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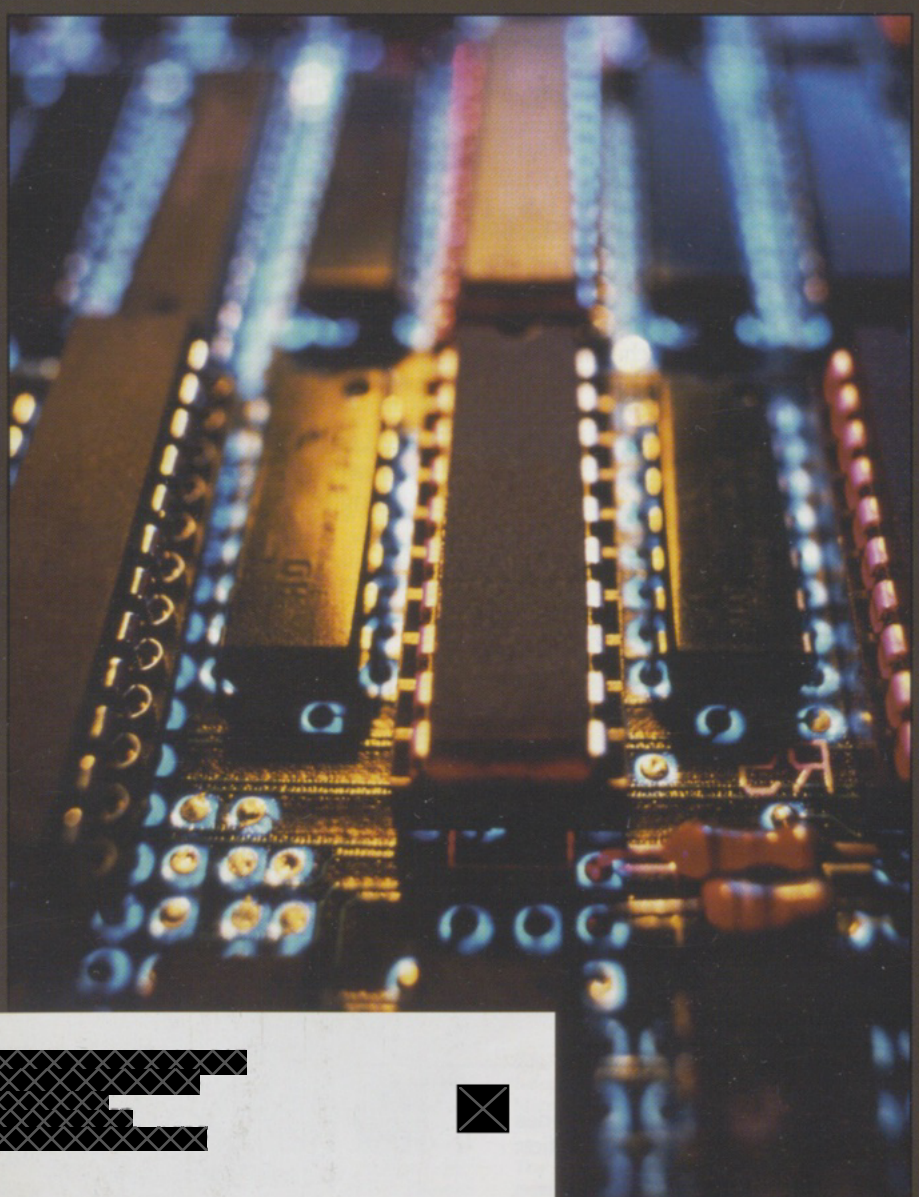

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President's Column: Greetings LITA Members and Friends!

Tom Wilson

I am very pleased to accept the challenge to continue the excellent tradition begun by Pat Ensor in the form of this column. As she discussed, it is an opportunity for the LITA president to increase communication with the membership. My vice-presidential year went quickly, and by the time you read this, my presidential year will be well underway. Thank you to all of you who offered to serve the organization through committee and representative appointments and as interest group officers.

I'd like to share with you several things in the works.

One of the responsibilities of the LITA vice-president is to plan and lead the LITA Town Meeting at the Midwinter Meeting. Last January I asked the members present to answer two questions: What do you need more of from LITA? And what do you need less of from LITA? You will probably not be surprised to hear that there were no suggestions for less. We had a lively and helpful discussion that will frame a larger discussion of strategic directions for LITA. The following categorized ideas surfaced at the Town Meeting:

- **Communication with membership**
  - Loss of awareness of what LITA is and does since loss of newsletter
  - Happy Hour, social opportunities are important
  - Differing views of LITA-L purpose—organizational announcements versus technology/problem discussion
  - Automatic sign-up to LITA-L for membership—yes and no
  - Interest groups (IGs) need to actively communicate to membership
- **Recruitment, retention, and focus**
  - More public library people needed
  - More non-hardcore technical (techie) focus
  - More international focus; may need financial support
  - Leadership and member development activities
- **Programming**
  - Practical techie regional institutes are distinct need (e.g., XML)
  - More how-to, real-life technology specifics
  - National Forum is good
- **New services**
  - List of consultants, especially pro bono
  - List of people with expertise (e.g., Community of Science)
  - Identification of technology-related Web sites
  - Identification of resources that LITA people use to solve problems
- **Publications**
  - How to find out if publications are meeting needs
- **Organizational operations**
  - More formalized committee transitions, especially chairs
  - More continuity and transition for IGs
  - Timing questions associated with transitions
  - More content ideas and direction from leadership to IGs (e.g., shepherding and suggestions, not control)
  - IGs need more guidance on things they might do other than programs
  - More organizational orientation for committee/IG chairs than current efforts (e.g., written guidelines, checklists of activities, mentoring from past chairs)
  - Need information on what IGs and committees are doing; conference reports
  - Board liaisons to IGs

I hope that you will share your thoughts on these issues, and others you may have, on LITA-L in the next several months as we look to create a future together.

In a similar vein, the LITA board members participated in a lively visioning session in Toronto facilitated by Scott Muir and me. We examined our definitions of "vision" and brainstormed on what we wanted LITA to look like in five years. As a group, we played with some ideas for LITA slogans. There remains much work to consider, but our plan is to draft a statement this fall and present it to the membership at Midwinter for review and comment. There is more to come, please stayed tuned to LITA-L.

Thanks to many of you, LITA pulled off another great conference in Toronto. Although the attendance was down, the excellence in programming was up to its usual stellar quality. For one program, the Top Tech Trends, attendance was beyond belief. The audience not only filled one section of a ballroom, but when the neighboring section was opened, it, too, filled to overflowing capacity. This occurrence is just one more example of how popular LITA programs are.

The LITA board voted to approve the establishment of a new award honoring the life and contributions of Brett Butler. The LITA/Brett Butler Entrepreneurship Award, sponsored by the Gale Group, will be awarded to recognize a librarian or library who demonstrates exemplary entrepreneurship by providing an innovative product or service, designed to meet the needs of the library world through the skillful and practical application of information technology. Brett Butler represented the spirit of entrepreneurship and the accomplishment

continued on page 115

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Computer Literacy: Necessity or Buzzword?

Scott Childers

While the concept of computer literacy has existed for some time, the name has certainly changed. Whatever the name, the concept of computer literacy still has merit. By looking at the history of the computer literacy movement for grounding, we can build a definition for the next century and affirm that learning computer basics is a good thing for library staff to do.

The term *computer literacy* seems to have faded from library literature, but has the belief that the general populace should possess a basic computer-skill level faded as well? Have we already achieved this nebulous goal, or has the goal been redefined into something else? Are the skills we used to define computer literacy now called computer competency or possibly one of a host of terms, such as digital literacy, computer skills, Internet literacy, Informatics, computer proficiency, and others that have been used for more than two decades?

Whatever the name, the concept of computer literacy still has merit. By looking at the history of the computer literacy movement for grounding, we can build a definition for the next century and know that learning computer basics is a good thing for library staff to do.

History of the Computer Literacy Movement

People have been trying to define computer literacy for some time. As early as 1968, the National Science Foundation (NSF), at the urging of President Nixon and Congress, took a leadership role by adding the study of computers to the science curriculum of the United States. NSF held a 1980 conference that gathered computer scientists and classroom teachers to make the first attempts at defining computer literacy, as well as indicating that it was a multifaceted idea.[1]

Another component in the rise of the computer literacy movement was the marketing of desktop computers to both businesses and individuals in the early 1980s. The general populace was just being introduced to the idea of owning their own computers, corresponding with the introduction of the IBM and Macintosh Apple PCs to much fanfare. *Time Magazine* even named the computer its Man of the Year in 1982.[2] The eighties brought the computer out of laboratories and into homes, setting the stage for a new era of thinking about these machines.

A brief look at the number of articles indexed under the heading "Computers–Study and Teaching," the subject heading most closely related to computer literacy in the *Reader's Guide to Periodical Literature*, shows a dramatic increase in the mid-1980s (see figure 1). In 1984 Donald Norman said:

> Computer literacy is a common catch phrase, a popular slogan that whets the appetite of politicians and academics. But what does it mean? How would we produce it? Computer literacy can mean a hundred different things; there is not just a single concept involved, but a large variety of them.[3]

At this time he also proposed a scheme for four levels of computer literacy. The first level consisted of mastering what Norman believed to be basic, general concepts, to which the understanding of algorithms, architecture, and databases was key. The second level required an understanding of how to use a computer and accomplish something useful with it. The third level of computer literacy was the ability to program and the fourth level was the understanding of the science of computation, or "where the professional resides." Norman opined that everyone should achieve at least the second level of his computer literacy scale.[4]

Almost a decade later Howard Besser noted:

> Anyone involved in discussions around the development of a computer literacy curriculum in the 1980s recognizes the ambiguity of the term. Courses in programming, word processing, and even in explanations of basic components (such as how to use a floppy disk) all were termed computer literacy.[5]

He also made the observation that most hardware and software being used train people would be obsolete in the future, just like Apple IIs and Wordstar are obsolete now, so it is better to teach computer concepts instead of specifics. "So what do computer literacy courses teach? Of course they teach familiarity with the computer, floppy disks, the mouse, and so on. But on a deeper level, one of the primary things they teach is how to think in the kind of linear, logical fashion that is currently necessary in order to interact with a computer."[6] Also of interest was Besser's remark that, "few (if any) computer literacy programs discuss the social impact of computers in any meaningful way."[7]

Alfred Bork's statement summarizes the problem defining computer literacy: "Computer literacy is like motherhood in that most people are in favor of it. But unlike motherhood, it does not have a clear and precise definition."[8] At the most basic level, computer literacy could be defined as *turn on, insert disk, run a program.* Ethical and moral problems should also be approached when defining computer literacy. Bork noted, "Toward

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the end of this historical phase, the term computer literacy begins to fall into ill repute. Sometimes it is replaced by other names. In Europe and in other countries the name Informatics is popular, although it often denotes a higher-level course than one associated with the term computer literacy."[9]

As the '90s ended, the concentration of computer literacy discussion focused on the computer literacy of educators. Even then the definition was split between the ability to program, having only a general awareness of how to use a computer, or some point in-between where the user can use most programs, but has no knowledge about the specific workings of computers or programming.[10]

The Decline

At the end of the century, computer literacy was a buzzword more than anything else. What is the current feeling toward computer literacy? While those in academia tend to consider the ability to use computers essential, the general public doesn't seem to care as much anymore, as evidenced by the drop in popular articles on the topic. The number of articles indexed in the 2000 *Reader's Guide to Periodical Literature* under the topic "Computers–Study and Teaching" is less than in the 1980s (see figure 1).

What turned this necessity for our future into just another buzzword? Quite possibly it was the constant renegotiation of what computer literacy actually meant. As mentioned before, the meaning behind the term *computer literacy* kept changing and altering, with those writing about it being drawn toward one of two sides of the issue; one side being the complete understanding camp and the other campaigning for simply knowing how to use computers, but not how they work.

The public's loss of interest could also be a backlash against incorporating the word *literacy*. Even in the early days of the computer literacy movement, people called for a different terminology. They argued that calling it a literacy was a knee-jerk reaction, as there weren't any universally valuable computer skills and expertise did not equal literacy.[11]

Another possible cause for the decline is the fact that children took to computers much faster than educators had predicted. In the early 1980s there was a push by educators to have children learn computers. Even the award-winning Schoolhouse Rock series developed their own shorts about computer basics, *Scooter Computer and Mr. Chips*, in response to the belief that the youth of that era would be afraid of computers. The fact that they only made four episodes may illustrate that the series wasn't a very successful endeavor. For children, computers went from being a mysterious machine to a simple tool in a very short span.

A fourth factor in the decline of the computer literacy movement could be the nature of computers themselves. Besser noted, "In fact, computer literacy curricula seems to fail even on the level of delivering meaningful vocational skills (due to the rapid technological developments that are changing the nature of computing skills on an almost annual basis)."[12] With computer and software constantly advancing, some late adapters might not get the footing they need and will always be trying to catch up.

Some of the computer literacy fervor has shifted to a concept termed *information literacy*. Information literacy is usually defined as the combination of traditional literacy concepts and fundamental computer-literacy skills.[13] When some talk about information literacy, the computer skills component is usually assumed or a secondary thought after the skills of assessing and using information.

Why Have Computer Literacy Today?

An early argument from Besser for computer literacy was to be a good citizen. He reasoned that to be a productive member of society, an individual must know

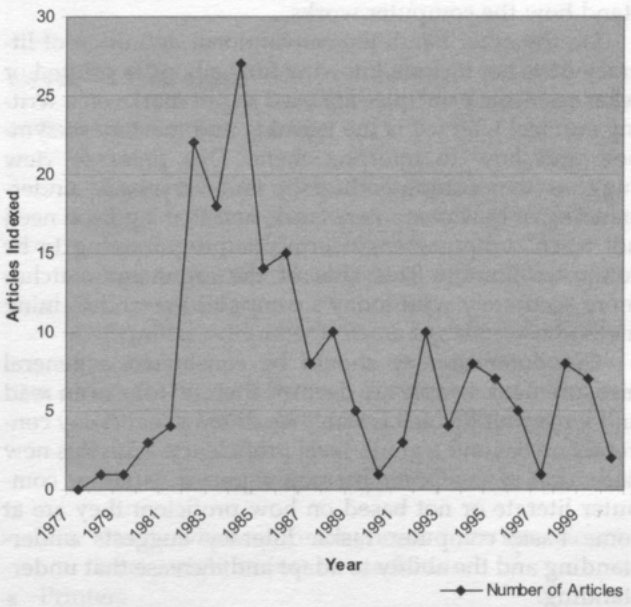

Figure 1. Articles with the Subject Computers—Study and Teaching

about computers. This argument also means that little to no vocational training would be needed to enter the job market.[14]

Bork stated, in a similar vein, "The argument is similar to that for language teaching: everyone will need to be computer literate in the society of the future because computers will be widely used in all activities."[15] As cliche as the statement is, nothing sums it up better than *the future is today.* What once was an extraordinary knowledge is now a necessary skill in most homes and almost all workplaces. This qualifies this necessary skill set as a literacy, but is it truly separate from the classic reading and writing definition?

Using a computer is almost like driving a car. Some choose not to learn to drive at all, while most learn just the basics; they know what results when you do certain things with pedal and levers. Others have an in-depth knowledge of the automobile and can do more than simply drive it. Then there is a final class, the professionals, who create and build the machines.

Can we consider a person computer literate even if they regard the computer as a proverbial black box? Some argue that being able to use the computer for a specific task, such as e-mail or a specialized program in the workplace, is not the same as being computer literate; using computers to meet immediate needs defines only the proficiency level of the user.[16] Being able to do simple tasks does not mean the person is computer literate, but simply proficient in those simple tasks. This leads to the argument that computer literacy means being able to understand how the computer works.

On the other hand, the conventional definition of literacy does not include knowing how a book is printed or what scientific principles are used to put marks on a writing surface. Literacy is the learning and mastery of symbols and how to interpret them. This point of view suggests that computer literacy is a very basic understanding of how computers work, and that a person need not teach computer engineering or programming to be computer literate. This side of the argument matches more accurately with today's computer use and training methods.

Computer literacy should be considered a general measurement. People are deemed literate if they can read and write, but literacy is rarely qualified in everyday conversation beyond a grade-level proficiency. With this new definition of computer literacy, a person is either computer literate or not based on how proficient they are at some basic computer tasks. Literacy suggests understanding and the ability to adapt and increase that understanding.

Computer proficiency should describe the skills needed to do whatever tasks are necessary on the computer. Proficiency is not literacy, but the ability to do things based on rote memorization or using very little adaptation. You can, however, use proficiencies to estimate a person's computer literacy.

What mix of proficiencies can estimate the literacy of a person? A new schematic is in order. The Computer Proficiencies chart in the appendix is a sample of what we could do. If a staff member performs the tasks in a certain proficiency level, their level of computer literacy can be estimated. Some staff members may be able to do most level 2 tasks, but may be missing some of the proficiencies in level 1; just as a person may be able to read at a higher level, but still not have a fully completed, basic lexicon.

Level 1 is the baseline proficiency level, and any skills that a staff member is lacking within this level should be approached and mastered as soon as possible. A staff member who is only at this proficiency level is in danger of falling behind as computer technology and software continue to change.

To be considered computer literate, a person should achieve at least the second, or *desired,* level of computer literacy. The second level is that of a barely computer-literate person, similar to the literacy of someone with a kindergarten reading level. This level of computer competency is the minimum level that the majority of the library staff should rate. Skills that an employee is lacking could be possibly ignored if their other job skills are high enough.

