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Enriching the Internet:  
The Library's Role as Creator of Electronic Information

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Abstract. This paper addresses several experiments that the UIC Library has undertaken to shape how information is presented on the Internet. Four projects begun under the Great Cities Initiative at UIC will be discussed. Each project is described very briefly. The significant issues addressed in its development, the future of each project, and areas for other partnerships are identified. The four projects include: the partnership with the Chicago Public Library to make information about the Library and the City available to eight branches of the CPL and Internet visitors from 30 countries; a contract with the U.S. Department of State to provide State Department information world-wide on a timely basis that has resulted in more than 8000 full-text items being fully indexed and distributed via Gopher and the World Wide Web more 900,000 times each month; a project with the Pemberton Press to provide selected articles from its four library journals, plus tables of contents, author's guidelines and other information; and a collaboration with the Illinois State Archives to distribute access to local databases, such as the Federal Land Sales in Illinois.

1 Significantly expanded and revised version of an article originally published in First Monday  
(http://www.firstmonday.dk/issues/issue2/content/index.html)
Academic libraries for much of the twentieth century have based their reputations on the sheer magnitude of their collections - how many kilograms and pieces of printed matter are available on-site to their users. This view is changing because access to remote information, once discouraged by libraries by the length of time it took and by the associated costs (e.g. postage, copying, loan fees), has changed dramatically because of the computer. Large networked computer systems, such as OCLC, have reduced time and costs associated with getting remote information. The resulting drop in the cost of locating remote items, through the use of a large, shared bibliographic database, and the availability of alternative methods for fast delivery have led to a libraries to embrace interlibrary loan and electronic delivery of information to the patron’s desktop. Libraries increasingly are emphasizing quick access to print information - anywhere - rather than attempting to own all known print information locally, on-site.

If we examine this change in philosophy, we can see the evolution of the library from the physical warehouse to the access point or gateway to information. As the physical warehouse, libraries were located in big buildings that grew bigger and bigger to house their ever-growing collections. These very large collections were designed to provide immediate on-site access to the local users of the library. As the access or gateway role has increased in importance, we have seen a smaller growth in collections. Fewer new buildings or additions are being built, and so collections are more crowded. Libraries increasingly lend to and borrow from other libraries, and provide access to their own collections which are stored off-site. While local users continue to be the primary focus of library service, the increase in interlibrary loan has made every library more aware of those people outside the local community. Their access to the library’s materials impacts increasingly the availability of library materials for the library’s local users. In fact, in a growing number of cases, it is easier (i.e., faster) to borrow an item that is already owned, but is out on loan to the patron of another library, from a third library.

Not only has technology sped up the loaning and interlending of print materials, it has offered new ways of delivery and new formats to deliver. Libraries move electronic full text and page images of paper journals via fax, e-mail, file transfer protocol (ftp), and even printouts through the mail. Libraries create electronic images to delivery via telefacsimile or e-mail. We are providing access to electronic information services via networked and standalone CD-ROMs and through World Wide Web sites. But again the focus is access by local clientele. And in many cases, concentration on or limiting to local users is driven by licensing and other intellectual property considerations as well as costs.

The power of technology has not only allowed libraries to share resources more easily and less expensively, it has also allowed the library to bring more information and more up-to-date information to its users. Now researchers can have access to very current and nearly complete information from the government agencies, in a format that allows researchers to perform their own analyses of trends, instead of poring over older print volumes or just selected variables. Instead of wrestling with year-old government forms submitted by America’s public corporations, a researcher can view information submitted as recently as the last 24 to 48 hours.

All this electronic activity is now leading libraries into a new realm, one that is not directed solely at local users. This is the role of the library as publisher and creator of electronic information. The library is making electronic information available over networks, converting paper information into bytes, and finally making new information. The result is a vast expansion of the user base where external use may dominate the library’s statistics.
Despite some estimates of more than 100 million home pages and terabytes of data, there is a shortage of access to high-quality electronic information. Access to electronic information is highly dependent on access to computers and to networks. Much has been written about "wiring the last mile" (that is, bringing the network to the home) and about making computers more available to those who can least afford them. While issues of connectivity are important, it is unlikely that libraries will be significant players in resolving these broad social policy questions, although the library community will be a significant force in articulating issues, especially those of equity. Libraries are likely to be the on-ramp for some users, the provider of computers to those who can not afford their own, and a major source for those who need assistance and training in using computers and the networks.

