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The Future of Automated Systems in the Academic Library

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Abstract

Automated syslems in the academic library are continually evolving. An overview of the history of the automated system is presented with emphasis on client/server models. The shift from character-based to windows/web-based modules in the automated system is explained. Speculation on the how the changing roles of librarians. the evolving automated system, and the changing technology such as the ASP model. may impact each other.

Keywords:

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Introduction

Predicting the way the library will be in the future is not an easy task. Back in 1986. Ruth M. Davis, President of The Pymatuning Group Inc. was asked to do this as the third Leiter Lecturer at the National Library of Medicine. She stated that technology would free information and knowledge services from the library and its associated immobility. Technology would peel the covers off the information content of library collections and give users direct access to this information from locations of their own choosing. Technology would free dimensional constraints that had previously prohibited the mixing of imagery, data, text, and signals. Technology would remove geographical inequalities of access to the tools of science and engineering. All of this would be facilitated by knowledge-based Integrated Services Digital Networks (ISDNs). ISDNs were visualized as large depositories storing both the factual databases and the world's library archives on satellites. This way one could have an "instant" library in ten minutes using satellite communications such as a small one meter receiver antenna and transmission speeds of over 100 megabits per second. Time has shown that most of these predictions have come true, except for the satellite storage of ISDNs. Davis' predictions were made before the development of the World Wide Web and so she did not have the means to predict that it would become such a dominate means of information communications. The point is that any predictions for the future can only be based on what is present today. One can not speculate on how an unknown technology can influence the future. Keeping this in mind, this paper would rather look at trends visible in library automation today and how these trends will influence the future of automated library systems.

The automated library system of the future will need to accommodate librarians wanting to offer the patron more and better services. The system wi11 need to provide easy access to electronic resources. The system will need to blend thoroughly into the library's operations from both the user's and the librarian's point of view. Physically, large areas of the library will be converted into centers for easy access to electronic resources. The automated system will need to be self-supporting and transparent with the vendor in the background only necessary for trouble-shooting and enhancements. Vendors will form partnerships to tailor the system to a customer's needs or libraries will shop from several vendors to get a more tailored system for their needs. Enhancements added need to go beyond traditional library functions. Systems will need to be supporting transparent interconnectivity to the other databases in the academic community for such functionality as materials bookings, textbook management, readers advisory systems, and personal bibliographic record handling applications.

This paper will present a brief overview of the automated system in the library from the beginning to today's client/server systems. The paper will explore in detail the client/server computing model. The paper discusses the effect that today's and tomorrow's technology may have on the services in the academic library of the future. No longer can the library rely on a static automation system. The system will need to be dynamic, ever capable of being updated, to take advantage of new technologies and information resources.

Overview of the Automated System within the Library

The development of electronic databases began in the 1960's and preceded the development of automated systems for libraries. Libraries started to acquire automated systems in the late 1970's. Vendors at this time concentrated on supplying a solution for a

specific functional task. Some vendors concentrated on circulation while others concentrated on acquisitions and serial control functions.

In the 1980's, there was a shift to integrated automated systems. Often all the software, the hardware, and services were provided by one vendor. This is also known as a turnkey system. The advances in the development of library automation were tied in with technological advances. For example, libraries were not able to install large quantities of dumb terminals, essentially a monitor and keyboard, for online public access catalog (OPAC) access until. hardware vendors could deliver reliable CPUs with increased terminal capacity. Many vendors lost a lot of their business due to their inability to incorporate new technologies with functional enhancements. One example of this is the failure of some vendors to migrate to the Unix operating system, which is small and open thus allowing application developers to expand its functionality. Those vendors that moved to the Unix operating system were then capable of providing connectivity with other modules and systems. Also, by the end of the 1980's vendors were expected to accommodate standard off-the-shelf peripheral devices such as printers and barcode scanners.[1]