The third, or *target,* level is the level of computer proficiency that all library staff should try to achieve; however, staff members who do not have these skills should not be penalized. The more proficiencies a person has, the more literate we can assume they are and the more able to adapt and learn as computer technology and software change. Those achieving this level or greater can be of a great benefit to the library system in which they work.

Impact on Libraries

What does computer literacy mean for library staff—paraprofessionals and professionals alike? It has already been demonstrated that the demand for computer-related skills has moved from insignificant to critical for most academic library positions.[17] Other types of libraries have shown this increased demand as well.

The most important impact on libraries should be an increased emphasis on training. Libraries must increase the amount of computer training available to their staff, professional and paraprofessional alike. Whether through in-house training or staff attendance of outside workshops—training must be an integral part of the libraries' staff development. There must also be a concerted effort to hire people with computer skills.[18]

If training is made an integral part of the library's mission, then the library should be aggressive at adopting

computer literacy and be willing to dedicate human and financial resources toward that end. They must also be able to keep up with technological changes.[19]

"Training should be viewed as a necessity, not a luxury; as mandatory, not voluntary; and as comprehensive, not superficial."[20] If library staffs fall behind in computer literacy, we may see libraries further threatened by extinction.

Training also must include more than the basics. There must be continual effort for skills improvement. Basic computer literacy for library staff is the goal, but there is no end game. Technology changes and the better trained a staff is, the better they can handle those changes. The amount of training a computer-literate staff needs is less than a staff who only has a step-by-step or rote memorization–based skill set.

Conclusion

A computer-literate library staff is a necessity. With the continuing increase of reliance on computers and networks, library staff of all levels need to be able to adapt to this ever-changing technology instead of being locked into a certain skill set based on a rote memorization of steps that will become obsolete when hardware is updated or the next version of software is introduced.

This does not mean, however, that all library staff members have to become system managers. Achieving the target level of computer literacy is not a hard goal to accomplish if you commit to it. The level of computer proficiency that a person needs to be computer literate in the early days of this millennium is still relatively low. Achieving library-wide baseline literacy is only the beginning; continuous training at higher proficiency levels helps create a more adaptable workforce.

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Appendix: Computer Proficiencies Chart

Note: Much of this chart was derived from the Basic Computer Equipment Competencies List created by the Library Network Technology Committee at tech.tln.lib.mi.us/finalbasic.htm; accessed Jan. 13, 2003.

Level 1: Baseline

- Basic workstation start-up
  - General
    - Know location of equipment power buttons
    - Know what sequence equipment needs to be turned on in order to operate
    - Know passwords and where to find them
  - Basic operating
    - Familiar with how screens are supposed to look
  - Shut down
    - Know how to shut down the computer properly
    - Know the sequence equipment needs to be shut down
    - Know what equipment needs to be shut down every night or just on weekends
- Printers
  - Know how to turn the printer on
  - Know how to add paper
  - Ability to print specific pages (rather than the entire document)

- Web browser
  - General
    - Know how to open and close browser
    - Know how to use the menu and toolbar buttons
    - Able to change options and preferences
    - Able to add, use, and edit bookmarks
  - Searching
    - Know how to open a URL
    - Know how to use a variety of search engines and subject directories
    - Able to understand a variety of error messages
- Computer security
  - Know how to respond to computer virus, parasite, or hacking incidents.
- E-mail
  - Know how to send and receive attachments
  - Know how to resend bounced messages
- Operating system
  - Know how to navigate in the folder, directory, and drive system
  - Know how to create or delete a folder
  - Understand the differences between files and folders
  - Understand various save options
  - Know how to navigate without the mouse
  - Know the common menu items in applications

Level 2: Desired

- Basic workstation start-up
  - Know the start-up commands computers go through and the common errors
  - Aware if equipment is plugged into surge protectors in case those get turned off
  - Know where power cords are so connections can be checked if there is no response from the equipment
- Printers
  - Know how to change the toner cartridge or ribbon
- Computer security
  - General
    - Able to differentiate between legitimate security threats and those that are not, such as hoaxes
  - E-mail
    - Aware of potential security and privacy threats while using e-mail, including:
      - Attachments
      - Chain letters
      - Hoaxes
      - Spam
      - Viruses
- Web browser
  - Know the differences between various Internet browsers and their different versions
  - Have a basic understanding of different terms (such as telnet, chat rooms, etc.)
  - Able to diagnose and correct printing problems
  - Know how to deal with frames when printing e-mail
  - Know how to send mass e-mail
  - Recognize questionable attachments as possible viruses.
- Operating system
  - Know how to toggle or use the task bar to move between multiple open applications
  - Know how to select multiple files or folders
  - Know how to copy and paste, and drag and drop within files and folders
  - Understand the file naming conventions and extensions
  - Know the right-click mouse options (in Windows environments)
  - Know how to navigate in the file structure to open, save, or delete

Level 3: Target

- Printers
  - Know how to clear a paper jam
  - Know how to check and clear the print queue (if applicable)
  - Ability to print white text (when dark background is on screen)
  - Ability to check the printer set-up for proper configuration
- Computer security
  - General
    - Understand how the security software protects computer
    - Aware of the potential security problems that can arise in patron usage of library computers
    - Understand the various ways in which security can be compromised
  - Internet
    - Aware of the potential security and privacy threats while using the Internet, including:
      - Cookies
      - Downloading malicious or unauthorized files
      - Unsecured communication of private information
      - Viruses

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Building an Internet Gateway

Ron Davies

The Library of the International Labour Organization created a gateway to Internet sites in the areas of work, employment, and social issues titled WorkGate. This article describes the design decisions that went into the project, such as the number of information resources that could feasibly be maintained and the selection criteria for including these resources. The actual development of the gateway involved the building of an underlying database and Web-based interfaces, the selection and description of Internet sites, and the creation of taxonomy to be used in classifying sites and browsing. While the gateway has been favorably received, ranking search results in a small database of brief records remains a problem. An unexpected benefit of the project was the opportunity staff had to share information about sites that would prove useful in their daily work.

The International Labour Organization (ILO) is the United Nations' specialized agency that seeks the promotion of social justice and internationally recognized human and labor rights. The ILO's strategic objectives are to promote fundamental principles and rights at work, create greater opportunities for decent employment for women and men, enhance social protection, and strengthen social dialogue. The ILO Library supports the organization's mission by providing knowledge-sharing services in the areas of work and sustainable livelihoods and the work-related aspects of economic and social development and human rights.[1] Library clients include ILO constituents (the governments of 176 member states as well as employers' and workers' organizations); external clients, such as researchers in social and labor issues; and more than 1,900 ILO staff located at headquarters in Geneva, Switzerland, and in forty field offices around the world. In addition to providing reference and information consulting services, the library continues to develop and make available the Labordoc database (www.ilo.org/labordoc), a catalog of more than 350,000 bibliographic references, and the multilingual *ILO Thesaurus* of labor, employment, and training terminology.[2] In 2002 the ILO Library launched a new service, WorkGate (www.ilo.org/workgate), a gateway to Internet resources in the area of work, employment, and social issues.

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Design

What is an information gateway? Gateways are online services that provide references to selected, high-quality information resources on the Internet. However, in addition to providing links to networked resources, they also provide descriptions of those resources, including descriptive metadata, content descriptions, abstracts, subject keywords, and other controlled vocabulary.[3] A gateway allows users to quickly discover resources on a particular subject through searching resource descriptions or by browsing based on a classification system or taxonomy.[4] Although the development of an information gateway at the ILO was hardly an original idea, the process of creating a gateway for a specific subject area and the design decisions made in developing this resource may prove useful to organizations considering similar projects.

The idea of building a virtual library or gateway to Internet resources on the world of work had been independently suggested by several library staff members. They perceived that, in response to the growing volume of information on the Internet, ILO staff and stakeholders needed Internet resources that had been identified, evaluated, and selected for their high quality and relevance to ILO concerns. Users also needed a coherent, logical structure to easily access those sites and some assistance in using and navigating these resources in order to save their time and effort. After considerable discussion by professional staff, the decision was made in mid-2001 to proceed with the creation of an information gateway. Seven library staff members, primarily reference staff, agreed to undertake the selection and description of high-quality Internet sites in addition to their regular workload; two library students who were completing a practical internship at the library also worked part-time on the project. The author, who was the systems librarian and one of the original proponents of the gateway, was assigned the role of project coordinator as well as those of technical support and interface designer.

Even before the project began, much thought went into determining the size and scope of the gateway. Given the very limited resources available and the ever-changing nature of Web sites, it was agreed that the gateway should not include more Internet sites than could be reevaluated by library staff as part of their normal reference work on a minimum six-month rotation. Preliminary tests indicated that it took between thirty and seventy-five minutes to describe a new site (including testing, evaluation, description, and classification) and about half

that time to review a previously described site. On the basis of these estimates, and supposing that each staff member could devote about ten hours per month to this work, it was determined that the gateway should include no more than three to four hundred sites.

The team charged with developing WorkGate began by establishing selection criteria. Everyone endorsed the policy to select only high-quality sites that were of value as a reference tool. A set of criteria was developed based on the following factors:

- relevance of the site to the ILO's mission;
- authority of the person or institution responsible for the site;
- objectivity of the information provided;
- currency of the information;
- likely permanence of the site;
- originality of the information;
- scope (particularly in providing an international perspective);
- accessibility in terms of ease of navigation and use;
- quality of links referring to other sites; and
- any endorsements or recommendations that the site had received.[5]

Much discussion went into whether Web-accessible commercial databases and search engines should be included, since this practice would duplicate information available elsewhere on the library's Web site and would result in listing many commercial resources that were only available to ILO staff. In the end, the team chose to include them for the convenience of ILO staff, but added an indication that use of these particular resources was restricted. The most critical issue was avoiding duplication within the library's main bibliographic database and catalog, Labordoc. The development team decided that individual documents, whether available in print or electronic format, including those on the Internet, would continue to be cataloged in Labordoc, as documents changed relatively rarely and users cared little whether a document was in print or electronic form. On the other hand, Internet sites as a whole, being inherently more dynamic and difficult to describe and requiring more explanation in terms of how to use and navigate them, would be described in WorkGate. As the ILO is an international organization with three working languages, the information in the gateway as well as the user interface would be provided in English, French, and Spanish.

Early in the design process, ILO considered participating in OCLC's CORC project.[6] CORC was at that time moving into an operational phase, and while the ongoing cost structure had not yet been decided, the cost to an OCLC-contributing library would probably have been reasonable. In the end, however, the ILO Library decided not to participate in CORC for three reasons. First, the need to revise descriptions created by staff who were experienced searchers but not trained catalogers would introduce costs and complexities into the project that were not thought justified at this early stage of the gateway's development. Second, the multilingual aspect of the gateway would have been difficult to implement using the essentially unilingual structure underlying the CORC and MARC formats. Third, producing a user-friendly output from the CORC system was felt to be time-consuming, cumbersome, and difficult to update. Even using CORC data, a local database with a Web interface or an extensive set of processing scripts would have been required to produce anything like the simple, easy-to-use, and attractive interface that WorkGate users would require. Other initiatives have been developed since then, such as Renardus (http://renardus.lub.lu.se), an integrated search-and-browse access to European subject gateways, and these may offer interesting future alternatives to CORC as a way of sharing gateway information.

Development

The actual development of the gateway proceeded in three separate paths. First, computer systems necessary to support the gateway were developed. The choice of a database system was simple: the ILO's IT department had selected Oracle as the organization-wide database standard and provided the necessary licenses to the library free of charge. The author, who was also the interface designer, had never worked with Oracle or its associated PL/SQL programming language, but he had experience developing and implementing a variety of Web interfaces using the Common Gateway Interface (CGI), including the development of a large Internet gateway of Canadian government information. It took approximately twenty days over the next two months to design the application and develop three separate PL/SQL-based Web interfaces. Two simple interfaces were created for system administration, and a more visually appealing interface was developed for end users; the latter used cascading style sheets, a multifunction tool bar, a simple search capability, drill-down browsable menus based on a hierarchy of subject classes, and a breadcrumb navigation device indicating the context of the current page within the hierarchy.

While the software development was taking place, the full project team was also meeting on a regular basis to discuss the selection and description of Internet sites. A starting pool of sites was compiled by combining the personal bookmarks of the library's reference staff, and then adding other sites suggested by documentation specialists at ILO headquarters and field offices. Staff was also sent on Internet treasure hunts to look for sites in

specific subject areas that were underrepresented, or to find additional sites in languages other than English. Afterwards came the difficult process of evaluating and whittling down more than fourteen hundred possible sites to the three or four hundred maximum number of sites that could be included in the gateway. The development team held meetings over the course of three weeks to affirm that sites met the selection requirements, and debated and determined the relative merits of different sites so that only the best in each individual area would be retained. Once the sites were selected, staff tackled the job of creating a description of each site, including the assignment of up to three different categories drawn from a structured list of subjects, using the interface to the Oracle database.

The development of this structured list of categories—in effect, a taxonomy for the ILO—was the third major part of the gateway project. Over a period of more than twenty years, the library had developed the *ILO Thesaurus* for the description of books, articles, and other materials in the Labordoc database. However, with more than four thousand descriptors, and half as many nonpreferred terms, the thesaurus was too large to use in describing a small collection of Internet sites, and its organizational scheme was inappropriate for browsing purposes. In addition, different departments within the ILO had been developing databases or other information resources for which the complete *ILO Thesaurus* was overkill, and staff in these departments frequently expressed a need for a more limited and structured controlled vocabulary that was still specific to the ILO's areas of expertise. The WorkGate project seemed the perfect opportunity to develop and test a taxonomy that could serve to describe more simply all the main activities and interests of the organization. Therefore, under the guidance of the head of the library's technical services unit and with WorkGate as the first (but not only) intended use, a taxonomy was developed for work, employment, and social issues. Originally intended to include about three to four hundred terms, the first official version of the taxonomy contained more than six hundred terms, of which only one quarter are currently used in WorkGate. In addition to subject terms assigned to the individual records, displays in both alphabetic and classified order of the full range of categories used in WorkGate are available on the Internet site (see figure 1), including *see-also* references where these have been established. In terms of narrowing from general to more specific terminology, in finding related topics, and as a search aid, the taxonomy has proven useful for WorkGate, and promises to be equally as useful to other in-house information services.

During the development of the project, a number of design decisions were revisited. For example, the original intention had been to rate each Web site for quality, but staff felt that rating sites proved too difficult to do consistently and objectively, and the idea was dropped. To offset the need for users to drill down through multiple levels within a hierarchically structured taxonomy to arrive at a specific but popular topic, a favorite topics link was added to the main WorkGate tool bar, linking users directly to a list of subjects popular with users and important to the ILO. The intention to build a multilingual gateway was also abandoned due to resource constraints. Although the software will support other languages, the user interface was made available in English only, and sites were described only in the principal language of the site, with multilingual sites or sites in a language other than the three working languages described in English only. This decision simplified gateway development at

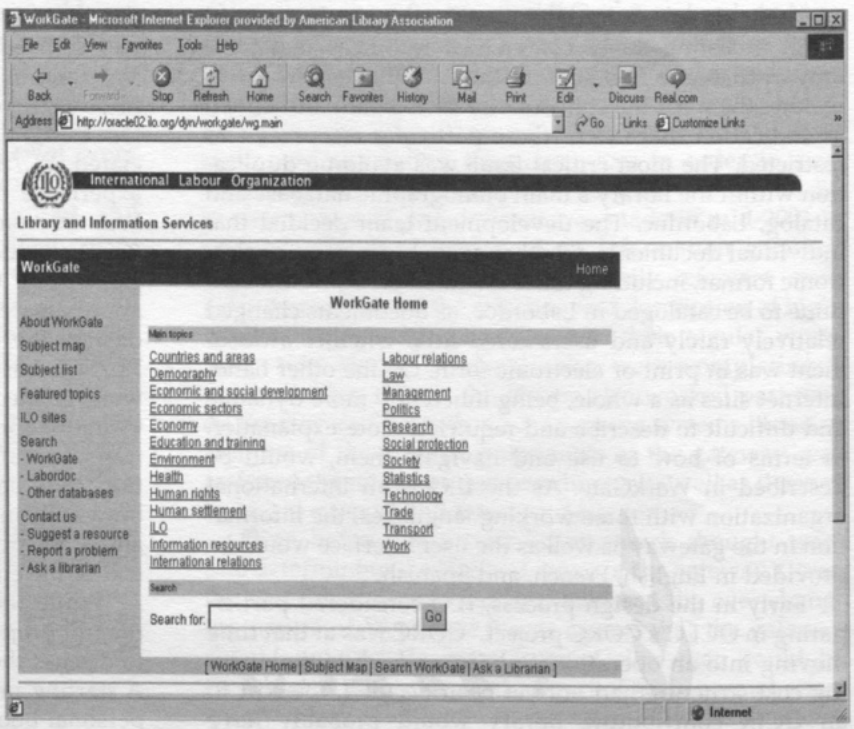

Figure 1. WorkGate Home Page

the risk of discouraging non-English speakers, and at the expense of often incomplete search results, meaning a search for an English full-text keyword will not find any exclusively Spanish-language sites, and a search using a French keyword will find only French-language sites, and not sites in English or Spanish.

Evaluation

WorkGate was completed in late 2001 and released for general use by ILO staff and via the Internet in early 2002. It drew praise from ILO staff and consultants, particularly for its ease of use and information architecture. On the other hand, it also drew some negative comments, particularly in terms of its full-text search capability: searching for a general term like *management* often resulted in the retrieval of irrelevant sites, such as those concerning agricultural or emergency management or using a data management system. In fairness it must be said that this is a problem for many similar gateways, such as the Eldis gateway on international development (www.eldis.org), and that given the limited size of WorkGate, it is never hard to find the relevant sites amongst the dozen or so references that such a search returns. Although many relevancy-ranking algorithms are difficult to apply to a small database consisting of short records, the need for some method of ranking or grouping of search results may have to be reexamined in the future.

