

The Digital Library: Without a Soul Can It Be a Library?

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Abstract

For many people "digital libraries" mean information on the Internet that is available to them either directly or indirectly through search engines, indexes or library catalogs. While digital libraries imply abundance, they do not necessarily connote the broad range of services or quality resources that libraries provide. Digital libraries are perceived as being solely mechanical or electronic, providing only online resources and lacking people serving people. If the digital library is actually to be a library and not a soulless, heartless construct, then it needs to evolve beyond mere storage and access to digitized information.

A library is a fusion of resources in a variety of forms, including services and people supporting the entire life cycle of information beginning with creation, to dissemination and use, through to preservation. A digital library works best when it is an integral part of a library that provides its users with access to information that has been evaluated, organized, and preserved in the most useful formats. Digital libraries and traditional libraries share common goals and should interact as if they shared a common soul. If they do, the [digital] library will accomplish more than it could separately and serve its users on the highest order.

Introduction

My thesis today is similar but different from what I proposed about a year ago at the Association of College and Research Libraries biennial conference.¹ In April 1999 I said then that most digital library discussions focused entirely on computer processing and the restrictive notion that digital libraries are libraries because they provide information resources. I also said that often these discussions did not include librarians, and as a result, they neglected to consider the range of services and variety of resources in diverse formats that anticipate as well as meet the needs of their user communities. To computer scientists, the library is a thing, an inanimate object, a really big database; to librarians it is much, much more. What is different today is that there is some evidence in the published literature that computer scientists have begun to hear the information professionals and to think more broadly about the components and activities that comprise a library.

Libraries should be thought of as "information ecologies"² and, though this is perhaps a trendy term, it accurately depicts a system of people, practices, values, and technologies within a particular environment. It is the environment as well as the people (and, therefore, the values), that I find are largely missing from digital libraries. A core value in information ecologies is that all users must have access to information; that information, however, may come in many different forms, not just digital or paper, but through classroom instruction, discussion, networking, as well as through a Kurzweil reader. The underlying goal of access to information for everyone shapes the policies and activities that make libraries unique and this is why computer scientists also use the term library. While librarians rely more than ever on technology, human expertise, judgment, and empathy are central to making this information ecology work and it distinguishes the digital library from the library.

Libraries are working, hospitable places that have integrated technology into existing policies, workflow, and values. Information ecologies respond to local environmental changes and local interventions, and they allow relationships. In libraries, relationships involving tools and people extend beyond people and how they use the tools and technology, to the locality so that the environmental point of view replaces the system view point in digital libraries. Sometimes in an ecology something invades and transforms the environment; in libraries adaptation has taken place that fosters new relationships between technology and library practices and people.

Through this paper I share my frustrations with digital library developers and the shortsighted approaches of computer scientists who ignore librarians in their research and writing about digital libraries. Through design scenarios I'll demonstrate how some faculty members have already been misled about digital libraries. I'll also share some of the most recent work on digital libraries that give me hope that digital library development is on the right track to be fully integrated into the library's information ecology.

¹ McMillan, Gail, "[Digital] Libraries Support [Distributed] Education" in *Racing Toward Tomorrow: Conference Proceedings Association of College and Research Libraries 9th National Conference*. Washington, D.C.: ACRL, 1999. <http://www.ala.org/acrl/mcmill.html> Jan. 18, 2000

² Nardi, Bonnie A., and Vicki L. O'Day, *Information Ecologies: Using Technology with Heart*, Cambridge, MA: MIT, 1999.

Catharsis

Through working with computer science faculty at Virginia Tech over several years, I began to believe that all computer science research resulted in a narrowly defined digital libraries that were not really about libraries at all. They largely usurped the word and ignored the broad range of services and resources historically associated with libraries, as well as the people who have expertise in helping information seekers find what they are looking for. I've recently begun to feel that they even ignore the activities of library users by lumping them together in a few predictable categories. Unfortunately, reading about digital libraries up until about a year ago did not dissipate what I learned through my limited personal experiences.

At that time I was shocked by the definitions of digital libraries that I found in very reliable resources. For example, the October 1998 "Report of [the] First Summit on International Cooperation on Digital Libraries" defines it as "a collection of digital objects ... along with methods of access and retrieval, and for selection, organization, and maintenance of the collection." The often quoted Michael Lesk text from 1997, *Practical Digital Libraries: Books, Bytes, and Bucks*, says "Digital libraries are organized collections of digital information. They combine the structuring and gathering of information, which libraries and archives have always done, with the digital representation that computers have made possible." And, digital libraries "address traditional problems of finding information, of delivering it to users, and of preserving it for the future." These definitions emphasize improving access to information by focusing on computer processing of information. They imply that if you digitize the information and speed the processing (that is, finding the digital objects), you will have the library of the future. They ignore those aspects of libraries and library users that can not be programmed or digitized. They largely disregard the human element.

