E-JOURNALS: ACCESS AND MANAGEMENT

This chapter examines the complexities of delivering e-journal content and looks at the tools that address access and management issues. The discussion identifies the problems associated with e-journal access and management and describes how cataloging and linking improve access.

The cataloging discussion illustrates the difficulties of trying to adapt print-based practices to e-format journals. An introduction to linking technology and terminology demonstrates how recent developments have opened dramatic opportunities for the discovery of journal content.

The chapter also reviews the products on the market and the particular e-journal management problems they are designed to solve. The different types of products discussed include:

- E-journal finding tools (also sometimes called e-journal content management or tracking systems)
- Link servers (also called link resolvers and sometimes simply SFX, using a brand-name to describe a class of products)
- Metasearch engines (also called broadcast or universal search engines or portals)
- E-acquisitions information systems and e-journal licensing services

The chapter concludes with the topics of measuring e-resource use and archiving e-resources.

E-journal access and management problems

In the context of electronic journals, the term management applies to many complex and interconnected functions. The ability to link information within the Web environment provides a powerful tool for both managing public access and controlling e-journals collections.

Vendors and libraries alike are actively exploiting linking capabilities to improve user access to e-journal content as well as backroom administrative and financial functions. Developments in this area are occurring at a dizzying pace.

In addition to the dramatic progress in the application of linking technologies, vendors are developing new products with specialized capabilities and expanding the functionality of existing products to address the market's emerging needs.

Libraries would like to be able to make a few key decisions to resolve all their e-journal management problems in a fully integrated and simple way but may need to take iterative steps toward a comprehensive solution. As e-journal collections expand, libraries large and small face significant administrative problems.

In relation to user access, libraries must decide:

- How e-journals should be represented in the online catalog and whether the OPAC ought to be the main access point for all library resources

- Whether to create a separate e-journals list on the library website to facilitate access to each e-journal title, especially those in the aggregated databases discussed in the first part of this report
- How to keep up with changes in titles and holdings in aggregated databases and journal packages so availability information in the catalog or on Web title lists is accurate
- How to assure users have easy access to the full text of articles in the e-journals accessible through the library from online citations to those articles wherever the citations may appear

On the acquisitions, technical, licensing, and internal management information side, libraries must determine:

- How to avoid creating and maintaining holdings and other information on e-journals in a multitude of disconnected files
- How to track basic license terms for different journals (such as renewals and notice periods for cancellation) as well as nonstandard acquisitions information, such as whether the journal has been acquired as part of a package through a consortium agreement (and through which consortium if the library participates in more than one)
- How to monitor in-process status of e-resource orders to assure extended delays do not occur between the decision to purchase and the appearance of the resource on the library's website
- Whether e-journal information and the databases containing it should be built and maintained in-house, supplied by a vendor to be housed locally, or kept on a vendor site with remote local access
- How to identify the causes for interruptions of service and quickly restore access

Many libraries have invested large amounts of staff time in building local solutions to these problems that require a substantial commitment of resources to support and keep current. Observing libraries coping with the increasing complexities of e-journal management, vendors saw appealing product development opportunities.

Challenges extend along the life cycle of an e-serial as a library information resource. The cycle begins with the identification, selection, and purchase of the title. It carries on through the representation of the title in the library's integrated library system (ILS) as well as its search and discovery systems, ending ideally with the long-term preservation of the information.

In the pre-online era, libraries bought products and services from subscription agents and integrated systems vendors to help them handle these functions for print journals. Now that libraries operate in an increasingly electronic environment, these same suppliers are offering products to solve parts of the e-journal management problem derived from their core business interests. In addition, new companies, such as Serials Solutions, have come into being to focus on particular tasks.

A factor that complicates discussion of the different kinds of products is that vendors keep adding new functions to existing offerings. As competition increases, extensions of product functionality will probably become even more common.

Overlapping and changing functions of different products make sorting out which one to buy for what purpose difficult. Since no one solution is likely to

satisfy all needs, deciding what supplementary purchases or arrangements are needed adds complications.

Improving access to e-journals: Basic tools

Cataloging: Issues and solutions

As soon as publishers started to produce significant numbers of electronic journals in 1996, CONSER (Cooperative Online Serials) Program began to consider standards for representing them in OPACs, both in national-level databases and at the local level.

Following traditional practices would require online serials, as versions of their print counterparts, to be given separate cataloging. Librarians agree that separate records should be required in national-level databases.

From the beginning of CONSER discussions of this topic, librarians have been split on the question of how to describe e-journals in local catalogs. Both purists and pragmatists have good arguments.

Pragmatists hold that a single record approach makes the most sense in most settings, if for no other reason than the average library simply does not have the resources to separately catalog e-journals. Catalogers are in short supply, and many institutions still have print backlogs.

They also argue that the ease of direct online access makes having detailed descriptive information in OPAC records less important. Single record proponents think users will be confused by multiple listings and are uninterested in the fine distinctions among online versions that could be exposed in separate records.

The separate record advocates say adding enough information to the single print record makes it unwieldy. Updates and changes, they argue, will be harder, especially with regard to holdings. Also, patrons may need to see the detail that can be reflected in separate records. Patrons may need to know, for example, whether the version accessed by the library actually contains the issue needed, is in PDF or HTML, or has graphics, sound, or video.

PDF: Portable document format

HTML: Hypertext Markup Language

CONSER has taken the flexible course of requiring separate record cataloging in bibliographic utilities and allowing the option of single records for individual libraries. Interim guidelines permit institutions to note the existence and online location of the electronic version by including the URL in the record for the paper version.

An even larger issue than how e-journals should be cataloged is whether the OPAC itself will remain the central record of library holdings in the digital library era. Will it become instead only one among many sources of information integrated through linking mechanisms and high-level search engines with other discovery tools?

Accepting that the catalog need not be the final authority might lessen the need to force cataloging standards designed for traditional formats to handle the issues presented by e-resources.

Although librarians have reached no consensus about the cataloging of e-journals, new service providers are coming forward to assist in adding records to OPACs and keeping them up-to-date as online serials themselves continue to change and develop. As a practical matter, the solutions they offer push libraries in the direction of adopting a dual record approach. These new entrants into the e-journal marketplace are described and compared in the section on e-journal finder products.

Linking: The basics

As shown in Chapter 1, aggregated database vendors have built various linking capabilities into their database products. The most basic are links from citations to the full text mounted on their own servers. Citations also may link to full text located at other sites. In addition, links can be provided to what are referred to in the language of linking as extended services. Extended services links do not lead to text directly, but rather allow the user to receive the text through interlibrary loan or document delivery or to find related information (for example, through a Google search).

Except for Ebsco as of 2003, aggregated full-text databases do not offer links from the references cited within articles—a capability sometimes called reference linking.

Reference linking usually means links from cited references but may be used to refer to links from any citation to the full text.

Other types of vendors also have explored links as added-value features. Abstracting and indexing (A&I) services have long offered the ability to link from citations to full text in library collections. Creating links in A&I services normally requires title-by-title registration. Both configuration and maintenance of links on a product-by-product, title-by-title level is an onerous burden for libraries.

