Introduction to Resource Sharing

Abstract

Chapter 1 of Library Technology Reports *(vol. 49, no. 1) "Resource Sharing in Libraries: Concepts, Products, Technologies, and Trends" presents some of the conceptual approaches available to libraries in the way that they provide access to materials to their patrons beyond their local collections. Models of resource sharing discussed include sharing an integrated library system among the members of a regional consortium; implementing a resource sharing environment to connect ILS implementations to enable consortial borrowing; and providing materials through document delivery services or global interlibrary loan systems.*

N o library today can be expected to directly hold all of the resources to fulfill all the needs of its users. Rather, most libraries supplement their local collections through resource-sharing arrangements that allow them to offer their clientele access to a broader universe of materials. Libraries participate in local, regional, or global services for the borrowing and lending of materials, supported by different types of organizational relationships and technical infrastructure.

This issue of *Library Technology Reports* provides information on the resource-sharing alternatives available today, explores some of the relevant technology trends underway, and looks at the evolving strategies emerging as libraries continue to seek innovative ways to provide more resources to their patrons despite the realities of reduced staff and collection budgets. It reviews the major products that provide interlibrary loan and resource sharing and that automate interlibrary loan operations.

In these times when libraries experience harsh budgetary limitations, they need to exploit every possible opportunity to achieve better services for their patrons with fewer resources. Interlibrary loan, consortial borrowing, document delivery, and shared collections are some of the key strategies that allow libraries to provide access to more materials than are available in their local collections. Books involve the fulfillment of a physical object that must be returned to its original owing institution; articles, book chapters, and other content items of manageable length can be scanned for electronic delivery. Different types of technical infrastructure are needed to support each of these models of resource sharing. Material type plays a major role in resource-sharing options.

Concepts and Options

Many different models are found within the realm of resource sharing. We will consider global interlibrary loan services such as OCLC's WorldCat Resource Sharing service, as well as systems that facilitate cooperative reciprocal lending among consortia or regional library systems to more effectively pool and share their collections.

The key principle of resource sharing centers on enabling libraries to provide access for their patrons to materials beyond their immediate local collection. Some involve reciprocal agreements where libraries make some or all of their collections available on request to patrons affiliated with cooperative partner institutions; others, where libraries or other organizations supply materials for a fee.

Technology plays an essential role in support of resource sharing. Libraries depend on various types of automation systems to manage their collections,

and other layers of infrastructure are needed to enable broader exchange of resources among libraries and their patrons. Some of the important areas that we will examine include staff workflow tools that help personnel in a library manage requests and fulfillments from external systems, system-to-system communications that allow integrated systems to interact with resource-sharing environments, supporting standards or protocols, and other technology or infrastructure components. We will consider some of the models of resource sharing, ranging from circulation of materials within a single library system, to consortial borrowing environments created among libraries with independent integrated library system implementations, to centralized interlibrary loan services, to shared infrastructure in support of automation and resource sharing.

Beyond Circulation

Resource sharing goes beyond local circulation—the lending of materials owned by the library to its own directly affiliated clientele. Local circulation in itself can be a fairly complex operation, with business rules designed to maximize equitable access to library materials. Circulation systems need the ability to determine whether or not an item can be borrowed by any given category of patron, the length of circulation periods, whether renewals are allowed, and what fines or other measures apply when materials are returned late or lost. A circulation system routinely includes the ability to allow a patron to place holds on items of interest that might not be immediately available and to be notified when it is ready for pickup. Multibranch facilities usually allow patrons to borrow materials from any branch in the system, using the holds feature. These libraries would have procedures in place to route materials from one branch to another to fulfill these requests. The circulation of materials within a single library, even if it operates multiple branches, is a well-understood process and can be managed through the built-in functionality of most integrated library systems. Costs for lending items within a library system are low since the routing of materials involves relative short distances and can be handled though in-house or contracted couriers. In most cases, no additional transaction or service fees apply.