At the completion of the project, staff were asked what they felt were the most and least successful aspects of the project. While a number of valuable suggestions for improving the site were made, in general participants felt the gateway had met its objectives, and that it was easy to use. Interestingly, some of the benefits of the gateway project were quite independent of WorkGate itself. The project coordinator had feared that the occasionally lengthy meetings to discuss the selection of Web sites would be among the least successful aspects of the project. Instead, appropriately enough for a project aimed at sharing knowledge, reference staff appreciated the opportunity to discuss with colleagues the relative merits of different sites, and felt that by doing so, they had discovered new resources that would prove useful to them in their reference or instructional work.

Conclusion

As of late 2002, the content of WorkGate had already been updated several times, in keeping with the commitment to ensure the data resources it describes are current. The work of the project team has been integrated into regular activities and a member of the public services staff has taken on the responsibility of WorkGate editor. Much work still remains to be done in promoting the service to both staff and the constituents of ILO—namely trade unions, employers' organizations, and governments throughout the world. However, the experience in developing this service has already proven to be valuable, not only in helping users find high-quality information quickly, but in demonstrating the role that libraries and librarians can continue to play in a world of networked electronic information.

References and Notes

1. The ILO Library was formally known as the Bureau of Library and Information Services. For more information on its history, see Eleanor Frierson, Joëlle Kargul-Maccabez, and Sue Luzy, "Information Service in the International Labour Organization: A Seventy-five-Year History," *IFLA Journal* 22, no. 2 (1996): 98–101.

2. International Labour Organization, *ILO Thesaurus: Labour, Employment, and Training Terminology*, 5th ed. (Geneva, Switzerland: ILO, 1998).

3. This definition is derived from that given in the DESIRE Information Gateways Handbook. Accessed July 14, 2003, www.desire.org/handbook.

4. The Social Science Information Gateway (www.sosig.ac.uk) and EEVL: The Internet Guide to Engineering, Mathematics, and Computing (www.eevl.ac.uk) are two well-known examples of gateways.

5. Other gateways may use additional evaluation criteria, such as subjectivity (interactivity) in Liz Lawes and Jessica Crilly's "The London Institute's i Page: Creating and Maintaining an Academic Gateway Web Site," *Art Libraries Journal* 27, no. 1 (2001): 31–35.

6. See, for example, Thomas B. Hickey, CORC–Cooperative Online Resource Cataloguing, 1998. Accessed July 14, 2003, www.oclc.org/research/publications/arr/1998/hickey/corc.htm.

An Evaluation of Computer-Supported Collaborative Serial Management: A Case Study

Ying Zhang and
Gracemary C. Smulewitz

This case study was performed at Rutgers University to evaluate computer-supported serials management in an academic library context. Information in an ExtInfo folder within each serial control record of an integrated library system was manually restructured to a standard language and formatted to establish a central location to perform collaborative serials management. From interviews and questionnaires, the authors learned that serial staff and librarians are essentially satisfied with the centralized information distribution. From their perspective, the standards applied to the ExtInfo folder reduce errors in serial management, improve and streamline routine work, and require little learning effort to master.

Serials management is considered to be one of the most complex but important functions in a library. It is comprised mainly of two parts, collection and technical services and public services. While public services (such as reference, circulation) directly interface with library users, collection and technical services support public services through a series of behind-the-scenes operations. The responsibilities of collection services include acquisitions, check-in, claiming, binding, shelving, and their related workflows for serials processing. In a collection services department, each serial staff member performs one particular function. All of the operational functions are interwoven.[1] Weaknesses in the workflow in one function results in extra work in another, and consequently lowers the overall quality of serials processing.

Each serial staff member gathers individualized information through his or her work experience that can be shared among serial staff.[2] Not only is the processing of that information necessary to his or her own work, but it is also essential to the other processing steps of the serial management workflow. For example, if the check-in staff acquires first-hand information about a change in the publication frequency of a given title, then the claiming staff needs that information to determine the appropriate schedule for claiming an issue that has not been received. The bindery staff also needs that information to determine how many issues should be bound together.

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In comparison to other publication types (such as monographs), serial information may be unpredictable and vague, but it is critical because processing is ongoing for the term of the subscription. A serial may change title or publication frequency, merge with a different title, publish supplements, or suspend publication during the period of a subscription. The libraries may change fund allocation, subscription period, shelving location, or vendor during that same period. Serial staff must make corresponding managerial adjustments to respond to any of these changes. Figure 1 shows the general serial collection functions and the information needed for each process. The figure's rectangles represent the serial processing steps and the cylinders indicate the information needed for each step. By evaluating the texts in the cylinders, one can see that each piece of information is used for more than one processing step.

Background

The serials processing operations of the New Brunswick Libraries Collection Services Department at Rutgers University was the object of this case study. Until 2000, serial subscriptions were received in each library on the New Brunswick campus of Rutgers University. Staff in each library processed their respective collections separately. Three years ago, the research libraries took over the serials management of the unit libraries. Alexander Library (AL), a large research library for humanities and social sciences, manages the serial processing of the four smaller humanities and social science libraries. The Library of Science and Medicine (LSM), a large research library for the sciences, is responsible for the serial processing of the four science libraries. Except for unit shelving responsibilities, all serials processing is performed at the two research libraries. While the consolidation is economical, it also has inherent difficulties; one problem in particular is sharing processing information for a distributed serials collection. At times, different libraries had used different terminology to express the same serial processing information or used the same terminology to express something entirely different, and often the libraries had varying processing practices. Some of the processing information was tacit knowledge, while other information was documented in folders of the serial control record. The lack of comprehensiveness, accuracy, and understandability of the information now shared by many staff members was unacceptable for the new environment. For this reason, the libraries decided to standardize the content, representative terminology, and format related to the processing and management of each serial title and place that information into a single folder, known as the ExtInfo folder, in the serial control record. The serial con-

trol record is used to manage all processes of the title from receipt to distribution. The ExtInfo folder is one of many items that comprise a serial control record in an integrated library system (ILS) and it is where processing instructions are placed. To standardize the ExtInfo folder, it was necessary to collect all essential serial processing information from varying serial control records and staff interviews, and agree on standard terminology that represented the task or data needed to process the title. The ultimate goal of the project was to represent all standardized information in the ExtInfo folder for collaborative serial management.

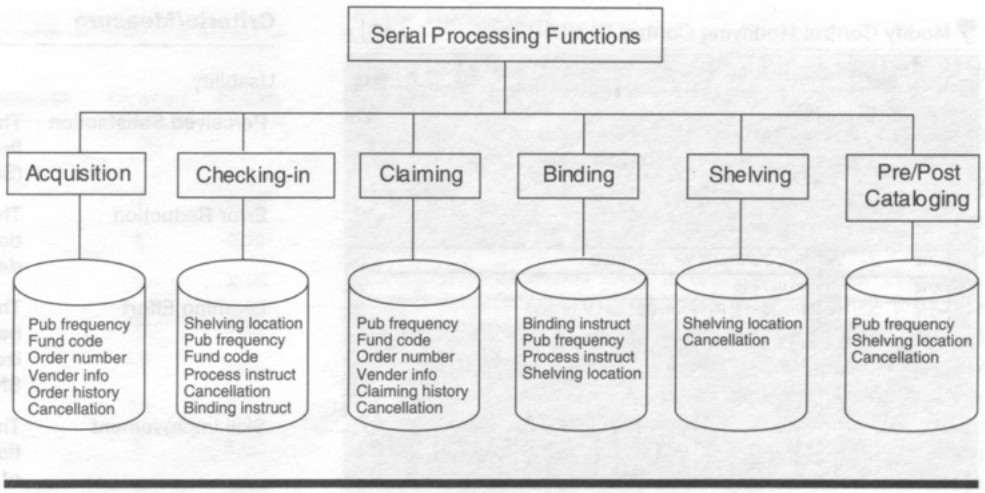

Figure 1. Serial Collection Functions and the Information Needed for Each Process

The first step was to agree on the information needed in each record, what terminology and format should represent that information, and how the information should be standardized. Information on shelving location, components of a bindable unit, and a subscription period are examples of what was considered essential in the record. Two format options were suggested. The information could be entered into the records in a coded format that would enforce consistency, recognition, and perhaps retrievability, or the information could be noncoded but consistently placed. The coded format would use delimiters and a letter representing the type of information that followed, such as ‡b for bindable unit. Once all the information was agreed upon, a pilot project was conducted on the records for two unit libraries testing both formats. A sampling of forty standardized ExtInfo records was created for each library; twenty records were in a noncoded format and twenty records were in a coded format. Figure 2 shows samples of these two formats.

Research Objectives and Questions

The research objective of this study was to evaluate the perceived usability and efficiency of serials management using information in a real ILS. This evaluation focused on the usability and efficiency of standardized information in the ExtInfo folder, including standardized, coded ExtInfo (SCEI) records and standardized, noncoded ExtInfo (SNEI) records, in terms of serial staff's perceived satisfaction, error reduction, learning effort, skill improvement, and time saving. Figure 3 presents the definition of the measures.

Method

Two qualitative research methods were employed in this study: a survey and a semistructured interview. While both methods could collect subjective data regarding the usability and efficiency of the ExtInfo folder, the semistructured interview was more likely to obtain insightful and detailed information regarding the background, goal, function, and implementation of the project and the Collection Services department.

There are a total of twenty-three full-time employees in the New Brunswick Libraries Collection Services department that are involved with serial work. The department head (HEAD) and the coordinator of the project (CORD) both have a rich knowledge of collaborative serials management and the ExtInfo project and volunteered to be interviewed. Also, fifteen of the twenty-three employees representing LSM and AL were asked to participate in the survey. These employees were considered most likely to use the ExtInfo information. The questionnaire was distributed through e-mail, and eleven of the fifteen employees responded. The authors coded these interviewees INF1 to INF11 respectively.

The authors measured the usability criteria by examining in a triangulated manner the perceived satisfaction, error reduction, skill improvement, and learning effort required. They also measured efficiency by examining the extent of the standardized ExtInfo with respect to saving serial processing time.

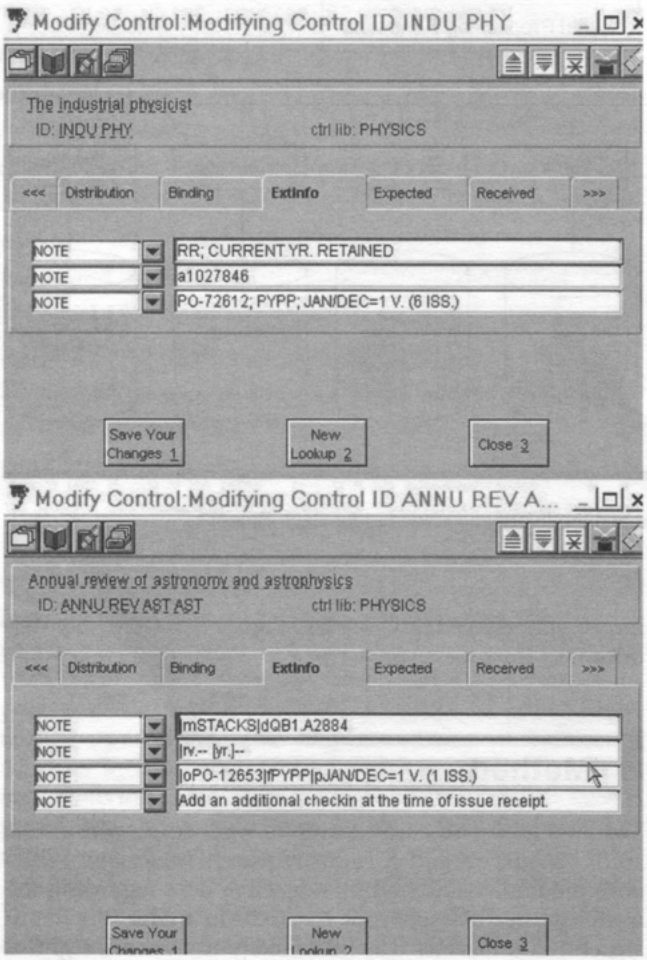

Figure 2. Sample ExtInfo SNEI (top) and SCEI (bottom)

Semistructured Interview

A thirty-minute-long semistructured, audio-taped interview was conducted in the library with HEAD and CORD. The interview questions were designed to explore the perspectives of both leadership levels regarding computer-supported distributed collaborative work in a real serials department operation, and to give insight into the usability of the project.

Questionnaire Survey

A prepared survey questionnaire was designed to examine staff's thoughts on collaborative serial work, shared information among serial staff, and the usability of the project. The survey provided a more focused look at the influence of the project on the day-to-day functions of serial management. After having looked at sample ExtInfo records, both SCEI and SNEI, extracted from the system, the staff subjectively graded all survey statements from a usability perspective by using a Likert scale. They indicated the extent, from strongly disagree (1) to strongly agree (5), that they agreed with the survey statements.

Criteria/Measure	Definition
Usability	
Perceived Satisfaction	The extent that serial staff are satisfied with the standardized ExtInfo (SCEI or SNEI)
Error Reduction	The extent that standardized information in ExtInfo (SCEI or SNEI) decreases errors in serial processing
Learning Effort	The effort required for serial staff to become comfortable using standardized information in ExtInfo (SCEI or SNEI) routinely
Skill Improvement	The extent that standardized information in ExtInfo improves the capability of serial staff to effectively process material for related functions
Efficiency	
Time Saving	The extent standardized information in ExtInfo (SCEI or SNEI) decreases serial processing time

Figure 3. Definition of the Measures in Evaluation

Research Findings

Table 1 shows the average scores for each measure based on the collected data from the questionnaire survey. The following is a detailed summary regarding the survey and the interview results.

Satisfaction

Overall, both serial managerial and processing staff were satisfied with the project. While the survey participants were in strong agreement regarding their satisfaction with ExtInfo (as shown in table 1), the results of qualitative data analyses also reflected the perceived satisfaction from the managerial perspective. When asked whether they were or would be satisfied with ExtInfo, CORD

Table 1. Collected and Analyzed Data from Questionnaire Survey

Criteria/ Measures	ExtInfo Formats	Scores	Mean
Usability			
Error Reduction	Overall	2	4.45
	SCEI	8	2.70
	SNEI	9	4.73
Learning Effort	Overall	4	2.55
	SCEI	12	4.60
	SNEI	13	2.45
Skill Improvement	Overall	5	4.00
Satisfaction	Overall	1	4.27
	SCEI	7	1.70
	SNEI	6	4.45
Efficiency			
Time Saving	Overall	3	4.36
	SCEI	10	2.50
	SNEI	11	4.55

replied, "Having everything in a same way and same format, all nice and neat. That's satisfaction for me." She also was satisfied with the ultimate goal of ExtInfo, stating, "pertinent information is in there [ExtInfo] that we need for our operation in order to work smoothly." She also believed other serial staff would also be satisfied. The reason is that with ExtInfo, "In doing their duties, they [serial staff] can quickly find all they need to know about the title without having to spend between five to twenty minutes investigating something."

However, it is interesting that, according to the interview results, serial processing staff are more likely in favor of SNEI (the average scores for SNEI and SCEI are 4.45 and 1.70 respectively), managerial-level librarians and staff tend to be fond of SCEI. The processing staff may prefer SNEI because it would take less effort for them to learn (as indicated in the learning effort survey results). According to the feedback that CORD gets from her staff, SCEI is "kind of hard to read." By contrast, the two interviewees at the managerial level think ExtInfo is a central information location that perhaps also can be a powerful managerial tool.

According to the two interviewees, the general factors affecting serial staff's satisfaction with ExtInfo include its accessibility, understandability, clarity, comprehensiveness, correctness, and the standardization level of serials management information.

Error Reduction

The average scores that serials processing staff assigned to the perceived error reduction by using standard ExtInfo is 2.70 and 4.73 for SCEI and SNEI respectively. According to the results, SCEI is more likely to reduce errors than SNEI. The overall perceived error reduction is 4.45, which ranked first among the five aspects of perceived usability. Generally, survey informants agreed that ExtInfo could reduce error in serial records and procedures. The transcribed interview results are also in accordance with the survey results. Both interviewees believed ExtInfo would decrease errors in serial processing and records. HEAD gave a vivid example of how a foolish error could be generated without proper information in ExtInfo. When the library decided to unsubscribe to a package subscription that included many titles, there was no information in ExtInfo to indicate that a specific title came with a package subscription, and as the claiming staff did not know this information, they continued to send claim reports to the vendor. By including standardized cancellation information, she believed that "We will process it correctly." CORD also believed that the frequency and time spent "investigating problems will decrease dramatically," and "Errors associated with invoicing, or claiming, or material being sent to the appropriate location in libraries should also decrease dramatically." She further explained her rationale by saying "If the information is in there [ExtInfo], it's hard to mess it up. If it isn't there, there's room for lots of error."

Learning Effort

Both survey and interview results showed that learning how to use SCEI required more effort than learning how to use SNEI. The mean scores for perceived learning effort were 4.60 and 2.45 for SCEI and SNEI respectively. As each record in SCEI contained machine-readable delimiters, it was not surprising that human staff are not accustomed to them. The staff's feedback provided by CORD shows that SCEI was somewhat difficult for staff to read. Regarding the overall perceived learning effort, five out of eleven respondents strongly disagreed or disagreed with the statement "The standardized ExtInfo will require extra learning effort." Accordingly, the overall perceived learning effort for both SCEI and SNEI dropped to 2.55 in average, which may indicate that ExtInfo is not beyond the serial staff's existing knowledge.