While libraries are unlikely to be the providers of wiring to the home or of subsidized computers for individual purchase, when it comes to the third element in access to electronic information, the information itself, libraries must have a significant impact. There are three fundamental forces that limit access to electronic information today. These are:

1. how much older, print-based information has been converted to digital format
2. how much new information is coming out in digital format
3. whether electronic information is network accessible

The first category, the lack of data conversion, usually can be traced to a perception of the actual value of information in the marketplace. Since the information is usually available in one format (generally print), it must be shown that there is some exceptional added value to re-issuing it in another (digital) format. The conditions pertaining to the issuance of the original print item can affect this greatly. For example, an item that is only available as a print item will require the capture of the text into a digital format. An item that was printed from an electronic manuscript requires very little effort if the goal is simply electronic display. If, however, the goal is make an item electronic and to enhance access by adding navigation features such as hyperlinks, the costs of the electronic edition can increase substantially.

The second category, how much new digital data is being issued, is difficult to analyze succinctly. Marketplace considerations are very real and very complex. The lack of the equipment to use electronic formats will further reduce the number of potential customers for digital information. Thus we see some electronic titles attaining a ubiquitous presence because they are offered bundled with equipment purchases. Simply put, it just doesn't pay to digitize information that few can use, and even fewer will pay for. Before the current era of digitized and digital information, librarians addressed the need for dissemination of information by persuading publishers and authors to create books using the force of the marketplace, i.e. demand and supply. Publishers helped librarians by reprinting out-of-print books and by encouraging authors to create books on certain topics. Librarians helped publishers and their editors to identify key topics that needed to be addressed with new publications. These traditional roles are slowly re-emerging in today’s digital environment. As more and more publishers want to undertake digital efforts, they are turning to librarians to help identify or shape these initial products. The efforts of librarians have contributed greatly to the development of large bibliographic databases, such as RLIN, OCLC, BRS and Dialog, to the creation of electronic versions of print texts such as Britannica Online, and also to the publication of electronic journals and full-text repositories of journals articles.

The final area, whether electronic information can be used over the network, presents a different set of considerations. Traditional data-processing professionals may not be knowledgeable about internetworking issues or understand the intrinsic value of information. In some cases, data-processing staff are knowledgeable about the audiences for electronic information, but are
extremely concerned about the security risks that open networks and information access present. In
both these cases, what is needed is the ability to convert data from a proprietary format to an open
format and to provide a low-risk access method. Librarians bring their desire to open up access to
information and can push network administrators to invent ways to make information more widely
available in secure ways.

As librarians have become more involved in addressing these issues, a new role for the library has
emerged. The library is now becoming the distributor of information online, moving this function
from a locally-based one designed just for the library's own clients to a national, and even
international, one serving many information seekers from around the world. This new function of
the library - the library as electronic publisher - has evolved thanks to the comparatively lower
start-up costs of electronic publication/distribution over publication/distribution of paper
information and to the library's strong desire to provide off-site access to information. In the case
of universities, the network infrastructure needed to publish information electronically is often
already in place to support the research and teaching roles of the university. The electronic
distribution of information is a natural evolution of the use of this infrastructure, and from there the
activity of creating or promulgating electronic information follows quickly.

Many libraries are undertaking these projects with partners. The organizations with whom they
partner own important information of wide interest. These organizations recognize the skills of
librarians. Among the most highly prized skills are our ability to package information, to organize
information, to archive information, and to promote the use of information. In addition, librarians
have earned a reputation of forming strong partnerships that are respectful of the expertise and
concerns of all partners.

At the Johns Hopkins University, the collaboration of the library staff, the computing center, and
the university press led to the creation of Project Muse - the Johns Hopkins World Wide Web
server of more than forty scholarly journals. At the CIC (Center for Institutional Cooperation), the
collaboration of computer specialists and librarians had led to the creation of a huge archive of
electronic journals. The University of Illinois at Chicago University Library has also embarked on
a series of efforts in this area. The UIC library has established a number of partnerships, to put
information out onto the Internet - that is not simply to collect the information but also to organize,
package, archive, and disseminate it widely.

