PLANNING, ASSEMBLING, AND MANAGING A VIRTUAL LIBRARY

Much has been written about roles and responsibilities of libraries and librarians in the electronic environment, but as Stanley Katz recently asked, "Do we know what we want the virtual library to be and do? Is enough money, and appropriate personnel, being allocated to libraries to perform their potentially expanded role in both teaching and scholarship?" (Katz, 2001). Money and personnel are, of course, two critical issues that must be addressed by anyone undertaking a virtual library project.

Overall, when considering or beginning a virtual library project, determine the following:

- **Planning**
  - o Mission and Scope
  - o Stakeholders
  - o Timeline
  - o Communication
  - o Evaluation and Assessment
- **Management and Funding**
  - o Organizational Structure
  - o Staffing
- **Technology Infrastructure**
  - o System Integration
  - o Commercial Services
  - o Authentication
  - o Interface Design and Usability
- **Content and Service Development**
  - o Electronic Resources
  - o Guides and Informational Pages
  - o Resource Sharing
  - o Reference

This chapter looks at these issues in the context of virtual library development.

Planning

As with any major project, the importance of planning for a virtual library cannot be underestimated. As will be seen with the two virtual libraries profiled in Chapters 3 and 4, much thought and work must be dedicated to planning and management issues. Essential reasons for project management include ensuring that requirements are met, standardizing

routine work to avoid duplication of effort, reducing the number of potentially overlooked tasks, and maximizing use of resources (Martin, 1997).

Collaboration with existing institutions to develop, manage, and maintain library technology, infrastructure, resources, and services is crucial. Defining mission and scope, identifying stakeholders, determining potential funding sources, and developing a technology infrastructure are all practicalities that need to be addressed in planning a virtual library.

Define Mission and Scope

Determine the size of the project. Defining and articulating what the virtual library will be helps planners determine resource needs and also allows patrons and clients to understand what can be expected from it. The following few questions will help define the scope of a virtual library effort:

- Is the virtual library an extension of an already existing service?
- Is the virtual library an attempt to bring together and coordinate existing services across a state or region?
- Is the virtual library a completely new project?

The answers to these questions help planners define the size of the project and begin to set its direction.

Defining the mission and scope is important because it sets the objectives, parameters, and priorities around which provision of content and services revolve. Defining the mission allows management to determine adequate levels of funding. It allows the library to articulate its goals, justify budget expenditures. It provides the institution with a context for marketing and public relations.

In determining scope, decide what services will be offered, and plan for scalability of both resources and services. By planning for extension of resources during the planning stage, a virtual library will be able to implement an infrastructure to support expansion of its services and increased user population without placing a strain on the system as expansion takes place.

Scalability: the ability of an application to continue to function well as it changes in size or volume to meet user need. (definition from www.whatis.com)

The library's mission and vision also must be tied to the mission and vision of the parent organization, if one exists. This link places the library within an overall context and firmly establishes it within a greater institutional vision, allows the library to provide clear direction, and demonstrates its value within the overall institutional context.

The scope of the project must also include determination of the primary audience. Although the gateway to a virtual library is accessible globally through the Internet, the library must focus on providing information and service to its primary clientele. In a sense, the role of the virtual library is not much different from that of the traditional: select, acquire, organize, and make information available to serve its primary community and assist with the use of that information. Articulating the primary community or audience is essential during the planning phase so appropriate technology, resources, and services can be identified and so effective evaluation methods may be developed.

Stakeholders

Regardless of the scope of the virtual library project, stakeholders must be identified for effective coordination and to gain commitment and support of the key players who will make or break the project. Stakeholders may include state and local government officials, institutional managers and administrators, existing library personnel, faculty, and, of course, end-users.

Identification of stakeholders also allows for determining infrastructure and services already in place that may be leveraged to avoid unnecessary duplication of effort and expense. In the case of Kentucky Virtual University (KYVU) and Kentucky Virtual Library (KYVL), the governor and state legislature played a key role in the development of this statewide effort along with Kentucky Library Network, the state library organization. KYVL also has effectively used the work group structure to develop participatory management of the library and to create buy-in through participation of library personnel throughout the state.

The two virtual libraries profiled in this issue of *Library Technology Reports* are similar in that they are statewide efforts funded through legislative appropriation. Coordinated efforts were made by stakeholders at all levels of the process to define the mission and scope of the libraries. This involvement was important to bring together the many different groups and communities necessary to make such large efforts successful realities, to secure funding, and to implement the finished project.

Timeline

Set a timeline for the project with deadlines for key aspects. Determine who is responsible for key points of the project and develop procedures and a structure that will allow for effective workflow and communication as each aspect is developed and completed. Allow subgroups to set their own meeting requirements, procedures, and protocols within the boundaries and priorities of the entire project.

For example, determine how often subgroup project leaders should meet and how they will report to and communicate with one other between meetings. Identify required reports, who is responsible for delivering it, when it is due, and who the report is delivered to. Clearly identify levels of authority and reporting structure so all parties know where they fit into the project and how each subproject intersects. Use project management tools to help track the project overall as well as for each subproject. These tools, such as Gannt Charts, tree diagrams, and flow charts, may also be used as effective communication tools for project groups and teams.

