

Electronic Collection Management and Electronic Information Services

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ABSTRACT

As the life cycle of information products has become increasingly digital from “cradle to grave,” the nature of electronic information management has dramatically changed. These changes have brought new strategies and methods as well as new issues and challenges. At the bottom line the services are increasingly delivered to a desktop from distributed publishers or information providers. Information organizations act either as primary information providers or as brokers between the user and the primary service provider. There has also been a significant reorientation from “ownership” of materials to “access” to information. This paper covers developments in the factors and strategies affecting collection management and access. It discusses major trends in electronic user services including electronic information delivery, information discovery and electronic reference. Finally, it addresses the challenges in user and personnel education in response to this electronic environment and an increasingly information literate user population.

1.0 INTRODUCTION

One of the earliest significant implementations of electronic information management for libraries and information centers began in the 1960s and 1970s with dialup access to remote electronic databases such as those provided by Dialog and LexisNexis. The Internet has further contributed to the success of remote information systems and databases by increasing the information transfer rates from 300 baud to multiple megabits. The World Wide Web simplifies the process and interpretation of the bits that are transferred.

With these increased technical capabilities, new online databases that provide bibliographic and full-text access to information resources have proliferated and the volume of electronic information content now available from the desktop is staggering (Lyman and Varian 2000) – and it was recognized twenty years ago that the volume of information was already beyond our ability to absorb the increase (de Sola Pool 1983). Library catalogs have been computerized¹ and are available and interoperable across the Internet. Audio, video, and multimedia resources are available, as are interactive services from games to banking. Filtering and push/pull delivery services help us manage information proliferation.

¹ Michael Buckland (1997, ch. 5) makes the very useful distinction between electronic libraries and automated libraries. Electronic libraries contain electronically stored documents. Automated libraries (which may or may not be also electronic libraries) use automated search and retrieval systems, for example, online public access catalogs (OPACs).

Electronic collection management and electronic information services are being pushed by the dramatic increase in the amount of digital information from an increasing variety of sources, by the new technologies in the information field, and by heightened user expectations. This paper explores some of the theoretical and practical aspects of collection management in the digital age. It also looks at the major trends in electronic user services including electronic information delivery and electronic reference. Finally, we address the challenges in user and personnel education in response to this changing environment and the increasingly information literate user population.

1.1 The Digital Revolution in Libraries and Information Centers

As a key institutional structure for providing information “collections” and “services” to users, the library (throughout this paper, “library” represents libraries, information centers, and special collection builders) has had to respond rapidly to a changing external publishing environment. The Internet and most recently the World Wide Web have impacted libraries and their delivery of service in ways unthought of except by visionaries like Vannevar Bush (1945) or H.G. Wells (1937). Libraries continue to fulfill their mandates but in ways different than they once did. “Library” is less a place than a concept that represents certain processes or services (Birdsall 1994). If we accept that “library” is something other than place, the continuity of library function is maintained even as libraries transition from, in Negroponte’s (1995) terms, atoms to bits.

We now distinguish between three different types of libraries: traditional libraries, digital (electronic or virtual) libraries, and hybrid libraries. Traditional libraries have physical objects.

Digital libraries are byte-based. According to the Digital Library Federation, digital libraries have very much the same form and function as traditional libraries:

Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities. (Digital Library Foundation <http://www.clir.org/pubs/issues/issues04.html#dlf>).

Michael Lesk (1997) suggests that digital libraries share three common traits: (1) they can all be searched, (2) they can all be accessed from anywhere, and (3) they can all be copied using electronic means without error. Are then digital libraries traditional libraries but more so?

A number of libraries have emerged that are born digital. Digital libraries, including Web-based collections, are redefining both the role of electronic information storage and retrieval as well as the role of traditional libraries. Digital libraries include collections of books, journal articles, graphics, newspapers, and other material in digital format; in sum, collections of digitized content.

As a practical matter, most libraries must manage both traditional “physical objects” and digital materials in a hybrid library environment (Pinfield et al 1998). In certain disciplines, such as astronomy and physics, legacy information that may never be digitized can be as important as the information that is only born digital. Many libraries have begun the transformation from traditional to hybrid forms (for an example, see Bjoernshauge 1999). Many academic and public libraries have incorporated digital material into their collections if only by adding links to that material in their OPACs or from library web sites. Depending on who is speaking, hybrid libraries may be the model for the foreseeable future (Leggate 1998) or a way-station to another form (Oppenheim and Smithson 1999). The HyLiFe Hybrid Library Toolkit (2002) provides guidance to those seeking to develop or migrate to hybrid libraries.

What is the future evolution for electronic libraries? Harold Billings argues that research libraries are becoming huge linked relational libraries. He sees the need for formal relationships among existing libraries to build the mega-libraries that would meet anticipated user needs. Libraries might simply evolve into gigantic and, hopefully, well-organized portals or, as Lancaster and Warner (2001) describe, one model as “switching stations.” On the other hand, it is possible to see the impact of “customization” in “MyLibraries”, which are desktop entities that allow a user, either individually or through profiling, to select his resources of interest and how they will be displayed. Some discipline- or domain-specific “MyLibraries” have been constructed. Most academic libraries provide some form of “MyLibrary” service to their patrons (Billings 2000).