Publisher-to-publisher links: CrossRef

In 2000 a group of scientific, medical, and technical publishers launched the CrossRef project, which facilitates links from cited references in articles to full text on publisher websites. This system uses a digital object identifier (DOI) to transmit the citation information from which links are generated.

CrossRef, www.crossref.org

As participants worked on CrossRef they came to realize that linking from articles to text is complicated by the fact that different libraries have different ways of accessing the same journal title (for example, via the publisher's site, an aggregated database, a journal gateway, or a locally loaded file). The various possibilities require finding a way to ensure the link goes to the appropriate copy for each library. The creation of OpenURL has solved this problem.

Appropriate copy: A limitation of the CrossRef project was that a digital object identifier (DOI) could be associated with only one URL. But libraries may need access to different legitimate copies of an article, for example, in a locally loaded journal or aggregated database. A mechanism is needed to ensure the link from a citation goes to the copy that is appropriate for a particular library.

Unrestricted linking: Open URL and link resolvers

OpenURL is born

Experience with CrossRef underscored the need for a standard, widely accepted way to transmit information describing individual units of text to be used for linking purposes. Herbert Von de Sompel and colleagues at Ghent University in Belgium worked on this problem in the late 1990s and produced a major breakthrough. Von de Sompel posited the concept of the OpenURL. Previously, vendor-provided links existed only within the closed system of the dealer's own realm. They performed in the same way no matter where the request for linking originated. What Von de Sompel sought was a way for links to be:

- Open (for example, to connect beyond the publisher's limited environment)
- Subject to the control by the requestor (that is, the library)
- "Context sensitive" (defined by the library's situation)

Von de Sompel, an ardent film fan, named his research program SFX, for special effects.

Link resolvers: How OpenURLs improve access

To connect a citation to the text cited (or other relevant information) requires some way to transmit the elements of the citation that uniquely define the text (the metadata) to the machine on which the text resides. In the language of linking, the place from which the link is requested is called the source; the location of the text desired is called the target.

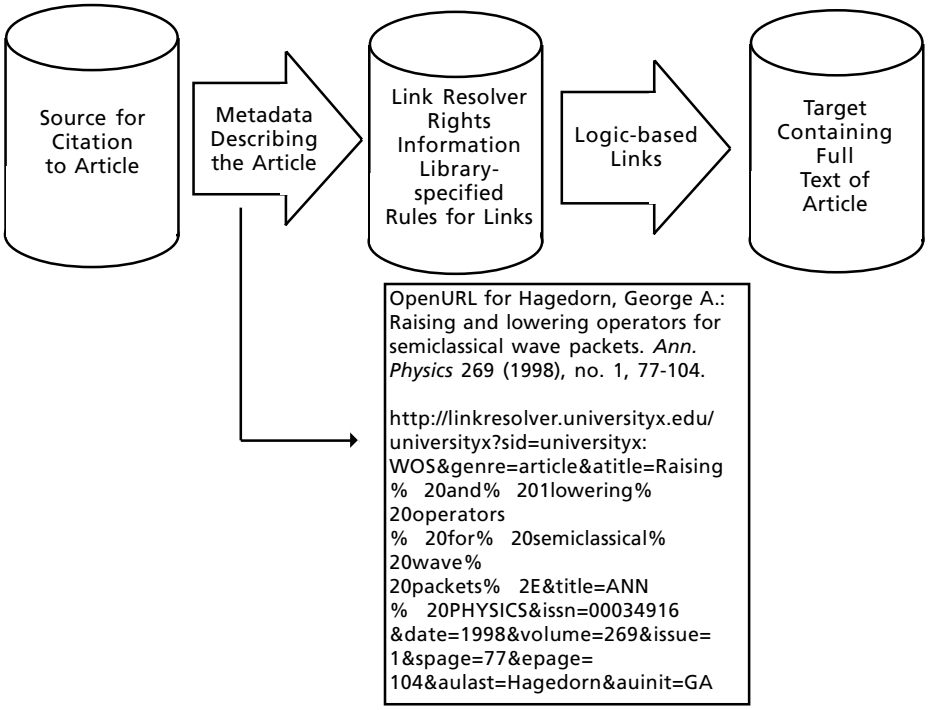

Diagram 1. How An OpenURL Resolver Works

OpenURL provides the language for the query from the source to the link resolver. The resolver knows what subscriptions the library has, so it has the ability to link only to resources the user is entitled to access.

If more than one e-copy of an article exists, the library can either choose which version the patron sees or rank order the various choices. The library also can set the terms and conditions of the link request.

A link to interlibrary loan can be limited to the case where no print copy of an article is available. Links to a document delivery service can be limited to that case and restricted to faculty members only. Diagram 2 illustrates the universe of linking possibilities.

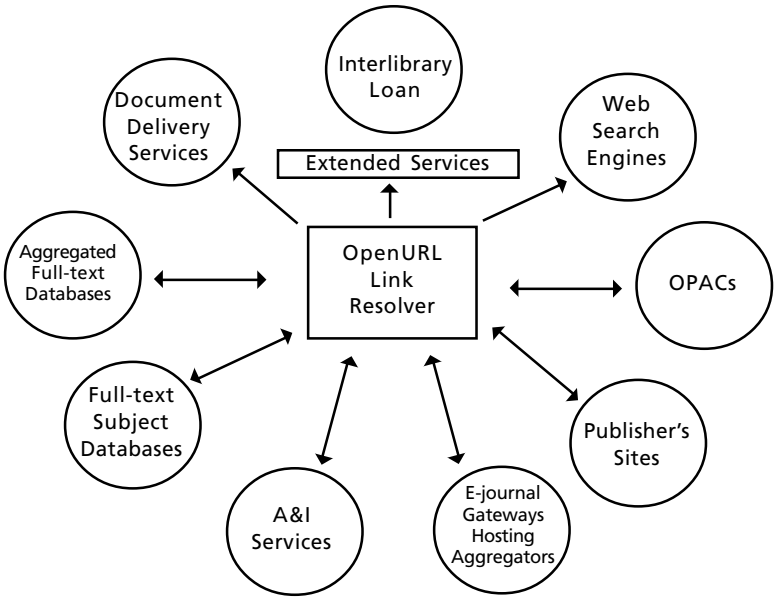

Diagram 2. OpenURL link resolvers and the universe of linking possibilities

The existence of OpenURL dramatically expands the services libraries can offer users, but it also requires management, decision making, and financial investments. To take full advantage of OpenURL, libraries need link resolvers, which are servers with software that can receive OpenURL queries.

The resolver checks the metadata of the citation against the information it has in its files about the titles the library subscribes to and the rules the library has set for processing links. Normally the user is then presented with options according to the specifications the library has given for the order in which they appear and other display issues. Following the rules again, the resolver creates a link request that goes to the target and the desired material appears on the user's screen.

The resolver can be housed and maintained by the library or the vendor. Configuring a link resolver requires a certain amount of work for library staff. Though some servers can be batch-loaded with relevant title information and come from the vendor with predefined links to major services, library staff have to set the rules the server follows and customize aspects such as the language on the screen presenting the user's choice of options. Librarians also may want to add more targets. Updates also must be processed on a regular basis.