Set a launch date with appropriate activities to publicize the project. Include a contingency plan to anticipate risks and problems and potential methods of addressing problems so when they inevitably arise, a plan is in place to solve them quickly, efficiently, and with the least possible disruption of service.

Communication

Two types of communication plans are necessary: internal, to facilitate communication among the library's staff and stakeholders, and external, to market and promote the library to end-users and to the public. Develop an

internal communication plan including dissemination and archiving of regular progress reports, minutes, and other documentation. Ideally, communication strategies should be built into the work process for committees and groups so everyone involved in the project is kept up-to-date and informed. Progress reports should be distributed at the completion of each deadline identified in the timeline.

Communication also allows stakeholders to be involved and helps reinforce commitment. One strategy from KYVL, for example, is the use of a Web site for work groups to post minutes, reports, and other documents of interest to the entire virtual library community. Other communication strategies that may be used include telephone calls, fax, meetings, e-mail, distribution lists, listservs, threaded discussion lists, shared networked file or Web server space, or videoconferencing.

An external communication plan is important for building participation and buy-in for the project. Strategies may be similar to those used in the internal plan. Completion of subprojects within the implementation plan can be used as communication checkpoints to demonstrate successes and build involvement. To facilitate use and participation by those who do not have time to become full-time members of work groups or other volunteer committees, use Web-based forms for content submission and surveys, or discussion groups. These relatively small efforts will assist to increase use and may generate innovative ideas from potential users of the product and services. Additional methods of external communication include flyers, brochures, press releases, or visits to groups that form the core user base. End-user surveys should also be employed; once again, regular library users may be in the best position to suggest ideas for improved and enhanced services.

Develop an Evaluation and Assessment Program

At times overlooked, evaluation and assessment plans and strategies should be included in the development of the virtual library from the beginning. Not only does evaluation and assessment allow management to analyze whether the library is delivering promised services, it also provides the library with valuable information to justify funding allocations and to develop new, innovative services. Assessment also provides management with documented success stories to use in both internal and external marketing and public relations. Assessments should include everyone involved with the project, including stakeholders, staff, and users. (Objectives should have been developed while defining the mission and scope of the project.)

In determining an assessment plan, identify the outcome measures of success for each objective and determine how those measures will be counted and identified. Use quantitative and qualitative methods. Although statistics may provide evidence of numbers of use, methods should be devised to demonstrate the effectiveness of use as well. Some methods of evaluation and assessment might include the use of statistics, surveys, feedback forms, interviews, focus groups, and user anecdotes or stories. Assessment should be ongoing as part of routine operating procedure. An evaluation schedule should be included in the plan with information on how it will be conducted, at what periods it will take place, by whom, how data will be disseminated, and how it will be used for improving resources and services.

Virtual libraries, whether an extension of a traditional library or stand-alone, have no location. They are accessible from anywhere at any time.

As stated by Hooper, "In traditional libraries staff developed and interpreted the library systems, and the information they contained, to the customers. In virtual libraries Infomediary Web functions become the new intermediaries. Users are encouraged to help themselves and the systems by which they do so are customized to make that as easy as possible and as intuitive as possible" (Hooper, 2001).

Whether reliant on infomediaries or on flesh-and-blood humans, management and organization structures determine how the virtual library will be managed, maintained, and developed over time. Organizational structure must be designed with clear delineations of responsibilities and reporting structure, whether it be hierarchical or decentralized. The organizational structure should reflect the environment in which the virtual library exists. The structure should be in place before implementation of the library begin, so managers and staff understand the responsibilities associated with their roles.

As will be seen with the profiles of KYVL and FDLLI, institutions must devise organizational structures that suit their individual natures and development as well as the political realities of their situations. Similar in that they both work and collaborate with individual libraries within their state, KYVL and FDLLI are also distinct.

KYVL is managed and coordinated by a central staff that collaborates on an effective decentralized work group structure. The development of KYVL through the vision of the governor and legislative appropriation for coordinated distance learning in the state allowed for a centralized body to come into existence from the beginning for overall management of the virtual library.

FDLLI is less centralized; it also began through legislative funding as an outgrowth of coordination efforts to bring together disparate bodies providing distance learning opportunities and services in the state. But FDLLI has the more difficult task of bringing together and enhancing already existing services among many organizations. It has done so through collaboration between state university and community college systems, coordination of the Reference and Referral Center, and management of the courier service by the Tampa Bay Library Consortium.

Staffing

Staffing for the virtual library must also be addressed as part of organizational structure. Library staff may work solely for the virtual library or be part of a more traditional library structure with hours dedicated to staffing the services provided by the virtual library. Member libraries may contribute or participate in virtual library consortia through staffing arrangements or support agreements. For example, both KYVL and FDLLI have arranged technology infrastructure and staff

support with systems departments of participating universities. Include staff training and development plans so librarians and other virtual library staff have the opportunity to enhance existing skills and learn new skills as services are updated and expanded.

Funding

Prepare a budget for startup, first-year operations, and five-year operation and development—anticipating upgrades and expansion. In each budget, include costs for personnel, equipment, hardware, software, licensing or purchase of resources, marketing and public relations, development, and other operating expenses (such as supplies).

Funding for virtual libraries may come from varied sources and is one of the most crucial factors in planning and development. Funding opportunities may include state allocation, grants, library consortia or associations, member fees and support, vendor partnerships, and private or nonprofit organizations.