Regardless of the path for future development, large portals or customized MyLibraries, the electronic library, if it is to have meaning, must bring value to collection management and services from that collection. Atkinson (1993) emphasizes the need for organization, selection, and management of resources in digital libraries, just as these resources are managed in traditional libraries. Chen states that for digital materials to be a library, they must be organized according to some standard (1998). Library and commercial portals provide user-centered and enhanced access to information resources by evaluating and selecting local and global information that is context driven. As with print resources, librarians designing portals are careful to provide access to only the most authoritative electronic sources to create trustworthy access to information. (Mischo 2001) The National Science Digital Library (NSDL) and Science.gov are examples of two science portals created to provide access to science information that is selective and authoritative in a way that search engines such as Google can never be (Tennant 2003a). To do so, there must be an articulated collection management policy based on sound philosophical underpinnings.

2.0 ELECTRONIC COLLECTION MANAGEMENT

The electronic library and collection management in that library are relatively new concepts. The earliest literature dates to the 1970s and 1980s (Harter and Kister 1981, Dowlin 1984). In 1984 Kenneth Dowlin (1984, p. 33) suggested that the electronic library has four attributes: (1) “management of resources with a computer,” (2) “the ability to link the information provider with the information seeker via electronic channels,” (3) “the ability for staff to intervene in the electronic transaction when requested by the information seeker,” and (4) “the ability to store, organize, and transmit information to the information seeker via electronic channels.” An electronic library utilizes both electronic information resources and electronic means to manage and move those resources.

There are sound reasons to consider collection management in an electronic environment. Libraries bring more than organization and intermediation to information collections. They also bring authority. Inclusion in a collection implies pertinence and appropriateness. At the same time, the same information “content” can and will be provided in different “containers.”

2.1 The Key Challenge: Ownership versus Access

The move to electronic information management has resulted in a number of debates. “Ownership versus access” has been one of the more important issues. Budd and Harloe (1994) distinguish between the ownership-based and the access-based organization. In the former, emphasis is placed on building “on-the-shelf” collections while, in the latter, emphasis is placed on access to resources, regardless of where they are “owned.” Value is assessed differently. For the traditional model, the value of a collection is its size. For the access-based library, value is defined as the ability to retrieve useful information. The former library collects “just in case” material is needed; the latter provides it “just in time.”

Both models contain pitfalls and problems. Keller (1992b), for example, has argued that “[n]ew access instead of ownership paradigm leads ultimately to an environment where ‘all is meta information,’ with no or few ideas on the shelves.” The issue of access also brings in a whole new set of questions regarding archiving and preservation, intellectual property including fair use, as well as conditions for purchase which have moved to a complex set of licensing terms and conditions. Buckland (1997) suggests that libraries consider *ownership* for high demand items and *access* for those in low demand.

Given the spread of digital access, union catalogs, and universal borrowing, it is no longer so important what an information organization contains (owns); rather, the focus is on the services (access) the organization can provide (Ferguson and Kehoe 1993). This change in a basic tenet of library management has resulted in the need for different library use metrics.

2.2 Access Models

“Access” to digital information comes through several modes of access. Each of these forms can be considered as part of the “ownership versus access debate” and impacts the new ways of managing electronic collections. The following describes four models now employed in the digital environment. These are the interlibrary loan model, the universal borrowing model, the fee-based model, and the no fee model. The interlibrary loan (ILL) model has been with us for many years. Universal borrowing (UB) is a recent phenomenon first seen in the mid-1990s. The fee-based electronic access model dates to the early 1960s with the advent of electronic database services like Dialog. Today, a large volume of “no fee” or “free” services are Web-based and emerged as major resources in the mid-1990s.

2.2.1 Interlibrary Loan Model

Interlibrary Loan (ILL) is a process by which one library borrows from other libraries materials it does not hold in order to meet the information needs of its patrons. Interlibrary Loan is not a new concept nor is it one that emerged out of the digital revolution. ILL is however facilitated by various online services including electronic union catalogs (like OCLC’s *WorldCat*) and automatic ILL request services attached to OPACs and online databases. The ILL community has developed a continuing interest in using the Web and other means to facilitate the ILL process.

The North American Interlibrary Loan and Document Delivery (NAILDD) Project promotes the development of efficient ILL/DD delivery systems using networked technologies. NAILDD has identified three areas of primary concern: “comprehensive and flexible management software, improvements in ILL billing and payments, and system interoperability via use of standards” (Jackson 1998). OCLC has played a major role in developing system interoperability, facilitating billing and financial transfers (IFM or ILL Fee Management), and development of management software. A number of international initiatives led by the Research Libraries Group (RLG), the Library Corporation (TLC), Ameritech Library Services (ALS), AGCanada, and others have sought to improve system interoperability and information flows, thus enhancing digital access.

OCLC manages an international Interlibrary Loan Service or Global Sharing Group Access Capability (GAC), built upon its union catalog *WorldCat*. It utilizes a standard Web interface and software (<http://www.oclc.org/services/brochures/>).

Many countries have developed model codes for ILL, for example the American Library Association – Reference and User Services Association (ALA-RUSA) Interlibrary Loan Code for the United States (http://www.ala.org/rusa/stdn_inc.html). ILL exchanges among countries are guided by the International Federation

of Library Associations and Institutions (IFLA) International Lending: Principles and Guidelines for Procedure (<http://www.ifla.org/VII/s15/pubs/pguide.htm>).

The Interlibrary Loan system is guided by a set of standards (ISO 10160 and ISO 10161). These standards were developed to insure interoperability among electronic ILL systems and their application protocols. These standards and protocols are managed by the ILL ISO Maintenance Agency. The National Library of Canada serves as host.

