- Progress Report November 2," The Electronic Library 10 (June 1992): 155-163.

6. Ibid., 155.

7. Tracy M. Casorso, "NCSU Digitized Document Transmission Project: Improving Access to Agricultural Libraries," The Electronic Library 10 (October 1992): 271-273.

8. Ibid., 271. About the Author Dana Rooks, Assistant Director for Administration, University Libraries, University of Houston, Houston, TX 77204-2091. Internet: LIBL@UHUPVM1.UH.EDU.

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