Skills Improvement

The majority of survey informants and interviewees agreed that ExtInfo provided universality to serials processing tasks and allowed staff to process serials in multidisciplines. The serial staff in the main libraries processed either science (LSM) or social science and humanities (AL), and

they were accustomed to these disciplines' idiosyncrasies. According to HEAD, standardization of the processing terminology and format would provide a *shared meaning* that could be easily understood in both LSM and AL. She stated, "The staff can be cross-trained and cross-utilized." Similarly, five out of the eleven respondents assigned the highest score to the survey statement "The standardized ExtInfo will increase the different library scopes that you can work with," while five respondents gave a neutral score and one respondent agreed with the statement. The average score (4.00) for perceived skills improvement was ranked as fourth among the five measures. It seems that the interviewees at the managerial level assigned more weight to skills improvement than the serial staff did, possibly because the survey statement is more representative of a managerial viewpoint rather than a routine work perspective.

Time Saving

Both survey and interview results reflected that ExtInfo can save serial processing time. The average score for efficiency is ranked as second among the five measures of perceived usability, right behind perceived error reduction. The average scores of survey efficiency statements for SCEI and SNEI were 2.50 and 4.55 respectively.

As mentioned by HEAD, regarding standardizing ExtInfo, "The project itself will take time to do." However, once ExtInfo is fully standardized, "it will reduce the workload significantly." Information in the ExtInfo folder has been created by each library. Some libraries [such as the Music Library] supplied little information, "We need to know what they do with a particular title. Now we need to call them . . . [and] speak to someone in the library who has some knowledge of what happens to that title . . . Sometimes we actually have to go [to the library] to look at the material . . . If we don't enter the information now, we will be asking the same questions over and over [such as what we need to do with a particular title]." CORD also agreed that ExtInfo could "ease out daily workflow . . . It tells you a lot about the title, without your having to search the bibliographic records or order records." Therefore, ExtInfo saves serial processing time and is efficient.

Discussion

Strengths and Limitations

The multiple triangulation with respect to research methods, measurements, and data sources, is likely to be the most highlighted strength of this study, and perhaps increased the reliability of the research findings.

Using a working library environment rather than a contrived research environment substantiated research findings. There was a weighted value to personal experience and tacit knowledge. However, the homogeneous sample from one serial department perhaps reduced the general applicability of the research findings. Although the authors believed that the results might apply to serial departments in similar academic libraries, as serial management is similar across libraries in terms of processing and sharing information, further studies are still needed to verify the research findings. In addition, the authors did not conduct a post-survey investigation to examine why four employees did not respond to the survey. It is possible that the responses from the other four staff members could have affected the research findings.

Suggestions for Further Research

This study only focused on the usability and efficiency evaluation in terms of user perspective. In order to strengthen research findings, further studies are needed to obtain more objective data. For instance, researchers could randomly select sample standardized ExtInfo records to investigate whether average errors (e.g. check-in, binding, invoicing, etc) are reduced by comparing them with nonstandardized sample records.

Considering that there are few publications concerning research on computer-supported work or the use of a centralized information center in a library setting, such kinds of research topics require researchers' attention. Compared with other organization studies, library studies seems to be more conservative. For a long time, researchers in the library studies domain have focused too intently on physical resource (such as books, serials, databases) management or the knowledge organization and representation in physical resources. They pay little attention to the management of tacit knowledge regarding routine collaborative library work. In fact, a library is a context where highly distributed collaborative work exists. Therefore, the authors advocate for more extensive study in routine collaborative library work. Borrowing existing frameworks from organization studies seems to be a promising shortcut to achieve this goal, as there are more papers found investigating computer-supported collaborative work (CSCW) in distributed organizational circumstances other than library contexts.[3]

The research findings that emerged from the comparison also suggested further study to devise a predictive framework for examining the impacts of various information representation formats on collaborative works (for example, ExtInfo for serial management). As suggested by Zhang, the format of information representation "determines what information can be perceived, what processes can be activated, and what structures can be discovered from the specific representation."[4] Similar to Zhang's statement, these research findings not only showed the plausibility and necessity

of the use of centralized information as a memory aid for serial staff that allowed tacit knowledge to be sharable, but also implied the potential power of computer mediated information center as a higher-level managerial tool. During the interview, HEAD also realized that "data can be taken out of the system, depending on how it is put into a system." In general, further studies are needed to address questions such as how a given information representation format influences the collaborative serial management.

Implications for Practice

Compared with other organizational settings, the operation of a library tends to be more conservative with respect to applying advanced technologies, especially in serial departments, simply because technological innovation often requires labor and time-consuming work. However, these research findings suggested that a standardized information center is worth implementing, although it may take time and labor to implement. This is analogous to the transformation from card catalogs to ILS, where initial efforts led to eventual benefits.

The research results also indicated that the use of a standardized information center for collaborative serials management was not simply collecting pieces of tacit information from staff. The external information center needed to be well organized and accurate in order to assure its quality. Moreover, a carefully designed information center could gain extra value for higher-level management. Nevertheless, while devising more functions, the format of centralized information might deviate from human cognition. Accordingly, essential education and adaptation were expected before one could see the desired effects of such a standardized external information center.

Conclusion

This study was an exploratory effort to evaluate CSCW in a genuine library setting, particularly a serials collection department. The study showed that ExtInfo is perceived by serial librarians and staff to be usable and efficient in decreasing error, improving efficiency and work skills, and satisfying the expectations of the serial staff. The findings provided strong evidence that such an external information center can be used to make distributed and tacit serial information sharable for collaborative serial activities. The authors also found that not only the content but also the format in the centralized information center might impact serial collections service differently. A well-organized information center is essential for distributed, collaborative serial management.

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of innovation. This award will honor that spirit and accomplishment in others.

The year ahead excites me. We begin this fiscal year in good financial condition. The programming for the year looks fantastic. Keep your eyes on the LITA Web site for upcoming regional institutes. And don't forget to attend the LITA National Forum in Norfolk, Virginia; your colleagues will be there.

As a follow up to one of the Town Meeting issues identified above, I will be appointing a task force to study the involvement of public librarians in LITA and to make recommendations to the board on how we might increase opportunities for these members and encourage other public librarians to become LITA members.

I welcome your comments and suggestions in furthering the effective reach of LITA and am honored to serve as your president.

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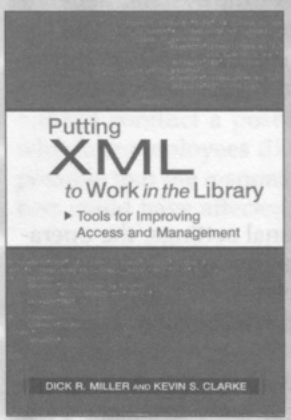

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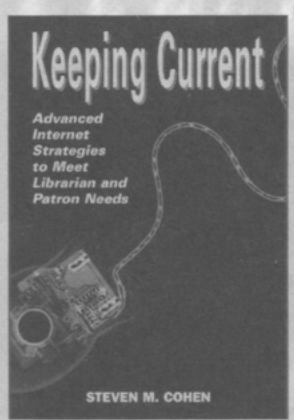

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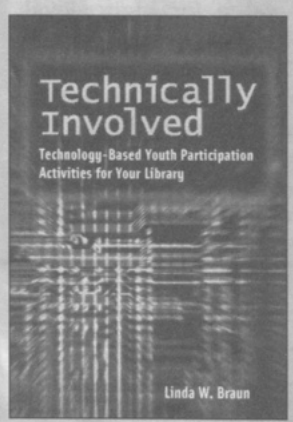

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Implementing the SFX Link Server at the University of Iowa

Paul A. Soderdahl

In January 2002, the University of Iowa Libraries introduced its link server—linking related content from one information provider to another—using Ex Libris SFX software. Three basic services appeared on day 1 of the link server's implementation: (1) citation reference linking to full-text electronic journal articles; (2) linking to holdings in the local catalog; and (3) persistent linking to an electronic reference service. The system is now integrated with more than seventy-five licensed databases and includes links to more than 16,000 full-text journal subscriptions. New developments beyond citation reference linking include links to Journal Citation Reports, Ulrichsweb, and interlibrary loan. This article describes the planning and initial implementation process of the SFX server.

By providing library patrons with the ability to link easily from citation to full text, link servers hold the promise of improving the integration of electronic information sources and are quickly becoming a mainstream service in academic libraries throughout the country. Many libraries are now in the evaluation stage or have already selected a link server product and are moving to the implementation stage. The University of Iowa Libraries (UIL) introduced its link server, which uses Ex Libris SFX software, in January 2002. This article describes the planning and initial implementation process at UIL, and identifies a number of phase 2 services currently in development.

Put briefly, link servers provide libraries with the ability to link from one electronic resource to another. In its simplest application, a link server can provide citation reference linking—the ability to link from a citation, typically in an abstract and index database, to the full-text article. While a variety of licensed databases have embedded citation reference linking, they typically assume a one-to-one relationship between source and target. In reality, multiple copies of electronic journal articles often exist, and the most appropriate copy often depends on the location or affiliation of the library user. As Beit-Arie et al. note, "The 'appropriate copy' problem, then, is essentially the issue of where and how to insert localization into the linking process."[1] Libraries are thus motivated to install and configure their own link servers to address the issue of appropriate copy for their clientele.

Pre-Implementation

UIL started to investigate link server technology in fall 2000. Having recently implemented Ex Libris's integrated library system, Aleph, they were aware of Ex Libris's acquisition of the SFX technology initially developed by Herbert Van de Sompel at the University of Ghent.[2] In September 2000, UIL had their first demonstration of SFX (and MetaLib, Ex Libris's federated search and library portal product). UIL closely followed the development of SFX through its beta testing and were poised to be an early implementer by the following fall.

The decision to use SFX was simple. At the time of UIL's implementation, it was the only deliverable product on the market. Most link servers today, including SFX, SIRSI's OpenURL Resolver, Endeavor's LinkFinder Plus, and 1Cat, rely on OpenURL architecture.[3] SFX not only was built upon the OpenURL framework, it was actually the technology for which OpenURL was originally defined.[4] This was the deciding factor for UIL, as the development of OpenURL was seen as an example of Ex Libris's commitment to open standards and transparent technology.

In summer 2001, UIL reached a critical point in managing their electronic resources. Information about UIL's licensed resources existed in a variety of locations, some more hidden than others. For some products, the library catalog had the most accurate and complete information. For other products, the locally developed gateway database was the most authoritative resource. In a few situations, the only access to a product was squirreled away on branch library Web pages or in other elusive places. UIL decided to clean house before beginning the link-server implementation.

UIL formed an implementation team whose first task was to collect all product data together in one location. They wanted to make sure that when the link server went live, the database was as complete as possible. In retrospect, this was not a necessary step. Following the 80/20 rule, UIL could have proceeded with configuring and implementing the link server with the data they already had on the assumption that it accounted for 80 percent of library resources.

The implementation team consisted of ten library staff: a project leader, an applications support person (who administers the server application), an electronic resources technical services librarian, and seven public services staff representing the reference, government documents, chemistry, business, health sciences, and law libraries.

Implementation was a part-time effort over a period of approximately three months. The SFX software has matured since UIL's implementation with a considerably improved ease of administration. With a concerted effort, the link server would now

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take only a fraction of the time to implement.

UIL's public services librarians were instrumental in identifying priority sources and targets, and, in particular, determining which linking services would be required for day 1 implementation. UIL decided they would begin with three basic services: (1) citation reference linking to full-text electronic journal articles; (2) linking to holdings in the local catalog; and (3) persistent linking to an electronic reference service titled *Ask a Librarian.* In addition, UIL would provide a persistent link to a set of frequently asked questions.

UIL also decided to do most of their testing in the public arena. The nature of citation reference linking is that the link—or SFX button—appears in UIL's licensed periodical databases. As a result, libraries must rely on database providers to provide a mechanism for OpenURL—enabling their users' access. Many vendors now allow libraries to activate OpenURL through a Web-based administrative interface. At the time of UIL's implementation, however, most vendors were new to OpenURL and there generally was no systematic process for activating their resources. In nearly every situation, UIL decided to activate all of the vendor's databases for all users at the point of first contact (rather than identifying certain databases or certain workstations for testing). The public testing was not problematic, and UIL continues to follow this model when activating new databases.

Moving into Production

After UIL identified the three basic services for day 1 implementation, they then prioritized getting as many targets, or electronic journal titles, activated as possible before activating the source databases. This strategy maximizes the chance that users will find a service of interest when they click on the SFX button. Before activating new sources, UIL continues to make every effort to ensure that a preponderance of buttons will result in services of interest to the user.

Beyond simply identifying sources, targets, and services, the implementation team faced several decisions. An early important decision was what to name the service. Many libraries were simply calling their service "SFX," but the team decided against that for a few reasons. First, they wanted to distinguish the service from the underlying software that drives the services; UIL had very few services that were named after the software applications used to run them. Second, names of software products change, and UIL did not want to be faced with a name change decision in the event that Ex Libris should decide to market their software differently. Finally, the team decided that the name "SFX" had no inherent meaning for our users. UIL named the service "InfoLink," which suggests the element of linking and complements their library system titled "InfoHawk."

In January 2002, UIL officially went live with the InfoLink service but with no publicity. Over the next several weeks, UIL made some minor tweaks to the configuration and continued to activate new sources and targets. Then in March 2002, UIL began a publicity campaign. Word spread quickly, and the InfoLink service is now widely recognized by students and faculty and has become one of the most important and well-received new services that the library has implemented in recent years.

UIL has also taken advantage of the SFX database to provide direct access to electronic journals outside of citations. SFX's export tool creates an alphabetical list of electronic journals, something that users find desirable regardless of how lengthy the list becomes. UIL also provides a service that allows users to enter citation information into a blank form in order to generate OpenURLs and deep link directly to the article level from a known citation.

Beyond Full Text

While promoting the ability to go directly to the full-text article, UIL has been careful not to cast InfoLink too narrowly. Citation reference linking certainly is the bread-and-butter of a link server; however, there is potential far beyond linking to full text. Linking servers provide libraries with the ability to offer many other value-added services that they consider relevant for their users. According to Walker, "Linking from metadata—a full citation or a single identifier—should be to a wide range of services, and all kinds of links between electronic scholarly information resources should take into account the context of the user."[5]

This philosophical approach has impacted several of UIL's local configuration decisions. First, the words "text" or "full text" were intentionally avoided in naming the InfoLink service. In addition, UIL chose not to implement direct-linking functionality that bypasses the SFX menu screen because of the desire to add other value-added links and related services beyond simply viewing full text. UIL has also not suppressed any full-text targets. For example, SFX can be configured to suppress links to an aggregator's version of an article when the publisher's version is also available. Similarly, links to publishers who do not support article-level deep linking can be suppressed in favor of those who do. Infolink also provides recursive linking—if a user clicks on the UIL SFX button inside an aggregator's database, the button will link right back to that same aggregator. All of these are locally configurable options. UIL's approach has been to provide as many links as are relevant and guide users through annotations rather than making the assumption that the only goal is to get to the full text.

With this approach in mind, UIL is now working on a number of phase 2 services beyond full text. These services include:

- Linking to a journal's impact factor in ISI's Journal Citation Reports
- Linking to a journal's directory information in Ulrichsweb
- Initiating author searches in a variety of databases, including the local catalog, Web of Science, and numerous periodical abstracting and indexing databases
- Searching for cited references in Web of Science
- Linking to Books in Print and book review services

Furthermore, the SFX link server now is an integral part of UIL's interlibrary loan services. At present, interlibrary loan staff regularly use SFX to check if an item can be found online or in local holdings prior to initiating an interlibrary loan. UIL will soon integrate SFX automatically into their interlibrary loan request form by combining the interlibrary loan form with the SFX citation linker. After a user enters whatever bibliographic data is at hand, the SFX server will first look to see if the full text is available electronically. If not, the SFX server will then look to see if the item is in the local catalog. If that search also fails, the user may then proceed to the next step of the interlibrary loan process. As a result, interlibrary loan requests for items already held locally, either electronic or in print, will be weeded out before they even make it to the interlibrary loan office. The entire process happens in just a few seconds.

Finally, UIL now is experimenting with a variety of mechanisms for using SFX as a backend to help faculty create links to full-text articles in their course reading lists. The library works closely with faculty in the development of resource lists for courses, and we want to provide an easy mechanism for faculty who use UIL's TWIST course Web server, or the WebCT and Blackboard servers, to guide students directly to full-text resources available electronically.

UIL also actively participates in the SFX/MetaLib Users Group (SMUG), a self-governed users group of which the University of Iowa is a founding member. SMUG provides an opportunity for resource sharing, especially for locally developed sources and targets and for niche databases. The group also acts as a sounding board for Ex Libris developers and identifies those areas of primary concern for customers at large. Most importantly, however, SMUG is a collection of unabashed OpenURL advocates, and a key effort of the group has been to promote OpenURL implementation with vendors, benefiting the entire link server user community. SMUG has watched OpenURL blossom and can offer information providers details about best practices for their OpenURL implementation. In particular, vendors who permit customers as much local customization as possible tend to be the most effective implementers of OpenURL. A particular stumbling block in some implementations is the vendor's inability to allow the customer to use its own customized icon and link text. The user's group experience with many vendors is that each customer is being told the same story that they are the only customer voicing concern with that vendor's implementation. As the OpenURL user community grows, information providers will be driven to better implement OpenURL in their environments, and the users group community will become an effective medium for passing along concerns of collective interest.