The librarian may extend the boundaries of the quest, stretching the point to determine if there might not be untapped resources. For example, would a patent search reveal something about the topic? What librarians call the "reference interview" is sometimes now referred to as "information therapy." Researchers get help understanding their needs, with clarity and focus developing through the reference interview.

Librarians use tact, diplomacy, persistence, and negotiation to elicit essential details about the researcher's needs. Through interaction, creative thinking, and each person bringing knowledge and expertise to the interaction, a librarian can help a researcher shape the quest for information into a good plan of action. Even very good computer programs do not return good results from an Internet search when we don't clearly articulate the question, when we use an analogy, when we're illogical and our reasoning is not linear. With the assistance of a professional who is trained at providing reference services, the real question gets teased out and the appropriate database(s) can be searched. For example, does the researcher want *everything* available or does she want historical or the most current information, books or articles, summaries or full text, sample or comprehensive findings, a few or exhaustive results? Should the results be for the novice or the expert? The librarian makes a significant contribution, often defining the search, honing the researcher's goals, and helping the researchers to understand their needs.

Rephrasing the question often nets different results, but that is not to say that creative rewording refines a vague question. Researchers must learn to be careful with automated searching because some search engines, as with spell-checkers, will replace one word with another, and sometimes we know it, but sometimes we are not aware of this 'service.' The Reference Librarian may also expand the search criteria in order to give the researcher more

information. Sometimes this is a result of negotiation but sometimes it is just done with good intentions (such as being expedient and saving the researcher and the librarian some time). This might include giving the researcher more information to work with when the original search resulted in a very small result set. The librarian comes to understand, either initially or eventually through conversation and negotiation that can be subtle and tactful, or forthright and direct, and everywhere in between, what the researcher actually wants. Does a digital library take into account this ineluctable human touch? No. Does this sound like a pretty typical library activity? Yes.

Therefore, what many computer scientists attempt to create is not a library, and definitely not the Athenaeum-like place where writers and scholars meet, and certainly not an information ecology. Computer scientists seem to have taken the old-fashioned circulating collection and applied technology that allows multiple simultaneous users access to existing online collections. The computer scientists who discuss and conduct research and write about digital libraries are on a noble mission, but too often they ignore the foundations of librarianship, the broad range of services, human factors, and the environment of the effective information ecology that is the library.

Human factors cannot be stressed enough because they are an integral part of the library. As scholars we must admit, and studies have found, scholarly research is not necessarily a linear, highly structured, and logical process. We tend to work in a cyclical, organic, and intuitive manner, generally employing less structured methods such as browsing, tracing some footnotes, following some bibliographical references, and consulting colleagues.³ We have feelings about what tack to take and we have been known to backtrack and change strategies.

There are also factors that divide researchers by academic discipline and subject expertise, technical aptitude, cognitive style, and personality, as well as by cultural differences. Computer scientists need to develop a better understanding of the actual processes library users go through and to give more weight to how researchers accomplish their work. Digital library developers want to define the generic digital library user groups and map a strategy for them, for us, and articulate a process that is meaningful. But, library users are much too diverse to be very easily categorized.

In addition to recognizing differences among library users, digital library developers should consider whether the objectives of digital libraries users differ from those of "traditional" library users. If not, can the same evaluation criteria be used in both settings or do digital libraries require different evaluation criteria? From a librarian's point of view, and looking at these four evaluation criteria, there is no difference in the expectations between library and digital library users:⁴

- Success in terms of the effectiveness of the information retrieved
- Success at what cost (cost-effectiveness)
- Impact on user (benefit)
- Impact at what cost

³ Payette, Sandra D., Oya Y. Rieger, "Supporting Scholarly Inquire: Incorporating Users in the Design of the Digital Library," *Journal of Academic Librarianship*, 24:2 (March 1998): 7.

⁴ Lancaster, F. W., "Are Evaluation Criteria Applied to "Traditional" Libraries Equally Applicable to Digital Libraries?" at <http://edfu.lis.uiuc.edu/allerton/95/s1/lancaster.html>, Jan. 11, 2000

User Studies

Even if we surmise that library users and digital library users have many of the same objectives, there is the problem of a dichotomy between what users say they want and what resources they actually use. I'm not sure the digital library developers have taken this factor into account either. It is, of course, a problem that librarians find difficult to handle and is also very difficult to consider when programming. For example, users say they want multi-database searching and common user interfaces. However, only some are aware of the loss of functionality that can result from a common user interface, and they want to have a back door entrance to the databases. At the same time, however, they are concerned about information overload, slow response time, and duplicate records often found in a multi-database search.