In formulating KYVU and KYVL, the state of Kentucky punctuated its commitment by allocating the largest amount of resources ever allotted for virtual education and library services. This commitment of resources, combined with KYVL'S management practices, has undoubtedly led to its ability to provide the types of resources and services that make it viable and allow it to grow. In addition, the cost savings to the state generated by consortial purchasing, coordinated document delivery and courier services, and cooperative collection development may be tremendously advantageous and may be used as a marketing tactic for continued and increased funding.

Continued commitment to funding levels of this type are crucial, as is pursuit of other funding sources. For example, FDLLI is also state-funded but has added a Library Services Technology Act (LSTA) grant to fund the courier service. Both KYVL and FDLLI also rely on support from major universities within the state. KYVL has a cost-sharing scheme for database subscriptions; subscriptions for FDLLI are paid for by state allocation, the state library, State University System (SUS), and the community colleges.

The need to secure and maintain funding allocations from various sources cannot be overstated. State allocations can often be precarious and vulnerable to changes in political and economic climate. At the time of this writing, continuation of FDLLI's funding is uncertain. Although SUS received monies the community colleges did not, many colleges were pulling out of the initiative despite the loss of shared electronic resources and other services. Despite its tremendous success, RRC's funding has been guaranteed only through December 2001 with funds rolled over from the current fiscal year. The situation could change if additional funding is secured. FDLLI's experience is a good example of the vulnerability of virtual libraries dependent on public funds. FCLLI's situation demonstrates the need for a virtual library to to continually lobby and market itself and its services, ensure stakeholder and participant support, and celebrate success and benefits.

Marketing, closely tied to funding, is crucial not only to secure budget allocations but also to ensure use. RRC has marketed its services to students and faculty through presentations, announcements on electronic mailing lists, dissemination of documents, flyers, brochures, and linking from course

and class Web sites. KYVL has promoted itself through local news stories, presentations, training sessions, dissemination of reports, and preparation of fact sheets and brochures.

How to Determine Technology Infrastructure

For the virtual library to be a reality, an information technology infrastructure that ensures easy, seamless access to resources and services must be in place. For any virtual library to start from the ground up with completely new purchases of equipment, staff, and software is unlikely. Both KYVL and FDLLI demonstrate the effectiveness of leveraging systems and infrastructure already in place at member institutions through effective collaboration. Agreements and contracts should be made between the virtual library and member institutions outlining roles and responsibilities. These agreements should include information about hardware and software support, maintenance, levels of service, upgrades and updates, and costs.

Integration of Systems

Implementation and coordination of the technology necessary to virtual libraries depends on the dedication and commitment of member institutions as well as their willingness to partake in and contribute to shared systems and resources. If the virtual library is organized around a consortium or cooperation of libraries, the use of multiple system vendors for catalogs and databases may exist—with all its attendant issues (see table on page 27).

A common integrated library system (ILS), for example, one automated system shared by all member institutions, has the advantage of allowing members seamless sharing of files and transfer of data. However, a common ILS may also pose issues surrounding determination and maintenance of standards across the consortium, control over design and feature implementation, staffing, maintenance and security. On the other hand, distributed systems increase the difficulty of sharing files and data. Distributed systems may also impose a need for greater technical expertise to create and maintain workarounds to integrate the systems of different vendors (see table on page 27).

Distributed system: A system in which member institutions may purchase or maintain ILS from different vendors

Decisions about coordinating and bridging these distributed systems, as well as the potential migration to one common system, need to be made. If a shared system is not used and migration is not planned, bridges need to be built so the end user is not faced with the prospect of multiple entry points and multiple interfaces.

KYVL has been able to leverage the use of an ILS as an electronic resource gateway and has established agreements and guidelines for participation by member institutions. FDLLI has tackled issues surrounding bridging two different vendor systems used by the universities and community colleges within the state. Both KYVL and FDLLI have had to address difficulties posed by lack of standardization among vendors in attempting to provide seamless access.

Issues for Common versus Distributed Integrated Library System:

- Customization of design for individual libraries
- Degree of control for individual libraries
- Security of access to data
- Cooperative cataloging, shared or unshared authority control
- Union catalog or individual catalogs for each institution
- System maintenance
- Centralized staffing
- Shared patron files and other data
- Naming conventions and standards
- Report generation
- Documentation
- Training of staff

In addition, ILS vendors are beginning to offer arrays of services beyond the traditional library catalog, including options for patrons to personalize their accounts. If selecting a new ILS (see table on page 27 for criteria), virtual libraries must determine how these enhancements to the OPAC fit with other services provided by the library, whether to turn them on or provide the service separately, and whether and how to integrate them with other systems.