In the past year, link-server implementations have grown dramatically. In one year, UIL's local link-server implementation has matured into a service that has become invaluable to its students and faculty. More than seventy-five of UIL's licensed databases are now OpenURL-enabled, with links to more than 16,000 full-text journal subscriptions. Link servers provide libraries with a rare opportunity to leverage their access to Web-based materials while keeping local control over how the materials are presented and which links are most relevant to their users, proving to be important components in any integrated library system.

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A History of Web Portals and Their Development in Libraries

Joe Zhou

This article studies the history of Web portals widely used in business-to-business and business-to-consumer Web applications

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in the late 1990s. Web portals originated from Web search engines in the early 1990s and evolved through Web push technology in mid-1990s to its mature model in the late 1990s. This article also compares Web portals with other popular media, such as radios and televisions, for their audience base and content broadness. As of January 2003, only a few libraries had adopted Web portal technology despite the widespread use of my.yahoo.com-type Web portals in the business sector. The article examines several reasons for the lack of portal development in libraries and concludes with a set of Web portal development guidelines for academic libraries. Some of the pioneer library portals are also discussed, as well as the California State Government, the first government portal to offer customization and financial transactions for individuals and business. This article concludes by probing a more fundamental question about general information storage and retrieval processes. In the last several hundred years, libraries primarily built hierarchical data structures and librarians provided information service without any search engines. In the past ten years, Web business communities have primarily worked on developing fast search engines for information retrieval without paying much attention to data structure. Now with the exponential growth of data on the Web, it is time that librarians and computer engineers work together to improve both search mechanisms and data structures for a more effective and efficient information service.

What is a portal? "Portal" has been the buzzword of the networked age since 1997. Portals were so popular in business-to-business (B2B) and business-to-consumers (B2C) applications that the business world borrowed an old jingle: "I'm a portal, he's a portal, she's a portal, we're a portal, wouldn't you like to be a portal, too?"

Portal derives from the medieval Latin word *portale*, meaning "city gate." *American Heritage Dictionary* defines a portal as "a doorway or an entrance, or a gate, especially one that is large and imposing." New definitions for portals in the networked environment can be found on many Web sites. A synthesis of these new definitions is as follows: a Web portal is a doorway that can be customized by individual users to automatically filter information from the Web. It typically offers a search engine and links to useful pages, such as news, weather, travel, and stock quotes. A portal can also be defined as a customizable Web search engine to reflect the MY trend in current Web development. The platform for a portal Web site is a search engine, but a portal is different from a general search engine in that it can be customized by individuals for automatic, constant search for specific information, and it can deliver the results to individuals in a predefined way. A customizable search engine is unique to the user; it is different from anyone else's.

The very early history of portals used by librarians can be traced back to the 1960s, when the first digital version of Index Medicus was created.[1] Some science librarians may still remember the customized weekly search in Medline for medical researchers and in INSPEC for physicists. This kind of canned search was predefined offline first by scientists and librarians together with a set of criteria. The canned search was performed by librarians against the weekly updated database tapes on IBM mainframes. Finally, the search result was delivered to scientists for the most recent developments in related fields. In the business community, CEOs often had various Executive Information Systems (EIS) before the Web came into existence in 1992. EIS was developed to provide top decision makers with broad, diverse content according to previously defined criteria. Both librarians' canned searches and the EIS service can be seen as human-controlled portals as they provided customized information in a timely manner through human mediation.

The history of current Web portals can be traced back to the Boolean search technology developed in 1994 and 1995.[2] Due to the exponential growth of Web pages, users cannot locate Web files by conventional means, such as using directories like those in phone books. Search engines offer document content with full-text indexes and direct links to the documents in the Web environment. Initially, most Web users were researchers and educators with high-speed Internet access. They were very excited about the advent of the search engine. Academic librarians all over the country started to offer college-level library instruction courses on Web search engines as early as 1992. When more and more people started to use the Web, not just for research but for entertainment and daily information gathering, it became evident that giving people a complicated search command language to find popular information was not efficient. In order to address the average user's frustration and reduce the *seek time* for relevant information, the search sites added the function of channeling or categorization—filtering popular sites and documents into preconfigured groups. This categorization is a step further from the general Web site; the Web provides broad information for a broad audience and categorization provides narrowed information for a broad audience. The concept of categorization is not new. Just as in TV channels, Web channeling can provide the audience with specialized content in sports, politics, weather, and news. A good analogy is to consider the general Web site as the only radio station in town back in the good old days. In today's Web, categorizations are like TV channels, and Web portals are like pay-per-view (except the payment is a free registration for most Web portals). Sometimes people also refer to categorization or channeling as Web portals, which is true in the sense that it is an earlier stage of a portal. However, in this article, Web portal refers to only the Web sites that can

be customized by individual users. Figure 1 illustrates the different Web technology for different audiences.

There has been one important intermediate technology between search engines and Web portals that has been forgotten—push technology. Instead of the individual user having to pull information from the Internet, push technology allows a Web site to deliver the selected information directly to the user's desktop. Push is a general term for any information-delivery client software or service that can be customized to notify users of new information and to automatically send that information to users' desktops. In order to use push technology, a small software program known as a push client has to be downloaded from the push service Web site and installed on the client PC. The push client software provides the interface to the push service. Several of the push pioneers included PointCast, Marimba, BackWeb, and GM's Cyberworks business unit. During 1995 and 1996, PointCast was the name representing a new business model to the online service environment.[3] PointCast's business model was described as beaming news over the Internet from various sources according to what people needed. The key here was the delivery of *customized* information directly to users' desktops. PointCast let users define an information category and receive data updates without having to request or search for them again and again on the Internet. The original PointCast system aggregated news from fewer than ten sources in spring 1996. Within a few months, Web content providers from all kinds of *channels* asked PointCast to be their information distributor. PointCast users increased by one million each month in the first twelve months after its first release in 1996. C/NET honored PointCast with the Best Internet Application Award in 1996. PointCast used free downloads and personalized information as its major selling points and the Microsoft Corporation announced in 1996 that PointCast news broadcasts using Internet technology would be included in Windows operating systems by July 1997.[4] Figure 2 is an archived PointCast Web site as of April 1997.

	Audience	
Content	**Broad**	**Narrow**
Broad	Broadcast: same content for large, diverse audiences; i.e. first generation static Webs most universities had up to year 2003	EIS: broad and diverse content built from enterprise intranet applications for corporate decision makers and researcher
Narrow	Categorization: special content for diverse communities, such as news, weather, and stock quotes; also called channels	Portals: specific content intended for individuals; content can be customized by individuals from client computers

Figure 1. Content versus Audience on a Broad to Narrow Scale

Unfortunately, PointCast did not become the next Netscape or Yahoo! due to several reasons. In 1997, when push technology was hot, there were several articles questioning the future of the new technology. In 1997 Oliver Pflug, a columnist for *Computerworld*, argued in an article titled "'Push' Technology, Dead on Arrival" that client-based push software could severely slow down a corporate computer system by creating nonwork-related traffic jams, and that the software required more disk space and memory than most PCs were equipped.[5] Ken Auletta argued from an academic point of view that PointCast failed because of its poor management.[6] Not uncommon among entrepreneurs, the founders of PointCast—Christopher Hassett and his brother Gregory Hassett, along with Christopher's wife Janet—were entrepreneurs but not management professionals. They did not transfer their company to professional management until it was too late. Christopher Hassett declined an offer made in January 1997 by News Corp of Los Angeles for $450 million (some companies valued PointCast to be worth more than $750 million in 1997).[7] In 1998 PointCast failed its IPO and in 1999 the company merged with Launchpad Technologies for a measly $7 million deal, forming EntryPoint.[8]

Push technology may be dead, but the concept of customized content auto-delivery transformed into server-based Web portal technology. Portal Web sites not only provide search functionality and a library of categorized content, but they also have expanded to offer additional features such as access to special interest sites. A few examples of these sites are my.fool.com for financial information, personal travelocity.com with individual logins for traveling information, and my.weather.com for weather and local news. The MY trend has dominated the Internet platform since the late 1990s and most of the well-known Internet companies, such as Yahoo!, Lycos, Infoseek, AOL, Alta Vista, and even the State of California Web site offer MY-type portals on their Web sites.

The technology for Web portals is neither new nor complicated. It requires only so-called *basic* authorization. Each user is authorized based on a user ID and a password and they can access their personal profile based on the correct user ID and password pair. Compared to domain name authorization, IP range authorization, and client digital signature authorization, basic authorization is what the name suggests. However, basic

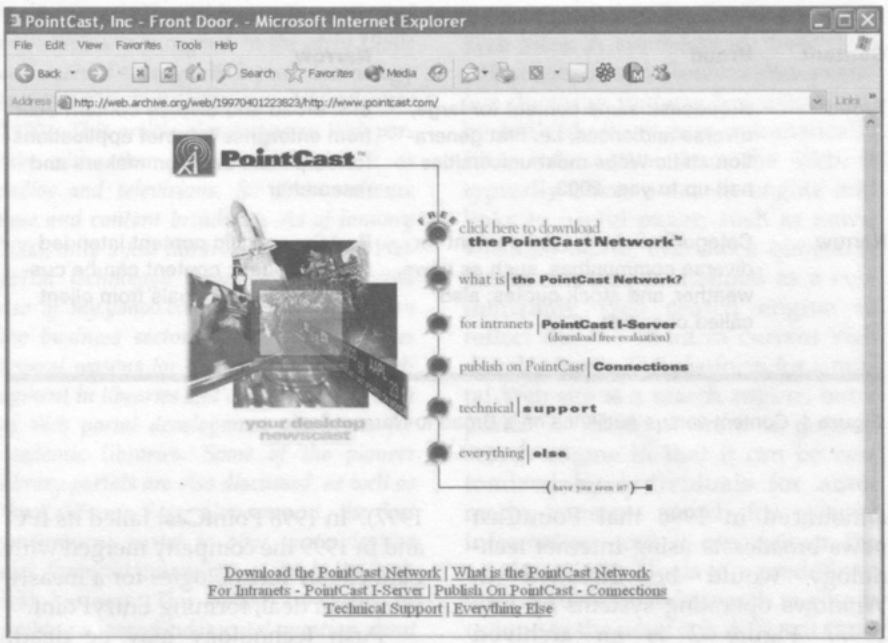

Figure 2. April 1997 PointCast Web Page (Archived)

authorization remains one of the most secure methods to preventing unauthorized access. The system resource requirement for setting up Web portals is minimal as each personal profile is very small; the space required on a Web server for even 50,000 personal profiles most often can be handled without additional hardware. It is interesting to note that Web portals or user customization are rarely mentioned in any computer science or electrical engineering journals. Most technical manuals for Web design and maintenance do not even bother with an index entry for portals. The author spoke several times with a senior enterprise system administrator for Intel's research division (see acknowledgment), where portals have been used heavily on the company's intranet. The Intel system administrator was surprised to learn that Web portals were still a research topic in higher education. For computer system administrators, the Web portal is merely a business process to improve the efficiency of company workflows, similar to the concept of an index to find information in a library. It is not surprising to learn that Web portals are frequently mentioned in business, education, and library and information science journals, but rarely mentioned in computer science and electrical engineering journals or in any Web site design technical manuals or handbooks.

The term "portal" is relatively new in the library field, and Web portals did not become an independent entry in *Library Literature and Information Science* until 1999. Library portal practice first appeared in January 1998 at the North Carolina State University Libraries.[9] The MyLibrary portal (my.lib.ncsu.edu) was truly a pioneer among academic library Web sites as it allowed individual users to customize the Web page by category. During the American Library Association (ALA) Midwinter Meeting in January 1999, the experts of the Library and Information Technology Association (LITA) identified the library portal as one of the future trends for library technologies.[10] This trend of Web customization remained the LITA top trend for the 2000 and 2001 ALA Midwinter Meetings.[11]

In September 1999, more than eighty research academic library directors came together to engage in a series of discussions and working sessions at the ARL/OCLC Strategic Issues Forum for Academic Library Directors in Keystone, Colorado. These discussions created the Keystone Principles. The term *library portal* did not appear in the document, but the portal concept was embedded in two of three Keystone Principles: "Principle Two—Libraries are responsible for creating innovative information systems for the dissemination and preservation of information and new knowledge regardless of format" and "Principle Three—The academic library is the intellectual commons for the community where people and ideas interact in both the real and virtual environments to expand learning and facilitate the creation of new knowledge."[12]

In December 2000, *Information Technology and Libraries* published a special issue on user-customizable library portals, and it stated clearly that user-customization was the key for library portals.[13] However, unlike commercial portals, library portals did not proliferate after the pioneering stage and there were only a dozen library portals at the end of 2002. Will the portal become the next generation business model for libraries like the online catalog in the 1980s and the static Web of the 1990s?

The answer is, "it depends." For academic libraries, as they are only one unit among their parent organizations—universities or colleges—it is unlikely that libraries will develop portals if their affiliated universities do not. Even if the university adopts a portal approach as its new business model for future Web development, the academic library is more likely to be included in the university portal as it is not logical to have more than one portal for each university. By the

end of 2002, only a few dozen universities had implemented Web portals according to Eisler's report in Syllabus (www.syllabus.com).[14] Many universities, government education agencies, and commercial Web technology providers published numerous white papers or guidelines on higher education portal development. Campus portals are out of the scope of this article, but the author recommends two books for further information: *Designing Portals*, edited by Ali Jafari and Mark Sheehan, and *Web Portals and Higher Education*, sponsored by Oracle Corp. and KPMG Consulting.[15]

To apply the various guidelines discussed in these two books on academic libraries, the author developed the following academic library portal development principles:

- The academic library portal platform should be the same as the campus portal
- The library portal should be developed iteratively—start small, but each portal product should be a building block for the next one
- The library should be sharing the same central users database with the campus (the campus has all faculty, staff records from payroll, and student records from registrar, while the library has community users records that the campus does not have)
- The library portal should be integrated with campus Web portals or have the capacity to be fully integrated in the future
- The library portal should include courseware tools for faculty and students and incorporate the library's major public services into course design
- Academic library portal development should consider revenue generation and fund-raising; the portal design should allow for advertising and e-commence for alumni and community members if desirable and appropriate

One point worthy of explanation is the iterative process. Iteration is the

repetition of a process where the results from one or more stages are used to form the input to the next process. It is a fundamental mathematical method for computing. To build portals iteratively means the process of building 1 through n stage portals can be used as the basis for building n+1 stage portals. Many of the pioneer academic library portals were developed before their affiliated campus developed university-wide portals. There were also plenty of articles and presentations on academic library portals. However, if library portal development does not follow some well-planned guidelines, the existing library portals will be short lived.

Four basic approaches exist for creating academic library portals: building a portal, joining a campus portal, partnering with other academic libraries for portal development, or hiring a portal vendor. Due to the limited scope of this article, the author is only focusing on the first approach, building a portal for an academic library, and almost all examples cited later in this article are home-made library portals. For participating campus portal development, David Eisler, the provost at Weber State University, presented an overview of building a campus portal to connect all the institution's constituents.[16] The major concern for librarians among recent campus portal development was that the university library was often not represented in planning campus portals. Campus portal planning usually involves campus IT, business operations, and public relations, but it should also involve the university library as a major information provider. Library consortia have handled license fees for electronic library products for member libraries and negotiated with commercial publishers as the *big buyer* for many years. It is more economical for library consortia to continue as a big buyer in library-portal development. One problem with the consortia portal approach is the difference in access privilege among different member libraries, and that may be why there has been a lack of consortia portal development. For selecting library portal vendors, Boss has an interesting article posted on the Public Library Association's Web site in which he discusses sources for portal vendors and their integration with library automated systems.[17]

The cost of building an in-house portal varies depending on available resources in the library. Many university libraries already have their own Web servers, application server, database products (MS Access, SQL, or Oracle) and enough storage space for each user to create a small profile. The major costs will be staff resources to create the My.Library portal and to maintain it. The construction time is normally six to twelve months for a complete My.Library site. Most academic library portals are not built from scratch, and many scripts are becoming freely available on the Web. It is the author's prediction that by 2005, either packaged My.Library software will be available free on the Internet for academic libraries, or commercial vendors will offer My.Library as a module for academic libraries to purchase.

Other than the dozen or so who adopted Web portals, the majority of academic library Web sites in 2002 and 2003 were either *hierarchical* or *audience orientated*. The hierarchical Web is a copy of a library's physical hierarchical structure, mainly organized by divisions (public service and technical service), departments (reference, access service, acquisition, cataloging), and units (interlibrary loan, reserve service). The audience Web site is organized by user types, such as faculty and staff, current students, prospective students, alumni, friends, and donors. Many libraries have combined the hierarchical and audience Web structures for their home page. The portal library Web site can be a build-in function in either hierarchical or audience library Web site. While library Web portals will provide different information for different users, the general My.Library portal contents are illustrated in figure 3.

Some of the pioneer academic library portals discussed in the following section are pioneers in the sense that their campuses did not have Web portals when these libraries took the lead and developed their own library portals.