Locating information quickly and effectively with a minimal investment of time in learning to search is, of course, also ideal. Studies show that many researchers limit themselves to the 1-2 databases that they are familiar with and have served them well previously. Many are unaware of the number and diversity of resources accessible. Of course, many researchers are answer oriented, not query oriented; they want information, not knowledge and not a lesson in where and how to find the information. It is difficult for librarians (and even more so for digital libraries) to get researchers to learn about resources outside the few that they are comfortable using. They are prone to taking shortcuts and missing the opportunities we create for them to learn about new services and resources.

I expect digital library developers to create a matrix through which to view the multi-dimensional library user's behavior and to apply computer analysis. An outcome would include the convergence of attributes including the library user's work state, cognitive state, personality, temperament, general aptitudes, and experiences. How cultural differences would fit into is a very difficult to see.

An adaptive user interface should "expand and contract" relative to the task or the situation at hand. It should respond to various user actions and should "forgive" actions such as backtracking and circular logic.⁵ In digital libraries we expect more adaptability and flexibility such as having multiple ways to perform the same task and allowing users to customize their environments. We are already getting used to features such as "preferences" and "user profiles" in some commercial word processors and Web browsers. Without doubt, both library professionals and digital library designers need to do more work on systems integration and user interface design to give users more meaningful information spaces.

What Does "Library" Mean?

Library users include teaching faculty as well as research and library faculty, so it is important to look at digital libraries from their perspective also because what they expect from a digital library is affected by how they think of the library. When talking with English and engineering faculty and my university, it was readily apparent that they thought first of the building that houses *their* collections. Computer science faculty immediately focused on programming access to existing digital resources. Librarians first mentioned collection development and evaluating and developing library resources to meet the needs of a research university.

⁵ Payette and Rieger, p. 9

Another dichotomy, the library as place vs. thing, arises when we look at role of the library in asynchronous teaching and learning. The classroom needs to be thought of as a *component* of the teaching/learning process that can be independent of time and place. However, while my teaching colleagues would not eliminate the instructor from the course, they would consider eliminating the librarian from the library. In both cases, the one that resides wholly on a computer or a network of computers is not a complete replacement or duplicate of the other. The asynchronous, the digital, is more effective as one component of the whole, including the physical environment.

Libraries are more than their information resources, their collections, the buildings that house them, the systems that they run on, or the services they provide. Information professionals make judgments and interpret user needs; they provide services and resources to people. Some traditional library services can be replicated in the digital library, partially or wholly, but some cannot be replicated. Online instruction is important, but sometimes meeting face-to-face, or having a conversation, between student and instructor is the most effective method. Information seekers should not be denied any library resource or service because it is not available online. The digital library and the library should be complimentary, intertwining systems that exist to serve the user community on the highest order.

Defining the Digital Library

<http://scholar.lib.vt.edu/DLI2/defineDL.html>

The "digital library" should be a series of activities that brings together collections, services, and people in support of the full life cycle, from creation, dissemination, use, and preservation, of data, information, and knowledge. The challenges and opportunities that motivate an advanced digital research initiative should be committed to such a broad view of the digital library environment.

A digital library should be a seamless extension of the library that provides scholars with access to information in any format that has been evaluated, organized, and preserved. Access to this evolving collection of digital information should be provided through personalized systems as well as through the services of information professionals (i.e., flexible and extendable). The digital library adds value and saves time while extending the hours of access. It reduces the need for proximity to information resources, but still emphasizes the quality of those resources. It is a library that can be individually customized and, ultimately, will be easy to use.

With a digital library evolving within an academic library interested in research and development along pedagogical lines, we have a unique opportunity to incorporate participatory design to address user issues and collection-centered issues, as well as systems issues. One of my colleagues reacted to my definition of a digital library like this.

we seem to want "the library digitized," ... rebuilding an entire environment, culture, space, and discourse for knowledge accumulation/evaluation/organization/preservation around digital means of access and use. ... we want to generate a system, like [OCLC] or the Internet, rather than a product, like an OPAC or Windows, so that it might be easily, cheaply, and widely used. This ...orientation seems more worthwhile and important than just throwing forth a new stream of computing commodities. ...The library is a very old social institution, so we need to have an attitude of permanence when working in this area...

