THE LIBRARY PROFESSION AND THE INTERNET: IMPLICATIONS AND SCENARIOS FOR CHANGE

JUNE ABBAS
SCHOOL OF LIBRARY AND INFORMATION MANAGEMENT
EMPORIA STATE UNIVERSITY

This article examines and outlines the impact the Internet has had upon the library profession. It traces the growth of the Internet and the historical, as well as current uses, of the Internet by information professionals. It further explores the evolving roles and functions of libraries and librarians. Current empirical studies of librarian's uses of and their attitudes toward Internet use, as well as subjective surveys and reasons, are outlined and discussed. The article also addresses how the Internet and the emergence of the digital library has, and will continue to, affect the information transfer process and society's view of information and the information professional. Lastly, suggestions of possible scenarios for this emerging information profession paradigm are given.

INTRODUCTION

Perhaps no other recent innovation has impacted the library profession to such a great extent as the Internet and other networked resources. Not only is our world becoming an interconnected global community, but this early use of the Internet has changed the fundamental roles, paradigms, and organizational culture of libraries and librarians as well.

This article will explore and outline the impact the Internet has had upon the library profession. There is a continuing evolution of the roles and functions of libraries and librarians which appears to parallel the growth of acceptance and use of the Internet by library professionals. This article does not intend to argue for the demise or the survival of the physical library or the old paradigms (or the basic underlying principles of the profession) associated with this function, rather it hopes to show that the library profession is contemplating a new paradigm, a new set of ideas; one of knowledge/thought/technology integration as suggested by Billings (1992) or Steele (1995). Furthermore, this article is not limited to one type of library since all types will and have already experienced the impacts of the Internet. Finally, this article will attempt to limit discussion to the roles and service functions of the library and librarians and will not address organizational issues.

THE LIBRARY PROFESSION AND THE INTERNET

The Internet has been in existence for the past 26 years (Bournellis, 1995). Libraries' use of the Internet also spans the same time frame, beginning in the 1970's. Then, however, access was mainly for basic database searching in large systems such as OCLC, RLIN, BRS and DIALOG (Saunders, 1992). During the early years of Internet use, the database searching was mainly restricted to the reference and interlibrary loan librarians. With the growth of the Internet and the addition of more diverse electronic resources, the capacity for searching the Internet also increased. For example, Engle (1991) reports that in 1991 there were "over 2,900 computer networks connected to the Internet. . . . and over 200 online library systems" (pp. 7-8).

In the years between 1980 and 1990, the number of new Internet databases grew nearly 25 percent per year. Between 1985 and 1990, the number of full-text data bases grew by more than 50 percent each year (Malinconico, 1992). According to Malinconico, "the computerized systems libraries used as recently as the 1980's maintained an obvious and continuous relationship with traditional library functions" (p. 36) such as bibliographic searching and online public access catalogs or OPAC's.

Katharine Sharp Review [ISSN 1083-5261] No. 5, Summer 1997 [http://edfu.lis.uiuc.edu/review/5/abbas.pdf]

It is also interesting to note that the Internet was mainly utilized for its communication functions or e-mail systems. According to a survey done by Ladner and Tillman (1993), 93 percent of librarians surveyed mentioned some aspect of electronic communication as their primary use of the Internet. Librarians viewed the Internet as their "electronic Rolodex" because it enabled them to communicate with colleagues around the world in a convenient, timely, nondisruptive, and inexpensive manner (p. 50). Secondary uses included interlibrary loan requests, searching OPAC's, obtaining and transferring files, and database searches for reference queries.

With the expansion of databases and their overall use by librarians, the traditional services and roles of the librarian were beginning to be called into question. Engle (1991) noted that "[r]ecent dramatic advances in computer networking and the accelerated growth of information retrieval technology have brought about the beginnings of an evolutionary leap in resource sharing that is profoundly impacting the library landscape" (p. 7). Librarians as early as the late 1980's began to wonder what impact, if any, technology would have on the profession.