Criteria for Selecting an Integrated Library System:

- Cost (focus on overall, long-term costs; not on short-term low cost)
- Features
- Vendor history and financial stability
- Number and types of libraries the vendor serves and types
- Acceptance of emerging standards
- Vendor commitment to ongoing development
- Vendor-provided training and support on ongoing basis
- Documentation
- On-site support
- Vendor user group
- Frequency of updates
- Operating system compatibility
- Hardware platform needed
- Number of staff and degree of expertise needed to support system
- Graphical interface for end users and for staff components
- Ability to customize/design the end user interface
- Ability to integrate other vendor systems (indexes and databases)

Commercial Services

Outsourcing is not a new concept for libraries; the use of an outside vendor to save time or money has been adopted by libraries for various functions, such as cataloging. Commercial vendors that provide library services are emerging and targeting universities, particularly those offering distance learning opportunities, to provide an expanded range of library services. Although these commercial ventures are new and likely to alter and evolve over time, they may be attractive to planners who prefer to leave technology development and staffing to others or to those who simply cannot afford to keep up with the ever-changing pace of technology development and upgrades.

www.e-globallibrary.com

One of these services, Jones e-global library, offers a complete technology infrastructure needed to maintain a virtual library as well as development of all content and services that may be customized for a particular library or institution. Jones will work with an existing library to customize services, including integration of ILS and databases, or it will develop an entirely new virtual library for the institution. Although providing virtual library services in this manner may involve some loss of control, it may be a viable option for a library that does not have the staffing or expertise to maintain its own infrastructure or which prefers to devote staffing and funding to other functions. Institutions may also view this type of venture as less expensive and more cost-effective than increasing funding for the existing physical library to develop its own virtual library.

Jones e-global library, in addition to technology infrastructure, aims more broadly at developing an electronic full-service library specifically for online education that mirrors the services provided by the traditional academic library. Originally developed to support Jones International University, an online education provider, e-global library is now being marketed to other providers on a licensing model to partner either with Web-based educational endeavors or with academic libraries to customize content to support the curriculum of the particular institution.

Jones offers two pricing models: enterprise and per student/per course. Costs for either are determined by many variables, including size of user population and the options selected. As an example, a promotional enterprise base price offered at the time of publication for a higher education institution with enrollment of 2,500 students was $5,000 per year. Base price includes four tutorials (Libraries 101, Internet 101, Business 101, Papers 101), more than 67 research guides, about 3,000 Internet resources, links to 67 government sites with about 150,000 full-text documents, and sections on financial aid and career development. As part of the e-global library service, guides and Internet resources are updated quarterly and links are verified daily.

Although Jones works with established libraries, other commercial services appear to be aiming more broadly at providing resources and services directly to the public. Questia, for example, is only available by subscription to individuals. Searches of the Questia electronic book and journal collection are free; however, a subscription is needed to view the complete text or to use the service's research tools. At the time of publication, its subscription cost was $19.50 per month or $149.95 per year. Library and institutional pricing are not available. Questia's market currently consists of undergraduate students in the humanities and social sciences who access a collection of more than 40,000 e-books and articles.

www.ebrary.com

ebrary has signed agreements with 12 major university presses as well as

additional private publishers to distribute some of its material online in a .pdf format. Materials available are mostly older books. The company provides its service through a virtual copy machine model: books are available free online but the researcher must pay a fee of 15 cents to 25 cents per page to download or print the text. This fee is determined by the content provider or publisher.

www.xanedu.com

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Authentication

Don't underestimate the importance of enabling easy access to resources and services in a virtual library. Visitors to a virtual library may never step foot into a traditional library and may use the virtual library for all informational needs, so one of the goals of the virtual library should be to simplify access to all resources and services as much as possible. License agreements with vendors of commercial databases complicate authentication and authorization issues. Site licenses may impose restrictions on a number of simultaneous users and require access through a specific IP range, through ID and password, or they prevent it completely. Enabling use of restricted resources and services is accomplished through authentication and authorization.

Authentication = ensuring users are who they say they are

Authorization = providing access to restricted resources based on authentication of who the user is and the groups he/she is associated with

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Ideally, users should be able to access all virtual library resources with a single sign-on so that they are not faced with the use of multiple passwords across vendor platforms or library services.

Potential authentication methods and issues include (Guenther, 2001):

- **ID and password**
  - Web servers allow directories to be easily restricted.
  - Maintenance is time-intensive.
  - Users forget passwords.
  - Passwords can be shared or stolen.
- **IP address range**
  - Allows restriction to range of acceptable addresses.
  - Limits access to those within the IP range.
  - Prohibits use of Internet Service Providers outside of the IP range

(which may be the most common method for student or community access to the Internet).

- **Proxy server: allows remote computer to appear to be associated within the acceptable IP range for a restricted resource**
  - o Users must configure their browser settings (which may vary between Internet Explorer and Netscape and different versions and platforms).
  - o If settings are left permanently enabled, all Web surfing is channeled through the proxy server, adding to server load and potential slowdowns.
  - o Causes problems if Internet Service Provider also uses proxy server for some services.
  - o Ezproxy by Useful Utilities is one solution for resolving the negatives associated with proxy servers.
    - Intercepts the browser request, pages are returned by rewriting the URL to that of the proxy server.
    - No browser configuration is necessary by users; authentication is through username and password.
    - Costs $495 and works under Linux, Solaris, or NT platforms. Custom compilation for UNIX systems is available
    - Supports Radius, LDAP, Unix login, INNOPAC API, or local username and password files.
- **Cookies: files created by the Web server and stored on the client computer**
  - o Allows users to authenticate once as long as cookie sits on the hard drive.
  - o Privacy issues: not secure for shared computers.
- **Digital certificates: software-based IDs using encryption to confirm identification**
  - o Users do not need to remember IDs and passwords.
  - o No need for the system to maintain database of usernames/passwords.
  - o Not accepted by all applications and vendors.
  - o Are often vendor-specific and expensive.
- **Public key infrastructure: encryption method using mathematical process or algorithm that scrambles a message so it can only be read by a recipient with the appropriate key**
  - o Allows for privacy and confidentiality.
  - o High security—difficult to break.
  - o Requires method to distribute keys keys through a certificate authority that validates the user's identity.