2.2.2 Universal Borrowing Models

The Universal borrowing models (UB) allow authorized users from one system to borrow (access collections) from libraries within a consortium. (The term “universal” in this context refers to providing access to everyone within a defined group, not universal in the sense of totally open.) There are two major models for UB arrangements. In the first, libraries of different types within a common jurisdiction permit intra-jurisdictional lending. This is used primarily within a particular geographic area, such as a county or state library network, that includes public, academic, and special libraries. The second type of UB involves libraries of the same type such as academic research libraries. Some large libraries may belong to multiple groups.

In the digital world, consortia or other pre-coordinated groups of organizations are increasingly active and pervasive due to the need to get the most favorable conditions under licensing agreements. Cost models for publishers of digital information are in serious flux and the need for groups that build collections to work together in their dealings with publishers and in developing access infrastructures for digital collections has become increasingly important.

2.2.3 Fee-Based Access

Although the Web initially encouraged free and freely available information, as it matures, commercial publishers are actively using it for vending their electronic material. The volume of fee-based access will continue to increase at an increasingly rapid rate.

Examples of the increasing number and variety of resources available as fee-based services include access to bibliographic and fulltext databases, to online journals, and to electronic books.

- There are a number of electronic databases that provide bibliographic and/or fulltext access to documents. These include services like Dialog, LexisNexis, Westlaw, Ovid, Chemical Abstracts’ STN, OCLC’s *ContentsFirst*, OCLC’s *FirstSearch*, CARL UnCover, British Library Document Supply Centre Inside Information and Inside Conferences, ISI Current Contents, ISI – The Genuine Article, and the Canadian Institute for Scientific and Technical Information (CISTI).
- There are a number of database providers, like the Thomson Companies, that own a wide array of properties. Their holdings range from the *Physicians Desk Reference* and *Jane’s Warships*, to the ISI collections. They also maintain copyright, patent, and trademark databases.
- There are a growing number of publishers providing direct individual or library subscriber access to online e-publications. E-publications either replace or supplement the paper version of the journal. There are a variety of models for the publication of e-publications, with some retaining the traditional periodicity of “issues” while others are providing almost continuous updates as articles become available.
- E-journals and hybrid-journals provide journal access either by subscription or association membership. These include *Science* and *Nature*. *The Journal of the American Society for Information*

Science and Technology is offered to members in either paper or electronic format (or both for an additional fee). Companies like MCB University Press and Elsevier offer bundles of online journals, multiple titles for a single subscription price, to libraries and individuals.

- E-book providers are Web based vendors of online and for the most part popular books. They are fee-based services charged to the consumer. There are a number of services that provide access to e-books. See, for an example, eBooks (<http://www.ebooks.com/>). Adobe provides pointers to e-book vendors (<http://www.adobe.com/epaper/ebooks/ebookmall/main.html>).

2.2.4 No Fee Electronic Access

No fee access to digital materials has become increasingly available through the Internet and, thereby, directly to the end user. Materials can be read online or downloaded in a variety of formats, including pdf, Microsoft reader, and html. From the “collection” point of view, providing identification and access to the free sites brings with it a number of issues. Since these are free materials and the level of responsibility of the “publishers” may vary considerably, collection developers have the difficult challenge of determining whether digital access provides sufficient continuity in their collection development scheme. Maintaining links to free electronic sites is a major collection maintenance challenge for digital collections. One major source of free material that is rather durable and generally of good provenance is US government material, especially policy and technical documents because US government materials cannot be copyrighted. Some sample sites for free material are:

- Project Gutenberg (<http://promo.net/pg/>), begun in 1971, permits its users to download books.
- Online Books (<http://onlinebooks.library.upenn.edu/>) at the University of Pennsylvania provides portal access to more than 15,000 e-books. It provides pointers to materials in its collection and on the servers of other providers. The text is marked up to provide cross references by hypertext links to material on the same subject in the collection.
- Subject gateways are comprehensive collections of digital and often Web documents organized around a set of central themes. Examples include the WWW Virtual Library (<http://vlib.org/>), BUBL LINK (<http://bubl.ac.uk/link/>), the Internet Guide to Engineering, Mathematics and Computing (<http://www.eevl.ac.uk/>) WebMD (<http://www.webmd.com>), and so on. Preserving Access to Digital Information or PADI (<http://www.nla.gov.au/padi/>) is a subject gateway to digital preservation issues. The Resource Discovery Network (<http://www.rdn.ac.uk>) is a metagateway, with links to major gateway sites.
- Governments provide Web based database access to a wide range of information. Examples include Thomas, a Library of Congress gateway to US Congressional documents (<http://thomas.loc.gov/>) and Edgar, a service of the Security and Exchange Commission (<http://www.sec.gov/edgar/searchedgar/webusers.htm>). Two of the major US science agencies, the U.S. Department of Energy and NASA provide free access to large technical report collections. See <http://www.osti.gov/> for DOE and <http://ntrs.nasa.gov/> for NASA.
- E-print and pre-print archives -- Los Alamos National Laboratory broke new bibliographic ground when it established an e-print archive (<http://arxiv.org/> and mirrored at: <http://xxx.lanl.gov/>). This archive and others like it have proved invaluable in fields with fast breaking innovation.
- Many e-journals and some h-journals (hybrid, or journals published in paper and electronically) offer free access to their articles. These include a number of popular and scholarly journals offered in electronic format without charge or subscription; for example, the venerable *Scientific American* (<http://www.sciam.com/>), as well as the information science journals *Information Research*

(<http://informationr.net/ir/>), *D-Lib Magazine* (<http://www.dlib.org/>), *FirstMonday* (<http://www.firstmonday.dk>), and *Ariadne* (<http://www.ariadne.ac.uk/>). Many newspapers offer free access to all or parts of their editions. These include *El Día*, *New York Times*, *Wall Street Journal*, *Le Monde*, *Helsingin Sanomat*, *The Times of India*, to name a few.