Personal News	New books, articles, and reserve materials related to the predefined personal profile
Communications	Message from subject librarian for reference question. Other notifications, such as book overdue, ILL book due, etc.
Personal Records	Books checked out, ILL or new book requests status, pay dues or fee based document delivery online with credit cards
Calendar	Exhibition schedules, library cultural and art programs
E-Learning	Library catalog, networked databases, ILL and other document delivery service, e-reserves
Online Community	Alumni chatting, life-long learning, donors recognition, and Friends of the Library forum
Channels	New library services, library hours updates, special collection's new exhibition, student employment opportunities, best-selling books now in the library
Other	Online fundraising, possible book donations, and other revenue generating functions

Figure 3. My.Library Web Portal Contents

- MyLibrary @ NCState (http://my.lib.ncsu.edu) is the first academic library portal and a great prototype (see figure 4). There is a guest account for non-university community members to see the portal page. The background information and some scripts are available to the public at http://dewey.library.nd.edu/mylibrary.
- Virginia Commonwealth University Library (www.library.vcu.edu/MyLibrary) allows users to choose information resources with some predetermined information based on users' disciplines. It also allows guest log-in (see figure 5). Background information is at www.library.vcu.edu/mylibrary/about.html.
- MyLibrary at Mississippi State University (www.lib.usm.edu) is an example of low-cost library portal approach. In 2000 Li Zhou, a graduate student in the computer science department, designed the Mississippi State University MyLibrary project as a partial fulfillment of her master's degree requirements. Another unique feature of this Web site is the additional MyCourse portal for instructors on the library home page.
- The University of Washington's My Gateway portal (www.lib.washington.edu) is a prototype for large research library portals (see figure 6). It provides a guest page for people outside the university community to see the interface.
- The library portal at Spencer S. Eccles Health Sciences Library at the University of Utah (http://medstat.med.utah.edu/library/personalize.html) is an example of a special library portal. From the main library Web page, a button labeled *Personalized Eccles* will lead users to the portal page. Detailed instructions on how to use the portal are available in Microsoft Word and PDF formats from the library Web site.
- The University of Toronto Libraries my.library portal page (www.library.utoronto.ca/mylibrary) has multiple functions. The portal is the personal library Web space where University of Toronto community members can collect e-journals, library materials, catalog searches, Web sites, and any

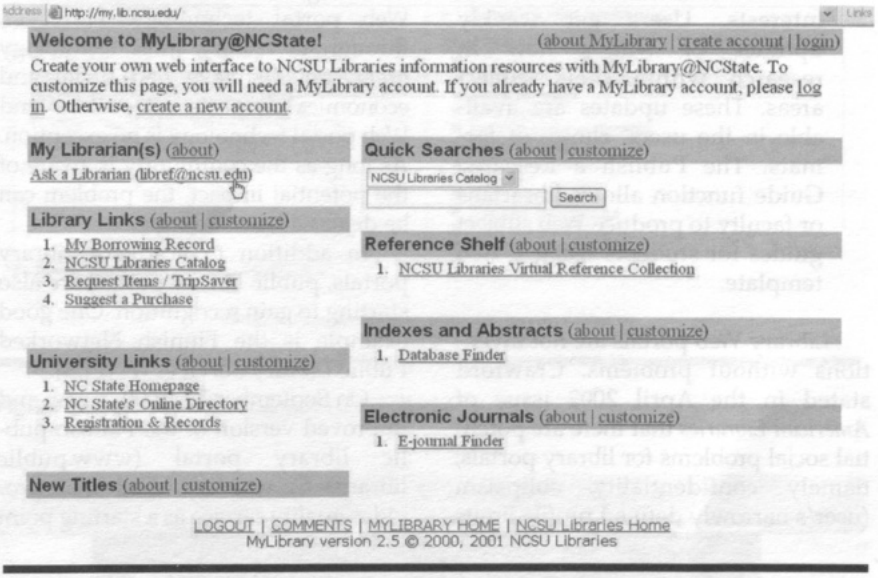

Figure 4. North Carolina State University Library MyLibrary Portal

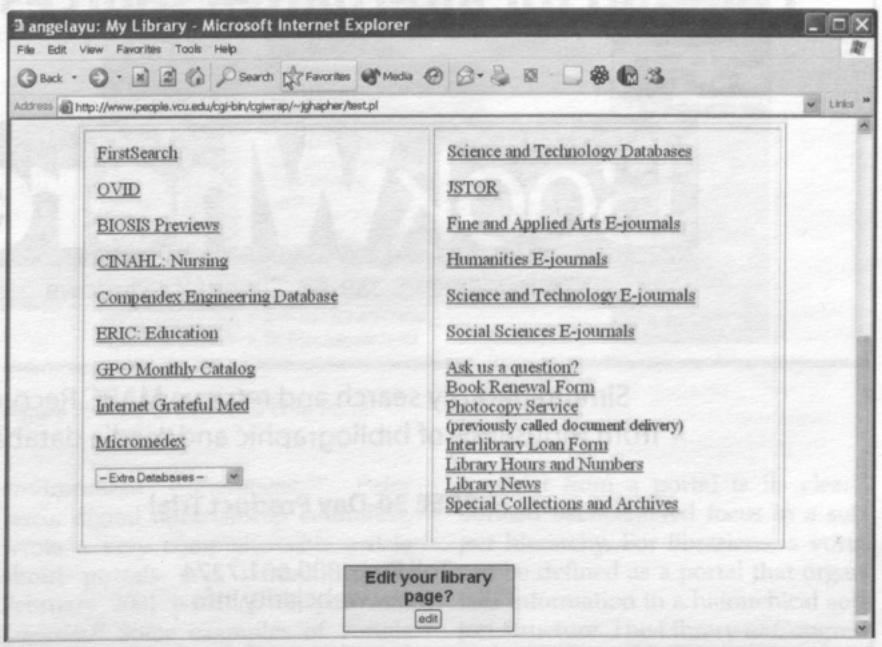

Figure 5. Virginia Commonwealth University Library Portal

other resources they choose. Faculty can also use my.library to create online resource guides for their students. A component of my.library, my.alert can be used to store canned search profiles customized to different research interests. Users get weekly updates of what's new in research within their subject areas. These updates are available in the users' choice of formats. The Publish a Research Guide function allows librarians or faculty to produce Web subject guides for students using a Web template.

Library Web portals are not inventions without problems. Crawford stated in the April 2002 issue of *American Libraries* that there are potential social problems for library portals; namely confidentiality, solipsism (user's narrowly defined profile limits the full use of library resources), irrelevance (small percentage of users make significant use of MyLibrary portal pages), and differential service (users who didn't setup a portal profile receive lower-quality service).[18] These are all legitimate social concerns about Web portal technology. However, throughout history, most technology breakthroughs have had social and economical impacts on society, and Web portal technology is no exception. As long as the community is aware of the potential impact, the problem can be dealt with accordingly.

In addition to academic library portals, public library portals are also starting to gain recognition. One good example is the Finnish Networked Public Library Services (FNPLS).

On September 22, 2000, a new and improved version of the Finnish public library portal (www.publiclibraries.fi) was launched that provides quality service as a starting point for all Internet users, especially users seeking information about libraries, children's resources, culture, and information services. FNPLS provides a login for each user with very limited customization, but users can access information in all nineteen participating regional and central libraries.

What was essential to this effort is that all public libraries in Finland participate directly in the development and maintenance of the services. Each public library has been assigned a super-username and a password in order to access the updating modules of services from workstations in their own local libraries. All the services provided by the FNPLS Web site are aimed at both library staff and the general public. Published in three languages—Finnish, Swedish, and English—each language version has its own domain name.[19]

Another portal worth mentioning is my.ca.gov, the official State of

California Web site. My.ca.gov was contracted out to a system integrator, Deloitte and Touche Consulting Group, in July 2000 and completed in January 2001. The portal site uses the BroadVision One-To-One Enterprise as the foundation, BroadVision InfoExchange Portal as the interface, Interwoven's TeamSite for content management, Broadbase Software for customer relations management, and Verity for information retrieval. My.ca.gov offers users, consumers, and contractors a single access point for all state government information and services (see figure 7).

Not all the information on my.ca.gov page can be customized. The two narrow columns on each side are fixed; only the middle column can be customized by the individual user. Under the my.ca.gov portal, companies can execute financial transactions with state agencies and individuals can file state income tax, check tax refund status, renew an expiring professional license, or renew their motor vehicle registrations online. Putting these high-demand services online is time saving for customers and state employees. The state also receives additional revenue by charging an extra online fee per transaction (for example, a four-dollar fee for an annual renewal of a personal-use class C vehicle). This is a win-win situation for all. According to Knight-Ridder, the cost of building the California State Government Web portal was initially estimated at $5 million in July 2000, but the actual costs soared to more than $10 million by the time my.ca.gov was announced by the California governor in January 2001.[20] However, the six-month construction of the my.ca.gov portal was considered speedy for the size, quality, and depth of the Web site.

The newest business model for Web pages is a *vortal*, or vertical portals. The Webopedia defines vortal as "a portal Web site that provides information and resources for a particular industry. Vortals are the Internet's way of catering to consumers' focused-

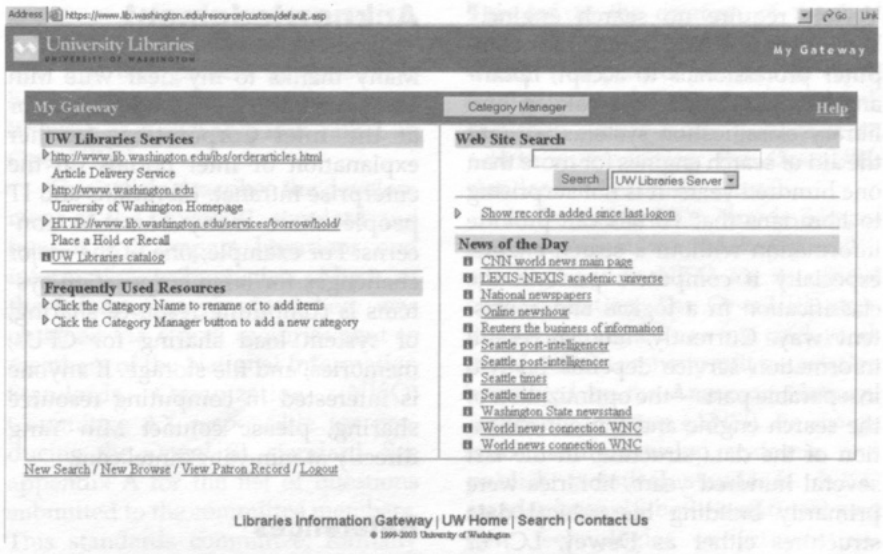

Figure 6. University of Washington Library Portal

Figure 7. State of California Web Portal

environment preferences."[21] Peter Jasco, digital librarianship columnist, wrote a very comprehensible article about portals and vortals in the February 2001 issue of *Computers in Libraries*.[22] Some examples of vortals are verticlenet.com, garden.com, web md.com, kidshealth.org, findlaw.com, and women.com. What distinguishes a vortal from a portal is its clearly defined user-centered focus in a subject hierarchy. For librarians, a vortal can be defined as a portal that organizes information in a hierarchical subject structure. The Library of Congress and the Dewey Classification Systems in a customizable Web format are perhaps the best examples of vortals.

Vortals require no search engine.[23] While this is a hard concept for computer professionals to accept, librarians have used the card catalog and library classification systems without the aid of search engines for more than one hundred years. It is not surprising to librarians that vortals can provide information without a search engine, especially if computers perform the classification in a logical and consistent way. Currently, any successful information service depends on two inseparable parts—the optimization of the search engine and the normalization of the data structure. In the last several hundred years, libraries were primarily building hierarchical data structures either as Dewey, LC, or patent classification systems without any efficient search engines. Since 1992, the Web business communities have primarily been working on building fast search engines for information retrieval without paying too much attention to data structure. Now with the exponential growth of data on the Web, it is time for librarians and Web engineers to work together to improve both the search engine and hierarchical data structures for more effective and efficient information service.

Here is a final comment about vortals made by Alan M. Meckler, CEO of internet.com in March 2001:

> The whole Internet is moving towards vertical Web sites. The Internet is so big, so wide ranging, and it's growing exponentially. No horizontal Web site can keep up; therefore, you have to go vertical. It's like a great library. Libraries have subject areas, and that's exactly how the Internet is breaking out.[24]

Library subject areas refer to library subject classification systems for information storage. While libraries strive hard to become more like business Web portals, Internet business communities also attempt to become more like libraries by organizing huge amounts of information into hierarchical structures.

Acknowledgment

Many thanks to my dear wife Min Yang, a senior system administrator at the Intel Corporation, for her explanation of Intel portals on the enterprise intranet. Librarians and IT people share many common concerns. For example, one of the major challenges for large corporation systems is computing resource sharing, or system load sharing for CPUs, memories, and file storage. If anyone is interested in computing resource sharing, please contact Min Yang directly at min.yang@intel.com.

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The Development of the NISO Committee AX's OpenURL Standard

Arthur Hendricks

This paper describes the development of the OpenURL standard and how it will impact librarians and information technologists. This article is based on information provided via email inquires sent to members of the National Information Standards Organization (NISO) Committee AX responsible for producing this standard. The OpenURL syntax is designed to enable transportation of metadata and identifiers about referenced works and their context from any information resource to a local link server. This allows libraries to create locally-controlled and managed link servers that enable the delivery of context-sensitive linking in and across their collections.

OpenURL is a developing standard that provides a mechanism for transporting bibliographic metadata about objects between information services via the Internet.[1] The standard is based on the idea that links should lead a user to appropriate resources. Currently, Web links do not take into account the identity of the user as they link to the same Web page. When more than one institution provides access to copies of the same electronic article, the link from the citation to the full-text article should point to a copy that is available to the user. Since different users have access to different resources, the link should resolve who gets what. The link must be able to package metadata and identifiers describing the information object, and send this package to a server that resolves the link. The resolver should take into account the user's identity when resolving the metadata into specific articles.

In the OpenURL framework, information resources allow for open linking by including a hook, a programmer-defined customization, along with each metadata description that they present to users. This hook presents itself in the user's browser as a clickable link called an OpenURL.[2]

This article describes the development of the OpenURL standard and how it will impact librarians and information technologists. Much of the information provided here was obtained via e-mail inquiries sent to members of the National Information Standards Organization (NISO) Committee AX responsible for producing the OpenURL standard. See appendix A for the list of questions submitted to the committee members. This standards committee, formally designated NISO AX, consists of seventeen members and four observers from diverse backgrounds and workplaces (libraries, publishers, and service providers.) See appendix B for complete biographical information on the respondents.

History

The OpenURL concept evolved from research by Herbert Van de Sompel and his team at the University of Ghent in Belgium.[3] In 1998 they began to explore the role of local link servers for libraries to facilitate context-sensitive linking between heterogeneous scholarly resources.[4] As a result of this work, the first context-sensitive link server, titled SFX, was developed. Ex Libris was one of the technology partners involved in this experimental work, and Oren Beit-Arie, Ex Libris Group vice president for research, was assigned to the project. In February 2000, Ex Libris purchased all rights to develop and market the SFX technology.[5] SFX-URL was developed as a protocol for transporting metadata from sources to the SFX server.

In March 2000, Van de Sompel, Hochsteinbach, and Beit-Arie began work on a general framework to enable a standardized infrastructure for open and context-sensitive linking. This led to the creation of the first draft of the OpenURL standard, which was posted publicly in April 2000 at www.sfxit.com/openurl.html, and they subsequently published an article summarizing the OpenURL standard in *D-Lib Magazine*.[6]

In December 2000, Van de Sompel and Beit-Arie submitted the OpenURL specifications to NISO for its official standardization. The OpenURL standard was accepted as a fast track work item.[7] NISO is a nonprofit association accredited by the American National Standards Institute (ANSI). Its charge is to identify, develop, maintain, and publish technical standards. NISO standards apply both traditional and new technologies to information-related needs, including retrieval, storage, metadata, and preservation. The working draft of the OpenURL standard is available at http://library Caltech.edu/openurl/Working _Documents.htm.

Scope and Application of the OpenURL Standard

The AX committee members were each asked to describe the scope and application of the OpenURL standard and state what problems the standard addresses. Most stated that it was originally developed for providing context-sensitive linking in a scholarly Web-based information environment. According to Ann Apps, researcher for Manchester Information and Associated Services, "The current draft OpenURL (version 0.1) of the standard defines 'by-value' metadata for particular bibliographic resources (or referents) (journals and articles,

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conference proceedings and papers, books). It also defines the resolver to which the metadata is sent as a BaseURL."[8]

As for the future applications of OpenURL, most committee members saw it as being useful for a variety of objects on the Internet, not just scholarly citations. According to Van de Velde:

> Within the scholarly literature, localized services could be attached not only to citations, but also to keywords, mathematical and chemical formulas, genome sequences, etc. Outside of the scholarly environment, localized services could be attached to real-estate listings, news stories, stock listings, etc.[9]

According to Apps, version 1.0 of the standard will include the description of other entities: the referring service, the referring entity within that service, the requester, the service type requested, and some administrative metadata detailing the OpenURL version number and identifying it as an OpenURL. It will allow description of the resource using identifiers, or using *by reference* as well as *by value*. The initial set of by value metadata will be bibliographic, but there will be a mechanism for communities to register metadata formats, so potentially OpenURL could be used for any type of resource.