Routine circulation provides efficient access to the materials a library owns. The key limitation, however, lies in the finite nature of library collections. Access to a broader universe of materials requires business and technical arrangements with external services.

Monolithic Interlibrary Loan Services

A long-standing model of interlibrary loan involves a centralized service that brokers requests among very large groups of libraries. OCLC stands as the best-known and largest organization providing this type of service. In previous times, several other services existed, including UTLAS in Canada, Western Library Network (WLN) based in Washington, and Research Libraries Information Network (RLIN), but considerable consolidation has transpired over the last two decades. WLN and RLIN have become part of OCLC, and the former UTLAS services have been subsumed within Auto-Graphics. Many national libraries, including those of Australia, New Zealand, and most countries in Europe, operate centralized interlibrary loan services. Others, such as CISTI in Canada, Docline, operated by the National Library of Medicine, and the British Library, operate large-scale document delivery services.

Centralized interlibrary loan services are often tied to bibliographic services, such as the maintenance of a comprehensive bibliographic database that provides MARC records in support of original and copy cataloging. As part of the bibliographic services, either through online cataloging or through batch processes, holdings data is associated with the MARC records in support of related services, including interlibrary loan.

These monolithic interlibrary loan services play an essential role in the global enterprise of resource sharing. Almost any desired item, no matter how obscure or rare, can be provided through one of these services. OCLC's WorldCat, for example, aggregates metadata describing massive amounts of material available on request.

The main disadvantages of this model of interlibrary loan involve high expense and relatively long times to fulfill requests. Costs might include transaction fees assessed by the interlibrary loan service broker, charges assessed by the lender, and shipping. A request might cycle through multiple potential suppliers before it is completed, and shipping from distant locations will extend the fulfillment interval even further. Yet for materials that cannot be supplied in other ways, these services play a vital role.

Some of the technology issues related to these centralized interlibrary loan systems include the standards, pragmatic protocols, application programming interfaces (APIs), and other techniques for automated submission, tracking, and monitoring of requests and workflow tools that streamline the business processes associated with submission and fulfillment of requests.

Consortial Resource Sharing

Libraries also engage in other arrangements that can satisfy at least some percentage of their patrons' needs at lower costs and with faster fulfillment than a monolithic interlibrary loan service. By banding together in consortia, libraries are able to pool their resources to gain various benefits. The ability to draw from materials distributed across a larger group of libraries can

significantly increase the size of the collection effectively available to patrons and reduce the number of requests made to higher-cost services. While these consortial groupings do not offer the comprehensive level of resources available globally, they establish a pool of resources far greater than any of the participating libraries would hold individually. Rather than rely on the postal service or commercial shipping, consortia often implement a courier service that makes regular rounds among the participating facilities.

These consortial resource-sharing organizations depend on some type of technology infrastructure. As shown below, models include sharing an integrated library system or using add-on software that provides discovery and request management in conjunction with multiple integrated library systems that may be in place in the participating institutions.

Managing Workflows

Different types of technology infrastructure are available to support resource sharing within a consortium or to streamline the ways that a library makes use of a centralized interlibrary loan service. Interlibrary loan operations involve a complex set of tasks and workflows that benefit from automation tools that can eliminate or simplify steps. Support for interlibrary loan processing is generally not within the scope of integrated library systems. Yet an important part of the interlibrary loan automation process involves the movement of library materials in ways that require updates or circulation operations within the ILS.

The traditional workflow for processing interlibrary loan requests has been one where library personnel play a direct role. They would perform tasks such as submitting the request to the interlibrary loan service on behalf of the patron, completing and verifying the citation to confirm that that item exists, verifying that it is not available in the local collection, or selecting a set of potential suppliers to fulfill the request. When an interlibrary loan office receives a request for an item, possible workflow steps include verifying that it is held by the library, determining if it is eligible for external loan and whether it is in use, and ultimately retrieving the item from the collection, charging it out in the local circulation system, performing any needed updates in the interlibrary loan system, and then packaging the item and directing it to the appropriate shipping service. Each of these many different possible steps adds time and expense to the process. Different types of technology infrastructure have been developed to eliminate as much staff intervention as possible, to streamline workflows, and to create rapid and less expensive resource-sharing environments.