Since the 1990's. there has been the shift to a client/server model. The new technology that is driving this shift is three-fold. The first is the personal computer (PC) revolution that started in the early 1980's and introduced a completely new way to perform day-to-day activities. The second technology advancement was actually a software development and that is the introduction of the graphical user interface (GUI) for the personal computer. This interface was first introduced by Apple Computers with their Macintosh in 1984 and was quickly followed by the rest of the PC's with Microsoft's Windows. The ability of the user to open multiple windows, use pull-down menus and point a mouse and by "clicking" on icons to accomplish tasks changed the scene of computing. Of course this development would not have occurred without the increased computing power of the personal computer, which is still advancing at a tremendous rate today. The last development which took place in the late 1980's was the introduction of the Internet's World Wide Web (WWW or Web). This method of communication on the Internet was first proposed by Tim Berners-Lee at the European Laboratory for Particle Physics (CERN). Linking of documents by clicking on anchors in a text and now in any media has completely revolutionized how people communicate and do business. This latest development is also apparent in automated systems as most vendors offer a Web-based online public access catalog (WebOPAC).

Today, the integrated library system has a very mature level of functionality. The set of features, such as a database and modules for every library function, expected in an integrated library system are well defined and almost universally implemented. The differentiating factors today involve interconnectivity, architecture and interfaces. Two musts are that library systems must be able to communicate with other systems through Z39.50 and must be accessible by Web browsers. A library's OPAC is no longer a stand-alone entity. Libraries must not only continue to provide access to their own holdings through their online catalogs, but will be expected to deliver a myriad of other information sources. These include electronic serials, online publications, Web-enabled databases, and real-time news resources. Any online catalog lacking the ability to integrate into this electronic information environment will not be adequate to meet the needs of the library and its users.[2]

Client/Server Computing

Libraries are moving toward a client/server environment where much of the overall computing activity is distributed between a server and a client. A simple definition of

client/server is:

> A computer architecture which divides functions into client (requestor) and server (provider) subsystems. using standard communication methods (such as TCP/IP and Z39.50) to facilitate the sharing of information between them.[3]

The usual depiction of a client/server architecture is that the client and server operate on different computer platforms. An example of this would be the server is a minicomputer while the client is a desktop personal computer. This is not always the case as a single machine can act as both client and server on a network. For example, two automated library systems in different libraries which are linked for resource sharing are functioning as client when requesting information, and as server when providing it. If the server and client reside on different platforms, then either one can be upgraded without affecting the other. One client can also be used to communicate with several different servers. For example, a personal computer based client can access not only the local library system, but also a CD-ROM server, a remote library system or an online database service. Of course, servers are usually designed to connect to multiple clients concurrently. In a client/server architecture, the client and server can be distinguished from one another by the differences in the tasks they perform, as clients always initiating the "dialogue" with the server by requesting a service and the server responding with the requested information.[4]

The following example demonstrates how a client/server environment works. A reference librarian formulates a request in the OPAC for a patron at his/her personal computer (client). This request is translated into an information request in standard format such as Z39.50 or a proprietary format understood by the information source (server). The link between the client and the server can be a local area network (LAN) within the building, an university-wide LAN, or a wide area network (WAN). Upon receiving the standardized request, the information source (server) retrieves the appropriate data, packages it into a standard form, and ships it back to the personal computer (client). Note that the server does not need to know the command language of the client, in this case the OPAC the patron is using, to respond to the request.[5]

The division of labor between a server and client can be anywhere along a broad continuum. At one end, only the presentation interface has been moved onto the client, termed a thin client. At the other end, almost all applications have been moved onto the client, termed a thick client, at which point even the database can be distributed on different machines. If you take this continuum far enough the client/server could be the same machine. Communication between database (server) and requester (client) is divided into three major tasks: database management software, applications which in part will massage the data, and presentation software which manages how the data is displayed to the user. Five different points along the continuum has been identified by the Gartner Group which typify different styles of the client/server model. These five, from a thin client to a thick client, can be characterized as follows: distributed presentation - the presentation is handled partly by the server and partly by the client; remote presentation - the presentation is controlled and handled entirely by the client; distributed logic - the application logic is handled partly by the server and partly by the client; remote data management - database management is controlled and handled entirely by the server; and distributed database-database management is handled partly by the server and partly by the client.[6]