Link resolvers are one of many types of products rapidly appearing to help libraries manage e-resources. E-journal locators, or finding tools, were the first. These tools simplify the task of identifying all the e-journals from various sources available through a library and reduce the time needed for patrons to locate and make use of them.

E-journal finding tools

As consortia started to sign agreements with major aggregated database providers, more and more libraries of all sizes gained access to articles in e-journals. Competing for large consortia contracts, aggregators launched aggressive content acquisitions programs.

As librarians began to consider replacing print subscriptions with electronic versions in aggregations, the need to locate journals in databases became more critical, especially in libraries with content from more than one aggregator. Compounding this problem is the fact that the years of coverage for a particular title may vary from product to product (or even in the same product over a period of time).

Titles in publisher packages and journal aggregators also change as is shown by the monthly adds and drops lists from most e-journal publishers.

To provide better access for patrons, some libraries created title lists on their websites with links to journals. Because of the volatility of aggregated databases, keeping these lists accurate and up-to-date proved to be exceedingly time-consuming. All these factors contributed to the need for a way to expose the contents of aggregated databases and journal packages for easy access by users with reduced effort for libraries.

At the same time, many librarians wanted a simple, reliable way to link library catalog records directly to and from the full text of journals in aggregated databases. E-journal finder services came into being first to meet the need for accurate library website lists, later adding the capability to provide OPAC records.

Serials Solutions

Serials Solutions,
www.serialsolutions.com

Serials Solutions, launched in June 2000, was the first company to offer aggregator content tracking. The founder, Peter McCracken, is a reference librarian who acted on his frustration at not being able to help students easily retrieve full-text articles.

His company's core service is providing a list of e-journals libraries have access to, whether through aggregators or via subscriptions. The list is generated from a database that includes information on e-journals from about 500 suppliers, including all major English-language databases.

Serials Solutions generates a searchable alphabetical list of titles for posting on each customer's website after receiving details of all sources for e-journals subscribed to by the library. The company has established relationships with suppliers to track changes in the suppliers' holdings on a regular basis that are, in turn, forwarded to libraries as part of monthly or bi-monthly updates.

The provision of CONSER records for loading in library catalogs is a relatively new service. Serials Solutions has found that CONSER records are available for 100% of titles in the major databases.

For materials that lack CONSER cataloging records (for example, foreign language titles and some of the news sources in a database like Lexis-Nexis Academic Universe), Serials Solutions aims to provide the best cataloging available. It also will supply brief records, if acceptable to the library.

Serials Solutions does not offer use statistics or collection evaluation reports as do other content tracking services. An explanation of why appears on the company website. Statistics based on clicks on the journal list are not reported because such figures represent only a portion of actual use, failing, as they do, to reflect access via bookmarks or other venues. Collection assessment reports (such as cost per title in aggregations) are not offered either since they, too, are misleading.

Serials Solutions has no plans to expand the product to permit management of acquisitions information.

Serials Solutions claims to have the most accurate data on aggregator content available combined with the most authoritative cataloging records. Reasons offered for the higher level of accuracy of its data include rigorous review of information received from sources, added checks now possible against CONSER records, and continuous feedback on errors from a large customer base.

Serials Solutions has more than 1,000 customers from many types of libraries, including about 40% of the members of the Association of Research Libraries (ARL).

The company provides the most economical service for most libraries except perhaps those who receive discounted prices on competitive products through consortia. Costs for the basic journal list (based on the number of titles) run $1,000 to $2,000 on average. Catalog records have an additional charge.

Journal Linker. Serials Solutions has extended its capabilities to better compete in the market. At the end of 2002, the company offered Journal Linker, a no-cost product enhancement for current customers.

Journal Linker facilitates links from an abstract, index, or citation to the library's Serials Solutions journals list and, from there to as close as possible to the full text of the article, usually the journal's list of issues. This function will work for the major aggregators and for other content providers that have a mechanism for specifying links to external sources from their databases.

Librarians will need to enable this function, specifying a link to Serials Solutions, in the administrative modules of sources with the appropriate capabilities. In libraries that have included print and other formats in their Serials Solutions lists, users will be able to link from the list to the OPAC to check for holdings.

Article Linker. Article Linker, a fully featured OpenURL server, is promised for delivery in early 2003.

Article Linker will enter the competition with SFX, LinkFinderPlus, and the other link resolver products. The server will be housed at Serials Solutions, and current customers will be able to use the prepopulated knowledge base of journal titles they created when they first signed on. (Note, however, that Serials Solutions also supplies this data for loading onto other servers.)

The price has not yet been set but, in view of Serials Solutions track record, Article Linker will likely be priced lower than comparable products. In the meantime, a small increase for current subscribers in the hundreds-of-dollars range will help defray product development costs.

The basic list offering from Serials Solutions will appeal to smaller libraries whose e-journal access is mainly through major aggregators. No sophisticated technical knowledge is required to implement the list in its standard form.

Webmasters who want to adjust the journals page to their own environment may want to examine customization possibilities in advance. The journal list has a simple design based on static HTML pages.

Though statistics based only on Web page clicks do not capture actual total use, libraries without the staff or time to devote to analysis of vendor-supplied usage data may nevertheless regret that Serials Solutions does not provide this information.

JournalWebCite

JournalWebCite, a mid-priced content-tracker option, probably is best suited for smaller libraries. A searchable, alphabetic list of titles available at the library both in print and electronic format is maintained on the company server. The list has a no-frills format and is presented as an unbranded library service to users.

JournalWebCite, www.journalwebcite.com

Though this option tracks content from major aggregators, titles from more specialized academic publishers are not included on the JournalWebCite list. Updating is less timely than for other trackers. Aggregator content is verified on no more than a quarterly schedule, and listings may be as much as 90 days out of date.

This service emphasizes management reports. Accounts of database overlap, 10 top targets, dollars spent on databases, costs per journal title, and others are offered. Pricing is based on full-time equivalent (FTE) staff for academic libraries and numbers in the community served for public libraries rather than on the number of titles tracked, as with other aggregators. JournalWebCite Lite, a lower-cost option without search capabilities or statistical reports, also is available.

TDNet

TDNet is a spin-off of a broadly based Israeli information provider called Teldan. The parent company is a subscription agent, as well as a database producer and aggregator. Where Serials Solutions' watchword is accuracy, TDNet stresses comprehensiveness, both in terms of title coverage and services offered.

The heart of TDNet is a databank of 50,000 journal websites. These data can be used to create searchable, alphabetic lists of library e-journal holdings from all sources. Major aggregators are covered, and libraries are invited to add any title they wish, priced or free.

Print titles also may be included for libraries wanting a comprehensive journals holdings list. Links to OPAC records are offered. MARC records are not part of the service but this enhancement is under consideration.

Considerable customization is possible, however, as is illustrated by attractive implementations at www.tdnet.com/wmu, www.tdnet.com/hbs, and a flower garden presentation at http://tdnet.bodley.ox.ac.uk.

Data on titles in aggregators are kept current by checks of publisher sites, and links are tested regularly by Web crawlers. Libraries receive weekly updates.