The UIC Internet Initiative

It was mid-1993 when the UIC Library decided to begin to create electronic information, not just
provide access to information made by others. An important feature of this undertaking would turn
out to be that UIC took an incremental approach, building and expanding upon the foundation laid
by each project. Another aspect would be the strong partnerships that developed as the experiments
moved from pilots into production. A third feature was the library’s willingness to profit from
lesson learned moving ideas and experience from one project to another. The hallmark of the
projects has been the flexibility of all involved, the openness to experiment and take risks, and
finally a quickness to adapt as circumstances change.

UIC's librarians began by scouting potential sources of information in an aggressive campaign to
find organizations and individuals with important, useful information that the Library could
develop and deliver over the Internet. The Library was motivated by the belief that electronic
information would be increasingly important to the university community to support teaching and
research. Furthermore, the Library felt that directly involvement in providing electronic information
would give the Library firsthand knowledge of the issues that needed to be addressed for electronic
information to be incorporated into the daily routine of the library and the library user. The Library felt that it could leverage the Internet expertise of its staff as well as the staff of the University's Computer Center by developing partnerships with information owners to explore these issues.

Under the umbrella of the campus Great Cities Initiative\(^2\), the Library is able to form partnerships to further the Initiative's goals. UIC's librarians felt strongly that there was a lot of useful government information that should be made more accessible. We were also interested in working with a variety of partners to learn more about the issues of partnering and particularly about the technical issues of disseminating information via Internet. We also wanted to develop several models and experiments to demonstrate the appropriateness of different approaches to electronic information to different segments of the information provider community. We were seeking information for which there was a public demand, but we were also exploring the issues of distributing information where the information owners would be concerned about marketplace issues.

Four projects are highlighted for this paper because they exemplify how the library addressed the need to open up information by making it network accessible, how the library worked to convert information from paper to bytes, and finally how we began to create electronic information from scratch. The partners represent a city, a state, and a federal government agency and a commercial publisher. All of our partners have taught us much in this endeavor, and we continue to learn from them every day.\(^3\)

**Increasing Access to Electronic Information: The Illinois State Archives**
(gopher://gopher.uic.edu:70/11/library/libdb/)

At the 1993 Illinois Library Association meeting, UIC Library staff urged departments and agencies of the State of Illinois, participating in the exhibition area, to consider sharing information with the Library. With this data, the Library could demonstrate, in a pilot test, how information could be distributed over Internet. The Illinois State Archives agreed to a trial project. During the fall of 1993 and winter of 1994, two databases, that had been available only to researchers on-site at the State Archives in Springfield, Ill., were converted from proprietary database formats into searchable Gopher-accessible files. These databases were the Illinois Public Domain Land Tract Sales Archive and the Index to the Chicago City Council Proceedings, 1833-1871.

The Illinois Public Domain Land Tract Sales Archive contains transaction data for approximately

\(^2\) The UIC Great Cities Initiative is an institutional commitment to increasing, facilitating and highlighting work serving the Chicago metropolitan area. Through this ongoing initiative, UIC is implementing teaching, research, and service programs designed to improve the quality of life in metropolitan Chicago and urban areas worldwide.

\(^3\) For a complete list of UIC’s projects, consult the following World Wide Web site at the URL: http://www.uic.edu/depts/lib/services/projects/
545,000 public domain land sales in Illinois, supplied by the Illinois Secretary of State and the State Archive to the University of Illinois at Chicago’s University Library and Computer Center. Public Domain Land Tract Sales are the sales of parcels of Illinois land by the government to U. S. citizens. The great majority of transactions date from 1815 to about 1880, when most public domain lands had been sold. Only the first sale of public lands is recorded in this database; subsequent sales of the land are not. This database is particularly useful to genealogists trying to locate information on family land holdings.

This second index contains the subject terms and dates of over 35,000 files that comprise the Chicago City Council Proceedings Index for the years 1833 through 1871. Using these index entries, a searcher can find a citation to the information in the published proceedings, or in the archives of the City Council’s proceedings.

Both these databases were in regular use every day at the State Archives by at least one researcher. In April 1995, average usage of the Land Sales file on the Internet exceeded 200 searches, with more than 300 records retrieved daily. This pilot project had taken the Library and Computer Center staff less than a week's time to complete, had increased access to the data immeasurably, and had increased actual use by 5000%. Spurred on by both the ease and the success of this first effort, the State Archives sent several more database files to add to the collection. The Library had addressed the issue of network access to local data by moving two existing electronic databases from a local-only access to worldwide access via the Internet using a standard protocol, a Gopher front-end to a SPIRES database in one case and to an SQL database in the other.