The network that provides the client/server environment has to be considered. The traditional local area networks (LANs) were proprietary and are even known by the

manufacturer's names such as Novell and DECnet. On the other hand, the best known wide area network (WAN) is the Internet. The Internet allows many different machines to communicate, using a common standard, a protocol. The protocol for the Internet is TCP/IP meaning Transmission Control Protocol/Internet Protocol (Aside: the Internet was actually named after the protocol that the network uses for communications). The International Organization for Standardization (ISO) has proposed a set of standards for network communications called the Open System' Interconnection (OSI) Reference Model. OSI consists of seven layers and TCP/IP functions at the "transport" and "network" layers of this model. It is worth mentioning, that although there has been formal pressure for the complete adoption of the OSI standard, it has not occurred. TCPIIP is also fast becoming the most popular protocol for internal LANs, called an Intranet. Libraries that have implemented local Web based OPACs are utilizing an Intranet to facilitate requests between the client and the server.

Vendors of automated library systems are switching from the host/terminal system to the client/server environment. This migration is to both thin client/server and thick client/server systems. The vendor Ameritech is marketing a thick client/server system called Horizon. The system is based on microcomputer technology for the server and for the clients. The database is on a microcomputer (server) and all the modules are Window-based applications and reside on desktop microcomputers or workstations (client). In the thin client/server environment, old and new technology can live side-by-side, as a PC or a network computer can be the client. The vendor Endeavor is marketing Voyager, a thin client/server system. In a thin client/server system network computers are not the same as microcomputers on a LAN. Unlike microcomputers, network computers do not need a hard drive as they run all their applications from a server. Sometimes network computers are also referred to as 'smart' terminals. Network computers replace the 'dumb' terminal of the host/terminal system since the network computers can do so much more. Often there is an intermediate server placed between the network computers and the main server. The intermediate server would then runs Window emulation on the network computers, handles Internet access, provides dynamic allocations of RAM and disk resources, CDROM access, and also can run desktop applications such as word processing software.[7] One of the major advantages of this technology is that older 286, 386, or 486 PCs may be added to this type of network without upgrades to make them Windows 95 compatible.[8]

Window and Web-based Applications for System Automation

For the last couple of years, vendors have been developing graphical user interface (GUI) applications. Until recently the GUI applications were primarily for online catalogs and database access. Only recently are vendors introducing GUI applications for the cataloging, circulation, serials control and acquisitions modules.

Most people refer to applications that run in a graphical user interface (GUI) operating systems as window-based applications. The applications are all based on the GUI principle of WIMP, an acronym for Windows, Icons, Menus, and Pointing devices. Therefore the applications all have certain features in common such as pull-down menus. There is even a de facto standard that Apple imposed on developers of applications for the Macintosh. As an example, an application's menu bar had to be set up as follows:

1. The menu had to appear at the top of the open window.
2. The order of the menu choices from left to right were File, Edit, View, after which the application developer was free to create his own menu choices.

3. The above three described menu choices should also be standard in their submenu choices. For example, the File Menu had to have the window manipulations features first, followed by saving features, followed by printing features, and lastly an exit (or quit) out of the application.

The bonus for the user of Macintosh applications was that all the applications were similar in looks and basic operations, thus speeding up the learning curve in using a new application. Mac users used to boast that it didn't matter what new application they had to learn, that they could immediately use that application. Microsoft Windows applications has also adhered to this de facto standard to a certain extent.

Window-based applications need to run in a supporting GUI operating system. Most commonly used GUI operating systems today are Microsoft Windows, Macintosh OS, and Unix-based GUI such as Sun Solaris. One can run these applications on thick clients that have such operating systems or on thin clients where the am interface is available from the server.

The advantage of using window-based applications is one gets the full benefits of multi-window and multi-tasking functionality. One vendor Ameritech, has a fine example of this technology in the Horizon system.