Interface Design and Usability

Develop standards

Standards are important to ensure consistency and usability for a virtual library. One of the most interesting sources for guidelines for the development of virtual library standards has emerged from the British eLib program. In October 1998, eLib Standard Guidelines were established to include recommendations for various standards that should be developed by virtual libraries (Dempsey, 1998) including user interface through delivery of services to common browsers; data interchange through standard formats for graphics page descriptions, structured documents, moving images, and audio; document delivery; communication protocols; data formats; record schemas; metadata for resource, collection, and service descriptions; resource identification; security; authentication; payment for services, if appropriate; and privacy.

Virtual libraries for the foreseeable future will be accessed through the Internet. Much has been written about the architecture and design of the Web as it has become the predominant gateway to library resources and services. The importance of user interfaces is compounded in a virtual library where it may be the only available access. As with students in the traditional library, remote users have varying degrees of technology skills and different information needs. Frustration with navigating among various aspects of a virtual library system can be prohibitive to users, particularly if there are not adequate help systems. Assistance should be made available, both in the form of self-help and mediated human assistance, both synchronously (for example, by phone, chatroom, and videoconferencing) and asynchronously (for example, through Frequently Asked Questions (FAQ) lists, e-mail, and Web-based forms) so users may have the assurance their library experience is of primary importance.

The challenge for virtual libraries is designing a system that is both simple to use for the novice user and complex enough to allow the sophisticated user enhanced access. Although libraries of all types strive for inclusion, the development of systems that foster usability for the virtual library is particularly crucial.

Collaboration should take place among library Web masters, Web designers, and systems administrators to ensure standards are developed and followed. Guidelines for Web page authoring, design, development, and testing should be implemented following industry standards; these guidelines must be communicated to all staff responsible for working with or maintaining the site. Maintenance activities should be scheduled and completed on a timely and routine basis, including site and system backups, link checking, content review, and updates.

Accessibility

Accessibility and usability of content and services is paramount in the virtual library. Alternative forms should be provided for delivering information. For example, portable document files (PDFs) are a quick and easy way of mounting information on a Web site, but they require a reader and may not be accessible for some users. Alternative HTML or text formats are needed. In some cases, multimedia files may be the best way of delivering information, but they not only require plug-ins, but also additional bandwidth on both the server and client end and may be impossible to download for those with slow Internet connections. Alternative formats must also be provided for these files.

Guidelines and standards have emerged from the W3C and the federal government to address the needs of creating and maintaining Web sites that are accessible by ensuring information is provided in multiple formats. Accessibility and usability are particularly critical for the virtual library in which the end user may not have the option of walking into a building.

www.w3c.org

Section 508 of the Rehabilitation Act requires compliance with accessibility guidelines for any organization that does business with the federal government. In addition, the Department of Education has required that any institution that receives one of its grants must also be in compliance. Whether a virtual library falls into either of these criteria, Section 508 provides a solid foundation for ensuring access.

www.section508.gov

Accessibility through devices other than the standard desktop computer must also be ensured. Increasingly, laptops with smaller screens than a desktop monitor, wireless devices, cell phones, PDAs, and other devices will be used by people to access information, including that provided by virtual libraries. Virtual library sites should be coded for flexibility, cross-platforming, and formatting for access devices without the need to create and maintain multiple versions of a site.

Extensible Markup Language (XML) is an application profile of SGML created to deliver structured content over the Web, separating data from the display. XML may help virtual libraries developers address access via multiple platforms and devices. XML allows content to be written once for display on many devices; the language is system and vendor independent. XML allows for defining new tags and attribute names, nesting document structures to any level of complexity, and describing the document's grammar for use by various applications. One significant concern, however, is that XML is not backward compatible and can only be read by the most recent browser versions.

The use of metadata is also an important factor in developing standards for a virtual library. The Dublin Core metadata standard for describing networked resources is comprised of 15 elements, each of which has a set of qualifiers and attributes that allow them to be further refined. The W3C's work on the semantic Web and resource description framework (RDF) is another area virtual library developers should familiarize themselves with as the Web and attempts to make it searchable evolve.

www.dublincore.org

Develop content and services

As noted earlier, content provided through a virtual library should be matched to the library's audience and to its objective and mission. The primary audience of a virtual library, like that of a traditional library, will visit with specific needs in mind. FDLLI, for example, serves the needs of distance learning students, thus its content and services match the distance learning curricula of its member institutions. Electronic resources such as licensed databases that serve the research needs for courses offered through distance learning programs, subject guides, class guides, course reserves, courier service, document delivery, and interactive reference can all assist with providing relevant services to be accessed at the point of need. KYVL, on the other hand, serves a much larger and disparate audience and provides access to a greater array of content and services.