What lessons were learned? First, we discovered that networking electronic information doesn’t have to be a big deal. If the information is already electronic, conversion to a network-accessible database manager can be simple if goals are kept modest. Effort is required in places that may not be predicted, for example, in writing or revising help documentation. Users address all kinds of questions to the technical support staff including why their ancestor isn’t in the database. Finally, we learned that opening up even an esoteric resource such as the federal land sales in Illinois can not only greatly expand use but can also significantly increase the visibility of the partners.

**Increasing Access and Coverage: U.S. Department of State** (http://www.state.gov and gopher://gopher.state.gov)

The Library’s next effort was considerably more ambitious, as we turned our attention to the conversion of large paper and CD-ROM archives as well as the current output of a government agency, all so it would be accessible over the Internet. UIC’s Documents Librarian negotiated a trial effort with the U. S. Department of State’s Public Information Office to publish State Department information worldwide via the Internet Gopher protocol. This effort required UIC to identify methods for the daily secure transfer of data from Washington to Chicago in a timely fashion; to train staff in Chicago and Washington about managing a Gopher server; and, to install and support the library’s first standalone Internet server.

Colleagues at the Coalition for Networked Information in Washington assisted the Library and the State Department in trying out several Internet suppliers. Data issued on CD-ROMs was copied and converted to text formats of suitable length and style. A standard header and footer for documents was developed. Daily transmission of current documents via electronic mail and FTP (file transfer protocol) was monitored to develop a secure process for the transmission of files. The Library added indexing and searching capabilities to the server and developed a way for visitors to leave comments and ask questions. The State Department staff named the project the Department of State Foreign Affairs Network (DOSFAN) and agreed to open worldwide access to the server in

Soon the very popular DOSFAN Gopher acquired a World Wide Web front-end, DOSWEB. Library systems staff added comment forms and searching capabilities to the WWW version. Graphics were developed and refined to load quickly even over slow connections. Image maps to allow visitors to clicks on graphics and retrieve documents were developed. A counter of visitors was used briefly, but with more than 900,000 visits per month from more than 80 countries, it was decided that dedicating computer time to merely update the counter was unnecessary.

The Internet distribution project has given the State Department staff much to consider. Policies on which documents will be added to the Gopher and which to the Web are being developed. Electronic distribution via the Internet is affecting plans for paper and compact disk distribution formats as well. The impact of the speed of electronic publication versus other media is being assessed. Secretary of State Warren Christopher made the following remarks in his speech on U. S.-Vietnam relations given in Hanoi on August 6, 1995:

> Communications technology is pushing the expansion of freedom for the individual at the same time as it is shrinking the distances between nations. My speech to you, for example, will be broadcast back to the United States by satellite. Through the Internet, it will be available to almost anyone in the world with a computer and a phone line. Governments cannot control this movement of ideas in the Information Age, even if they want to.

The lesson learned from the Department of State server are many. First, we learned that converting electronic information document by document is a lot of work, and it is work that in the arena of the World Wide Web is never really finished. Effort is required in many areas including training and retraining, communication, and constant monitoring of the site. Feedback to users takes an enormous amount of time, time spent that is very gratifying. We learned that network access to high use information causes enormous and sudden growth. Users are insatiable. No sooner is today’s press conference posted than people want tomorrow’s. No sooner are the 1994 documents converted than they want to know when 1993 will be available.

**Converting Paper to Bytes: Online, Inc.** (gopher://online.lib.uic.edu, now managed by Online, Inc at http://www.onlineinc.com/)

While DOSFAN was gearing up to go live, the UIC Library was approached by Online, Inc.(Pemberton Press) to consider hosting a Gopher server for one of its journals Multimedia Schools. The Library looked favorably on this request because it was a natural extension of the work being done by UIC’s College of Education in its outreach to the Chicago Public Schools and also because it would give the Library a chance to work with a for-profit partner, one who was interested in exploring the balance between making its content freely available on the Internet while protecting its print-based revenue stream. It became obvious early on that there was no reason not to include information from the three other Pemberton journals - Online,Database, and CD-ROM Professional - as long as the publisher was willing to take the risk that print subscriptions might be adversely affected.