White (1991) warned librarians that "[w]e have lost sight of the uniqueness and primacy of our role and mission and allowed ourselves to become bit players and spear carriers to the scripts of others" (p. 52). Yet other library critics warned that it was critical for librarians to reinvent or redefine their traditional roles to incorporate technology. Zink (1991) extolls, "[t]here will be no place (if there is now) for librarians who are not willing to interact with technology. . . . Too many librarians do not realize that the period of the late 1980's and 1990's is one of unprecedented change, not only in the library profession but in society as a whole" (pp. 76-77).

Literature of the early 1990's discussed the growing prevalence of digital or electronic resource sharing and the beginnings of what are now call *virtual libraries* (Malinconico, 1992; Saunders, 1992). With Internet access, librarians and an increasing number of clients were able to access these resources remotely. Underlying models and ideas of the traditional library as a repository of information resources were beginning to be replaced by the idea of remote, geographically unconstrained access (Hale, 1991; Ritch, 1991). At the same time the traditional role of librarians was perceived as being in danger of becoming displaced or disenfranchised by technology (Bosseau & Martin, 1992).

Since 1993, the Internet has experienced unprecedented growth. In July 1993, there were a total of 1.8 million network hosts. That number has increased to 6.6 million hosts in 1995. There were an estimated 56 million worldwide Internet users in 1995 with a projected increase to 200 million users by 1999. Of particular interest, of the 30 million users in 1994, only 3 million were consumers. The remainder were institutional users from academia, corporations, and government agencies (Bournellis, 1995).

With the growth of Internet resources and users, the library functions and roles concerning Internet use and the digitization of libraries and their resources also continues to evolve. Use of the Internet and telecommunications technology is becoming a prevalent aspect of our libraries. According to Schneider (1996), a 1994 survey of public libraries found that more than 93 percent of libraries surveyed were connected to the Internet.

Use of the Internet and other network resources is changing the traditional library functions. While in the 1980's and early 1990's as mentioned above, the Internet was used mainly for communications, database searching, and bibliographic access, today the Internet's modalities are changing traditional functions of library professionals such as the information transfer process and the perceived nature of information itself. Use of the Internet has changed or augmented all aspects of the information transfer process. The dissemination of information has become more fluid. Anyone with a modem can "just plug into [their] telephone line . . . and publish [their] manifestos or organize meetings" (Rheingold, 1993, p. 68).

Anytime a person creates a Web page or sends an e-mail message, that person is disseminating information. Prior to the Internet, dissemination of information was limited to formal or informal print publication. The creation and production processes have changed. Researchers or business people are now able to search the Internet's collection of electronic resources. Furthermore, they are able to use e-mail or teleconferencing to exchange information with others in almost real-time collaborative group "think-tank" sessions (Rheingold, 1993). Diffusion of their research findings can also be accomplished in the same manner, as opposed to face-to-face meetings or conferences.

Internet use has also indirectly affected the other aspects of the information transfer process. For example the organization, storage, and preservation of information has been both simplified and complicated. The Internet provides a medium in which to organize and store the vast new amounts of information available. New technologies such as hypertext and html have organized information in hopefully searchable formats.

Powerful search engines have been created to assist users in sifting through the information. While the Internet and its emerging devices of searching and organizing may provide some limited assistance to its users, the question remains: Are these devices an effective means of organizing the Internet? Is there room for a more traditional organization scheme and would such a scheme work with the digital nature of the Internet? OCLC is currently working to answer these questions.

OCLC's Project Scorpion[1] is attempting to assess the feasibility of using traditional cataloging schemes such as USMARC and AACR2 to organize Internet resources. The project's main goal, however, is to explore the "role of library standards, practices, and systems" concerning the organization and access of digital resources (Jul, 1996, p. 8). These are questions that should be of great concern to information professionals.

The Internet is also a medium for the preservation and storage of information. In the past, libraries were seen as the main storage facility of information (White, 1989). As society becomes increasingly more digital and more information resides on the Internet, the focus on storage and preservation is shifting (Torok, 1993). For example, some academic libraries are now faced with the problem of whether or not to purchase serials that can be just as easily accessed on-line. Preservation of these same media also becomes an issue of economics, not the "just in case" preservation ideology of the past paradigm (Beckman & Pearson, 1993). Co-joined to the function of preservation is the destruction of information. Because the Internet can be seen as a medium for preserving information, the process of destruction of information also is affected. Should information professionals count on the Internet as a repository? Lane and Summerhill (1993) wonder what policies are being developed to ensure preservation of useful information. As more and more information is created and stored on the Internet, the capacity to store this information is also decreasing. Also, *who* will decide what to preserve and what to destroy? Will this attitude then change the principles we use in regard to preservation and destruction of information? These are implications yet to be determined.