A major movement on the part of scholars, public advocates, and some publishers would greatly extend the number of e-journals and other materials available under the free access model. The Open Access Movement asserts that scholarly materials, particularly those in the sciences, should be freely available to all. “By ‘open access’ to this literature, we mean its free availability on the public internet, permitting any user to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited. Open access eliminates two kinds of access barriers: (1) price barriers and (2) permission barriers associated with restrictive use of copyright, licensing terms, or DRM [digital rights management].” (Budapest Open Access Initiative, 2002 (<http://www.soros.org/openaccess/read.shtml>)).

The list of “open access” materials, particularly e-journals is increasing quickly. The Directory of Open Access Journals, maintained by Lund University Libraries and sponsored by the Information Program of the Open Society Institute and SPARC (Scholarly Publishing and Academic Resources Coalition), includes over 830 open access journals in 15 subject categories as of April 2004 (<http://www.doaj.org>). Some of these journals are alternatives to the more expensive commercial journals in various disciplines developed by open access publishers such as BioMed Central, the SPARC partners, and BioOne. These organizations may also act as trusted third parties for other publishers who are willing to deposit their materials in an open access arrangement with terms and conditions.

There have been several major statements of support for such a movement by scholars, practitioners, and even governments. These include the Budapest Open Access Initiative (<http://www.soros.org/openaccess/read.shtml>), the Bethesda Statement on Open Access Publishing (<http://www.earlham.edu/~peters/fos/bethesda.htm>) and the Washington DC Principles on Free Access for Science (www.dcprinciples.org). The latter statement seeks to achieve a middle ground, promoting free access while ensuring the sustainability of the scientific, technical and medical publishers. While there has been little movement in this direction from the physical sciences, “open access” is gaining momentum among the biomedical community. Key activities include the Public Library of Science, BioOne, BioMed Central and PubMedCentral. Peter Suber’s web blog, *Open Access News*, is a comprehensive blog of announcements, news and articles on this topic (<http://www.earlham.edu/~peters/fos/fosblog.html>).

2.3 Selection of Information for Electronic Collections

The number, scope, and type of information resources in electronic and print format, as Lyman and Varian (2000) make clear, are overwhelming. There are many sources from which information can be drawn, and there continues to be a need to effectively evaluate those resources. Libraries have long functioned as one of the chief mechanisms for evaluation of information quality and relevancy.

If we take to heart Birdsall’s (1994) conception of “library” as process or service rather than “place,” libraries must put added focus on how to manage collections. Electronic collection development must be consistent with the mission and an overall collection development plan. At the same time, collection development plans

should take into account the electronic resources now available to libraries (Gessesse 2000). As it becomes easier or more efficient to move electronic and physical objects from a collection repository to the end user, the logic of maintaining redundant collections declines. Through selective collection policies, scarce resources can be used to broaden collections rather than to duplicate them.

In Lee's (2002) *Electronic Collection Development: A Practical Guide*, he discusses the application of print selection techniques to electronic media. Evaluation criteria specific to electronic tools are well-covered including interface usability, remote authentication, and archiving.

There are a number of online aids to assist librarians in collection development for either electronic or "traditional" materials. Librarians have discovered that the online booksellers like Amazon provide a vehicle for useful reviews and for purchasing.

With quality and permanence caveats in mind, the Web can be a source for collection development (see Lee 2000). Web material should be subjected to the same scrutiny that any other resource should be subjected to and more so. There are a number of guides on evaluation of Web resources. Matthew Ciolek (1996) and Hope Tillman (2000) have produced excellent Web resource guidance. Stability or permanence is cited as one key criterion for collection selection. There is growing evidence that Web site and page stability can be predicted with some degree of probability (see Koehler 2002, Bar-Ilan and Peritz 1999).

There are Web resources that meet quality and stability tests. Some of these are the e-journals that have begun to proliferate. University and government based Web sites provide extensive information. Many government agencies are migrating publicly accessible documents from paper to electronic format. As these trends increase libraries will have to consider these Web resources as appropriate for collection.

The Web may also serve as a viable substitute for expensive online databases and some traditional collections. Susan Lewis-Somers (2001) has found that there are a number of legitimate high quality free online resources that can be used in place of Westlaw or Lexis for legal research. Indeed, one can draw on *Thomas* and a multiplicity of other government e-publications and services to meet niche requirements.

The Web is sometimes seen as a "free" resource that can be "incorporated" into library collections without regard to collection objectives. In some sense, the Web is a free resource, but the process of evaluation, incorporation, and maintenance of Web resources in a collection is complex and expensive.

Finally, Keller (1992a) makes the very important observation that despite the metadata and sophisticated access systems, access is for the most part a question of "to what" rather than "how." Libraries must maintain good, current, and appropriate collections – however constructed – to meet the needs of their users. In order to maintain those collections, Peggy Johnson (1997) argues persuasively for formal electronic collection policies that reflect the changing landscape and that provide information workers with the guidance and a decision framework. As we have seen, in an Internet world, the need to discover and select quality relevant materials is as important as in the "print" world but it is as yet very difficult to do. Guidelines, such as those provided by Tillman (2000) or Ciolek (1996) are critical and should be employed with rigor.

2.4 Acquisition

In a paper-based world, the intellectual property had a physical form and, therefore, only one person could possess or use it at a time. Acquisition was the purchase of a commodity. Certainly, with the advent of photocopying machines, issues arose on the premise of one copy, one possession. To deal with this, copyright

has traditionally been balanced by the fair use doctrine. Copyright and fair use is discussed in more detail in another paper in this lecture.