The experiences from the projects for the Illinois State Archive and the U. S. Department of State gave us insights into working with a traditional publisher. For example, we agreed at the outset that Online, Inc. would control the information and that at any time, the Library would remove
information at the request of Online, Inc. At the same time, the Library asked that it be allowed to review any information of a quasi-commercial nature, for example, the wording of the information about subscriptions. Both Online, Inc. and the Library agreed that the server would provide access to the texts of a selection of articles from each issue of the magazines. Each electronic version of an article would provide information on how to acquire for a fee a print copy that would include illustrations not available digitally. All information on the server would be freely available to anyone on the Internet, and updated regularly. Online, Inc. would not only provide information on how to subscribe to its journals but would also provide information on how to submit articles to the editors for potential publication. The articles distributed on the server would include both feature articles as well as regular columns.

From the very beginning it was clear that the Online Inc. Gopher server, and now the Online Inc. WWW server, were increasing the sales of both individual articles and subscriptions by giving customers a chance to sample the quality of the journals before making a purchasing decision. Demand for the journals in fact has led to their availability in individual paper issues on selected newsstands (which did not occur before the Internet project), in addition to the distribution of paper issues by subscription. Electronic access did not hurt the sales of Online's paper journals, it has actually helped to increase the demand for them. In addition, Online has diversified its periodical offerings, with a new journal entitled Online User.

This project helped the Library to understand and explore first-hand many of the issues related to commercial publication via the Internet. It also helped a publisher understand the potential of the Internet to increase the sales of its products. In addition, we learned that a for-profit partner expects a quicker turnaround on posting of items and is more likely to double-check that the server is in order.

Making Content: The Chicago Public Library (http://cpl.lib.uic.edu)

Based on the success of the State Archive, DOSFAN, and Online, Inc. projects, the Chicago Public Library (CPL) approached the UIC Library about participating in CPL's Library Services and Construction Act (LSCA; assistance from the U. S. government to improve library services) grant to put Internet access in eight library sites. The UIC Library agreed to provide its expertise to train and support the CPL staff’s execution of the grant objectives. Unlike the other previously discussed projects, where agencies gave us the information and we figured out how to organize and distribute it effectively, the CPL staff knew what and how they wanted to their information to look. They needed the expertise of the UIC Library staff to make it happen. As a result, this partnership demanded more sharing and more joint work from the very beginning.

The Library agreed to train the CPL staff to manage and develop their server with the idea that eventually CPL would move its server to its own location and manage it without our assistance. The development of this server pushed us to learn new and emerging techniques, such as writing common gateway interfaces to other software and Java scripts, always one step ahead of our CPL colleagues. The other UIC-based servers have benefitted as our technical knowledge has grown, and ideas have moved quickly from one server to another. The CPL staff brought us ideas and documents and told us how they wanted them to look. The challenge has been to make the documents appear on the Internet as envisioned. Documents developed included a clickable map of the library's branches, a clickable portrait gallery of Chicago's mayors, and a timeline of Chicago. The Library has been able to publish worldwide the resume-writing workshop of one of its branches. CPL maintains up-to-date lists of resources about Chicago and Illinois as well as
showcasing CPL's own activities and services.

This partnership helped the UIC Library to achieve its final goal, the creation and distribution of original electronic information. Our common interests, both being libraries, have led to more collaboration. Our support role grew quickly beyond training one person to training the staff. We learned how exciting the actual making content can be as we created new information sources. The Chicago Public Library will graduate from UIC’s server program early in 1997. The eventual loss of the dynamic nature of the collaboration is balanced by our enormous pride in helping them get started.

Conclusion

The University of Illinois at Chicago Library has been pleased to participate in the development of these projects. The story doesn't stop here. Since these activities first started, the Library has become publisher of an original electronic journal, the AIDS Book Review Journal (http://www.uic.edu/depts/lib/aidsbkrv/), edited by one of the Library staff. We are at work on another group of partnerships and await the Chicago Public Library’s graduation sometime next year to its own server. Our participation has benefitted the University greatly in its goals to improve the quality of life in metropolitan Chicago and urban areas worldwide in an effort to become a model for a land-grant university in an urban setting. The Library now knows that academic libraries have an important catalytic role to play in making more useful, high-quality information available on the Internet. We learned that we can have an impact on the electronic availability of the information our users need for their teaching and their research. Through partnerships with organizations inside and outside the university, we've demonstrated that the academic library can leverage its expertise to help realize a goal of abundant, useful, and easily-accessible information for all.