Professor of political science, Tim Luke, went on to suggest that the digital library have these characteristics

- an open, adaptable notion of document...
- a flexible, expansive system of cataloging tags
- a backward link and forward link between creators and users
- an incomplete, emergent method of evaluative records/profiles/notes
- a uniform, expansive, but accurate system of searching
- a simple, shared means of dissemination
- an adaptive, rebuildable, and error-resistant means of storage

Tim Luke <twluke@vt.edu> Sat, 13 Jun 1998 15:34:39 (EDT)
http://video.digital.libraryib.vt.edu:90/~fox/DIGITAL_LIBRARYI2/ScenLuke.txt

Another faculty member, Gary Downey, professor and director of the Center for Science and Technology Studies, wrote in response to the definition of a digital library: "that adding collection-centered issues in the midst of the user-issues and systems-issues is a major intervention in technology-oriented thinking that will help our digital library research project." He agreed with our broad notion of a digital library and its being a seamless extension rather than a wholesale replacement of the library.

However, Downey criticized our phrase "digital library environment" because he prefers "thinking about computer technologies as collections of activities[i.e., things, not places?]"--in this case, the digital library as a collection of library activities that live alongside and in the midst of other library activities. Even more particularly, I think of computer technologies as collections of activities of communication--which raises questions about who is communicating to whom about what, and what kinds of social interactions are taking place through such communications, how these modify pre-existing relationships among people, and so on."

Gary Downey <downeyg@vt.edu> Tue, 19 May 1998 17:06:10 (EDT)
Subject: Re: definition of a digital library

The following scenarios attempt to clarify various views of digital libraries and how they should support distributed teaching and learning.

Digital Library Scenarios

Reference Scenario

The "reference scenario" below, by Jane Schillie, demonstrates that undergraduate students have been seduced by the convenience of searching the web. They are impressed by the quantity of information retrieved and they think, "all information is equal." Schillie's scenario illustrates the advantages of the personal reference interview as intellectual access versus electronic access. In this particular scenario, the librarian discovers that a student requesting assistance in finding information about the women's movement is actually interested in finding primary source material to help her analyze Gloria Steinem's influence on the women's movement.

Sarah approaches the reference desk while Jane Schillie, College Librarian for the Social Sciences, is on duty. She says she needs information about the women's movement. Jane asks several questions and discovers that Sarah is really interested in researching and writing about Gloria Steinem. She wants to analyze Steinem's writings and public appearances and evaluate Steinem's impact on the movement. She admits she searched Alta Vista but became frustrated trying to sort through the results. Other than an interview with Steinem that appeared in *Ms. Magazine*, she didn't find anything very useful. Jane pulls up Alta Vista, motions Sarah to the computer and asks Sarah to replicate her search. Sarah types in gloria steinem and retrieves 283,703 results. Jane suggests that she do a more precise search by typing in "Gloria Steinem." Four thousand results appear and they scan the first few titles. Sarah grimaces as she reads the title "Gloria Steinem Naked" but chortles when she sees "Gloria Steinem and Garbanzo Beans." She agrees to try something else. Jane directs Sarah to a web site that lists criteria for evaluating web sites, then guides Sarah to the University Libraries' subject contacts page for Women's Studies. The page provides links to web sites selected by Jane and leads Sarah to Feminist.Com where she finds Steinem's speeches in full-text. Next, Jane points out a television archive and the two work together to locate video and audio clips of Steinem. From there they head to the *Ms. magazine* web site and a treasure trove is discovered. Scanned images of Steinem and her personal correspondence are linked to the site. Thanking Jane for her time, Sarah heads off to work on her project. Several weeks later she sends Jane an email message containing a URL. Jane pulls up the site and smiles as she looks at Sarah's finished project. Hypertext links to the primary source documents are embedded, as are links to the electronic sources Sarah cited in her bibliography.

Librarians teach information discrimination through personalized research assistance, guidance, and instruction. They are trained information professionals who ask probing questions because experience has taught us that most people who ask for assistance do not initially ask the question that they really want answered. The information professional listens carefully and analyzes and interprets the responses to discover what information is needed, and guides them to the appropriate resources.

Librarians' expertise with technology includes knowledge about different information resources. This used to be, and still is, what "reference" work was all about but the sources of information are continually expanding and now they include and in some cases are predominantly online databases. Many researchers today begin their quest for information by selecting a brand name Internet search engine, rather than selecting the most appropriate subset of it. The lack of refinement, organization, and evaluation of Internet resources often eludes many researchers, especially students.

The interplay among people is as important as the interplay between people and technology. When the technology stumps the researcher, the librarian does not necessarily have to be told there is a problem. Sitting at the Reference Desk we can handle the articulated problem as well as the one expressed only by a frown. We can read faces, just as we can hear one question when we are asked another. When the digital library is within the physical library, there is the opportunity to take advantage of both—technology and people.