Delivery of content must be targeted so users do not become lost in a maze of irrelevant information. KYVL has solved this problem through the development of portals to aid groups in navigating the site and finding information that is most relevant to them. KYVU users are guided to academic resources and community users are guided to more general resources, teachers are guided to resources most relevant to them, and so on. This philosophy has been extended to an information literacy tutorial as well, with different versions under development to fit the needs of intended audiences.

Electronic Resources

The publishing world and aggregators are delving into the electronic content delivery market with a dizzying array of options and services for libraries. In turn, these vendors are also complicating licensing and copyright issues. Collaborative purchasing of electronic resources is a familiar area for statewide library consortia. Not only does collaborative purchasing allow libraries to offer a standard and common array of resources across the consortium, it also allows beneficial cost savings to member institutions and provides the opportunity to expand the number of resources available through pooling of resources.

The fall 2001 online issue of *Library Technology Reports* will focus on evaluating and purchasing online database collections and will serve as an excellent reference point for those purchasing collections. In brief, the following issues have been identified by the International Coalition of Library Consortia (ICOLC) to be addressed and negotiated during the RFP process for electronic resources (International Coalition of Library Consortia, 1999):

Content format:

- Use of plug-ins, java, and javascript that may limit accessibility
- Cross-browser compatibility
- Use of standard HTML
- Compliance with the Americans with Disabilities Act through text-based interface
- Multiple methods for capturing content (print, e-mail, download)
- Use of embedded media
- Platforms
- System architecture (Z39.50, HTTP version, stateful vs. stateless interfaces, fixed URLs)
- Access control (authorization and authentication)
- Security and privacy (SSL, SHTTP, cookie tracking)
- System management (downtime notification, service call response time, usage statistics, technical support contacts, notification of changes to system design)
- Response time (standards for adequate performance may be used from previous years to determine and clarify performance: uptime and failures, percent of network capacity used, peak load performance, target response times)

- Local issues: local bandwidth, nature of use (simultaneous users), network distance from vendor

In addition, ICOLC has issued a statement on perspectives and practices for selecting and purchasing electronic information (International Coalition of Library Consortia, undated). These include:

Contract negotiations:

- Providers should not preclude libraries from working through consortia to seek advantageous pricing or special arrangements.
- All terms and conditions should be negotiated and clearly stated in a contract.
- Nondisclosure language should not preclude consortia from sharing pricing and terms/conditions with other consortia.

Pricing:

- Consortia should not be asked to pay for undelivered features.
- Consortia should not be charged high premiums for development level products.
- Consortia should not be expected to pay the entire cost of research and development for new electronic products.
- Consortia should have the option to purchase electronic product without paper and the product should cost less.
- Providers should offer multiple and flexible economic models.
- Bundling electronic and print subscriptions should not be the sole pricing option for electronic information.

Access, archiving, systems, and licenses:

- Electronic files should be available before or no later than print format.
- Consortia should be granted a perpetual license when purchasing the content, and the provider should guarantee perpetual availability.
- Consortia that want to mount information locally should be allowed to do so.
- Consortia should have flexibility to choose format they wish to receive and store information; data should be available in multiple formats.
- Consortia should have the right to integrate data into local system infrastructures and information services.

Content and management data and use:

- Providers should not place undue restrictions or burdens on authorized use (downloading, storing, printing, use for classroom purposes, e-reserves).
- Licenses should permit fair use.
- Libraries should commit to taking reasonable steps to prevent misuse or abuse (but licenses should not place liability for abuse on libraries).
- Walk-in use by non-affiliates should be included as part of permitted user group.
- Individual libraries should be granted right and opportunity to measure use and gather information for collection development.

- Anonymity and confidentiality of individual users must be protected.
- MARC records should be provided.

Authentication:

- Providers should be flexible in authentication and validation methods.

Guides and Informational Pages

Other areas of content development include subject guides, course-specific guides, digitized material, course reserves, and multimedia collections. Development, maintenance, and updating of these resources can be the heart of the virtual library and also the most time-consuming activity for it. A virtual library may choose to develop all its own content and material, outsource, or implement a combination of both. In addition to Jones e-global library, other vendors such as Web Feet may accommodate the library seeking assistance with development of electronic resource content. Course management systems also attempt to provide some degree of library-type resources and services, usually through providing access to selected Internet resources.

www.webfeetguides.com

Web Feet has developed a core collection of Internet research guides that are available in print as well as in online or MARC format for integration into an ILS. Although primarily geared to schools and public libraries, Web Feet content is also used in community colleges and development of specific guides by any institution may be requested. Priced by copy or by enrollment size, Web Feet's service may be valuable for Web-based subject content development for virtual libraries that do not have the staffing to do their own.

The Web Feet core collection is available in online or MARC format for $495 for schools with enrollment under 1,000 or public libraries with fewer than 10,000 users. Other price schemes are available for larger libraries.

Essentially, the criteria for deciding whether to outsource virtual library content development rests on a few essential questions, with the primary being "What is the best use of time?" The answer to that question may result in some of the reasons to outsource:

- Maintaining content on a daily basis including ensuring links are working and content is updated and refreshed is time-consuming; outsourcing to a vendor allows in-house staff time to be dedicated to other activities.
- Upgrading of technology: purchasing hardware and software upgrades can be prohibitively expensive; outsourcing services to a vendor may be less expensive than purchasing and maintaining it in-house.
- Staffing: budget spent on technical staff maintaining hardware and software and developing new technology solutions may be less advantageous than budget spent on staff dedicated to local initiatives.
- Outsourcing may allow for experimentation with new initiatives without committing valuable resources for development and testing.