Along with the changes to the information transfer process, society's definition of the nature of information is also changing. We are becoming a digital world. In the past information was considered to be mainly oral and textual. However, because of changing information technology, information now is thought of as multimedia (Bolter, 1994)—as graphical, voice or sound, and the visual combination of all elements in video. It is no longer feasible to think of information as static words on a page.

Conversely, however, the nature of the information has also changed. One school of thought believes information has become fragmented and disembodied as a result of the above formats, which may also serve to change the meaning behind the information. We are, therefore, no longer accessing the "whole fabric of information, rather [the] bits of data, sound bites, and images torn from it" (Swan, 1992, p. 22).

The second school of thought, however, views hypertext as part of a new dynamic knowledge/thought/technology paradigm which pairs librarianship with the use of computer technology in order to expand capacities for storing, retrieving, representing, and manipulating information. Gapen first proposed the idea behind this new way of thinking in 1988 (Billings, 1992). She described a new knowledge/thought system in which the human brain will complement computer software. This new collaboration will allow rapid storage and transfer of information, but also new and different ways of processing and representing information. Gapen sees hypertext and hyperlinks, such as those now utilized by the Internet, as the first step in the creation of new interconnected resource sharing and cooperation between "hypersystems."

Billings (1992) expands on Gapen's idea to describe the hypersystems as not just information databases but as artificial intelligence systems which are capable of linking to and responding to any number of new knowledge/thought systems through open system interfaces. (This idea is similar to the computerized agents which are currently being developed by computer scientists.) Billings believes these new hypersystems will magnify individual system capabilities and "will allow for interactivity among knowledge and other systems in ways we cannot yet dream" (p. 14). These systems will also precipitate a "new order of achievement in the age-old goal of generating new knowledge" (p. 14).

Society is also beginning to view digital information as the standard or preferred form of information (Coates, 1992). Students or researchers are relying more and more on computerized databases or Internet databases to search and retrieve information (Mark & Jacobson, 1995). However, the problem with Internet digital publishing is that the validity or accuracy of digital information is seen as a given, with little consideration to source or authority. Because information on the Internet can be created by anyone, there is little or no editorial or peer review process. As a result of this

preconceived notion of accuracy, Internet authors can easily distort or manipulate information to suit their purposes. Users want rapid dissemination of information, so the burden of 'weeding' for quality control is placed upon the shoulders of the information consumers (Lane & Summerhill, 1993). According to LeJeune (1994), the lack of editorial process will have to change. She believes libraries and publishers "must make an effort to collaborate thereby ensuring that information maintains its integrity and continues to flow smoothly in the academic community and to the public" (p. 112).

These changes in the information transfer process have dramatically changed the traditional categories and roles librarians function under daily. For example, detailed cataloging codes such as those utilized by AACR2 and MARC records may not be necessary for online materials. There will be a convergence or interchange of reference, collection development, and technical services roles and a restructuring of traditional reference services to integrate Internet resources into the traditional research modalities (Sutton, 1996; Steele, 1995).

With all of these changes, we should ask what impact is Internet use having on the libraries and the librarians themselves? There are a limited number of studies that have measured librarians' attitudes toward, and use of, the Internet and its impact on the library profession. McClure, Ryan, and Moen (1993) conducted a study on the role of public libraries and Internet use. A survey of chief librarians ranked nineteen key issues of Internet use. The highest ranked issue was a general consensus that the Internet would provide new opportunities for libraries. This issue was followed by the belief that librarians had limited technological knowledge. It was also generally felt that using the Internet would facilitate the need for new skills and initiative by librarians.