Because of the economic implications for these intellectual property issues in the digital environment, in recent years, information suppliers have begun to move away from the sale of information to the licensing of information. The digital revolution has significantly changed the ways in which information can be packaged. It need no longer be offered within “physical packages.” It can now be transmitted from producer to publisher to end user electronically. That may well render the principle of first sale moot because information containers need not be used. It also means that limits are placed on the ability of the licensee to transfer or transmit information to third parties. Under most licenses, lending practices and in some cases universal access is either prohibited or restricted.

With this background in mind, organizations may follow an ownership or an access path. Whichever they choose, they must develop acquisitions policies. Acquisitions of electronic or digital materials often entail a set of decisions that differ somewhat from paper (Pinfield 2001). Some of these decisions entail organizational questions. Are electronic acquisitions treated as an intrinsic part of the library collection or are they categorized as “other resources?”

As Stephen Pinfield has shown (2001), electronic acquisitions are not without their costs. These costs include the cost of the document (usually in the form of license). These services are offered using a variety of pricing models – individual subscriptions, bundled subscriptions, joint print and e-journal subscriptions, maximum number of users, and so on. The negotiations between library purchaser and licensor vendor can be time-consuming and complex.

2.5 Access Agreements

Now that acquisitions have taken the form of licenses rather than purchases, there are critical differences between traditional and electronic access agreements. Licenses represent permission or authorization for one party to use the property of another under a prescribed set of conditions. These licenses may limit the number of users for a database at any given time, they may limit the range of authorized users, and they place a temporal limit on access. Typically, full text providers, particularly e-book databases, place a limit on the number of users at any given time. This is analogous, they argue, to the traditional model. There can be only as many users of a print book as there are copies of the book at any given time. Harris (2002, p.100) also makes important distinctions between the sale, the assignment, and the licensing of rights. An assignment of rights, unlike a sale of rights, is the non-exclusive permanent transfer of rights of access to the item under consideration. Licenses are less permanent and are analogous to renting rather than buying the object. A license or an assignment may specify the conditions under which copyrighted material may or may not be used.

Many national and international associations have developed guidance to help information managers negotiate licenses or to better understand their implications for libraries and other users (for example, the American Library Association, the American Association of Law Libraries, the Association of Research Libraries, the Australian Library and Information Association, the Canadian Library Association, the Colegio de Bibliotecarios de Chile, the European Bureau of Library, Information and Documentation Associations, to list a few.) These concerns have sometimes resulted in a number of very specific agreements, as for example the International Federation of Reproduction Rights Organizations (IFRRO) – International Group of Scientific, Technical and Medical Publishers (STM) Joint Statements on Electronic Storage of STM material of 1992 (<http://www.ifrro.org/papers/stmjoint.html>) and 1998 (<http://www.ifrro.org/papers/stmjoint2.html>).

Lesley Ellen Harris (2002) has prepared a guide to digital licensing under the American Library Association imprint. Her book provides a series of checklists and commentary. For example, she advises her readers to avoid verbal agreements in favor of the written; in part, because of the potential for future misunderstanding (Harris 2002, xv). Special issues arise when negotiating licenses for library consortia, so the International Coalition of Library Consortia (ICOLC) provides special guidance in this area.

There are also a number of symposia and other training offered on digital copyright and associated issues. Some examples include the International Summer School on the Digital Library in the Netherlands (<http://www.ticer.nl/index.htm>) sponsored by the Tilburg International Center for Electronic Resources at Tilburg University and the Libraries in the Digital Age Conferences held annually in Dubrovnik, Croatia (<http://knjiga.pedos.hr/lida/>).

In addition, many professional organizations provide guidance on access, digital content, copyright, and related issues. Examples include:

- Association of Research Libraries (<http://www.arl.org/scomm/licensing/>)
- Copyrightlaws.com (<http://www.copyrightlaws.com/index2.html>)
- International Coalition of Library Consortia (<http://www.library.yale.edu/consortia/>)
- International Federation of Library Associations and Institutions, Licensing Principles (2000) (<http://www.ifla.org/V/ebpb/copy.htm>)
- Stanford University Libraries, Copyright & Fair Use (<http://fairuse.stanford.edu/>)
- Yale Library, Licensing Digital Information: A Resource for Librarians (<http://www.library.yale.edu/~llicense/>)

3.0 ELECTRONIC INFORMATION SERVICES

The World Wide Web is a complex information medium. It is both a repository for information and a transmission vehicle. It provides free public access and increasingly fee-based access to an immense body of digital material. The Web also supports a wide range of interactive services including banking and securities trading. E-commerce has moved into many other areas and it is now possible to purchase a wide variety of goods and services on line. Over the last several years, countries such as the United Kingdom, Canada, Australia, the United States and Lithuania are using the Web to disseminate information and to provide online services from government to citizen, government to government and between agencies of the government.

The advent of electronic information services has created a new set of demands for information providers. These services include new reference models, new means for information discovery and delivery, and demands for user and personnel education in the uses of the new resources and technologies. It has also prompted a re-examination of the rights and responsibilities of information providers, intermediaries, and end users (see, for example, American Library Association 2000).

A number of services are now offered online that, heretofore, were provided in person or through other print means. Online includes electronic reference and electronic document delivery systems. These services have been expanded to include automated information delivery and built according to various interoperable standards. Electronic information services that have been created include interactive e-commerce and e-governance services as well as various organizational database management needs (including registrations, membership renewals) and other functions.