The top-level journal list screen permits searching by title, publisher, ISSN, and vendor. The display has a sleek look and feel not possible with static HTML pages employed by competitors. The TDNet name and logo are prominently displayed in the standard implementation, but customization capabilities allow libraries to minimize the effect of TDNet branding.

ISSN: International Standard Serials Number

One of TDNet's unique features is a table of contents (TOC) function that forms the basis for several services not available from other suppliers. Users can set up personal selective dissemination of information (SDI) profiles and request e-mail notifications of new issues of chosen titles as received. The provision of these current awareness services makes TDNet appealing for institutions where users have had little exposure to automated personalized information services.

The table of contents function also makes possible a known-item article level search that links to full text for subscribed titles. Article level searching is

possible for 8,000+ titles in the TDNet database. Subject searching based on Library of Congress headings and keyword searches also are possible, but the search screen is somewhat confusing.

A statistical report generator is provided that can produce eight different kinds of usage reports, downloadable into Excel spreadsheets.

TDNet is the high-end product in the e-journal finder marketplace, though exact costs depend on many factors and may be considerably lower for institutions subscribing as part of a consortium. TDNet pricing ranges up from $5,000 per year depending on features selected, the number of titles to be listed, and the size of the library.

Special pricing is available for libraries that have a list function already in place on their website and want only updates and changes. Data suitable for loading as brief records in the OPAC also can be provided. The flexibility of options offered to customers is a particularly valuable feature.

TDNet's growing customer base includes small and large libraries.

Link resolver products

Once Van de Sompel established the viability of the OpenURL framework, commercial vendors immediately recognized the opportunities it presented. ILS vendor Ex Libris (USA) Inc. moved quickly to license Von de Sompel's SFX server technology. SFX, like Kleenex and Xerox, seems to have entered the library lexicon as a brand name with a generic meaning.

Although the Ex Libris' SFX product was the first to enter the market, other library system vendors soon followed with development of their own linking servers. Endeavor created LinkFinderPlus and Innovative Interfaces has WebBridge.

Link resolvers are sold as modules of ILS systems. Vendors also market them as standalone products, though combining them with other system modules has advantages for ILS customers.

Link resolver development is not limited to ILS vendors. Ebsco, for example, has just announced its own service for customers, called LinkSource and an independent firm, Openly Informatics, offers 1-Cate (One Click Access to Everything).

Ebsco LinkSource, www.linkresolver.com

1-Cate, www.openly.com/1cate/faq.html

Libraries with appropriate resources can build their own link servers. Aggregators also are purchasing branded link servers to address their external linking needs. As of 2003, Wilson has an SFX-powered interface, and Gale, too, is an SFX customer.

The relatively low percentage of full text in Wilson databases makes the ability to link out to external sources an important enhancement for Wilson databases. Linking is accomplished through the SFX link resolver Wilson has integrated into its databases. An icon is offered for the user to click when no full text is available for a citation within the Wilson database. The click opens a presentation screen that offers options for full-text access elsewhere in the library's e-journal collection.

Instead of offering initial setup options to libraries, Wilson has configured defaults that subscribers must change to meet their needs. Language describing resources is hard-coded, which could present problems for users. For example, without more explanation, patrons may not know whether they want text of an article from Ingenta or via Emerald.

Although OpenURL is becoming a de facto standard, some text will not be available through link resolvers, since not all sources of text are set up to generate OpenURL queries.

Link resolvers from ILS vendors

Ex Libris' SFX, www.sfxit.com

The development of link resolver products is a natural product development opportunity for ILS vendors. Ex Libris' **SFX** has enjoyed a significant advantage by being first into the market with a path-breaking product and continues to benefit from the common use of its name as a generic term for link resolver.

Some people also mistakenly equate the three letters with OpenURL, which is under consideration as a NISO standard and not the property of any vendor. Ex Libris has been particularly successful in sales to statewide systems that include libraries with a variety of ILS systems.

Ex Libris' SFX offers the ability to create A-Z journal lists and, through its Citation Linker, the opportunity for the user to do a quick search to see if a citation is available in a library's e-journal collection.

Endeavor's LinkFinderPlus, www.endinfosys.com

Endeavor has concentrated its product development energies on making OpenURL-based **LinkFinderPlus** easy to implement and flexible. A Windows-based graphical user interface (GUI) facilitates configuration and changes, and a customizable user interface facilitates user access.

LinkFinderPlus also offers the Invoke function that allows direct links to text without intermediate presentation of an options screen. Endeavor also is partnering with e-journal finders such as Serials Solutions to permit automatic loading of subscription information into the LinkFinderPlus knowledge base. Seventy-five libraries use LinkFinderPlus.

Innovative Interfaces' WebBridge, www.iii.com

Innovative Interfaces' **WebBridge** exemplifies the company's view that the universal search engine (its MetaFind) and the OPAC are at the center of the discovery process. With WebBridge, its OpenURL link resolver, Innovative OPAC records can display links to multiple instances of e-journal titles as an alternative to the standard A-Z list. WebBridge also aims to offer options from the OPAC record for searches for related materials in addition to supplying links from citations to full text.

Innovative also has taken on the problem of managing e-journals acquisitions information. See the section below that describes these products for more on the electronic resources management product Innovative has under development.

Following is a checklist of features to consider when evaluating a link resolver product for purchase:

- How customizable is the user interface?

  Since the purpose of the link server interface is to help the user navigate easily among possible choices for full text and ways to obtain additional information, appearance and wording are critical. Ensure you have the freedom you need to tell your patron what you think is most helpful and least confusing.

- Does the server support the full-text targets you need, especially aggregated databases?

- How easy is including additional targets appropriate to your library's situation?

- Does the server support links to the extended services you need (such as your preferred document delivery service)? Is creating links to your own choice of extended services easy?
- Does the product have a user-friendly administrative interface? Being able to do simple check-off of popular services and batch loading of titles from existing files is important.
- Does an option exist to maintain the server locally so you do not have to depend on the vendor's timetable for changes that may be important to you (such as immediate addition of new title or changes in a key source)?

Link resolvers: A perfect solution?

Though link resolvers offer exciting new possibilities for information delivery in libraries, they are not trouble-free. Clicks on resolver menus do not always produce the expected and intended result. Even though producers of targets undertake to keep vendors of resolvers current on changes that may disrupt links, failures to do so occur. Libraries also must remember to remove canceled targets and add new acquisitions.

Even when links go to the correct destination they may still fail. A target journal in an aggregated database, for example, may be missing the particular piece of text wanted because of selective coverage. The author may hold the copyright to a particular article. The text may be part of a section of a journal not included in the e-version, such as commentaries or letters to the editor. The article may simply be inadvertently missing from the e-version of the journal.

Links based on ISSNs may fail because of an inaccuracy in the identifier especially if it has been manually entered somewhere. Title changes may cause problems. Dates of coverage understood by the link server may be based on faulty data from the vendor.

One expert estimates, however, that under 10% of links fail to connect to their intended target.[1] Although a 90%+ accuracy is an achievement, reference librarians know that users will not care about overall performance if they cannot find the information they want.

The mid-1990s saw endless speculations on the future of libraries in a networked information environment. Speakers and writers stilled fears of the disappearing librarian by assuring that the organizational skills of information professionals would be needed even in the point-and-click world. The configuration of link resolver menus and the prioritizing of options are yet another validation of this prediction, since these activities allow librarians to have a direct influence on the information that users find.