Outsourcing the library's electronic gateway to a commercial vendor, course management developer, or other application provider eliminates the worry and expense of ever-changing technology needs and staffing. Creating, updating, and maintaining Web-based content and services may cost less if outsourced to a vendor that specializes in just such services rather than in-house commitment of staff and resources.

On the other hand, outsourcing also takes away a degree of control over library planning and management and even selection of resources. Library staff should expect some loss of control over content, initiatives, and services when outsourcing, which may hamper the library's ability to meet the needs of its primary audience. The library must refer back to its mission and objectives to determine which method best suits its needs.

Resource Sharing

For users of virtual libraries, the ability to obtain materials in a timely manner can be critical. The growing number of full-text databases and digitized collections helps in this instance; however, libraries must still be able to accommodate the need for print materials. As hybrids, virtual libraries will exist for some time in a transitional mode in which an increasing amount of material is available electronically but the need for print will still exist. Document delivery, courier service, and interlibrary loan are all methods for delivering print material to users.

The Reference and User Services Association (RUSA) of the American Library Association has developed guidelines for interlibrary loan, which were revised in 2001. Agreements between libraries within a consortium should be negotiated and agreed on with clear procedures developed for smooth transactions, acceptable delivery and turnaround times, reporting of statistics, and problem resolution.

www.ala.org/rusa/stnd_lnc.html

Reference

Reference service for the virtual library can take many forms: subject guides, Frequently Asked Questions (FAQ), topical informational pages, how-to pages, or mediated reference assistance. Informational Web pages, whether subject or topic-oriented, class-specific, or general in nature, can provide users with information 24 hours a day. Well-constructed, constantly updated or dynamic pages can provide the appropriate information at the time of need for many users. These pages can also be useful instructional or self-help tools.

Human-mediated assistance in a virtual library can be more complex. Many libraries, virtual and traditional, are tackling issues surrounding reference services in the electronic environment. One of the simplest forms of providing reference service for virtual libraries is through toll-free telephone service. The telephone can be an effective method of providing reference service in the electronic environment as it allows the librarian to conduct a reference interview to determine the user's true need. It can also be limiting unless the library can staff a phone service 24 hours a day or contract with other libraries or information providers to share coverage. Given the nature of virtual libraries and the increasing expectations that they provide service at all hours of every day, the inability to staff phone assistance at all times may hamper the ability of the library to fulfill its mission.

E-mail reference is another popular form of providing expert assistance to users. E-mail reference may take the form of a simple e-mail link to reference staff or require a user to complete a Web-based form. E-mail reference has the advantage of being available at all times and may, with its requirement for putting a request in writing, assist the user to formulate a clear request. However, e-mail reference eliminates the ability to conduct a

reference interview and eliminates all visual and oral cues for the librarian as the user is not present and cannot be heard. E-mail may also result in delays in response, particularly if incoming mail is not monitored continually.

Live interactive reference assistance has generated increasing interest as more and more institutions experiment with various technologies to provide real-time expert assistance to users. At the same time, collaborative efforts such as the Library of Congress' Collaborative Digital Reference Service and LSSI's Virtual Reference Desk projects have come into being. Multiuser object-oriented environments (MUDs or MOOs), videoconferencing, and various chat methodologies are among the technologies that have been tried.

www.loc.gov/rr/digiref

www.lssi.com

Libraries have experimented with MUDs and MOOs on both a large and small scale. Multiuser object-oriented environments provide a place for real-time conversation for anyone on the Internet. Although the ability to engage in synchronous conversation makes MOOs sound similar to chat rooms, in reality they are more. MOOs provide an opportunity for people to extend the environment in ways that enable the construction of text-based virtual reality.

MUD: Multiuser Dungeon

MOO: Multiuser object-oriented MUD

Individual objects can be created and programmed on the MOO that others may interact with. These functions of the MOO environment provide rich educational opportunities for students who participate in them. Some researchers, though, have found that the learning curve associated with the technology has made their use problematic for virtual libraries. (Shaw, 1996, and D'Angelo, 2000) They also require some degree of expertise in setup and require the installation of a client on the user's desktop. Advances have been made in Web-based MOOs that make their use simpler and eliminate the need for client programs, but current use of this technology for reference help is minimal.

Chat-based Reference Products:

AOL Instant Messenger
www.aol.com/aim

Conference Room by WebMaster
www.conferenceroom.com/home.cgi

Convey Systems
www.conveysystems.com

DigiChat www.digichat.com

Egain LiveWeb
www.egain.com

Groopz www.groopz.com

GroupBoard
www.groupboard.com

HumanClick
www.humanclick.com

LiveAssistance
www.liveassistance.com

LiveHelper
www.livehelper.com

LivePerson
www.liveperson.com

LSSI's Virtual Reference Desk Software
www.virtualreference.net/virtual

Netscape Chat http://home.netscape.com/eng/chat/1.0/faq_chat.html

Volano www.volano.com

WebLine
www.webline.com/products/web.htm

Conferencing has been tried with various products, including Microsoft's NetMeeting and CUSeeMe. Although conferencing provides the advantage of visual as well as textual presence and allows for sharing of Web pages and searches in real-time, the technology requires significant bandwidth, which hampers its effectiveness, particularly for those working with slower modem connections.