The advent of electronic information services has also prompted new interest in artificial intelligence systems or agents to facilitate the delivery of information services. These range from natural language processing (see Jacquemin 2001) to the creation of content (see Bringsjord and Ferrucci 1999). These are future directions for services and are only mentioned here.

3.1 Electronic Reference

Electronic reference has come to mean several different things. By one definition, electronic reference is interpersonal reference information management using electronic means for the patron query and for the reference response. Libraries have employed this model using telephones for years. E-mail, instant messaging and chat have added a new dimension to the reference relationship. In this form there is still a one-to-one patron to librarian exchange.

An Association of Research Library (ARL) survey found that in the 10 years from 1991 to 2001, the median number of reference questions asked at reference desks dropped by nearly 30,000 (Ronan and Turner 2003). Research libraries responded to this phenomenon by locating a librarian at the point of interaction between their users and their online resources by implementing chat also called digital, real-time or live reference services. Libraries have formed partnerships to provide 24/7 access to chat reference service for their users. The Boston Library Consortium Ask 24/7 (<http://library.brandeis.edu/247/>) and Maryland Ask Us Now (<http://www.askusnow.info/>) are examples.

Chat Reference: A Guide to Live Virtual Reference Services (Ronan 2003) and the ARL Chat Reference Spec Kit (2003) are both useful guides designed to aid librarians in the implementation of this service. The sources provide information on selecting software, training staff, and evaluating the service. An executive summary of the Spec Kit can be found at <http://www.arl.org/spec/273sum.html>.

The User Group for Questionpoint, chat and email reference service software developed by the Library of Congress and OCLC, has created a living digital reference document (http://www.loc.gov/rr/digiref/QP_best_practices.pdf) for the purpose of supporting digital reference services as they evolve (QuestionPoint 2003). Policies and best practices for digital services are discussed.

Libraries are currently conducting studies to evaluate and assess the effectiveness of the chat reference in answering reference questions. In a pilot study conducted by the University of Maryland (<http://www.dlib.org/dlib/february03/white/02white.html>), the researchers found that librarians answered questions with a high level of accuracy but when it came to escalating a question to proceed deeper into the research process with the questioner, on the whole, librarians were less than adequate in this regard. The finding suggests that the interactive aspects of chat reference need to be further developed (White, Abels, and Kaske 2003).

A second model for e-reference has been developed and is more impersonal. Often, through email or Web-based queries, patrons place reference questions to anonymous reference librarians. The Internet Public Library provides an "Ask A Question" box with a pledge to respond within three days (<http://www.ipl.org/div/askus/>) The British "Ask-A-Librarian" service (<http://www.ask-a-librarian.org.uk/>) incorporates local reference librarians in an online service, with a pledge to respond within two working days. The Virtual Reference Desk (<http://www.vrd.org>) infrastructure developed by the Information Institute of Syracuse University and a network of partners provides software that triages reference questions through a series of experts who are linked by the network. Participating sites can be found through the AskA+ Locator which is organized by subject.

The National Information Standards Organization (NISO) in the US recently released a draft standard, the Question & Answer Transaction Protocol (NISO, 2004). The protocol defines a method and structure for exchanging data between digital reference services. The draft standard is available for trial use by implementers until April 2005 when it will be made available for comment as a draft NISO standard.

A third model establishes a reference-like interface, the “electronic reference desk.” Libraries provide information portals with selected useful online information finding tools. Examples are given in Table 1.

Table 1: Examples of Electronic Reference Desks

Reference Service Title	Location	URL
The Virtual Reference Desk	Wageningen UR Library	http://library.wur.nl/desktop/vrd/
Electronic Reference Resources	Sourasky Central Library	http://www.tau.ac.il/cenlib/reframe.htm
Electronic Reference Shelf	McGill University	http://www.library.mcgill.ca/refshelf/swsindex.htm
The Online Library	University of London	http://www.external.ucl.ac.uk/ref.asp
Oxford Reference Online (fee-based subscription)	Oxford University Press	http://www.oxfordreference.com
Ready Reference Shelf	University of Michigan	http://www.lib.umich.edu/refshelf/
Virtual Reference Shelf	NASA Goddard Space Flight Center Library	http://library/vrs/vrs.htm

Libraries have also begun to place online pathfinders on their Web sites. Pathfinders are pre-prepared reference tools designed to point users to resources for commonly asked reference questions. These pathfinders may focus on locally held resources or they may take advantage of Web-based resources. For an example of a set of pathfinders, see the Internet Public Library pathfinder page at: <http://www.ipl.org/div/pf/>. Building pathfinders requires some html knowledge, excellent reference skills, and a grounding in Web evaluation techniques.

FAQs (frequently asked questions) are a variant on pathfinders and “ready reference” that have developed in the Web environment. FAQs, as the name implies, are lists of questions and answers to those questions client, patrons, browsers, and others have asked of the Web site creator. They provide a ready resource to many questions that might be asked and save time for all parties.

Increasingly e-reference has begun to blend these techniques together. A true reference site may combine pre-set access to a Reference Shelf, access to specific librarians via e-mail, and a network of additional experts that provide support for more detailed or tertiary questions. FAQs and pathfinders may also be provided, and they may be built automatically as a result of collecting the answers to previously asked e-reference questions. An example is the Virtual Reference Desk at Wageningen UR Library which includes an extensive reference shelf, a search engine, and an e-mail connection to a librarian. Additionally, many librarians are using the transcripts from chat and email sessions to create searchable knowledge bases that capture the knowledge of librarians. The New York Public Library’s “Ask A Question” service (<http://ask.nypl.org/>) includes chat reference in both English and Spanish, email reference, access to telephone reference, and a Q & A archive, a searchable knowledge base.