The staff may decide to present a publisher's site as the first choice for text, reasoning that aggregator content might be selective or lack images. Or the resolver's presentation screen might be set up to encourage use of PDF as opposed to HTML or vice versa.

Many choices exist for pointers to supplementary information about the author of the article or the subject. Should biographical information have pointers? Should the user have the option of launching an Internet search for the author's website or a subject search of the catalog? Someone needs to decide.

An educational effort also is necessary to help users understand what the link or the linking icon in the source of the citation means and how to interpret the choices it presents. Librarians need to ensure the language describing the options is clear and that any related information suggested is meaningful

for the user. Too many alternatives could be confusing, frustrating, overwhelming, or simply annoying.

How link resolvers are different from metasearch engines

A detailed discussion of metasearch engines is outside the scope of this report since their capabilities extend beyond access to e-journals and their content. Software of this type allows users to discover all the resources on a topic of interest available through the library no matter what their format or whether they are housed locally or remotely.

Broadcast searching products entered the marketplace in 2000 with the appearance of WebFeat (moving from the corporate into the library realm) and the development by Gale of Total Access. ILS vendors have now added metasearchers as the top layer in their systems.

Product names are listed below only to distinguish them from the link resolver product of each vendor.

Vendor	Link resolver product	Metasearch product
Endeavor Information Systems Inc.	LinkFinderPlus	Encompass
Innovative Interfaces, Inc.	WebBridge	MetaFind
Ex Libris (USA), Inc.	SFX	Meta-Lib

Metasearch engines offer a way to find information when the user does not know where to look or wants to find all there is. They can be thought of as starting the search process from the top down.

Link resolvers, on the other hand, facilitate the process from the bottom up: that is, from the relevant, known citation to all the other bits of information that enlarge and place it in context.

Linking servers provide the way into the interconnected web of information on a topic from the ground floor; meta-search engines offer entry through the front door.

Products that manage e-acquisitions information (and more)

Facilitating user access to e-journals is only half the e-journal management problem. The behind-the-scenes activity that makes possible superior service to users has its own set of complexities and challenges. Several types of organizations are beginning to address these back room issues.

NISO/EDItEUR: Standards for exchange of serials information

NISO/EDItEUR,
www.niso.org/news/SerialsExchange.html

Accurate online information on journals is critical for linking and journal management systems to work well. Recognizing the increasing urgency of this need, the National Information Standards Organization (NISO) and EDItEUR, the international group focused on e-commerce standards in the book and serials industries, have joined forces to develop a standard format for the exchange of serials subscription information.

The widespread exchange of journal information among aggregators, publishers, and companies working with products such as e-journal finders calls for a way to transmit data accurately, efficiently, and securely. A joint working party has been formed to resolve technical issues and organize a demonstration project involving publishers, intermediaries, and libraries.

Innovative Interfaces' electronic resources management module

Innovative Interfaces is moving into a promising new area with work on an electronic resources management system. The ILS module under development will allow storage and manipulation of the many data elements that libraries need to track their electronic collections.

Innovative is designing templates for entry of administrative, financial, and license information. Having this material online and searchable will help simplify e-journal management. The product is being tested at the University of Washington and will be available as part of the Millennium ILS or on a standalone basis.

Products from subscription agents

Since libraries have relied on subscription agents in the print environment to facilitate purchasing and related functions, intermediaries have begun, a little belatedly, to offer customers ways to accomplish the same tasks more efficiently in the networked world.

The various ways to acquire e-journals (through aggregators, as part of journal packages, or via consortia) have greatly increased the burden of acquisitions administration. Libraries have more separate invoices to pay and more details to monitor about individual subscriptions.

Subscription agents are moving aggressively to offer:

- Enhanced functionality in their journal gateway services (such as provision of use statistics for collection assessment)
- Services to facilitate e-journal acquisition:
  - — Identification of gaps in the e-serial collection through matching library print holdings against e-titles available
  - — Automatic setup of free-with-print journals
  - — Web access setup for new acquisitions
  - — Consolidated electronic invoices itemized by title suitable for loading into the library ILS acquisitions module
  - — License negotiation
- Troubleshooting capabilities
  - — Negotiation of grace periods
  - — Arrangement of access to licensed content after cancellation
  - — Resolution of interruptions in service

Subscription agents find themselves in an increasingly difficult position in the networked information marketplace. Publisher package deals may cut them out of the purchase process altogether. As pointed out by Rollo Turner of the Association of Subscription Agents and Intermediaries, bypassing agents may result in exasperating and costly situations for the agent and the library:

> Bulk purchases undertaken by libraries through consortia or possibly directly with a large publisher may involve taking the paper copies at deep discounted prices. The agents may not have been involved in these arrangements and may therefore have already invoiced the paper and/or individual electronic subscriptions at list price. The result is muddle and confusion while the exact requirements are redefined and then refunds,

claims, and coping with the seemingly inevitable subscription breakdowns which occur to everyone's frustration and cost.[2]

Agents are receiving less from publishers for doing more work. They may have no choice but to raise service charges to libraries for handling the numerous titles from small publishers. Libraries have a stake in the survival of subscription agents.

The failure of RoweCom at the end of 2002 demonstrated dramatically the intensity of the pressure on the middleman. Agents that remain have a compelling incentive to demonstrate their value to both libraries and publishers, and to explore new markets for direct delivery of information.

Swets/Blackwell's Electronic Journals Access Service

Swets/Blackwell is moving to increase its value to library customers with the introduction of its Electronic Journals Access Service. The service combines an improved and renamed SwetsNavigator (now called SwetsWise Online Content) and SwetsWise Subscriptions. SwetsNavigator was created in 1997 as a journal gateway service.

SwetsWise Online Content offers a table of contents feature that offers access to 17,600 journals with links to 5 million articles in full text. New partners are being sought to add to these numbers. This function is akin to the TOC search capabilities of the e-journal finder TDNet, but the Swets/Blackwell gateway does not function as an aggregator content tracking system nor does it include any free journals.

Like TDNet, the service offers TOC-based use statistics. Like Serials Solutions, Swets/Blackwell provides catalog records (supplied by Marcive) or, if desired, durable URLs for pasting into the 856 field of library MARC records. Unlike those offered by Serials Solutions, however, the MARC records from Swets/Blackwell do not include holdings information.

SwetsWise Subscriptions promises essentially all the acquisitions management functions in the list above. The company also is building an online license bank. The two modules can be purchased as an integrated whole or separately.

Ebsco e-resource access and management services: A total solution?

The company with access to the most information on electronic journals and the most highly developed linking capabilities is likely to be able to come closest to offering libraries a cradle-to-grave e-serials management solution.

Ebsco has a formidable base for developing the answer to the e-resource librarian's prayers. As an agent, it has rights information for its library customers as well as data on thousands of titles in its subscription database. As a major database producer and aggregator, it has direct access on its own servers to many journals. Its journals gateway adds yet more relevant information. Its robust linking capabilities tie all these elements together.