Web-based applications, on the other hand, are designed to be used in a Weh browser. This is a true client/server solution. The applications are completely hardware independent. Applications are developed using Internet-based programming languages such as Sun Microsystem's Java or Microsoft's Xactive. The applications can then be accessed from remote servers via the Web. Using the Internet (or Intranet) as the communication channel, hardware independent clients using standard Web hrowsers, such as Netscape's Communicator or Microsoft's Explorer. can execute the Web-based applications. For example, the Java code in a semi-compiled form is embedded within the Web HTML document by using the 'applet' tag. When the application has been invoked by the client, it is delivered from the server via the Internet and compiled and executed by the Web browser. Actually a Web document might include a number of small Java applications.[9] This technology when used for information retrieval relies on middleware that resides on the server. Middleware has been defined by the Gartner Group as :

> that breed of software residing between the user's application and operating systems, concealing the complexities of networking protocols, database dialects. and operating system flavors as data requests are interpreted and routed through an organization.[10]

It would be the middleware that would have the Z39.50 protocol embedded.

Web-based applications do not share any standards at this time. So far the applications implemented are small, but as applications grow in complexity there also will need to be a consensus in the appearance of these applications, otherwise users will loose the quick learning curve attained in window-based applications. The advantages of web-based applications are many. These applications retain all the advantages of window-based applications. They are portable, as they are independent of any operating system. Lastly, these applications can use the linking ability built into the Web.

Already there are many examples of Web-based applications available in the business environment, and they are also appearing in library systems. The most obvious example is the WebOPAC. Another example is the Bradford OPAC 2 (BOPAC2), an initiative at the University of Bradford, UK and sponsored by British Library Research and Innovation

Centre. BOPAC2 is an experimental library interface designed to help end-users conduct parallel searches across multiple bibliographic catalogs that are Z39.50 accessible. This database employs Java applets as the means of processing the search request, presenting the search results, and other, further manipulation of the results by the user. Users select which catalog or catalogs they want to query and enter search terms on a form. Users can examine and manipulate the results of their search in various ways. This software is being evaluated in two UK university libraries, and has also been set up for external access (http://www.comp.brad.ac.uklresearch/databaselbopac2.html).

Library Services

There is no doubt that the trends in library automated systems will greatly impact library services. New services will appear and some current ones will disappear or change their function completely. The fact is the importance of the place where information exists and is used has decreased. Academic librarians previously focused on getting the information into the library and hoped that this would help the user. Now information can be located anywhere, and the focus has shifted from the place, the library, to the user. Although the librarians duties are changing, the traditional goals of librarianship, as articulated by Dewey and Ortega y Gasset, prevails: serving the user, bridging information and user, and serving as a filter interposed between .the user and the information. Ranganthan and Ortega y Gasset see the future role of academic librarians as information professionals, a role in which librarians function as filters for the user against the torrent of information disseminated by means other than the printed book.[11] The following will speculate on how the changing roles of librarians, the evolving automated system and the ever-changing technology have impacted each other.

Most integrated automated systems serve the functions within traditional roles of librarianship. The automated system provides lots of statistics for collection development. Acquisitions, cataloguing, serial control, and circulation each has its own module within the automated system. Access to the collection is provided through the online public access catalog (OPAC). The automated system provides a means of maintenance of the system usually done by the systems librarian.

Traditionally, the services of the library were divided into two areas of responsibility: the technical services of acquisition, cataloguing, serial control, and systems, and the public services of circulation, interlibrary loan and reference.

Technical Services: Beastall (1998) states that the staff of the
library are unable to come to terms with the rapidly changing technology and adopting any new technology has become a problem. Most technical librarians do not realize

> That the library is like a lookout scout who needs a faster horse than the enemy, or a gun that has a longer range than the opponent's.[12]

So technical services are often not on the forefront of library reform. This has to change, as it will be the technical functions of the library that will need to manage and organize the mass of information now being gathered by the libraries. It will be critical to a library's functioning that technical librarians keep up by self-education with the changing nature of information management. All librarians will need to read the literature, attend conferences and workshops, and participate in discussion groups in their field.