3.2 Information Discovery

The Web was once perceived not only as a supplement for libraries but as a replacement for them. Perhaps Louise Addis is the first information professional to appreciate the opportunities the Web can offer as a transfer medium (Berners-Lee 1999: 45) to support a variety of disciplines and library needs (Henderson 2000). It has been fairly well demonstrated that the Web is neither a library nor a substitute for libraries (Koehler 1999). It is one of many resources in the information environment.

Therefore, one of the most critical issues for electronic collection managers is the heterogeneous nature of information resources and the proliferation of information discovery tools. While some portion of the Web content is indexed by Google, Yahoo and other Web search engines, these search engines do not normally provide access to the “deep or hidden Web”, that part of the Web that is hidden in databases, is password protected or behind firewalls. In addition, many different discovery mechanisms exist when trying to integrate external resources with internal databases, web pages or documents in document management systems. New metasearch tools, also known as federated, broadcast, and cross-database search tools, are being deployed to allow these disparate, heterogeneous resources to be searched simultaneously and then displayed from their native systems in a single interface. Examples include the Google Appliance, Goldfire, WebFeat, Vivisimo, ExplorIt from Deep Web Technologies and portal products such as Autonomy. A listing of metasearch and metacrawler engines is available from Search Engine Watch (<http://searchenginewatch.com/links/article.php/2156241#reviews>) along with links to related articles.

The metasearch or federated search tools are still being perfected with much debate surrounding their use. Encouragingly, as the federated search tools have evolved, services such as authentication, merging and duplicate identification have been added. However, problems still remain regarding relevancy, institutional repositories, and the one-size-fits-all philosophy that is behind metasearching. The ability for a cross-database search tool to return results from several sources is possible but relevancy ranking the items that are returned is difficult. Complications arise when library catalogs (MARC records) or sources that use OpenURL-based systems to link to full text articles are used. Setting the algorithm for the de-duplication of records located in several databases so that duplicates are eliminated but items that are not really duplicates are included is a challenging task (Tennant 2003b).

For institutional repositories to be included in a federated search process, libraries would have to harvest the metadata from the repositories and then make the harvested data a target, a database in metasearching, which could be searched by the metasearch tool (Tennant 2003b). The Open Archives Initiative (OAI) protocol for metadata harvesting (<http://www.openarchives.org>) was formed to encourage the creation of e-print repositories and to facilitate research information distribution. Several cross-database science and technology search tools have been established using the OAI protocol. Arc, (<http://arc.cs.odu.edu>) a cross archive search service, is one such tool, and, as of September 1, 2003, it contained 6,475,000 records from 160 repositories (McKiernan 2003). For more information on metasearching of institutional repositories follow the three part series on open archives initiative service providers in *Library High Tech News*.

At this time, federated search engines serve some user groups better than others. Undergraduate students are well served by federated search tools as they are looking for general or introductory level information on a given topic. Graduate students and faculty need thorough coverage within a given discipline and need the advanced searching capabilities of the native subject database (Tennant 2003b). Further, database producers feel that federated searching loses the search efficiencies unique to their native databases. For example, when metasearching JSTOR, it is not possible to search within a discipline as it is intended in the native design leaving the search result not subject focused. Licenses with database providers may or may not allow for the

inclusion of their databases in a federated search. When licenses are renewed, federated searching will certainly be addressed (JSTOR 2004).

3.3 Information Delivery

Libraries and other information providers are moving to augment or change traditional models by providing a wide array of electronic services. A well known example is the library at Los Alamos National Laboratory. This library is helping to meet the information needs of LANL scientists and engineers with the Library Without Walls concept. The LANL LWW provides services to its patrons at all times using electronic information delivery, enhanced data base access, and customized linking between bibliographic and full text resources. It also provides electronic information dissemination through a “MyLibrary” service to its patrons.

Selective Dissemination of Information (SDI) and document delivery systems are of long standing in the library community. Document delivery is a library-managed courier service to move requested documents from the repository to the end user and back. Many libraries have long provided such services by moving physical objects. One of the largest such delivery services is the British Library’s Document Supply Center (BLDSC). In recent years, the BLDSC has moved toward extensive electronic document delivery by fax and through transmission of digital documents by ftp, telnet, e-mail attachment or the Web. Similarly, the services offered by such companies as Amazon.com, Borders, or Barnes and Noble represent a form of document delivery provided by the commercial sector.

SDI represents a slight variation on the document delivery model. Under the SDI model, documents are delivered to end users based on some criteria other than specific demand for the object. This may be a user profile developed by the librarian in cooperation with the end user based on end user interests. Many vendors and some libraries suggest additional documents of potential interest to the end user by offering “more like these” services.

Electronic Information Delivery (EID) is a variation on SDI models that uses the growing power of Web technology and content-oriented standards to respond to user requests from distributed content sources. A number of digital EID systems have been developed based on eXtensible Markup Language (XML), the building of complex indexes, and filtering mechanisms (Altinell and Franklin 2000). XML is designed specifically to structure information so that user queries can get better content responses. It uses “HTML-like” syntax to provide application specific meaning to digital documents through character string mark up. A related technology is RSS (Rich Site Summaries), a series of XML-based formats for the syndication of news and news-like items. It allows “news aggregator” programs to monitor these feeds and to respond when changes or updates are identified. Libraries and other information aggregators can “capture” these feeds and present them in their own interface formats. The use of RSS and “news aggregators” is especially popular in the web blog community.