Building on these strengths, Ebsco is creating a suite of related products meant to provide a comprehensive solution to e-journal access and management. The offering includes:

- EbscoHost Electronic Journals Service
- A-Z
- TOC Premier
- LinkSource (Ebsco's link resolver)

EbscoHost Electronic Journals Service. EbscoHost Electronic Journals Service (EJS) combines the information stored in both the EbscoHost database of licensed content and the old Ebsco Online gateway service.

Two versions are offered: Basic EJS and EJS Enhanced. Basic EJS is free to Ebsco subscription customers and covers only titles purchased through Ebsco. The major features offered by Enhanced EJS are listed below.

For the user:

- An end-user portal with access to 8,700 e-journals and the potential to deliver full text for millions of articles. Users can see tables of contents and abstracts for journals to which the library does not subscribe.
- A variety of search capabilities: browse journals (by title, publisher, subject), find journals (using basic or advanced criteria), and find articles (using basic or guided criteria, search by author, filter by subject)
- MyEJS. Allows creation of a personal storage area for favorites, saved searches/selective dissemination of information alerts, downloaded articles, etc.
- Pay-per-view article purchase (controlled by the library)
- Support by robust linking capabilities, OpenURL

For the e-journal manager:

- Alerts regarding new titles, additions, and changes to the library's account
- Registration, tracking, and simplified updating for journal sites that do their own authentication
- Usage reports on all content, by IP address if desired
- Simplified creation of journal lists

To round out its e-journal access and management capabilities, Ebsco also has produced the following add-on services:

Ebsco A-Z. Ebsco A-Z is a searchable journal finder list. Ebsco promises daily and real-time updates to provide more currency than any other service available. The service tracks 400 sources, plus any the library wants to add, including print journals.

Titles purchased through Ebsco are automatically added to the list as acquired. The gateway can be mounted locally or maintained on Ebsco servers. Usage data are provided on sessions, searches, and the number of links to full text with totals by journal.

TOC Premier. TOC Premier is a table of contents gateway service that contains 18 million records from 23,000 titles. The sources of the records are Ebsco Publishing's abstracting and indexing program, the EJS database, and material licensed from the British Library Document Supply Centre. Links to full text can be made to titles the library subscribes to through Ebsco or accesses through EJS, or to journals the library subscribes to that participate in CrossRef.

The library also can set up extended services links from citations to interlibrary loan, document delivery, or related materials. This feature also supports link resolver connections to further expand full-text options. TOC Premier also allows for alerting services.

Licensing and Registration Service (2003 release) will systematically track licensing and registration requirements. Consulting services also are being built to help libraries with negotiation.

Ebsco e-resource access and management services cover a lot of ground, but is it an almost perfect and affordable solution? Cost of the EJS Enhanced version depends on the level of subscription expenditure through Ebsco. For large libraries, adding journals not handled by Ebsco Subscription Services at $15 per title could be an expensive proposition. The A-Z service is priced to fall into the mid-range for similar products.

Customers need to total the cost of all the features they need, add in the price for all the journals they want, and decide.

E-journals management solutions: Deciding what to buy

The following chart presents a summary of the products available for managing e-journals. A single choice probably will not solve all of a library's e-journal management and access problems.

E-JOURNAL MANAGEMENT PRODUCT FUNCTIONS

Product	License Info	Acquis. Info	Regis./ Activ,	OPAC Records	OPAC Links	A-Z Journal List*	TOC Search Linked to Full-text	Alerts & SDI	Stats Reptg	Add'l Features
Serials Solutions				CONSER	●	●				Link Resolver
Journal WebCite					●	●			●	
TDNet					●	●	●	●	●	Custom-ized Data Provision
Swets/ Blackwell E-journal Access	●	●	●	Marcive**			●	●	●	
Ebsco/ E-resources	●	●	●	●	●	●	●	●	●	Link Resolver
Ill Electronic Resources Mgmt.	●	●					●			Fully Featured ILS

*Whether print holdings, free journals, and other titles outside aggregators and packages and at what cost in a factor to be included in product evaluation. Another consideration—that may involve a charge—is whether the list is maintained locally or on the vendor's server.

**Records lack holdings information.

Deciding what product or products to buy depends on analysis of the library's needs and service priorities and must take into account the level of commitment to local solutions already in place. Such an analysis includes at least some of the following factors:

- Local policies on cataloging of e-resources and standards for e-journal OPAC records
- Whether a robust infrastructure is in place for an e-resources list, how much has been invested in it, and what its functional requirements are
- How many titles must be listed and whether a comprehensive journals list showing all available formats is the goal
- How important is the availability of a global quick-search function linked to full-text articles owned by the library?
- Is the journal gateway the appropriate launch pad for issue alerts and current awareness services?

Each of the services provided by e-journal management products has a price tag.

Link resolvers are an additional expense. Though they improve service to users, they also require work. The integrated solutions offered by ILS vendors and others (optimized to work best with their other modules) also may have the advantages of eliminating duplication of effort and reducing user confusion with a familiar look and feel.

Though Ex-Libris has been quite successful selling SFX as a standalone product, libraries may now want to look more carefully at competitive systems that have been developed by their own ILS vendor.

Link resolvers require configuration and, before that, agreement on policies—a time-consuming affair at some institutions. Since implementation of extended linking capabilities also adds to user education and troubleshooting responsibilities, libraries may want to postpone this enhancement until more basic access issues are resolved.

Measuring e-resource use

Librarians want to know how much the resources they purchase are used. They also want to understand information-seeking behavior and to measure how much the user benefits from the discovery tools provided.

Having resources online provides the possibility that libraries may at last have a way to measure objectively what patrons look at and how they find it. This knowledge is relevant for cognitive studies and the design of retrieval tools. It also is valuable to libraries for many administrative purposes. Accurate journal usage information helps libraries decide:

- How well purchases match the needs of their users for learning, teaching, research, or recreation
- Whether to cancel certain journals. Would articles from some journals be more economically provided via interlibrary loan or on a pay-per-view basis? How much are individual journals in packages used and are the ones subscribed to in print those that are in most demand? Does the use of journals not owned previously justify paying for the whole package?

- How best to allocate resources
- How best to frame justifications for additional funding
- Where increased user education may be required

Although some publishers fear that producing and distributing use information may threaten subscriptions, most recognize that they need this information as much as libraries do (or perhaps more). Producers want use data to:

- Measure loads on their servers and to plan expansions of technical infrastructure
- Determine whether improvements are needed in design or navigation of their site
- Know how much the added features they create are used
- See which journals, authors, and articles are read most (This data informs editorial policies and can be used to target areas for new initiatives.)
- Establish whether loss of print subscriptions is being offset by a rise in electronic usage
- Find out how much use is coming through intermediaries such as document delivery services or journal gateways
- Evaluate their overall business plan and pricing model

Though publishers have good reason for wanting detailed statistics, creating the infrastructure to collect and report them to libraries is costly. Marthyn Borghuis, manager of Elsevier's comprehensive statistics service, reported at the 2002 Charleston Conference that the cost of the program is in the multimillions of dollars annually.

Initiatives for measuring e-resource use

Because of the high level of interest in the library community at large, several organizations have been working to establish guidelines in measuring e-resource use.