OCLC is already utilizing Open URLs. According to Phil Norman, OCLC is undertaking analysis and design of an initiative that will include a centralized, cooperatively built database that identifies what electronic journals exist, who provides them, and what libraries have rights to use them. This application will be OpenURL aware.[10]

ProQuest is also implementing OpenURLs. According to Todd Fegan, the primary focus initially was to build OpenURLs for the purpose of outgoing links from their indexed records to the full text that resides outside of ProQuest. "Our view has changed slightly in that we are now looking to standardize our linking on the OpenURL whether its internal linking, inbound, or outbound. Links between our platforms will most likely be OpenURL based. The standard does allow for a 'local zone' so we can incorporate product specific information if we need to."[11]

Other Metadata Standards

While other metadata standards, such as Dublin Core (DC), OAI, ONIX, MARC, Z39.50, and so on, continue to be vital standards in the Web environment, OpenURL is different in such a way that it adds natural intelligence to the computer-to-computer process to navigate complexity, and OpenURL resolvers don't take metadata and immediately hand off whatever resources come up—a process that will frequently fail because the metadata is incomplete or because the source database and the object resource follow different rules. Instead, resolvers apply as much logic as they can, then offer the user a menu showing a range of possibilities.[12]

The committee members were asked how the OpenURL standard differs from other metadata standards and whether OpenURL would affect other metadata standards. Most stated that OpenURL is not a metadata format in itself, but a means of transporting metadata. Apps stated,

> OpenURL is transportable metadata and it is primarily concerned with bibliographic resources. It is really defined for linking to other resources, whereas DC is concerned with metadata about a resource itself. It has a defined syntax, whereas DC has defined semantics which can be used within various syntaxes. OAI is about disclosing/harvesting metadata, not about providing links.[13]

Apps also stated that OpenURL could be employed within DC to record the bibliographic citation of a journal article. Unlike DC, OpenURLs are not human-readable and therefore not very suitable for resource discovery results. It is possible that XML schemas will be developed for OpenURL. If so, these could be used by both DC and OAI as schemas for encoding bibliographic citation information. "It appears that OpenURL is the first standard to standardize the elements of a bibliographic resource citation."[14]

Norman added:

> It is envisioned that the OpenURL registry will allow new metadata formats to be created using XML schemas. Existing metadata formats such as MARC XML can also be registered once the registry is made public. Additional metadata encoding or transport methods such as RDF and Relax-NG may be added later in order to extend the use of existing metadata formats such as Dublin Core.[15]

Impact on Libraries

The benefits of the OpenURL standard to libraries and information service providers are enormous. Recently Research Libraries Group (RLG) revealed its full support for OpenURL dynamic link creation in the newest version of Eureka. "Eureka now enables librarians and their users to find virtually everything the library can provide, both online and on the shelf," said Walt Crawford, senior Eureka analyst at RLG.[16] Ex Libris's product SFX allows users to search a database and click on a resulting citation to search it automatically in other databases. Other library systems vendors such as Endeavor and Innovative Interfaces Incorporated (III) also are developing products with support for OpenURL. The committee members were also asked how they see the introduction of the OpenURL standard impacting libraries.

Van de Velde replied, "The most important impact is that users are

guided to resources they've never even heard of, just by clicking on some of the options available on the menu of services. It makes it easier on the library to let users know what is available."[17]

According to Beit-Arie:

> Primarily it enables libraries to take control of their own linking environment. Libraries can determine what resources should be linked and in what manner. With the OpenURL open linking framework, libraries can also incorporate local resources and services into their interlinked environment. Further, libraries can consolidate the maintenance of links via their OpenURL link server.[18]

He also pointed out that OpenURL virtually changes the way patrons navigate and use electronic resources. The fast acceptance of the standard in the scholarly information industry at large, considering it was only first published in April 2000, attests to that.[19]

Apps wrote that libraries will be under pressure to purchase OpenURL resolver software to provide their users with full-text links.[20] Using a resolver seems to require a large overhead in maintaining holdings information. She also stated that libraries probably will not need to encode OpenURLs unless they want to include them in custom-made OPACS.[21] OpenURLs are generally provided in source abstracting and indexing databases. Libraries will have to provide help and training to their users to explain OpenURL links and functionality.

When asked what potential library projects would benefit most using the OpenURL standard, Van de Velde stated succinctly, "The usefulness of any database is enhanced when it is OpenURL enabled, because the database can now be used to deliver localized services."[22] Beit-Arie illustrated the benefits to libraries in a broader sense and listed three applications of OpenURLs.[23] The first application is collection development and management. Through OpenURL linking, libraries collect valuable information and usage statistics that can help them in collection development. The second application is approval plans. According to Beit-Arie, some very interesting work is happening in this area in conjunction with OpenURL linking. The third application is resource sharing and consortial environments.

> OpenURL linking can facilitate some very interesting methods of resource sharing amongst consortia members. SFX, for example, is implemented in a number of very different consortia environments in which—to a different degree—resource sharing among members occur. With OpenURL linking, sharing can happen on-the-fly while retaining independence of member institutions.[24]

The Roles of Libraries and Librarians

The advice and insights offered by the experts on the committee regarding the roles that libraries and librarians should play concerning OpenURLs was enlightening. Most members recommended that libraries be aware of OpenURLs and insist that products that they purchase use them. Karim Boughida replied, "Be an early adopter . . . it's a library-driven project versus database or publisher vendor-driven. It's empowering librarians and end-users."[25] As indicated by Van de Velde, "Librarians need to be aware of this in their negotiations with data providers. They must insist that databases are OpenURL enabled."[26]

Beit-Arie wrote that OpenURL defines a low barrier mechanism and specification for a very important piece in interoperability of scholarly information.[27] Libraries and information providers alike can benefit from implementation of the OpenURL's open linking framework. Librarians should aim at having OpenURL compliance with every resource to which they license or subscribe. Information technologists should bear OpenURL in mind when designing and implementing new applications.

OpenURL can carry either very minimal or very extensive and complete metadata about a referenced work. For OpenURLs to be effective for the purpose of provision of context-sensitive linking, libraries should ensure that vendors provide sufficient metadata to meet the needs of context-sensitive services. According to Beit-Arie, there is now an active lobbying group among SFX customers to ensure that vendors meet the standards required by libraries. "Ex Libris has also played an active role in working with vendors to ensure that the OpenURL is effective."[28]

Some committee members had warnings about OpenURLs. According to Fegan, "It isn't perfect. It doesn't fix data discrepancies. It assumes that the metadata that is transported from one system can be properly interpreted and matched in a second system. Differing editorial polices, tagging rules, etc. . . . are still problematic. Librarians need to understand that there will be errors."[29] Norman also expressed the same warning: "Be aware that OpenURL is not another searching protocol or metadata format. It is for transporting metadata in a specific context."[30] On the other hand, libraries with OpenURL servers will help their users save time by easily connecting users with library-supplied resources that link to items identified through searches from services such as OCLC FirstSearch.

Norman also stated that library staff can set up the OpenURL server link in FirstSearch with a minimum of effort and without the need for extensive technical expertise. "Libraries can link to FirstSearch full-text, OCLC and local Z39.50 Holdings, and other

OCLC services from alternative service providers and resolvers through inbound OpenURL linking to OCLC's OpenURL Resolver."[31]

Concluding Comments

Clearly OpenURLs are the next logical step in the evolution of the Web. On the OpenURL Web site, there is a link to a song by Fatboy Slim titled "Weapon of Choice." Part of the refrain, is "check out my weapon, my weapon of choice." According to Van de Velde, "The theme song was by coincidence. The video had just come out around the time of our first meeting. I had downloaded it on my computer and showed it to the committee. I believe it was Herbert who pointed out that OpenURL was indeed a "Weapon of Choice" in two ways: it is a preferred weapon, but it is also a weapon that provides choice . . ."[32] Hopefully libraries will embrace OpenURLs and give their users their own personal weapon of choice.

Acknowledgments

I wish to thank committee chair Eric F. Van de Velde, director of Library Information Technology at the California Institute of Technology, as well as the other committee members, including Oren Beit-Arie, Ann Apps, Phil Norman, Todd Fegan, and Karim Boughida, for their responses to my inquiries.

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Committee-Recommended Resources

The committee members were asked for the top three resources they recommend to readers to learn more about the OpenURL projects. Most mentioned the NISO AX site (http://library.caltech.edu/openurl) and the site's bibliography (http://library.caltech.edu/openurl/Bibliography.htm). Apps reminded us that, "The NISO AX site provides information about the development of the standard. Other Web sites I'm aware of are commercial."

Beit-Arie added four following listings he felt were relevant:

- NISO AX OpenURL Web site, http://library.caltech.edu/openurl
- SFX Web site, www.sfxit.com/publications
- Herbert Van de Sompel and Oren Beit-Arie, "Open Linking in the Scholarly Information Environment Using the OpenURL Framework," *D-Lib Magazine* 7, no. 3, www.dlib.org/dlib/march01/vandesompel/03vandesompel.html;
- Herbert Van de Sompel and Oren Beit-Arie, "Generalizing the Open URL Framework beyond References to Scholarly Works—The Bison-Futé Model." *D-Lib Magazine* 7, no. 7/8, www.dlib.org/dlib/july01/vandesompel/07vandesompel.html.

Beit-Arie's third listing is the first article about OpenURL that describes both the OpenURL framework and its specification in some great details. It also contains a section about the DOI/CrossRef/OpenURL integration project. The fourth listing lays the groundwork for the current development of OpenURL v.1.0 by the NISO AX Committee.

Boughida recommended the following articles from RLG and OpenURL in Focus 56, June 2002 (www.rlg.org/r-focus/i56#sfx):

- "Connecting Citations and Full Text: Eureka and OpenURL," Walt Crawford, RLG
- "Implementing OpenURL Linking with SFX: The NYU Experience," Gloria Rohmann, New York University
- "OpenURL at the University of Chicago Library," Jim Mouw, University of Chicago
- "Implementing OpenURL: Advice from the Library Trenches," Kimberly Parker, Yale University

Boughida also recommended the OpenURL white paper, prepared by Harry E. Samuels, digital library projects coordinator, Endeavor Information Systems, available at www.endinfosys.com/pdf/openurl4_02/pdf.

Appendix A: Interview Questions

The following inquires were sent via e-mail to the members of the National Information Standards Organization (NISO) Committee AX

responsible for producing the OpenURL standard.

1. When and how did you become involved in the OpenURL project?
2. Please describe the scope and application of the OpenURL standard. What problems does the OpenURL standard address?
3. Initially, what applications did you envision utilizing open URLs? Has that changed as this project evolves?
4. How different is the OpenURL standard from other metadata standards, such as Dublin Core, OAI, ONIX and etc.? Would the OpenURL standard affect/enhance other existing standards and practices? How?
5. How do you see the OpenURL project impacting libraries?
6. What are the potential library projects that would benefit most using the OpenURL standard?
7. What is important for librarians and information technologists to be aware of concerning OpenURLs?
8. What are the top three resources you recommend for readers to learn more about the OpenURL projects, (for example, resources, Web sites, etc?)
9. What biographical information shall I add to this article?

Appendix B: Respondent Biographies

This appendix provides information about the positions held by the respondents and also their academic training.

Ann Apps is a researcher for Manchester Information and Associated Services (MIMAS), at the University of Manchester, England. She is also chair of the Dublin Core Citation and Type Working Groups and a member of the Dublin Core Advisory Board. She is a member of the CEN/ISSS Workshop on Metadata for Multimedia Information-Dublin Core (MMI-DC), the European standards initiative, as well as a member of the Committee of the British Computer Society Electronic Publishing Specialist Group.

Oren Beit-Arie is Ex Libris Group Vice President for Research and the managing director of the Information Services Division, a division within Ex Libris Group that develops and markets the SFX link server. He began work on the OpenURL standard (now known as OpenURL v.0.1) that was first published in April 2000, and worked extensively on promoting the OpenURL's Open Linking framework with libraries and information providers. He has degrees in mathematics, computer science, and theoretical linguistics.

Karim Boughida is a senior information systems architect at the Getty Research Institute. He has an MLIS from the University of Montreal, Canada. Before joining the Getty, he was responsible for digital library products at Endeavor Information Systems, Chicago, a leader in library and information systems. Prior to that, he was responsible for knowledge records information in database systems in various sectors (government, financial, etc.). Karim has been with the computer and information industry for more than thirteen years.

Todd Fegan is the vice president of ProQuest Product Management and has been with ProQuest for ten years.

Phil Norman earned a bachelor's of science degree in data processing technology from the Speed Scientific School of the University of Louisville. Prior to joining OCLC, he was a computer specialist for the IRS. He has been working at OCLC for over fifteen years. He was the project manager of the first release of FirstSearch in 1991 and has been associated with that product ever since. His current title is Senior Technical Manager of the User Interface Section of the Cooperative Discovery Services Division.

Eric F. Van de Velde is the director of Library Information Technology and at the California Institute of Technology. He holds a Ph.D. and a M.Sc. in mathematics and a M.E. in computer science.

Using Microsoft Share Point Team Services for Library Committee Management

Abhijit Rao

Library committees work for the improvement and technological advancement of library services. Managing these committees is not an easy task, especially when there are subcommittees within a larger committee. Inefficient management often leads to the disorganization of information and ultimately affects the objectives of the committee. This article explores the possibility of using Microsoft Share Point Team Services, a team Web site solution, for easier and more centralized management of library committees.

Library staff work in groups to improve library services and ensure the best service for their patrons. These groups, also known as committees, have goals to realize and deadlines to meet. They are involved in regular meetings, training and discussion sessions, and many other developmental activities. Due to the heterogeneous nature of this type of committee, where members are both within and outside the organization, library committee management demands organization.

Abhijit Rao is a Master's student at the Graduate School of Library and Information Science, University of Illinois at Urbana–Champaign.

Working as a graduate assistant to the University of Illinois at Urbana-Champaign library webmaster enabled the author to become aware of various issues related to committee management. An opportunity to work with a team Web site solution, namely, Microsoft Share Point Team Services (STS) for a class project, also presented the possibility of using STS for easier committee management. This article is the result of such an investigation.

Committee Management

Committee management depends heavily on the *activity* and *people* involved. The three domains of committee management are as follows:

- **Information management**—information produced from committee activities requires organization to make efficient retrieval and perusal of this information possible. This information should be readily accessible to all members of the committee irrespective of whether they are within or outside the library organization.
- **Time management**—library staff are busy individuals irrespective of their position and tasks. Time management is critical when deciding the time and date for a meeting or a committee activity.
- **Communication management**—smooth communication between committee members helps the committee solve problems and eliminate various hindrances. Channels of communication should always be open and conveniently accessible to all committee members.

What does a committee do? How does it function? What are its activities? The following items are some of the prominent tasks committees perform:

- **Committee administration**—one of the most important and well-elaborated features of any committee is its administrative capability. Committees normally begin by formulating their policies, rules and regulation, aims and objectives, ethics, standards, and so on. Budgeting is also perceived as another significant administrative effort on the part of committee management.
- **Member profiling**—committee members and their contact and background information are profiled for easy communication. Most importantly, member profiling helps evaluate the members' backgrounds, so that their expertise is of benefit to the committee.
- **Record publishing**—publishing reports and meeting minutes are a committee's two most common publishing activities. Publication can be in electronic or print form. These publications are then made accessible to the members of the committee for approval.
- **Record storage**—information gathered during the operation of the committee is summarized and stored for future reference. This information is usually a collection of subreports or one large report that discusses all the decisions taken during the lifespan of the committee.
- **Tracking and reviewing committee activities**—the person or group managing the committee keep track of the committee's development and make necessary reviews from time to time. This helps the committee to remain focused on its goals.
- **Scheduling management**—the larger and more heterogeneous the committee, the harder it is to coordinate a particular meeting time and date among members. Scheduling meetings, discussions, and training are some of the common schedule-related decisions that either an individual or the collective group must make.
- **Attendance analysis**—although this is not a vital aspect of committee management, some committees consider this task important. Members who regularly attend committee gatherings are more aware of the committee's development. Keeping track of member attendance may be one way of gauging their awareness.

The correlation between the committee's operational functions mentioned previously and the three domains of committee management is illustrated in figure 1.

Tasks in Committee Management

Some of the committee operations mentioned previously figure more prominently into committee management than others. This section addresses the main tasks by using real-life examples.

Scheduling Meetings

Scheduling meetings entails the following tasks:

- coordinating time and date between committee members; and
- notifying the members about the meeting.

The job of deciding a convenient meeting time and date usually rests with a single person. This individual has to inform committee members of meeting details. This individual also handles the last-minute changes made by other committee members, thereby making the coordination process all the more complicated and intricate.

Information Management	Communication Management	Time Management
■ Committee administration ■ Record publishing ■ Record storage ■ Tracking and reviewing committee activities	■ Committee member profiling	■ Scheduling management ■ Attendance analysis

Figure 1. Relationship between Domains of Committee Management and Their Functions

Record Publishing

Committee publications, such as meeting minutes and reports, entail the following tasks:

- publishing the meeting minutes;
- deciding the access points for viewing the information—for example, deciding whether the report should be in hard copy or electronic form;
- making records available to all members of the committee whether they are within or outside the organization; and
- informing the committee members of the report publication.

Meeting minutes are transcribed by the secretary and later are either printed or published electronically. An automatic electronic discussion list is often used for broadcast distribution of the committee document. A committee may adapt various methods of publishing information. This leads to nonuniformity of information publishing.

Information Sharing

Information sharing entails the following tasks:

- sharing important sources of information;
- discussing topics related to the committee goals; and
- using the medium of communication for information sharing.

Informal sharing between members is normally preferred to be face-to-face even if the information is resourceful and has to be shared with other members of the committee. This is because committee members feel that publishing information is extraneous work that is not worth the effort. The committee developments are either discussed during the meetings or relayed informally. Published information is usually a privilege for a handful of committee members because of security issues.

This section has highlighted some of the practical issues faced in committee management. In the next section, Microsoft's Share Point Team Services (STS), which supports group activities and ad hoc workspaces that facilitate team activities, will be explored.

