Elements of Digital Libraries, Present and Future

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Coming as it does at the end of my tenure as the director of the Internet Public Library[1] (IPL), this paper affords me the opportunity to take a somewhat philosophic look at the arena of digital libraries (at least as they are expressed in America). To that end, I'll examine what I consider to be the elements of a digital library: Content, Organization, Service, Technology, and People. I'll take a look at the present state of affairs for each of these elements in turn, then take a brief look at what the future may bring to these facets.

The Present

Content

The center of any library enterprise is content. There needs to be something at the core of a library that is utilized and acted upon by the library's users and librarians.

However, content is a nebulous concept. In the past, content was held in physical containers, objects such as books, magazines and video tapes, that could be handled and exchanged. The coming of digital content has exploded these old notions. Digital libraries must deal with content that they can't touch, move about, or in many cases even own. Add in the (somewhat justified) fears from publishers that digital content can be easily copied and shared and digital libraries begin to enter a minefield of choices and options (nevermind the fact that libraries *want* people to be able to copy and share information!)

Digital libraries have two basic choices for content: use content from other sources, or create their own.

Content from other sources can be obtained in one of three ways: buy it, license it, or get it for free. Since few content providers are willing to directly sell digital content, digital libraries are left with either licensing or using free material.

Most digital libraries associated with traditional libraries, such as those found at academic or public libraries, are comfortable using licensed content. This at least involves paying for information, which we have long done. For the most part, licensing digital content affords the library and its users greater access to the information, but at the cost of a loss of control over what the library can do with the information.

Many libraries are hesitant to include free Internet resources as part of what they consider to be their content. However, while it is true that an extremely large majority of the information available for free via the Internet is of little use for libraries, there is so much of it that even the small percentage of good information is still a sizable amount. For example, at the IPL we have a catalog of over forty thousand freely available Internet resources in our virtual collections, and there is still plenty more available that we have yet to get to.

The other option for content for digital libraries is to create your own. While few libraries today are creating completely original content, many are involved in the process of digitizing existing content, such as with the Making of America[2] project or the American Memory[3] project from the U.S. Library of Congress.

Organization

Having content available does little good if your patrons cannot find what they're looking for. Thus, digital libraries need to provide one or more organizational schemes to provide access to their collections.

One battle which is constantly being fought is the question of who are we organizing for, the librarians or the users? There is a strong attraction to co-opting our existing strategies for organizing information that we have used with books, magazines, etc., but this is a tendency that should be resisted, for two reasons. First, while these systems may be adequate for organizing large collections of physical objects on shelves, they are not so good at organizing smaller collections of digital objects which don't need to be situated anywhere. Second, while these systems are precise and exact, they are also complex and not of much use to users who don't have a degree in library science. A user-centered design approach can be most rewarding when applied to the organization of digital collections. Also, there is no reason why multiple organizational schemes cannot be employed: a basic scheme for users, and an advanced scheme for librarians (and other hearty souls who wish to brave it!)

Service

You can have a great selection of content, and a darn good organizational system, but it will still be hand for people to find the information they're looking for. As a profession, we know that people have different ways of using and accessing information. A large part of the effort extended by libraries involves helping patrons to navigate our large, often Byzantine organizational structures. Even a 'simplified' organizational scheme will make sense to some, but not to others.

With the ability of users to access digital library content remotely, it becomes important for the service aspect of digital libraries to also be available remotely. Now well past the trial stage, digital reference is being offered in thousands of libraries throughout North America, and cooperative systems, such as the Cooperative Digital Reference Service[4] & 24/7 Reference[5], are in the early stages of development. We are also beginning to see a movement towards the use of real-time, or 'chat', digital reference.

Technology

Obviously, technology is hugely important in digital libraries. The purpose of technology in a digital environment should be used to support the other elements, namely content, organization and service. This seems self-evident, but often it is the other way around, with libraries looking for ways to employ the latest technological craze, whether or not it is needed. For example, in the early days of digital reference, many libraries looked towards existing

call-center and help-line solutions to fit their technological needs. But it became rapidly apparent that a call center, which receives many of the same questions with a high degree of frequency, is very different from library reference work, in which the majority of inquiries are unique and may not be well-formed from the outset. Thus a technological solution that works well for one does not work well for the other. We are now seeing the emergence of solutions that are designed specifically for digital reference, with a large degree of input from the librarians themselves.