NCLIS, www.nclis.gov/statsurv/2000ven.pdf

In the public library domain, the U.S. National Commission on Libraries and Information Science (NCLIS) has sponsored a project to standardize online database use statistics and reporting mechanisms. The U.S. Institute of Museum and Library Services (IMLS) sponsored research that led to publication of a manual on networked resources use statistics and performance measures relating to public libraries.[3]

ICOLC guidelines, www.library.yale.edu/consortia/2001webstats.htm

The management responsibilities of consortia led to an early desire to contribute to the development of reporting standards, and the International Consortium of Library Consortia (ICOLC) has published two sets of guidelines, one in 1998 and one in 2001.

ARL's E-metrics Project

See www.arl.org/stats/newmeas/emetrics for a summary of the project, reports produced, and information on related initiatives.

As part of its New Measures Initiative, the Association of Research Libraries (ARL) sponsored a nearly two-year study, called the E-metrics Project, that assessed the impact of electronic resources on library collections and services. The project looked at methods for recording data on e-items in the collection, their costs, and use as part of the process of measuring the library performance. Several publications resulted from the work.

Several e-resource vendors cooperated with the effort and investigators

reviewed the formats and frequency of their usage reports, comparing data elements offered with ICOLC guidelines. The study team conducted a systematic, comparative review of the statistics provided by the cooperating vendors, looking at definitions of terms, interpretations, and reporting practices.

E-metrics Project, www.arl.org/stats/newmeas/emetrics/phasetwopart3.pdf

Researchers found that comparing data across vendors was essentially impossible. They were pessimistic about vendors achieving broadly based standardization of usage statistics and data delivery methods in the short term.

Librarians have developed a long list of desired data elements. They have asked for data not only month by month but also by time of the day and day of the week. Unwieldy and hard-to-analyze records of activity by IP address have been requested and delivered by some journal publishers. Few vendors, however, have met all the requirements librarians have specified, and those that have are not necessarily generating the desired information in the same manner.

Use data provided by publishers are inadequate, inconsistent, and difficult to work with. Not all vendors report all the same variables or define them in the same manner.

Statistics are delivered in a variety of ways. Some vendors e-mail them. Some provide them on websites suitable for downloading into spreadsheets with or without e-mail notice of availability. Usually data remain on the vendor website for only a finite amount of time. Downloading a full set of reports from a site into a spreadsheet program can be laborious and time-consuming.

Even tracking the use of a single publisher's output over time is problematic. Content changes over the years. When vendors find or are informed of errors in reporting practices, the improvements they make may destroy comparability of their own use figures over time. System malfunctions also can result in data loss, making mapping trends difficult.

Project COUNTER

As more people and groups attempt to make intelligent decisions based on available usage data, the flaws in the system become more obvious. The most recent response to the general level of frustration is an international initiative called Project COUNTER (Counting Online Usage of Networked Electronic Resources).

Project COUNTER, www.projectcounter.org and www.usagestats.org

COUNTER grew from discussions in Britain in the Publishers and Libraries Solutions (PALS) Group beginning in September 2000. In June 2001 the group organized an international forum attended by stakeholders in the vendor, standards, and library communities. A level of agreement was reached at this meeting on data elements and delivery. Working groups were formed to address additional complex issues. COUNTER became an organizational entity with a project director and a plan in March 2002.

Its most important goal is to create statistics that are not only consistent and compatible but also credible. Assuring reliability of the data requires establishing an auditing mechanism.

The project has an ambitious timetable and widespread support from interested parties on both sides of the Atlantic. It also has a set of reasonable and sane objectives that should help ensure success.

A survey of 650 librarians conducted by COUNTER indicated that the participants would be satisfied with a small number of dependable reports. Those surveyed were willing to part with the idea of time-of-the-day and day-of-the-week reports but did want monthly reports with no more than two weeks' lag time. COUNTER's plan will be to start small and test performance often. The immedi-

ate objective of having a code of practice ready by December 2002 was met with a first release in January 2003.

COUNTER needs widespread buy-in from the vendor community, an ongoing source of funds, a business model, and an effective organizational structure for the auditing function. Short-term goals call for finding the money to carry the project through 2005 and to have broadly based implementation within the industry by then. Different levels of compliance will be proposed to account for the differing capabilities of information providers.

COUNTER's plan has sensible goals and is intelligently designed. But building buy-in from stakeholders may not only take time but probably also require financial outlays on the part of vendors who might need to adapt current reporting systems or build new programs from scratch.

Assuming widespread compliance occurs by 2005, libraries and vendors face three more years of making decisions about e-resources with the flawed tools currently available.

E-archiving

A comprehensive solution to the problem of preserving digital objects is an increasingly pressing requirement in the age of information. Serious work has been underway for sometime to solve the technical, economic, and organizational problems of building and maintaining e-archives.

Though many libraries have already decided they want to move entirely from print to electronic access, some are reluctant to do so without assurance that the online version of a journal will be available permanently.

Many publishers want to abandon print as soon as possible to reduce the costs of maintaining two production, distribution, and accounting streams. But who will guarantee the literature and information in electronic format produced today will be available to future generations?

Although publishers initially showed no interest in older literature, they now see an economic benefit in the production and sale of electronic backfiles. If in response to this trend, libraries discard older print runs of major journals to save the costs of storage, the knowledge of the past also may be at risk.

The electronic archiving problem has many facets. Electronic media are fragile objects that exist in a mutable environment. They require software to be usable and reside on hardware that may become obsolete. The bits and bytes that make up the essential content they contain are subject to degradation.

The many different ways in which digital journals are produced and presented and the variety of elements they include greatly complicates the challenge of preservation. Preservation systems must allow for journals in PDFs as well as for those encoded according to different schemes (such as SGML or XML) and for the different interpretations of these schemes by different publishers.

Audio, video, and data supplements bring their own sets of preservation headaches, since authors may use different technical methods for creating these elements. Deciding whether to retain the links that add value to the text also is a thorny issue. Web-based journals may well be victims of their own success in expanding the varieties of information that articles are now capable of delivering.

The Library of Congress and digital preservation

At the end of 2000 Congress passed legislation establishing the National Digital Information Infrastructure and Preservation Program calling for the Library of Congress to lead a national planning effort for the long-term preservation of digital resources. To fulfill this broad mandate, the Library of Congress is cooperating with other government agencies, foundations, and interested parties in the business, research, and library communities. The planning process began in early 2001, with stakeholder meetings, the development of a conceptual framework, and a collaborative research agenda. The next step in the process will be scenario building.

Mellon Foundation projects

The Mellon Foundation has been a prime mover in the e-archiving arena, beginning with the JSTOR journal digitizing project funded in the mid-90s. In 2001 the Foundation sponsored several grants to universities to explore different aspects of the problem in cooperation with major scientific, medical, and technical publishers. These projects made progress on some of the technical issues but also highlighted some significant realities.

Cooperative work with publishers underscored the mutual interest of the library and the vendor communities in e-archiving. Publishers are eager for libraries to accept e-journals as the version of record since the publishers know libraries will not otherwise abandon print.

The CrossRef project and its enabling of links to older literature created a need for digitized backfiles. Producers recognized that libraries also might be willing to pay for the convenience of electronic access to earlier as well as more current literature, even if they had to pay for it a second time.