Most automated library systems have had a Web OPAC available for at least three years, but most technical functions are still performed in a character-based interface. As the GUI workstation moves into technical services there is a need to train the technical staff to work within their new physical environment.[13] This training should not only include learning the new GUI module, but also how best to take advantage of a multi-windowing environment that supports editing between applications, importing/exporting of documents and data from one application to the next and multitasking. Extra training should also be supplied to increase the librarian's proficiency in standard desktop applications of word processing, spreadsheets, database managing and communications. Right now most of the vendors of libraries systems providing GUI technical services modules do so in a Windows based computer. This movement may be very short-lived, as web-based products have already made their appearance in the marketplace and will probably dominate the computing environment of the future.

Will some of the technical services disappear, or will their functions blur together or even change completely? Already the function of the acquisition librarian is changing. Ten years ago, all acquisitions were of physical materials. Now, much of what is being acquired is electronic and does not leave a material trail. Most automated library systems are incorporating enhancements to the acquisition module to facilitate this new function. Acquisition modules now can interface with vendors directly, thus eliminating another paper source. In a way the acquisition librarian's functions have become easier with the advent of the capability of transporting information into spreadsheets and automated report writing. Now, the acquisition librarian can spend more time in analyzing the data. Should the role of the acquisition librarian merge with the role of collection development, and the automated tasks of acquisitions left solely to support staff? That movement is already here, as at the Salve Regina University the acquisition and collection development librarian is the same person.

Still decisions need to be made on the non-traditional material a library should acquire. Should the decisions be made completely by the collection development librarian, or should other departments take part? At the moment, the trend is that if the reference department wishes to add free pertinent information from online sources, the sources are incorporated into the library's webpages and not in the library's catalog. Decisions need to be made on what needs to be cataloged and even more importantly, who makes the decision of what needs to be cataloged?

Already, catalogers must grapple with the present and future issues of providing subject access and authority control in online collections. With the expanding world of electronic databases, information on the Internet, and the development of more sophisticated OPACs, the catalogers must deal with information that is controlled by traditional library conventions as well as information that does not conform to any quality control standards. Librarians must be ready to give this information to users in ways that will make its use most effective. Already the role of a cataloger is changing from processing to maintaining. The introduction of Table of Contents modules from vendors is an example of maintenance. There is no processing involved. The library is not adding anything to the collection, only the item's bibliographic record will need to be updated. Another well-known maintenance task is the upkeep of the 856 field of the MARC record that is used for location and access information of an electronic resource. Link-checking software is already available from most vendors of automated systems.

Libraries have been under a heavy budget crunch when it comes to acquiring serials. The cost of journals has risen astronomically in the past decade. Louisiana State University (LSU)

libraries constructed a methodology by using data from document delivery use, interlibrary loan use, and faculty needs assessments to redefine LSU's journal collection and expanding electronic information resources. One major decision was to give access to document delivery services such as SUMO UnCover to supplement journals that the library were discontinuing.[14] More and more serials are being published as on-line journals only. How does the serial control module track the new issues from these journals?

The systems department functions have expanded over the years from system maintenance to include a myriad set of duties that span both the technical and public services of the library. Some of the added duties include web master of the library's homepages; staff trainer; PC technician. maintaining LAN-based services, and developing applications.

Public Services: Many young people today are familiar with computers and electronics in general, but academic libraries should not use this as an excuse for presenting the user with complex and hostile online systems. The system should be such that it is intuitive and can be used effectively by just about anyone. Typical of the student perspective when faced with a new electronic interface is shown by the results of a survey done by Philip Davis at Cornell University. Davis determined that undergraduates rated trial and error as the most effective method of learning computer skills, well above online help and printed documentation.[15] Students want an easy to navigate that can be learned on the go. One way in which this can be achieved is by well organized library home pages that not only contain links to the online catalog, databases, and electronic journals, but also will provide an array of subject guides. quick reference, tutorials on search and retrieving information. and style manuals. Another method being tried is the personalization of the library to its patrons. The MyGateway service at the University of Washington allows patrons to customize their access to the library's resources. This method of harnessing the deluge of information that is available allows the patron to select those resources of particular interest and have their selections maintained at the library site and can be referred to each time the patron comes back. An initial set up will allow the patron to choose among the resources within the system. The resources include databases and the library catalog as well as news sources, university links and personal links to web sites.16 An expansion of this personal page idea known, as a portal, could include additional features. Patrons could be informed of new acquisitions or shown book reviews of interest based on previous searches or checkouts that a patron has made. Steve Coffman's proposal of the "Earth's largest library" was controversial when it was introduced but many aspects of this concept are already being implemented on commercial bookseller sites.[17]