People

Many alarmists would have us believe that digital libraries are intended to replace the need for librarians. This is far from the case. In fact, it can and should be argues that effective digital libraries will need more people behind them, not fewer, and that these people will need a broader and deeper suite of technological and professional skills. A true digital library has people behind it who make decisions about content, design and modify organizational structures, provide service, and create and implement technology; otherwise, it is just a search engine sitting on top of a pile of data.

Before I move on to the future of these elements, I'd like to pause to make a couple of points:

First, I'd like to note that there is nothing new here. These five elements, content, organization, service, technology and people, are elements of *all* libraries, not just digital libraries. What changes is simply the ways in which these elements are expressed. Which tells me that we are on the right track; without these elements, a digital library wouldn't be a library at all.

Second, all of these elements are being done, in part, by entities other than libraries. *Yahoo!*[6] organizes Web content; Ask-A services such as *Ask Dr. Math*[7] and *Go Ask Alice*[8] provide reference service; *Google*[9] provides searching technology. What makes digital libraries stand out from the rest is the intelligent combination of these elements, combined with a professional ethic, history and culture.

The Future

Content

One thing is certain about the future of digital libraries in terms of content: there will be more of it. In fact, we are in a mode of information abundance; there is so much information out there for people to wade through, intelligent decisions need to be made as to what deserves out attention.

In addition, the traditional media that libraries have always dealt with isn't going away anytime soon. Fully digital libraries such as the IPL will continue to be rare; most libraries will exist and need to function in a world of hybrid content, where digital and physical materials will need to be utilized side-by-side.

Organization

The near future of organization in digital libraries will take the form of cooperation. Long ago, libraries gave up the idea that every library had to do its own original cataloging for every book it owned, and cooperative cataloging was born. In the same way, there is no reason why every library, digital and otherwise, needs to be cataloging the same electronic resources. In this spirit, the IPL has recently agreed to join forces with other like-minded projects, such as the *Librarians' Index to the Internet*[10], *INFOMINE*[11] and others, to form a coalition that will seek to pool our efforts in organizing the rapidly expanding content available on the Internet.

We also need to think of new ways to organize digital information. As the amount of digital material continues to grow exponentially, our organizational schemes will need to grow and change along with the content.

Service

As mentioned earlier in this paper, cooperative digital reference services are already forming. The next frontier in digital library service will be to explore ways in which digital reference can be partially automated. While it is highly doubtful that a piece of software will be able to navigate the complexities of library reference on its own, there is the possibility that intelligently designed software can assist librarians by routing questions to the appropriate librarian, suggesting possible digital resources, performing an initial reference interview, or searching an archive of previously answered questions.

But beyond digital reference, there are other types of services that need to be explored in the digital realm; how can concepts such as bibliographic instruction and readers' advisory translate into digital libraries? What new service opportunities exist that we can take advantage of?

Technology

Ten years ago, the future of digital materials in libraries seemed certain: full text databases available from terminals in libraries, accessed by librarians at the behest of users. Just one year later, Mosaic, the first graphical browser for the World-Wide Web, was introduced, and the world of digital content changed practically overnight. Libraries have been scrambling to catch up ever since.

We're not the only sector that has been caught off guard; for example, the advent of the MP3 music format and Napster rocked the world of the recording industry. I like to think that the library world responded with a bit more grace than the recording industry; instead of combating change, we have embraced it. This is an attitude that will serve us well in the future.

The question that we as librarians need to be constantly asking is "What is the next big thing?" It has been nearly ten years since the last big change; most of the changes since then have been comparatively minor, if somewhat fast-moving. But will we be ready for the changes that virtual reality, artificial intelligence, or subcutaneous computing will bring? And

somewhere a college student is sitting at a computer terminal is his dorm room, devising a new way of applying technology to the way we store, process, or organize information, a way that no one else has considered.

People

Which brings us right back to the people behind the digital libraries. I most look forward to when the children of today--those who are growing up in a world where information technology is a part of their everyday lives--enter into our profession. It is then that we will finally be able to fully take advantage of the promise of digital libraries.

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