These SDI “push” technologies automatically provide end users with information based on predetermined interests. These interests may be established from a profile developed by interaction with the end user, or they may be developed based on the behaviors over time of the end user. News, weather bulletins, and stock quotes are common examples of information pushed or streamed to the desktops or pages of information consumers (Dysart and Jones 1995).

“Pull” or demand technologies require the user to be proactive. They require interaction at the transaction time between the end user and the information provider. This is, in classic terms, the interaction between a reference librarian and a patron (Small Helfer 1997). More recently, interactions between end users and search

engines represent “pull” interaction because the end user is involved in the identification and “pulling” to himself or herself of the desired documents.

Most hybrid libraries offer some form of electronic pull. Clearly, the OPAC represents an interactive system for information discovery and retrieval. Some academic libraries offer electronic reserve services for their faculty and students. Reserve librarians place scanned or digitized documents in the service to be retrieved and viewed remotely by students on demand. Full text databases, like netLibrary, ingenta.com and OCLC’s ArticleFirst may be used to pull documents either directly by the end user or through a librarian intermediary.

It is most interesting to note that the relationship between reference and information delivery is rapidly being redefined. Whereas information identification and then full text delivery used to be two distinct processes, as information is born and managed digitally, the identification of what a user needs is often only a click away from that information.

4.0 USER AND PERSONNEL EDUCATION

User and personnel education in information resources and access have been traditional library functions from training in school and public libraries to orientation and bibliographic instruction at the university level. Because of the explosion in digital and online resources and the frequent change in technologies and standards, libraries have had to develop in-house training programs for users and staff. They have also brought pressure on library schools to enhance the skills of their graduates in these areas. In addition, the advent of the Web made easy access to information over the Internet a reality. With the advance of search engine technology, came a revolution in information literacy and information use. This brought new demands on information professionals as well as many new public policy issues such as the digital divide.

The digital divide and ways to democratize information and technologies were key issues in the discussions of the World Summit on the Information Society held in 2004. Initially sponsored by telecommunications companies to promote wider access to undeveloped markets, the social and educational component of this global forum quickly became apparent. The outcome includes statements regarding the need for education and access in order to reduce the digital divide as much as possible.

In many countries, academic and public libraries have been identified as key institutions to assist in bridging the digital divide. In order to address these issues, they must train and retrain staff in the use of electronic technology and familiarize their patron or client base in the use and scope of those technologies.

In the United Kingdom, The Peoples’ Network is a government funded undertaking to bridge the digital divide. Using lottery-derived funds passed through the New Opportunities Fund, the object of the project is to provide universal Internet access, digitize local resources, and teach online skills to the public. The program offers a useful checklist for personnel training and the areas that should be covered. To help implement the plan, public library staff are to be provided with an eight-point set of Information and Communications Technology (ICT) skills (<http://www.peoplesnetwork.gov.uk/training/background.asp>):

- “1) A grounding in core ICT fundamentals;
- 2) Understanding how ICT can support library staff in their work;
- 3) Health and safety and legal issues in the context of ICT;
- 4) Knowing how to find things out on behalf of users;

- 5) Using ICT to support reader development activities;
- 6) Using ICT to support users to ensure effective learning;
- 7) Ensuring effective management of ICT resources in libraries;
- 8) Knowing how to use ICT to improve their own professional efficiency and to reduce administrative and bureaucratic burdens.”

More advanced skills include:

- “1) Net navigator – in-depth searching skills; validating Web sites; and using alerting services;
- 2) Information technology gatekeeper – web design skills; mounting and updating information; setting up and managing email databases; designing specialist interfaces; and setting up digital links;
- 3) Information consultant – analysis and diagnosis of users needs; awareness of information sources; building partnerships with other information providers; and information design and presentation;
- 4) Information manager – strategic planning; understanding regulatory and legislative requirements; content creation skills; and
- 5) Educator – training other staff and users to use ICT effectively and designing learning materials and programmes.”

Most libraries have patron training and education programs on “how to use the library.” This may involve in-library training and tours and, sometimes, online tutorials. Most of these programs now include the use of electronic resources. Students consistently show poor quality selection ability when choosing Web materials. If Web documents are to be incorporated in library collections, it is incumbent on libraries to provide assessment as well as search/retrieval training to patrons as well as staff. Kathy Schrock’s Guide for Educators on Critical Evaluation Information (<http://school.discovery.com/schrockguide/eval.html>) provides survey forms and other information on teaching students of different ages to perform this critical evaluation.

5.0 CONCLUSIONS

Electronic collection management and electronic information services are in a period of rapid transition. Information organizations are undergoing redefinition. New forms of digital libraries and information collections are providing more information to more users more easily and on demand. These changes are being felt and responses are being made by information professionals throughout the world. The value of information is more appreciated than ever. Information collections are no longer geographically bound. Using Web access, it is possible to search the OPACs of many of the world’s libraries and online resources from major primary and secondary publishers. Thus online and hybrid libraries have global reach. With global reach comes global responsibility.

The technology used to manage the information changes allows for extensive innovation in information selection description, distribution, retrieval, and use. The new e-publishing environment requires new ways to assess information for the purpose of selection. There is a new array of information markup and cataloging systems for collection management that, in turn, supports an equally growing array of information services for information producers, consumers, and intermediaries.

The full story for electronic collection management and electronic information services has yet to be told. These many changes and challenges give new meaning to the expression “may you live in interesting times.”² We are indeed living in interesting times and they will become more interesting still.

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² For an interesting discussion of the origin of the expression and the Chinese source urban legend for “May you live in interesting times,” see Stephen E. DeLong. “Sidebar: Get a(n interesting) Life!” <http://hawk.fab2.albany.edu/sidebar/sidebar.htm>

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