One of the key tactics in the broader strategy of enabling more efficient resource sharing is to create ways to short-circuit as many of the tasks in the traditional workflow as possible. Any scheme that can eliminate steps of human intervention or mediation should result in faster and less expensive transactions. A more streamlined cycle of workflow for an interlibrary loan transaction might give the patron the tools to efficiently discover materials of interest, capture definitive and accurate citations, and submit valid requests directly to a lender whose ownership of the item has been verified. Achieving these efficiencies depends on technical components that can reliably enable patron requests and route requests along the appropriate chain of potential suppliers, with effective tools for tracking, reporting, and staff intervention as needed.

Connecting Incompatible Systems

One of the challenges in resource sharing relates to the different technology platforms involved. An interlibrary loan system relies on a large-scale business application that manages the metadata of available resources, routes requests for materials, and performs a myriad of other activities in support of its operations. Libraries use the circulation module of their integrated library system to manage their inventory of materials and associated lending activities to their own users. The separate operation of these two independent systems can impose a great deal of duplicative work for the users in need of materials, for the interlibrary loan personnel involved, and even for the underlying computer systems.

Finding ways for requests to automatically flow among interlibrary loan systems and integrated library systems is one of the great technology challenges to be solved. International standards, such as ISO ILL or other agreed-upon techniques for the exchange of request transactions between systems and NCIP or SIP for communicating with a circulation module of an ILS, and the use of APIs are part of the toolkit of components available for the construction of a technology environment that can knit systems together seamlessly.

Load Balancing

Cooperative arrangements for resource sharing ideally distribute the workload evenly among participants. Whether a library is a net lender or a net borrower will depend on the relative strength of its collections and the research needs of its patrons. It's also important not to overburden any library disproportionately. The business logic of any resource-sharing or interlibrary loan system needs to be programmed to select potential lenders in ways that balance the load.

Trusted Systems

Efficient resource sharing involves establishing networks of trusted systems in support of the cooperative

agreements among institutions. Reciprocal borrowing arrangements establish the general principle that a given set of libraries agree to allow their patrons to borrow materials from each other's collections. The implementation of these agreements requires some supporting technical infrastructure. There are various approaches possible, including those that rely on applications that enable groups of libraries with separate ILS implementations to communicate with each other in support of reciprocal borrowing and others that might involve participating in a shared ILS that can both provide standard automation support for the libraries and facilitate resource sharing. The ability to route requests automatically between peer-to-peer resource-sharing networks or to pass unfulfilled requests to centralized ILL services also involves extending that trusted network to external systems.

Document Delivery

Document delivery constitutes a major portion of the resource-sharing arena. As opposed to books, which must be physically sent from, and later returned to, the supplying library, requests for journal articles, research reports, individual book chapters, or other items of finite size are fulfilled through a different set of workflows generally known as document delivery. Although there are many variations, the general process involves the lending library fulfilling the request by scanning the requested item and transmitting it electronically to the borrower's library or even directly to the borrower. Document delivery requires specialized technology support applications that may differ significantly from those used for books or other physical materials.

The methods of transmission of documents continue to evolve. Prior to the Internet, the lending library would create photocopies that would be shipped physically. Fax transmission became common beginning in the 1980s and is still used, though rarely. Today most document fulfillment takes place by transmitting scanned documents across the Internet. Specialized applications, such as Ariel and Odyssey, were created that facilitate the efficient exchange of scanned documents among interlibrary loan offices. The document, once received by the borrowing institution, may be printed for pickup by the patron, but it will more likely be delivered through an e-mail attachment or posted to a secured website where it can be downloaded by the patron using campus or library login credentials. A recent technique simplifies the process even more by scanning the document directly to cloud-based storage where it can be securely downloaded by the requesting patron. OCLC's Article Exchange service follows this approach.