Furthermore, there have been research surveys via Internet listservs to determine how well librarians have adapted to the Internet. A survey in 1993 by Ghidiu was conducted to measure: 1) what types of resources were used; 2) training given; and 3) frequency of use. Ghidiu determined that 62 out of 75 respondents were self-taught, while only 13 had formal training. The Internet was used daily by 10 respondents, and 17 used it weekly (cited in Finlay & Finlay, 1996). Further surveys by Cozzolino and Pierce (1993) confirmed Ladner and Tillman's (1993) earlier findings that e-mail was the most often reported use of the Internet.

Research by Finlay and Finlay (1996) reported variables such as knowledge of the Internet and the personality trait of innovativeness to have direct effect on the attitudes of librarians and their use of the Internet. A random sample of 101 full-time librarians with varying levels of Internet experience were asked to complete questionnaires. The authors hypothesized that, 1) librarians who have more knowledge of the Internet will exhibit more positive attitudes toward its use; 2) librarians who have more knowledge of the Internet will use it more often than librarians who are less knowledgeable; 3) librarians who are innovative will have more positive attitudes toward the Internet; and 4) librarians who are innovative will use the Internet more than librarians who do not possess this trait (p. 64).

In order to reduce bias within the test, each measure was taken separately. Attitude measures were taken using an eleven-point bipolar scale. Usage frequency measures included calculating the average Internet use in a one-week period and dividing this total by the number of Internet tools used. The second usage measure indicated variety or breadth of use. This was measured by surveying the total and variety of tools used (e.g., e-mail, access to library catalogs, file transfer protocol or ftp, telnet, etc.).

The results showed that "[k]nowledge appears to be the most important factor. Encouragement by a supervisor to use the Internet and having adequate opportunities to learn the Internet were both significant covariates" (Finlay & Finlay, 1996, p. 73). The highest attitudes toward the Internet and the highest use of the Internet were related to the combination of having high levels of knowledge and innovation. The results of this study, including the covariant results of encouragement by supervisors and opportunity for Internet use, suggest the need for a supportive and nurturing environment in which to learn and develop Internet skills. The results also suggest the need for more effective training programs. In order to confidently utilize the Internet, librarians will require adequate training, encouragement by administration, and time to develop their skills.

Finlay and Finlay (1996) further posit that this research "may begin the long process of identifying a complete set of characteristics and personality traits of individuals who might be prioritized for new hiring into positions requiring heavy involvement with the Internet" (p. 63). As more libraries become connected to the Internet, administrators will need to address these issues. However, does this conclusion also suggest that library schools will need to somehow "weed out" applicants who are not innovative? How will these conclusions affect library schools? While some library schools have changed their curriculums to include greater Internet exposure, has widespread adoption of these

findings been accepted by the library profession? This question can be partly answered by subjectively assessing why librarians choose to use the Internet.

Along with the empirical studies, there are also subjective reasons that may influence Internet use. List (1995) notes a professional schism between the so-called cyberphiliacs and cyberphobiac librarians: "[I]t is an understatement to say that interest in the Internet is widespread, particularly in the library world" (p. 1019). List also believes there is a widening gap of Internet "surfers" and the "rest of us who are wading in the kiddie-pool, or perhaps even just sitting pool side" (p. 1019). She believes that many librarians are simply not convinced that the Internet is the *only* way to do their jobs.

List also questions whose needs are actually being met by Internet use and proposes it is not the library clients, but rather the library administrators' needs and those of our own egos that are being met. For example, administrators believe that the presence of Internet use is important to attract potential funding resources and prospective students and employees. Administrators also view technology access as cheaper than ownership of resources. However what administrators fail to consider is who will work these resources or has the time to learn to utilize the Internet effectively? According to List, learning to use the Internet requires a major time commitment, both for the librarian themselves and in training library users to utilize it more effectively.

Interesting enough, librarians also view using the Internet as remaining on the cutting edge of their profession. They have begun to equate the Internet with their perception of their profession, as have library clients. "We are information professionals, after all, and that is what the Internet is all about: information. . . . librarians who are not using the Internet for reference questions have been told by colleagues and supervisors that they are guilty of bad librarianship" (List, 1995, p. 1021). In fact, professional job evaluations also reflect the importance of Internet use. The cyberphobiac may be a competent librarian, but non-electronic work is less visible, less measurable, and less glitzy.