System vendors are forecasting the "one stop" system. The future WebOPAC should be versatile. It would include not only the libraries physical holdings but also its electronic resources. It is not an unresonable projection. to expect that a patron would be able to search by keyword in the WebOPAC and get an array of results. These results may include books (with reviews and table of contents), full text articles, web sites and reference resources. There could even be a link to a document delivery service or to inter-library loan for materials found that is not located in the library. *Encyclopedia Britannica* offers a very useable model for this type of multi-resource search on its website (http://britannica. com). The goal would be a seamless transition for the patron. One would only have to work from one environment, the library's WebOPAC.

The physical layout of the library will change as more room will be assigned to provide patrons access to electronic resources. The tasks of a reference librarian will also increase and so this is one area of librarianship that will be expanding. The reference librarian's task

will be to help the patron find the information that he needs. As the mass of information increases in all its forms, librarians will need to find ways to make the finding of relevant information easier to access for the patron. The academic library. in the accomplishment of this goal, will need to provide instruction, electronic subject guides, information webpages and access to the librarian, either physically or remotely. E-mail and fax reference services are already offered in many areas. Online, real time access is seen as a possibility for the future.

Today, many of the traditional interlibrary loan (ILL) functions are being performed electronically and have moved away from the realm of the interlibrary loan department. Often, the catalog may be shared with several other libraries and submitting an electronic request for material not held at ones own library results in having the material delivered directly to the circulation department of the patron's home library. When the material arrives, the patron can be informed electronically or can check the status of the request by viewing their library record online. Taking this concept one step further, a Union Catalog may be shared among regional libraries that have library systems from different vendors. This catalog allows a patron to electronically place an ILL request and, with a delivery system in place, get quick access to materials. Innovative Interfaces Inc.'s INN-Reach software is designed just for this task.[18] The Interlibrary loan department is actually not involved in either of these scenarios as the loan function is incorporated directly into circulation functions.

Other innovations include the ability of the patron to search specialized databases, such as ArticleFirst from FirstSearch, using their own WebOPAC through Z39.50 technology. This allows the patron to use that capabilities of its own WebOPAC to place requests for materials found in that database. Information from the database on the article is electronically transferred to the ILL department along with the patron information. Most automated systems now have incorporated a complete ILL module allowing for the tracking of ILL requests, interfacing with OCLC or other ILL consortia, and keeping complete statistics of the ILL function. One of the ILL librarian's tasks that has not been affected is that of negotiator and implementer of a library's ILL rules with other libraries. Rules for ILL may be for agreements between individual libraries, for consortia agreements such as in the Higher Education Library Information Network (HELIN), or a serial based one such as Consortium of Rhode Island Academic and Research Libraries (CRIARL). It may be wise to combine circulation and ILL departments into one function.

Innovations that have yet to be fully utilized in the circulation modules of current systems include electronic reserves. Faculty materials may be scanned for electronic access or links to a department homepage where materials are available are two ways in which electronic reserves may be utilized. The circulation function within the library may become completely self-service. Some libraries already use self-serve check in/out stations. Recently Checkpoint Systems, Inc. has developed a radio frequency identification (RFID) technology that has been released as the Intelligent Library System. This system gives patrons self checkin and check-out ability as well as providing inventory control, circulation management, and loss prevention. It functions via unique circulation circuits that are concealed within the library materials.[19] The circulation librarian’s role will change to one of patron database control, inventory control. and policing of copyright rules and licensing agreements.[20]