Teaching Scenario

Dan Mosser, VT professor of English, presented a teacher's scenario for his course on the History of the English Language. His students would read, watch excerpts, play interactive games, perform workbook exercises, record their speech, and subject their speech and collected research samples to spectrographic analysis. Initially Mosser was very frustrated about the amount of time and trouble it would take to digitize and get copyright permission for all the material he wanted his students to use. Because he was so keenly focused on the new distributed learning environment, he didn't consider methods of distribution beyond the Web, and he only considered using the digital library. He lost track of the library, and did not stumble across announcements of new services and resources even though this news was available from the library's Web site. For example, though he is a frequent library user and has relatively easy campus access, he had not kept up with new document delivery services.

From his office Prof. Mosser looked for specific videos in the library's online catalog, but he did not find the title he wanted. He completed the appropriate web form, requesting that the Center for Alternative Media purchase digital video. He received e-mail notification when it arrived. He also received copyright permission to use it for this specific class, with access limited to users with vt.edu accounts. With a fresh sense of overcoming the technology, he added a link from his online syllabus directly to this library resource using the library's electronic reserve system.

Mosser's class will meet traditionally and with a virtual class in England. He requested and received the publisher's permission for the class in England to have access to the digital video for one week. During this week, Mosser plans to record the "discussion" and mark points of the recording so that he can later add explanatory text and links to video excerpts. This he'll archive with his other class materials. Quite some time later still, he'll make a conference presentation that includes this segment and he'll submit it to the Virginia Tech Digital Library, annotating it as a personal publication lacking peer review.

Librarians and information professionals do not attempt to meet the needs of information seekers with just one format, even one that is becoming as pervasive as digital. Similarly, few libraries limit their collections to just works available in paper, but also include magnetic tapes with audio and video recordings as well as bits and bytes, and vinyl, and microforms. We know that our library users inquiring about information want it in whatever format they can get easily and quickly.

Research Scenario

Robert France, Research Associate in Computer Science, created a scenario about a faculty research project. In his scenario, the fictitious Dr. Charity Miller is beginning new research on the history of photography. She uses a VRML (virtual reality markup language) browser on her desktop computer to interact with VT Digital Library from her private space, a virtual carrel that has all the resources of a traditional carrel and more. She begins with a web search, exporting her findings into her carrel.

Next she searches the university library catalog that includes not only local library holdings but many other libraries and databases such as OCLC's WorldCat. She drags into her "personal digital library" her list of hits that includes brief descriptions and whether or not it is available in paper or digitally. These are accessible by all of the standard library access points, including as a shelf-list in call number order and by any personal notes that she has added to them. The hits are color coded, designating their quality rating (which can be based on the source of the work or library bibliographers' evaluations made during collection development, etc.). Some of the works are not available digitally and her university library does not have

some others. Dr. Miller pastes the information into Web form to borrow works through interlibrary loan.

She then focuses on the VT library using the same catalog search and the same query but restricting the scope of the search to the local collection. Miller picks a point in the stacks where several relevant books are housed and, using one book as a clue, clicks herself to the virtual stacks. Here she sees every book that the library owns in this range, even ones that are currently circulating or are physically in the remote storage facility. She chooses to see them color-coded by quality, relevance to her search, or other criteria and can arrange them in any classification scheme or by any other piece of metadata. Spine labels are clear and easy to read! From her research she accumulated an annotated bibliography of works in the library that she emailed to Document Delivery, a library service that will deliver them to her office.

While this is in the works, Dr. Miller accesses the American Memory Project where she finds examples illustrating technological change in photography. She exports some into her workspace, uses an HTML editor to pass it to the university's digital library image indexer. The indexer signifies when it finds matches in the local collection of images. A collection visualization device creates a topographical map. The documents that are near each other in the map have similar content and mountains represent many images with the same content. She can see clusters of near matches or similar images. Now she's ready to begin her historical investigations.

VT Digital Library and Archives

<http://scholar.lib.vt.edu/>

In addition to fictitious scenarios that may predict how digital libraries will work, there exist real digital libraries and archives such the Digital Library and Archive at Virginia Tech where online resources and services are available to all university community members whether they are on campus or abroad. Known as the Scholarly Communications Project prior to July 1999, DLA is an early and demonstrated sustainable model of how digital library initiatives enhance traditional library resources and services, in many cases paralleling the physical library. Libraries do have a place in the digital library but the real difficulty is simultaneously maintaining resources and services for the library's every day walk-in and local users.