A further subjective reason why librarians are hesitant to use the Internet is the problem of accessibility. According to Woodward (1995), "the Internet is slow and circuitous" (p. 1017). While in some cases the Internet may provide the best, fastest, and most cost-efficient way to attain the needed information, users can get buried or lost in the endless menus, and dead-end links, and end up with useless or inaccurate information (Strong, 1996). Search engines or information sifting methods are still fairly basic—users are really accessing "an excess" of information (Schuman, 1992). Schuman believes we are really experiencing an information-glut or an "access to excess. The mere fact that there is more data available does not mean that people either want it or can use it meaningfully" (p. 102). White (1989) concurs: "The information process can be as easily distorted by strangling it through overfeeding as by starving it" (p. 309). Access means more than physical location; "[i]t means the connection of ideas to people" (Schuman, 1992, p. 112). Librarians have a valuable role of helping users sift and sort through the excess information. Librarians will need to train patrons to critically evaluate information accessed via the Internet.

As use of the Internet becomes a more integral function of the librarian, we may see the attitudes and roles evolve to accommodate the digital library of the future. However, Sutton (1996) proposes a model in which today's library is a hybrid one, which must balance both print and digital information, yet is leaning increasingly towards the digital library. Sutton presents a model which traces the evolution of libraries and librarians. Type I, or "Traditional Library," is defined by its specific physical place and a finite collection of paper resources. Type II, or the "Automated Library," is defined as the "first serious uses of telecommunications in library automation" through connections to bibliographic databases and OPAC's (p. 135). In the Type II we see a beginning of a mixture of digital and print media as well as the possibility of unconstrained geographic access. Type III, the "Hybrid Library," is where Sutton posits libraries are today. Two factors characterize this type: 1) the incorporation of both digital and print resources, and 2) the possibility of totally unconstrained geographic access to library and remote (Internet) resources (p. 137).

Sutton also proposes a Type IV, the "Digital Library," as the library of the future. Sutton defines Type IV as "the library as logical entity. It is the library without walls—the library that does not collect tangible information bearing entities but instead provides intermediated digital information" (p. 138). However straightforward and logical Sutton's model may appear, he questions whether this future idea or virtual library really comports with our idea of a library. Is merely providing access to digital information resources a library?

Sutton's model fails to take into account the library client's desires. Will library clients readily accept the lack of physical access or will they still prefer the combination of remote and physical access as presented by

Sutton's hybrid model? Atkinson (1993) states that "the primary purpose of information services has always been and will always be to reduce to a minimum the amount of time required by local users to obtain access to that information they need to do their work" (p. 201). Atkinson further believes that as we move closer to the digital library this purpose will become even more pronounced. Atkinson's explanation of library services does embrace the idea of the digital library as still being viewed as a library, however, will users see these remote services as a library?

Perhaps it can be said that the future is here already. James-Catalano (1995) views the entire Internet as the world's ultimate library. There are an increasing number of virtual libraries available on the Internet. The Internet Public Library (IPL) is such an example. It is modeled like the physical building with analogous structures such as a "Lobby" and "Reference Center," but it has no physical counterpart.[2]

The impact of the virtual library and the future it may enable for library professionals is uncertain. Library commentators are beginning to speculate on how libraries and librarians' roles will yet evolve further. There are many scenarios. Creth (1996) expounds,

> the values that are the foundations of the library profession should remain the same into the next century. These values of service, quality, universal access, and cooperation are not threatened unless librarians lose sight of them. The way in which these values are translated into operations and activities, though, will undergo substantial change. (p. 1)

The environment in which librarians work will change. According the Creth (1996) it will be characterized by:

- greater access to a range of information
- increased speed in acquiring information
- greater complexity in locating, analyzing and linking information
- constantly changing technology
- lack of standardization of both hardware and software
- continuous learning for users and staff
- substantial financial investment for technology. (p. 2)

Librarians will need to accept these changes and evolve as the information availability and technology does: "Librarians need to find ways to respond effectively and innovatively to the different landscape in meeting user expectations" (Creth, 1996, p. 2). The challenge is there and if librarians are to survive in the new information economy, they must accept the challenge and respond proactively.