Commercial publishers likely have no economic incentive to be responsible for permanent archives. Scientific and professional societies see the matter differently. Some are committing to preserving full runs of their journals in digital form.

Development of a sustainable economic model for e-journal preservation was the primary requirement identified by the 2001 Mellon-funded archiving projects. The results of the studies emphasized the high level of commitment that would be necessary for individual universities to assume the burden of archiving as a public good.

Perhaps even more important, the studies demonstrated that no model exists within university funding structures for financing a large-scale preservation effort for the benefit of the academic community at large.

The project results led to the conclusion that responsibility for the creation of a central archive should rest with an entity outside the university community that would be able to coordinate contributions from other stakeholders including publishers, libraries, universities, and government.

Mellon's next step has been to fund a substantial new effort at JSTOR to build on the knowledge gained through the joint publisher-university studies.

LOCKSS

LOCKSS, a Stanford University project, stands for Lots of Copies Keep Stuff Safe. The project promotes multiple libraries owning redundant copies of electronic serials to assure the continuing availability of the content.

LOCKSS, http://lockss.stanford.edu

This e-archiving scheme is based on the decentralized print preservation model. It envisions many libraries owning copies of electronic journals just as many libraries currently own print copies.

The idea is that institutions participating in LOCKSS will maintain permanent Web caches containing their holdings of an e-serial, thus owning it rather than simply accessing it, as is the norm in e-license arrangements. JSTOR is essentially the reverse of this concept, since it aims to create a single electronic archive to replace all the redundant print copies taking up space in stacks around the country.

The LOCKSS system will run checks on the multiple copies at different locations and identify errors that may creep into any copy at a participating institution. The defective copy will be replaced by interlibrary loan with an accurate copy.

The technical and hardware requirements for participating in the system are manageable, and even small libraries are welcomed as contributors. The Mellon Foundation and Sun Microsystems have supported the development of this project. Continuing funding has been received from Mellon, Sun, and the National Science Foundation. The system is undergoing a worldwide beta test. A long-term support system involving a formal financial and organizational plan will be required for the idea to be implemented on a broad scale.

Cooperative print retention programs

The extensive work on the preservation of digital objects is complemented by cooperative print retention initiatives. Though JSTOR has launched an expanded initiative in electronic area, it also has developed a cooperative arrangement with the Center for Research Libraries in Chicago to act as the repository for print copies of JSTOR titles. Smaller-scale collaborations also are underway. The Big 10 libraries, for example, have been working for the last year to establish agreements for the retention of print copies of journals in major STM publisher packages at one or more university in the Committee on Institutional Cooperation (CIC) consortium.

Is it safe to cancel print?

When deciding to discard print in favor of e-access, each library must consider its financial situation, the preferences of its users, potential cooperative arrangements with nearby partners, and its institutional history and mission.

Carol Montgomery, director of the Drexel University Library, has provided useful information on one library's experience in implementing an essentially all-electronic serials collection.The changeover began in 1998, and Montgomery has documented aspects of it on a continuing basis.[4]

Her most recent publication with Donald W. King compares the costs of maintaining print and online journal collections. With the cost of space as the dominant factor, Montgomery finds that bound journals collections have a disproportionately high cost per use, and e-journals in publisher packages and especially in aggregated databases are far more cost-effective.

Montgomery's work shows that titles in aggregated databases cost only $1 per use. Other interesting findings are the high administrative, collection development, public relations/communications, and especially reference-related expenses for the e-serials collection.

Drexel has elected over a period of time to limit the print collection to popular titles, journals where online versions lack illustrations or have illustrations of poor quality, key journals available only through aggregators, and journals not available online. The library also maintains an archival collection for library science as part of its mission.

Drexel can rely on large print journal collections in the immediate area. It does not catalog e-journals and has not purchased an e-journals management system. Institutions that have made different decisions will have higher administrative costs.

Many libraries are reluctant to move entirely to e-format without a guarantee that online journals will endure. Computer scientists are confident the archiving problem will be solved because technology is the engine of its own survival. Administrators recognize, however, that addressing the interests and coordinating the contributions of all stakeholders pose a major organizational challenge. Perhaps a more important question is how much maintaining massive e-archives will cost and how the costs will be shared.

The task: Challenging, but not impossible

Librarians responsible for electronic journals have been granted in generous measure the Chinese blessing of living in interesting times. The skills and knowledge needed to meet the challenges of this format are the stuff of lifelong learning.

Many tools are at hand to help librarians learn: websites, conferences, workshops, vendor-sponsored seminars, listservs and a growing descriptive and evaluative literature.

This summary of the state of the art emphasizes recurring themes:

- The selling of information and services to libraries has always been a commercial enterprise, with many participants in the value chain. The migration from print on paper to bits and bytes coursing over the Internet has re-emphasized the commercial realities of publishing and distribution, creating an increased focus on packaging and marketing. This reality necessitates that librarians cultivate an understanding not only of contract language and bargaining skills but also a heightened adherence to the principles of caveat emptor and common sense.
- The wise librarian consumer will test all the critical factors before buying: interfaces, record sets, administrative modules, claims of comprehensive coverage and quality, potential for customization —whatever matters most in what the producer promises. Clear-eyed assessment, however, should not preclude collaborative rather than adversarial relationships with vendors to further mutual understanding and improve products.
- The potential for serving information needs in the Web environment seems limitless, but adding new capabilities inevitably brings new complications. What libraries can offer their users is supported by an intricate and fragile web of agreements among different players in the marketplace, proper adherence to standards, a tissue of ethereal technical connections, and a mass of temperamental machinery. Unfortunately, the links that bind this awesome system together are made to be broken. The more complicated this network becomes, the more labor, time, and skill are required to explain, find, and fix failures.

Building and managing electronic journals collections is a high-cost, high-maintenance activity. To keep it affordable, libraries must have clear priorities and reassert selectivity in materials and services offered.

Footnotes

[1] Oliver Pesch, chief architect at Ebsco presented at the Charleston Conference, October 2002.

[2] Rollo Turner, "E-Journal Administration—Fragmentation or Integration?" Association of Subscription Agents and Intermediaries, Nov. 2002. www.subscription-agents.org/ejournaladmin.html. To be published in early 2003 in *The Serials Librarian.*

[3] John Carlo Bertot, Charles R. McClure, and Joe Ryan, *Statistics and Performance Measures for Public Library Networked Services.* Chicago, American Library Association, 2001.

[14] Carol Hansen Montgomery, and Donald W. King, "Comparing Library and User Related Costs of Print and Electronic Journal Collections." *D-Lib Magazine,* October 2002. www.dlib.org/dlib/october02/montgomery/10montgomery.html. Carol Hansen Montgomery and JoAnne L. Sparks. "The Transition to an Electronic Journal Collection: Managing the Organizational Changes," *Serials Review,* 26.3, 2000, p. 4-18. Carol Hansen Montgomery, "Measuring the Impact of an Electronic Journal Collection on Library Costs: A Framework and Preliminary Observations," *D-Lib Magazine,* October 2000. www.dlib.org/dlib/october00/montgomery/10montgomery.html.