Document delivery procedures must include steps in the fulfillment that ensure compliance with copyright. The document delivery management system will need to capture, for example, the number of times that each item has been supplied and any other parameters that reflect whether or not an item can be supplied within the guidelines or policies related to copyright compliance. Some libraries may work with services such as those provided by the Copyright Clearance Center to help manage copyright fees.

The fundamental changes related to the electronic publishing of journal content have made a major impact on document delivery services. A very large portion of the journal articles published are now available electronically. Many academic and research libraries now have electronic subscriptions for current issues and back runs of many journals and periodicals and have placed physical copies of those titles in storage. The need to scan articles to fulfill a document delivery request has diminished accordingly.

As libraries shift away from print collections of articles to electronic collections, different business or legal restrictions may apply. The use of electronic resources is governed by license agreements made between the library and a publisher or provider. The terms of these licenses may or may not allow materials to be lent to individuals not directly affiliated with the library. Tracking the eligibility of lending electronic materials adds a new layer of complication to the resource-sharing arena.

In the e-journal realm, libraries face the same reality as with print journals: they are not able to subscribe to all the materials that may be needed by their patrons. Other means to fulfill requests for articles not within the library's subscriptions are available, such as pay-per-article services from the publishers. Libraries continue to provide document delivery services by scanning articles as needed, but they may also be able to lend the electronic copies from their subscribed content resources when allowed by their license terms.

The recent advent of Web-scale discovery services also has an impact on document delivery. These services, such as Summon from Serials Solutions, Primo Central from Ex Libris, EBSCO Discovery Service, WorldCat Local, and especially Google Scholar, provide easy-to-use tools that allow library patrons to gain access to the universe of article-level content. Depending on the search scenario, this might include articles beyond those subscribed to by their home library. These discovery services have the potential to increase demand for document delivery services.

Shared ILS within a Single Library System

An ILS shared by a library system provides a shared automation and discovery environment for a group of libraries within the same organization. These libraries operate under a common governance and funding

structure. Examples include countywide library systems, library districts, multibranch municipal libraries, and even statewide or national systems. Materials in these shared systems are routinely circulated among all the facilities.

One of the key features related to sharing resources within these types of systems involves the ability to easily transfer items among branches. This capability enables patrons to request and receive materials housed at any facility within the system at the branch most convenient for their use. Traditionally, materials are assigned to specific branches or facilities, and materials delivered to a borrower at another branch are returned to the owning location. Another arrangement allows collection items to float, with items remaining at the branch to which they are returned even if they were originally assigned to another facility. Some libraries implementing floating collections create a layer of business rules that would identify specific items designated to be returned to their home location or that would control overall volume transfers so that the net gain or loss in the total number of materials in any given branch remains within designated thresholds.[1]

The circulation modules of most integrated library systems support floating collections. Some of the products that include this capability are VTLS Virtua, Millennium from Innovative Interfaces, Library.Solution from The Library Corporation, Polaris from Polaris Library Systems, SirsiDynix Symphony, and SirsiDynix Horizon.

Consortial Systems with Distributed Automation Systems

Many consortia bring together groups of libraries that each operates its own integrated library system. Efficient reciprocal borrowing among libraries with separate integrated library systems requires the implementation of an additional layer of technical infrastructure. This infrastructure would have a variety of components, including a union catalog that spans the collections of the participating libraries, a request management system, and connectors to the ILS of each of the participating libraries.

The basic resource-sharing scenario is to enable a patron to search the collective holdings of the entire consortium, request an item from any of the participating libraries, and have that item delivered to the patron's home library for pickup. While that workflow may be built in to many multibranch ILSs for a single library system, it is more difficult to achieve when multiple ILS implementations are involved, especially a mix of different ILS products.