Many roles and changes have been postulated. Below is a brief synopsis of these:

- **Librarian as gateway to future and to the past** (Creth, 1996). Providing Internet access is a necessary function of the library (Harris, 1996). "We also need the attitude that we will provide this type of service and that it is just another avenue to connect people with the information they seek" (Strong, 1996, p. 157).

- **Librarian as teacher or enabler**. Librarians should actively seek out users in a variety of settings to provide instruction and inspiration. Teaching should also include multimedia technologies (Creth, 1996).

- **Librarian as knowledge manager/worker** (Creth, 1996). The information transfer cycle is directly affected by Internet use. Librarians, according to Lucier (1993), should "embrace the entire new information transfer cycle, from the creation, restructuring, and representation of information to its dissemination and use" (p. 97). White (1996) however, questions if we should settle for the role of knowledge worker. He feels the librarian's future is in doing what computers cannot do. Computers can collect, identify, and organize information. The librarian should therefore be an information "lifeguard." A librarian's role is not to "enhance the work of the information highway paving trucks, or to assist the database developers by training their sloppy end users for them. . . . We have an important and valuable role [to] tell people what they ought to see and read" (p. 3). Our niche, according to White, is to protect clients from drowning in the information overflow.

- **Librarians as organizers of networked resources** (Creth, 1996). "Librarians need to take the initiative in creating better organization and access to what is available on and through the Internet" (p. 10). Currently OCLC and librarians are involved in a project called Project Scorpion which is investigating the feasibility of cataloging and organizing Internet resources (Jul, 1996).

- **Librarians as advocates for information policy development**. Librarians need to become

involved in policy decisions concerning Internet resources in order to ensure users rights of universal access, intellectual property rights, and censorship and privacy (Creth, 1996).

- **Librarians as community partners**. Libraries need to make themselves felt in the community as a valuable resource and tool (Steele, 1995; Hale, 1991).

- **Librarians as "sifters" of information resources**. The Internet provides an access to excess. Skilled sifters are needed to help users make sense and order of the resources. Saffo (1994) believes "consumers will pay serious money for anything that can help them sift and sort and gather the morsels that satisfy their fickle media hungers. The future belongs neither to the conduit or content players but those who control the filtering, searching, and sense-making tools we will rely on to navigate through the expanses of cyberspace" (p. 74).

- **Librarians as collaborators with technology resource providers**. Librarians should be involved with development of the databases and search tools needed for effective use of the Internet. Librarians should become designers, synthesizers, and navigators (Gapen, 1994).

- **Librarians as technicians**. With the increasing use of the Internet, librarians may find it necessary to expand their skills in this area. Librarians will need to provide technical advice on workstation configuration, modem access, networks, etc. (Steele, 1995).

- **Librarians as individual information consultants**. Librarians will focus more on individual, customized services and controlled access/facilitation by remote users (Steele, 1995).

The role of libraries and librarians will continue to evolve. "The heat is being felt by libraries and their staff but the networked 'greenhouse effect' will force growth and may evolve new information species" (Steele, 1995, p. 20). One such species is the "cybrarian." Librarians working on the Internet have begun referring to themselves as cybrarians (Wedgeworth, 1995). In fact, Stearns (1996) believes as we become increasingly more digital, more cybrarians are needed to address cyberspace issues.

CONCLUSION

The changing roles of librarians, as facilitated by the use of the Internet, should be of great concern to the profession. There are three major areas which should be addressed by the information profession to meet the challenges of these changes:

1. Because the Internet provides library patrons with a vast array of seemingly accurate information, librarians will need to increasingly adopt the role of teacher or guide. Patrons will not only need to learn how to best access information, they will also need to be taught to critically evaluate Internet resources to determine their validity. Librarians can and will need to provide this guidance.

2. Library professionals will need to address the issues of information organization and retrieval via the Internet. Librarians should remain proactive in dealing with policy and procedural issues concerning organization and access. In this way, the integrity of the information retrieved by library patrons can be ensured. Endeavors such as Project Scorpion are a step in the right direction.