Because of these experiences, libraries should have an active role in digital library development, helping to adapt evolving needs and expectations of its familiar user communities. Librarians educate today's casual Web browsers who will become tomorrow's serious researchers, from undergraduates cruising the web to sophisticated graduates submitting electronic theses and dissertations, to powerful members of the academy publishing electronically. The Digital Library and Archives collaborates with university researchers so that information seekers continue to have the opportunity to select resources in the environment that best meets their needs and desires in terms of quality, quantity, and timeliness.

Scholarly Publishing Services

EJournals

ETDs (electronic theses and dissertations)

News Reports

Virginia Tech Publications

Library Services and Archives

Copyright (guidelines and policies)

EReserve (online class materials)

Special Collections: Manuscripts, Rare Books, University Archives

VT ImageBase

General Information

Search the Digital Library and Archives

Presentations

DLA 1999/2000 or historical information

Digital library researchers have not, for the most part, acknowledged a hybrid format environment where, realistically, information seekers are not restricted to using just one technology. These scenarios and actual library practices, however, demonstrate the expectation that the format question should be resolved logically according to how the information is available and how it is to be used, as libraries currently do. Also demonstrated through these scenarios is how important interaction between people is to elicit the best result for the information sought.

They also show a better appreciation of the range of goals a digital library should support, and broaden the scope of the research to be undertaken to the library user's advantage. One goal is to improve teaching and assignments through the incorporation of library resources and services, whether the students are taught in a campus classroom or at a distance via a network in a distributed and asynchronous course. For successful classroom teaching and distance education, students need access to information resources and not all are, can, or should be digital.

Just because a resource is not digital does not mean that it cannot be used in distributed, asynchronous education. Digitizing an article may be one practical solution; another solution, however, may be linking to an existing article database. In some situations, sending a library book to a student's home may be the best way to get the information to the student, and making that possible through online requests should be a component of the digital library, as it is the library. Offering services such as document delivery through online request forms, as well as information in multiple formats, was not initially a component of the digital library.

Digital Library Discussion Needs More

The "carbon-based bipedal resource who is addicted to information, knowledgeable about research materials, expert at online searching, enthusiastic about working with students and available to communicate with you face-to-face and other ways, is your university librarian."⁶ These resources are working on a variety of fronts including a series of weekly brown-bag lunches where teaching, research, and library faculty discussed issues related to online teaching and learning. At one of these there was an opportunity to bring up the library resources and services that support asynchronous learning, not just the traditional classroom agendas. The definition of a digital library above showed the participants that technology is a bridge connecting traditional resources and services and their new form in the digital library; that we

⁶ "What Is It This Time," Virginia Tech's University Libraries flier [fall 1999]: College Librarians
<http://www.lib.vt.edu/info/libnews/whatisit/collelib.pdf>

should acknowledge the technology, appreciate it, and be enriched by using it, without excluding current analog or carbon-based bipedal resources.

The academic discussion of the practical application had points of convergence and divergence. It, however, largely avoided any financial aspects of libraries, and I attribute this to the fact that sometimes digital libraries, like the Digital Library and Archives, develop within larger libraries so that establishing a financial foundation was not necessary. DLA was a good thing for the library to do for the university community, so existing library resources were used to extend its activities. Sometime economic issues cannot be avoided and there is some good advice available. One source of sound advice is librarian Marshall Keys, until recently executive director of the northeastern US library network. For Laverna Saunders' *Evolving Virtual Library II: Practical and Philosophical Perspectives* he wrote about five factors of the information economy and how their interaction will have an impact on digital libraries.⁷

▪ **Economics of Publishing**

Scholarly communications will become available at low cost, i.e., below current market value and still “free” from libraries receiving administrative financial support. There will also be greater collaboration at the university level among faculty as authors and libraries as publishers and with scholarly societies. Keys says that this will result from the lack of success among publishers in selling over-priced individual articles. We're already seeing this happen at the DLA and even in other parts of the Virginia Tech campus in such areas as the recent funding of the Center for Digital Discourse and Cultures [<http://www.cddc.vt.edu/>].