Chat technologies (see table on page 27 for some currently available products) have emerged as the dominant methodology for providing live reference assistance in libraries, particularly with the emergence of the popularity of chat on the Web both in the form of instant messaging as well as chat rooms. End-user familiarity with these products makes them particularly attractive for educational and library use.

Chat software comes in various forms: Internet Relay Chat (IRC); instant messenger; or other Web-based plug-in, applet, or client software. IRC is an older, text-based client/server protocol requiring client software be installed on the user's desktop and that the user connect to the appropriate channel to communicate. Web-based software may take the form of a browser plug-in that the user must download and install before use, a java applet that is automatically downloaded by the browser at the time of use, or a plain HTML page that is automatically refreshed to the client computer (Luckevich, 1998).

More recently, call center products that bundle chat software with other features have emerged. Some libraries found these products, although aimed at e-commerce sites as a way to provide customer service, suit the needs of reference service as well. Several vendors provide products at no charge but others determine cost on a licensing or use model (see following table).

Chat-based Reference Product Features

Product Name	Cost	Client Download	Customizable	E-mail / Forward	Text Chat	Voice Chat	Page Push	Private Rooms	Private Messages
AOL Instant Messenger	Free	N	N	N	Y	Y	N	N	Y
ConferenceRoom	$0.00-$4,295	N	Y	N	Y	N	N	Y	Y
Convey Systems	$50 setup +$100 training + $50/month minimum	Y	Y	N	Y	Y	Y	Y	
Digichat	$495-4500	N	Y	N	Y	Y	N	Y	Y
Egain Live Web	Call for pricing	Y	Y	N	Y	Y	Y	N	N
Groopz	Based on use	N	Y	Y	Y	N	Y	N	N
Group Board	Free	N	N	N	Y	N	N	N	N
Human Click	Free to $1074/year +	N	Y	Y	Y	N	Y	N	N
Live Assistance	$500-1,500 + $150/month operator license	N	Y	N	Y	N	Y	N	N
Livehelper	Initially free, $50/operator for Pro version	N	Y	N	Y	Y	Y	N	N
LivePerson	$2500 + $700+	N	Y	Y	Y	N	Y	N	N
Netscape Chat	Free	Y	N	N	Y	N	N	N	N
Virtual Reference Desk	Varies	N	Y	Y	Y	Y	Y	Y	Y
Volano	$420-8,495	N	Y	N	Y	N	N	Y	
WebLine	Call for pricing	N	Y	N	Y	Y	Y	N	N

When deciding which product is best to use in a virtual library, take many factors into account. If the service is intended to be provided 24 hours a day, staffing decisions are as much of a concern as the technology, not only for resource allocation but also in deciding which product should be used. If staff monitor the service remotely from home or other locations, the use of a client program or one that requires a great deal of bandwidth may not only be detrimental from the end user's point of view but also from that of the staff member providing assistance. If the service is open to the general public, a simple product that does not require a plug-in, downloading, or learning curve will be the best since it facilitates easy and quick communication.

A key consideration for selection may be the type of service the software will be required to provide. A simple, text-based program that allows for questions and response may be adequate for most reference inquiries. E-mail, fax, or postal service can be used for sending additional information or search results. If the service will also be used for instructional purposes or if more in-depth assistance is desired, though, a more robust package that allows for sharing of Web pages, multimedia, white board, and other features may be a better choice.

Take staffing considerations into account. If service is to be provided

24 hours per day, 7 days per week, 365 days per year, adequate help should be hired. Partnering with other libraries in other time zones is also a possibility. This type of partnership requires negotiation to ensure time of coverage as well as agreements on levels of service provided by each institution.

Web-based chat products are currently the most popular method of providing interactive live reference service. As a relatively new technology, though, these software products change rapidly and are constantly under development. Diana Luckevich (1998) has devised criteria for evaluating features of chat programs that also may be used for any interactive reference product to determine the best product for a given circumstance.

End-user features:

- Private rooms
- Private messages
- Customizable rooms
- Embedded HTML and URLs
- No client to download
- Easy-to-use interface

Staff features:

- Transcripts of sessions
- Bump users out of a room
- Word filters
- Open or close room to visitors
- Restrict room access
- Integrate multimedia (audio, video)
- Room monitoring in real-time
- Private rooms
- Web page push
- Integrate white board or other collaborating tools
- Number of possible rooms
- Number of users possible per room

Administrative features:

- User ID and password for administrative login
- Log control and reporting
- Logs for access, content, server activity, advertising (if appropriate)
- Remote administration ability
- Firewall configuration
- RAM requirements for each room
- CPU load requirements
- Bandwidth requirements
- Disk space requirements

- Server platform required
- Built-in database
- Authoring tool for room and interface design
- Documentation quality
- Additional server software required
- Support offered and type (phone, e-mail, in-person)
- Daily maintenance required
- Cost

Library staffs have many considerations for implementing and managing a virtual library. With careful planning, virtual library developers can create a beneficial product for their audience that will be viable and continue to grow. A planning checklist has been included in Appendix A of this report for quick reference.