3. Library professionals should embrace the changes confronting them. Radical shifts in traditional ideas of service need not occur. Library professionals do, however, need to remain flexible and open to the potentials the Internet can have for the profession and for library patrons. For example, the concept of the non-physical, "virtual" library need not be a threat. Internet access should instead be seen as a means to augment information access for patrons. Library professionals who embrace this new environment of collaboration will be better able to provide customized service to their clients.

There is no crystal ball that can predict the future of the library or the impact the Internet has and will continue to have on libraries and librarians. Perhaps the best scenario, as well as the practical ones discussed throughout this article, is for the library profession to embrace these changes and accept a new idea of service as one which integrates the new technology with traditional ideas of service, quality, universal access, and cooperation. As discussed above, Billing's (1992) idea of a new orderliness or a new knowledge/thought/technology paradigm may be one such example. Most importantly, however, as long as library professionals never

lose sight of their mission and purpose to serve library patrons in the best possible manner, there will always be a place for librarians and libraries—virtual or not. It is also fair to suggest that further research is needed to assess the impact the Internet has upon library professionals, so that we may enable all librarians to prepare for the future.

NOTES

1 For more information, see the Project Scorpion web site at http://orc.rsch.oclc.org:6109

2 This site was created by the University of Michigan Library School as a pilot project and can be accessed at http://ipl.sils.umich.edu. Stearn's (1996) article *The Internet-Enabled Virtual Library* suggests other useful virtual sites. Gail Clement's homepage available on her virtual library site at http://www.fiu.edu/~clementg/gpc/rolodex.html provides an up-to-date list of virtual library sites.

REFERENCES

Atkinson, R. (1993). Networks, hypertext, and academic information services: Some longer-range implications. *College & Research Libraries, 54*, 199-215.

Beckman, M., & Pearson, E. (1993). Understanding the needs of users: The timeliness factor. In *Opportunity 2000: Understanding and serving users in an electronic library*. 15th International Essen Symposium, 12-17 October, 1992 (pp. 307-320). Essen, Germany: Essen University Library.

Billings, H. (1992). Magic and hypersystems: A new orderliness for libraries. In J. Hannigan (Ed.), *Library Lit. 21—The best of 1990* (pp. 1-17). London: Scarecrow Press.

Bolter, J. (1994). Authors and readings in an age of electronic texts. In *Literary texts in an electronic age: Scholarly implications and library services* [1994 Clinic on Library Applications of Data Processing, 10-12 April, 1994] (pp.7-19). Champaign, IL: Graduate School of Library and Information Science, University of Illinois at Urbana-Champaign.

Bosseau, D., & Martin, S. (1992). Visions: Taking control of our destiny. *The Journal of Academic Librarianship, 18*, 230-231.

Bournellis, C. (1995). Internet '95. *Internet World, 6*(11). Available from http://www.internetworld.com/1995/11/internet.html

Coates, T. (1992). The future of information technology. *Annals, American Academy of Political and Social Science, 522*, 45-56.

Cozzolino, T., & Pierce, T. (1993, April 17). Internet survey: Discussion of library reference issues. Available via e-mail: libref-1@listserv.kent.edu

Creth, S. (1996, September 30). *The electronic library: Slouching toward the future or creating a new information environment*. Follett Lecture Series. Available from http://www.ukoln.ac.uk/follett/creth/paper.html

Engle, M. (1991). Electronic paths to resource sharing: Widening opportunities through the Internet. *Reference Services Review, 19*(1), 7-12.

Finlay, K., & Finlay, T. (1996). The relative roles of knowledge and innovativeness in determining librarians' attitudes toward and use of the Internet: A structural equation modeling approach. *Library Quarterly, 66*(1), 59-83.

Gapen, D. K. (1994). The library as mind. In A. Okerson, & D. Mogge (Eds.), Gateways, gatekeepers, and roles in the information omnverse. Proceedings from the Third Symposium, November 13-16, 1993. Washington, DC: Association of Research Libraries. Available from http://arl.cni.org/symp3/gapen.html

Hale, M. (1991). Getting ready for tomorrow — or today. *Reference Services Quarterly, 19*,(2), 77-80.

Harris, H. (1996). Retraining librarians to meet the needs of the virtual library patron. *Information Technology & Libraries, 15*(1), 48-52.