I have often bemoaned the fact that there is not a better word than "publishing" to describe what libraries do when they make works available on the Internet. Peter Lyman reminded me that the description of "the social function of publishing is to make knowledge public," and that at one time 'publishing' was accomplished by reading aloud, before the Gutenberg-printed the book. “Digital documents are published by being placed in a public domain from which they may be copied and transferred to the reader; they are selected and “pulled in” by the reader.” "The physical characteristics of the artifacts within which knowledge is contained, whether books or computers, will shape the dynamics of reading and writing,...” and, therefore, libraries.⁸

▪ **Development of Metadata**

Beyond being a tool for resource discovery, metadata will be a source of permanent information about ownership and copyright. The metadata can also include information that extends the life of the work by containing elements that allow it to have a persistent location on the Internet because while its temporary location may actually change, there can exist a directory that reroutes the information seeker to the information resource. These systems are now called ‘handles’ [under the auspices of the Corporation for National Research Initiatives] or ‘PURLs’ [persistent URLs from OCLC]. The Networked Digital Library of Theses and Dissertations drafted the standard in 1998 and has just about reached consensus. For this one example, see <http://scholar.lib.vt.edu/theses/metadata/DCMARC.pdf>

Keys points out that publishers may use metadata to track and charge users at every level, applying, perhaps a fee structure that differentiated between the abstract, an entire article, and forwarding digital copies to another user. Other publishers (such as Elsevier) would use the

⁷ Keys, Marshall, "The Evolving Virtual Library: A Vision, Through a Glass, Darkly," *The Evolving Virtual Library II: Practical and Philosophical Perspectives*, Medford, NJ: Information Today, 1999, p. 172

⁸ Lyman in *Books, Bricks, and Bytes: Libraries in the Twenty-first Century*, p. 5, 7.

same tracking strategies but apply them differently, allowing libraries the current level of flexibility to apply copyright and fair use. Keys says because ...“library copyright under fair use is a minuscule fraction of all transactions involving copyright and distribution of copyrighted materials.”⁹

- **Information aggregators**

Not a new resource at the Reference Desk, information aggregators have expanded their services by moving online and include links to full text. One might even go so far as to say that libraries are information aggregators in that they have indexed information resources in their catalogs, including URLs in their bibliographic records that also link to works published by the library and others. Some libraries try to put a user-friendly face on various aggregates, but more often they teach their user communities how to interpret dozens of commercial interfaces over which they have no real control (either the database or the network connection to it).

- **Local system technology development**

Integrating systems does not necessarily mean bringing them together except in the eyes of the user as we do with the federated search system that queries multiple ETD databases with one search. Sometimes an advantage is that the search result from desperate databases is returned in a common format. Another advantage is that the user does not need to learn new search techniques for each search engine. Keys feels that integrated local systems restores some of the balance of power with respect to information aggregators and owners to libraries.”¹⁰

- **Library Consortia**

In response to increased fiscal responsibility and frugality, many libraries of similar type or locality, have banded together to share resources and database licensing and negotiations. Negotiating effects prices, policies, terms of use, and more, benefiting the library consortia as well as the commercial service provider. Cost savings are the primary goal, but the complicated negotiations means that the time it takes for one versus many is also reduced. In Virginia, VIVA, the Virtual Library of Virginia is a virtual consortia that includes public, nonprofit, and private universities. Vendors, of course seek revenue where it is most available, more likely at the private college than the public university. VIVA's funding is from the State Council for Higher Education in Virginia so it is with the "public good" in mind that negotiations include most institutions of higher education, not just the state supported schools. The primary drawback of negotiated access is that both the digital library and the library will suffer if a license does not guarantee the continued existence of the resource.

Is the Medium the Message?

For now, the digital library is access to a collection of information resources and limited library activities that live alongside and in the mist of other library activities. Cheryl LaQuardia put it well in the November 1998 issue of *Library Journal* when she reported that “We confuse the methodology for the product, consider the means as the ends, and mistake the

⁹ Keys, p. 175

¹⁰ Keys, p. 178.

medium (the web) for the message. Technology will eventually recede into the background to be a silent and unobtrusive servant.”

Whether we celebrate the technology or not, the best digital library should be a seamless extension of the library that, among other things, provides its user community with access to information in any format that has been evaluated, organized, and preserved. Ideally, access to constantly evolving digital information will be provided through global as well as personalized systems with the availability of services by information professionals, librarians. Digital libraries and libraries should not be separate, but should fuse to accomplish more than either can do independently to serve the user community on the highest order.

Digital Library developers have displayed an unfortunate tendency to feature the technology by limiting libraries to being primarily repositories of information. There is more to libraries than people gathering information. They also go to libraries seeking knowledge and wisdom and art and entertainment, etc.; they also seek *help*. Effective use of libraries involves library professionals helping researchers turn their rambling tales of what they are looking for into the essential elements of well framed questions. The next step is to help them identify a well-defined body of information and to avoid the misguided hunt. At this point, patrons are ready to continue on their own.