STS

STS is a new way for teams to work together. By using STS, anyone can create, author, and administer team Web sites that help a team organize and advance on a project. It makes communicating and sharing information easier. All you need to contribute to the team Web site is a Web browser.

Features

STS Web sites provide a place on the Web where your team can communicate, share documents, and work together on a project. A separate team Web site can be created for every project a team is working on. Information can be added to the team Web site, such as events, names and phone numbers of team contacts, and to-do items. New items are marked *new!* to make them readily noticeable. By default, this marker disappears after one day.

Some other features of STS let teams do the following:

- discuss and subscribe to documents;
- customize a site by adding or removing features, such as task lists or surveys;
- send invitations to the new site and allow users to begin contributing on the site immediately;
- create document libraries to find and view documents quickly;
- create and customize powerful, interactive lists and allow each user to create customized views of lists;
- add announcements, calendar information, surveys, and other special items to the Web site via a browser-based interface; and
- add users and perform other Web administration tasks by using an easy browser-based HTML interface.

Deploying STS

STS Structure

Upon installation of STS, the STS home page appears, offering several services.[1] The following section briefly explores the various services that make up this team Web site solution. Figure 2 explains each of the services on the home page.

Roles

Every Web site has users, and the job of the administrator is to make sure that the users of a Web site have appropriate permissions to the site.

To get permissions to the site, users must be added to the site and assigned to a role.

The various role levels are as follows:

- **Browser**—has rights to view pages, view Web document discussions, and read lists.
- **Contributor**—has browser rights, and additional rights to participate in Web document discussions and subscribe to documents and lists.
- **Author**—has contributor rights, and additional rights to edit pages, directories, and lists.
- **Advanced Author**—has author rights, and additional rights to define and apply themes and borders, link style sheets, and recalculate the Web site.
- **Administrator**—has all rights from other roles and many other rights to configure roles, create local machine user accounts, manage source control, create subwebs, and so on.

Creating Subwebs

When working with a large team Web site, it is often easier to break up the site into smaller subteams called *subwebs*. A subweb is a complete STS Web site that is located in either a subdirectory of the root Web site or of another subweb. Each subweb can have many levels of subdirectories. In figure 3, creation of a subweb is illustrated.

Other features that support committee management are as follows:

- **Notification**—the Subscription feature notifies the user by e-mail of any changes made to the content the STS Web site, so members need not check their committee Web sites on a regular basis.
- **Surveys**—STS provides surveys to poll team members. Decisions that require the consent of the team can be made using this service.
- **Customization and tailoring**—the content of a team Web site can be customized using nothing more than a Web browser. However, STS-compatible Web page editors, such as Microsoft

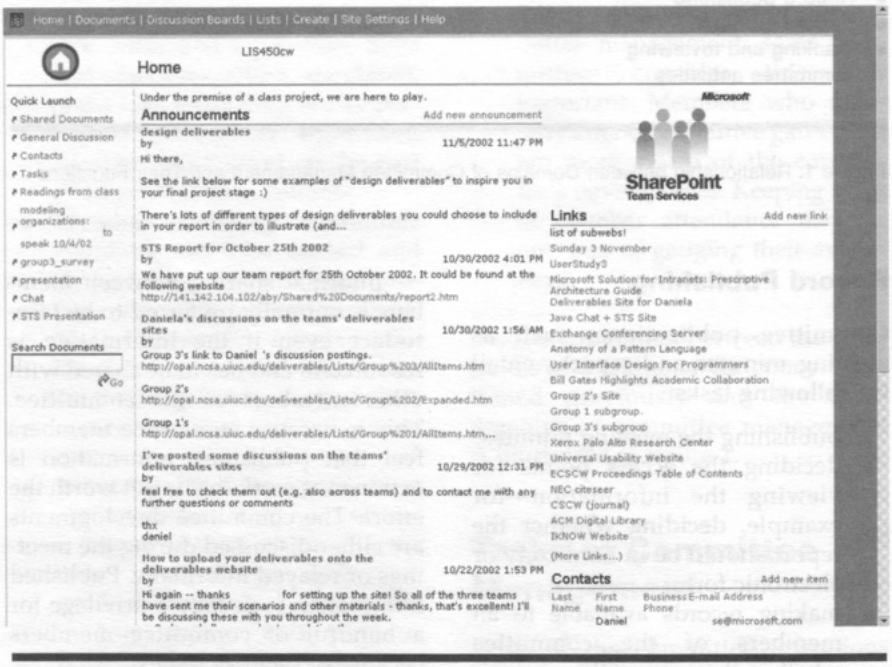

Figure 2. Share Point Team Services Home Page

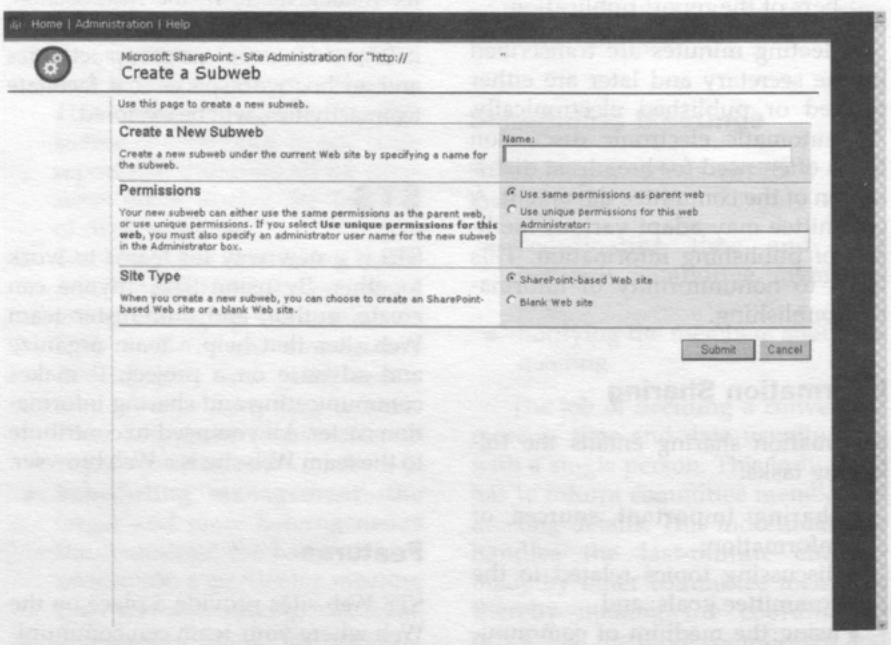

Figure 3. Creation of Subweb

FrontPage 2002 can tailor the site with custom layout, formatting, and content.

- **Integration**—integration with Microsoft Office XP products is also possible.[2]

Does STS Fit in the Committee Management Frame?

Considering the previously mentioned features, STS can provide a solution to most committee functions except attendance analysis. It can prove effective when there are a limited number of members because STS suits small team activities better than large ones. For a team size that exceeds seventy-five members, Microsoft has released Share Point Portal Server.

Acknowledgments

The author would to thank Darlene Chirolas, UIUC Library webmaster, for sharing her valuable experience and Daniela Busse of the Microsoft Corporation for helping explore some of the features of STS.

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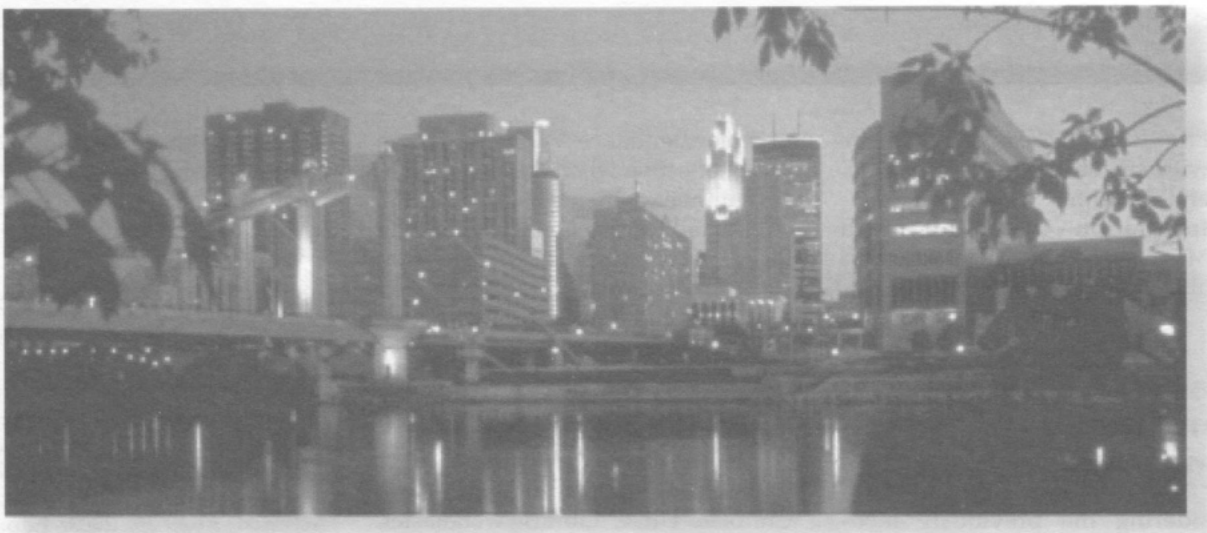

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Book Review

Tom Zillner, Editor

Leonardo's Laptop

Human Needs and the New Computing Technologies

By Ben Shneiderman. Cambridge, Mass.: MIT Pr., 2002. 288 p. $24.95 (ISBN 0-262-19476-7).

Ben Shneiderman, author of *Designing the User Interface* (Addison-Wesley, 1997), has written a new book. Head of the Human-Computer Interaction Laboratory at the University of Maryland for nearly twenty years, Shneiderman is one of the gurus of human-computer interaction (HCI). *Leonardo's Laptop* is also concerned with HCI, although it is a broader and more expansive treatment than found in his previous work.

Schneiderman proposes in *Leonardo's Laptop* that the genius of Leonardo da Vinci can be applied to the burgeoning world of usability, not only as a touchstone for comparison but as an inspiration as well. For example, he states, "The creative genius of Leonardo . . . has inspired technologists, scientists, and artists for more than half a millennium. His Renaissance integration of engineering with human values could be the path to appealing artifacts and provocative dreams" (3). His invocation of the greatness of da Vinci throughout the book in relation to usability is only partly successful, but given this ambition of Shneiderman that may have been inevitable.

Perhaps most successful in this work are Shneiderman's fantasies of what da Vinci might think of some of the up-and-coming tools of today and the future. For example, da Vinci carried tablets of several sizes to jot down notes and make drawings; therefore, he would probably be interested in PDAs, desktop computers, and wall-sized displays. Not an entirely new insight, but Shneiderman extends the possibilities further to discuss what a contemporary da Vinci of software might build: "3-D medical simulations with tactile feedback that let you crawl through the human body, a complete environmental model of the world to study global change, and a building-size FrescoMaker drawing package" (9). That last application sounds like the most fun, both for experienced and nascent artists.

The real meat of the book is foreshadowed by Shneiderman's discussion of new computing: "methods that can produce more usable, more reliable computer software and user interfaces that yield much improved user experiences" (26). New computing software supporting innovation will offer exemplars and templates as well as creativity-guiding software to assist users. Shneiderman stresses that these aids to *doing and making* are compatible with the Renaissance idea of *homo faber*, man the maker.

Shneiderman then outlines the transformations from old computing to the new. The first of these transformations is a shift shift in focus from hardware capabilities to computing that supports human relationships. In new computing, users no longer talk about their machines' properties, but about things like the number of e-mails they send and receive and how many postings they've made to discussion groups. We are still on the cusp of this transformation, because many people (not just geeks) still discuss the size of their hard drives rather than the number of e-mails they get, and some people mention both.

The second and related transformation Shneiderman describes is a trend toward user-centered services and tools and away from machine-centric processes. There is less interest in computer programs that make automated diagnoses than tools that help doctors make better diagnoses. Although there is still talk about house-cleaning robots, there is much more talk about music downloads. This may be a transformation that we take for granted, but it is important nevertheless. The personalization of Web pages (such as Amazon.com's welcome page tailored for individual users' interests) has been one trend that has helped to encourage personalized and customizable tools in other spheres. It's part of a critical mass that has generated this new move to usability.

The new usability often is incompatible with old ideas about what people want. For example, human-like intelligent agents have not done very well. The epitome of this failure is BOB, Microsoft's effort to put a human face on Windows that would assist users and automate tasks. BOB cost $100 million, but was roundly rejected by nearly everyone. (Shneiderman notes that there is a bit of residual BOB in the much annoying presence of the happy paperclip helper in Microsoft Office.)

Shneiderman claims this is but one example of the move from artificial intelligence (AI) to user interfaces. People consistently reject AI that is intrusive, particularly AI that attempts to mimic human capabilities. The latter was much hyped in the '70s through the early '90s, but never achieved success. What users wanted wasn't an imperfect machine-instantiated clone but an aid to their own capabilities and talents—thus the age of usability.

One of Shneiderman's ideas, discussed early in the book, is an example of usability gone too far. He proposes the bar coding of plants and minerals in parks that visitors could scan for a description of the item on a modified PDA. While the idea seems outrageous because of its interference with an enjoyment of nature in the raw, it is perhaps appropriate for small collections. The author's other ideas seem to be plausible and usually welcome, although many of them are not new.

Shneiderman next provides a lamentably short set of guidelines for user-centered design. This may be understandable in light of the fact that he has pretty much covered the field in his previous HCI work, but it is a disappointment nonetheless. For example, Schneiderman writes that Web sites should be designed so there

are many links at the top-level pages, making it easier to get to detail pages. In other words, many shallow links are better than few deep ones. Of course, this is good advice, but not covered in depth.

Shneiderman also points out that interfaces should be consistent, predictable, and controllable. For example, interface consistency can be achieved by placing a clickable icon in the upper left of a Web page or maintaining a uniform color scheme throughout a Web site or program.

Predictable design means that user intuitions and expectations will be met throughout a program or Web site. Shneiderman provides the examples of a shopping basket on the Web or the Save, Print, Open, and Close functions in a software program as examples of predictability.

Controllable interfaces are a favorite technology of this reviewer, and Shneiderman provides good coverage of them. As he states it, "controllable interfaces give you the power to do what you want" (65). Controllable interfaces provide the user flexibility, for example, to insert a spreadsheet into e-mail or select a virtually-limitless undo facility? Best of all, controllable interfaces allow programs to be set up for novices or experts with easy toggling between those modes or offer more advanced capabilities only when requested. Microsoft Office and Windows have taken that general direction, with most-frequently-used choices appearing first in pulldowns, and other choices only coming into view when you hold onto the mouse button at the bottom of the pulldown. Again, it is disappointing that these ideas were covered in only a couple of pages.

Shneiderman then proceeds to analyze user activities. Chapter 5, "Understanding Human Activities," contains some seminal ideas that can be fleshed out by anyone in the HCI, Web design, or software development fields. The author offers four categories of relationships: self, family and friends, colleagues and neighbors, and citizens and markets. Little discussion is required to understand these relationships of anyone from the smallest slice of the world up to the largest slice. Secondly, he categorizes four stages of activities: collecting, relating, creating, and donating. Individuals collect information, relate pieces of information to others, create works, and donate these works to one or more of the categories of relationships. Finally, Shneiderman introduces the Activities and Relationships Table (ART), a four-by-four category grid with relationship categories along one axis and stages of activities along the other. He then discusses ART using two examples, one a set of photo collection and management tools, and the other a set of tools for ubiquitous computing. These examples flesh out his categories and the ART concept.

Shneiderman then offers up a number of chapters providing his view of possible near-term changes in education, business, medicine and politics, all supplemented by ARTs. He has some solid ideas, but while they are imaginative, they are not revolutionary. For example, the author devotes several pages to the possibilities of Web sites, discussion groups, and online chat for exchanges of patient information. Shneiderman's purpose here and elsewhere in these chapters must be to explore the somewhat quotidian examples of everyday electronic life to back up his claim that we are shifting to a user-centered world, and he does that very well.

As you may gather, this reviewer was not quite as happy with these chapters as with the rest of the book. Perhaps it's because Shneiderman's examples have been discussed elsewhere; people new to discussions of the current trends and near-term future might be a better audience for this material.

This reviewer was, however, quite happy with the last chapters of the book. Shneiderman explores the many facets of creativity in his chapter "Mega-Creativity." He provides a set of principles for being tremendously creative. Of course, this ties in very well with da Vinci, a mega-creator if ever there was one. Shneiderman ends the book with a short chapter, "Grander Goals," that offers a wider vision of the future than is found in his examples of contemporary usability.

Although this review is somewhat mixed, I believe *Leonardo's Laptop* is worth reading. Even if readers skip the chapters on education, business, medicine, and politics, they will still come away with an interesting and worthwhile viewpoint on usability. And usability is something that can stand plenty of books and papers.

As a sidenote, there are wonderful reproductions of the works of da Vinci, both paintings and notebook pages, throughout the book. These and some one hundred other da Vinci images are available from Planet Art for around $140, all of them royalty free. If you make a lot of presentations, have a large Web site, or produce a newsletter, you might want to invest in the Planet Art CD.—*Tom Zillner, Wisconsin Library Services, Madison.*

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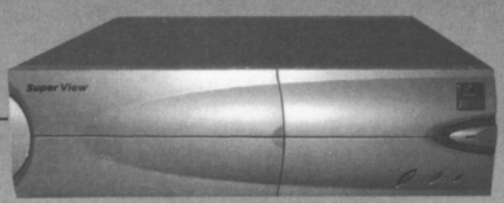

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