James-Catalano, C. (1995). Where's the library? *Internet World, 6*(8), 37-39.

Jul, E (1996). Why catalog Internet resources? *Computers in Libraries, 16*(8), 8-10.

Ladner, S., & Tillman, H. (1993). Using the Internet for reference. *Online, 17*(1), 45-51.

Lane, E. and Summerhill, C. (1993). Internet primer for information professionals: a basic guide to Internet networking technology. Westport, CT: Meckler Publishing.

LeJeune, L. (1994). The role of the scholarly publisher in the electronic environment. In *Literary texts in an electronic age: Scholarly implications and library services.* 1994 Clinic on Library Applications of Data Processing, 10-12 April, 1994 (pp. 105-112). Champaign, IL: Graduate School of Library and Information Science, University of Illinois at Urbana-Champaign.

List, C. (1995). Sanctifying the Internet. *American Libraries, 26*(10), 1019-1022.

Lucier, R. (1993). Knowledge management: Refining roles in scientific communication. In G. Boynton, & S. Creth (Eds.), *New technologies and new directions*. Proceedings from the Symposium on Scholarly Communication. Westport, CT: Meckler.

Malinconico, M. (1992). Information's brave new world. *Library Journal, 18*(5) 36-40.

Mark, B., & Jacobson, T. (1995). Teaching students skills for the electronic library. *College Teaching, 43*, 28-31.

McClure, C., Ryan, J., & Moen, W. (1993). The role of public libraries in the use of Internet/NREN services. *Library and Information Science Research, 15*, 7-34.

Rheingold, H. (1993). *The virtual community: Homesteading on the electronic frontier*. New York: Harper Perennial.

Ritch, A. (1991). Back to the future: From desk set to desklessness. *Reference Services Review, 19*(2), 74-76.

Saffo, P. (1994). It's the content, stupid. *Wired, 2*, 74.

Saunders, L. (1992). The virtual library today. *Library Administration and Management, 6*(2), 66-70.

Schneider, K. (1996). *The Internet access cookbook: A librarian's commonsense guide to low-cost connections*. New York: Neal-Schuman Publications.

Schuman, P. (1992). Reclaiming our technological future. In J. Hannigan (Ed.), *Library Lit. 21—The best of 1990* (pp. 100-113). London: Scarecrow Press.

Stearns, S. (1996). The Internet-enabled virtual public library. *Computers in Libraries, 16*(8), 54-57.

Steele, C. (1995, April 24-26). *New romances or pulp fiction? Do libraries and librarians have an Internet future?* Follett Lecture Series. Available from http://www.ukoln.ac.uk/follett/steele/new_romances.html

Strong, G. (1996). A concluding look at the library of tomorrow. *The Reference Librarian, 54*, 153-161.

Sutton, S. (1996). Future service models and the converge of functions: The reference librarian as technician, author, and consultant. *The Reference Librarian, 54*, 125-143.

Swan, J. (1992). Rehumanizing information: An alternative future. In J. Hannigan (Ed.), *Library Lit. 21—The best of 1990* (pp.18-29). London: Scarecrow Press.

Torok, A. G. (1993). From microforms to imaging: Document storage in transition. In *Opportunity 2000: Understanding and*

serving users in an electronic library. 15th International Essen Symposium, 12-17 October, 1992 (pp.166-182). Essen, Germany: Essen University Library.

Wedgeworth, R. (1995). On my mind. Toward a global library community. *American Libraries, 26*, 1012-1014.

White, H. S. (1989). The role of information in the modern age. In *Librarians and the awakening from innocence: A collection of papers by Herbert S. White* (pp. 304-312). Boston: G. K. Hall.

White, H. S. (1991). Hewers of wood and drawers of water. *Library Journal, 17*(10) 52-53.

White, H. S. (1995). The passion to be in fashion. *Olive Tree, 1*(3).

White, H. S. (1996). Do we want to be knowledge workers? *Library Journal, 22*(9), 41-42.

Woodward, J. (1995). Auto aces or accident victims: Librarians on the info superhighway. *American Libraries, 26*, 1016-1018.

Zink, S. (1991). Will librarians have a place in the information society? *Reference Services Review, 19*(2), 76-77.