Librarians know users and know domains of information. We are not indifferent to the collections we service or the users we assist. A machine is indifferent; a computer program is also indifferent. Digital library development should also address libraries as social institutions. We need more librarians like Gary Marchionini working with computer scientists doing research on digital libraries who will help them understand that "To be called a library, an entity must be ... guided by a service mission that is manifested in policies of acquisition (collection development), organization, and access. Libraries offer both content and services guided by such policies and exist in a social-political context that influences policies and operations." I have also been encouraged by interactions with new graduate students and faculty in computer science. Yin Leng Theng from Middlesex University, U.K., for example, came to Blacksburg last summer seeking input from librarians for her digital library research. She has wisely written, "...digital libraries are *more than* just web sites or stores of information... To design good, usable digital libraries, one requires knowledge about who will use them what they will be used for, the work context and the environment in which they will be used..."¹¹

The digital library lacks one of the most important features of a library—humanity. The compassion of librarians for helping information seekers be successful puts libraries on a higher moral plane, providing greater services. In 1991 Rosemary DuMont outlined three ethical periods of librarianship.¹²

- pre-1930: responsibility to library collections: creation and maintenance
- 1930-50: human aspects of libraries: good customer services and public relations; obligation to deliver quality services; free access to information, intellectual freedom (Library Bill of Rights)
- 1960-1990: broader needs of society, improve public good promote social justice, i.e., services beyond the local user community, under-served need libraries too

I suggest that we build on early ethical periods and enter a fourth:

- 2000- : help information seekers make sense of what they find among the overabundance of information [on the Internet]; help them 'drink from the fire hose.'

¹¹ Theng, Yin Leng, et al., "Design Guidelines and User-Centered Digital Libraries," Euro DL'99: 2.

¹² DuMont, Rosemary, "Ethics in Librarianship: A Management Model," *Library Trends* 40 (fall 1991): 201-215.

Take the Initiative

Overcoming the limitations of digital libraries will require leadership and diligence from passionate information professionals. Among the actions I continue to advocate we take are:

- Don't wait to be asked to participate with faculty in preparing grant applications. Help researchers understand how their grant applications will present a stronger argument for funding if information professionals contribute to the "library" in "digital library" research.
- Don't wait to be asked to participate with faculty in preparing classes and instruction. Don't let them inadvertently limit expectations based on what is available electronically or waste time scanning articles when the library's article database hasn't been searched. Encourage faculty to centralize course materials through student-friendly systems such as electronic reserve.
- Aggressively inform library users about how to evaluate online information. Help students understand that the information they need is available in many different formats that are within easy reach.
- Work with systems designers to improve functionality and make information easy to find. Stop complaining and start talking constructively with system designers.
- Learn from digital library research. Do not assume that its limited perspective means that its findings are invalid.
- Take a risk: meet and respond to the changing information environment and commit to improvement. Explore, discover and create new services; give up some control of the known. Try something new, quietly, then learn from the mistakes, make improvements, and advertise successes.

It Can be Done

In this paper I have touched on many of the aspects of convergence and divergence between libraries and digital libraries. It is not an exhaustive outline, but it is meant to focus attention on what is missing from digital libraries, to call attention to the roles librarians have played in the development of libraries, and to provide some suggestions about how we might have a positive impact on the future development of digital libraries. We have a noble mission that we should not allow to be by-passed by the speed and ease of information access.

The library is an information ecology that adapts to users needs. The challenge to do this and the breadth of responsibilities has grown markedly with the popularity of the Internet. This is a new information environment. The new information technologies do not necessitate a new social context that changes the meaning and significance of libraries and librarians.

The library must simultaneously deal with the philosophical issues as well as the practical issues while developing the digital library and maintaining the library. Libraries continue to handle old and new issues, making many radical changes within the last ten years that are now typical library services and resources. While the format of our resources may change, while access to information may change, while styles of service evolve, the vision of high quality, service-oriented, information centers still fits the library's mission. We will serve our user communities best if we incorporate these into the digital library also.

One might find the challenges for digital library development overwhelming, and I appreciate that I have the opportunity to suggest modifications to the current state of the art. It is important to remember that as information professionals and librarians it is our duty to

contribute to the development of digital libraries. Just because they aren't as good as libraries does not relieve us of the obligation to share our knowledge and expertise as well as the strong library heritage, so that our colleagues in computer science work towards the best results possible. This is not a competition with a winner and a loser. We will all be better off if the digital library becomes more like a library and the library takes advantage of the technological advancements of digital library research.

Digital information is not a revolution but a development, albeit a fast one, and information is only part of what it takes to achieve knowledge. In the end it is not the speed of the information or even the information itself that will give our lives meaning. It is still what we do with it that matters most.¹³

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¹³ Mason, Marilyn Gell, "The Yin and Yang of Knowing," *Books, Bricks, and Bytes: Libraries in the Twenty-first Century*, p. 171.

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