Beyond traditional functions of a library: While most traditional public service

functions remain an essential part of library operations, they have taken on new forms and have been joined by additional services to create a new look for public service. Some system modules already on the market from vendors will expand a library's traditional functions into the academic community. Some examples are textbook management systems and readers advisory systems such as CARL's NoveList. Just recently, Innovative Interfaces, Inc. has partnered with netLibrary.com to integrate the use of eBooks with Innovative's automated library systems (INNOPAC and Millennium). Under the agreement, Innovative will develop additional features to enable its software to automatically notify interested libraries of the availability of specific netLibrary eBooks, and to enable libraries to purchase eBooks electronically. For libraries that so desire, full MARC records for netLibrary eBooks will be loaded into the library catalog with access to the eBook. Preview access (such as the ability to view the table of contents, the first few chapters, etc.) also may be provided. In addition, Innovative's systems will manage the record-keeping and statistics associated with the circulation and use of eBooks by library patrons.[21]

In another new development, integration between system vendors and publishers has become a reality with the purchase of Endeavor by Elsevier. With this purchase, it will be easier for Voyager to create all kinds of direct links with Elsevier systems, but will this impose barriers for other system vendors as they strive to provide open linking with a multitude of vendors? Already there has been great progress in linking Ii brary systems. All of it is based on open systems - the Internet built on TCP/IP, the World Wide Web built on HTTP, Z39.50 providing global virtual cataloges and ISO 10160/61 opening up interlending. The industry needs more interworking standards between publishers and library systems - for authentication, licensing, copyright clearance, XML based e-trading and many more functions.[22]

All academic libraries should be thinking of creating a digital library. It is a means to preserve and make available the library's special collections. The advice is that there are projects that can be undertaken with very little funding. Many useful digital library projects are being created by reassigning existing staff and budget, or by taking advantage of grant opportunities large and small. An example given is Canada's University of New Brunswick, a medium sized institution with 13,000 students, that has created an Electronic Text Centre (http://www.lib.unb.caffextsl) that hosts a number of projects, such as -the Maliseet-Passamaquoddy Dictionary.[23]

Conclusion

Given the rapid growth of information, information sources, technological advances and changing user demands, libraries and librarians need to respond quickly and position themselves to provide a useful and relevant service. Innovation in library applications often does not always come directly from the vendors of integrated library systems, but rather from other sources. These sources include the information market place and also librarians. For example, Innovative Interfaces Inc. has many user groups. The main user group, Innopac Users Group, each year presents a request list of enhancements to Innovative.

The new business model of an application service provider (ASP) for library automation may have the potential for long term impact on how libraries manage technology. ASP is essentially a supplier who makes applications available on a subscription basis. An ASP is a business partner that provides choices regarding how software applications are managed and delivered. Carl Grant of Ex Libris (USA) states:

> There is a continuing need for systems that will serve as building blocks, not monolithic, all-encompassing solutions for libraries. In other words, systems that offer a well defined API (application programming interface) allowing it to openly and comprehensively interface with many other information tools used by today's forward-thinking libraries. Only through solutions like these can we take advantage of trends in distance education. copyright access, and multimedia formats.[24]

This modular approach in an open architecture environment can quickly extend a library's system's capabilities to accommodate technology advances. It can also be a means of outsourcing the entire library system and support services. This solution can be very attractive to smaller and medium-sized libraries. Essentially, the library's system could be housed at an ADP and all access to the system is through the Internet. One ASP could service multiple libraries at various levels of service.

Forecasting the future, the ASP model could be the end of integrated library systems as we know them today. The concept of the integrated system would shift from each library maintaining their own system, to help maintaining a consortium system, to tending Coffman's "Earth's Largest Library" (ELL). Each library through an ASP provider(s) would maintain their holdings and provide their library functions through the ELL. The concept is already manifested by OCLC, which contains records of 750,560,697 holding locations as of April I, 2000. (OCLC Abstracts). OCLC membership provides bibliographic records for downloading into one's own system. holding information, interlibrary loan services and an OPAC, WorldCat.

Libraries need to constantly review what they have, anticipate changes, innovate and provide excellent services and products. Libraries must look at how they can continue to help users as they always have done in the past and also look at new opportunities that will add value for the users and ensure that users continue to get the right information at the right time in the right form.

Notes

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