The union catalog component of the consortial resource-sharing environment can be implemented in different ways. A physical union catalog would consist of a bibliographic database populated with the holdings of each of the participating libraries. The MARC records would be extracted from each ILS instance and loaded into the union catalog system at some periodic interval, maintaining data regarding which library holds each item. Regular ongoing synchronization between the union catalog and local systems is needed to keep data current.

Another option involves using federated search technology, usually based on the Z39.50 protocol, to create a virtual union catalog. Under this approach, the queries entered by patrons would be broadcast to each of the ILS implementations to dynamically identify materials available within the consortium and the owning library. The virtual union catalog approach avoids the overhead of loading and synchronizing MARC records, but it may have limitations in performance and scale.

The consortial resource-sharing system would also include a request management system. Some of its capabilities would include accepting requests via the union catalog or other means, routing the request between ILS implementations of the owning and borrowing libraries, and performing various tracking and management functions. The process is based on using the existing functionality of the circulation module of the ILS to allow a remote borrower to place a hold on an item, which would then be routed to the designated library in the same way as any other local pickup location. The home ILS of the patron likewise exercises the circulation functionality that applies to notifying the patron that the item is available and charging the item to the patron for the specified loan period. The core problem is that the ILS of the library owning the desired item will not have a record for individual patrons of the partner libraries, and the ILS of the borrower's library will not have a bibliographic or holdings record for the requested item. These problems are solved through a series of commands executed by the request management system, using the NISO Circulation Interchange Protocol (NCIP). The sequence would include some variation of these actions:

- A patron associated with Library A places a request for an item in Library B.
- The patron is authenticated as a valid patron eligible to make the request using the patron barcode number and PIN in the ILS of Library A.
- A temporary patron is created on the ILS of Library B.
- A hold transaction is submitted for the item record in Library B and the temporary patron record, specifying the desired pickup location in Library A.
- A temporary item record is created in the ILS of Library A.
- A hold transaction is generated for the patron in Library A against the new temporary item record.
- The circulation module of Library B includes the

item in its routine list of materials to be pulled for hold requests.

- The item is physically routed from Library B to Library A.
- Library A receives the item.
- The circulation module of Library A generates a hold notice to the patron indicating the item is available, and it is placed on the hold shelf of the designated branch.
- The item is checked out to the patron using normal circulation procedures, based on pre-established loan rules for loan interval, renewals, and fines.
- The item is returned by the patron and discharged on the ILS of Library A.
- A message is generated to route the item back to Library B.
- Library B receives the item.
- The temporary item and patron records are removed.
- Selected data regarding the transaction is logged for statistical reporting.

While this sequence of actions seems complex and fragile, it can be entirely automated by the request management application and allows the library to handle these consortial loans using the same system and procedures that apply for the circulation of its own materials. Depending on the efficiency of the courier service among the libraries in the consortium, this model of consortial borrowing can make materials available to patrons in times similar to local hold requests. Fulfilling requests in this way is much less expensive than relying exclusively on external interlibrary loan services. Only those requested items not available in any library in the consortium would need to be processed through an external interlibrary loan request. The consortial request management system might optionally have the capability to automatically route such requests using the ISO ILL protocol, an API, or other system-to-system interchange method.

Shared ILS for a Library Consortium

A consortium of libraries of independent funding and governance might also join together to participate in a shared integrated library system. Such an arrangement comes with complications beyond an ILS shared among the branches of a library system but avoids the complexities seen above in managing transactions among the circulation modules of multiple ILS implementations. In a consortium, the libraries may have different policies, priorities, and organizational concerns, which all have implications for the shared ILS. Some of the issues that potentially apply to a consortially shared ILS include these:

- Different libraries may have different circulation policies for materials, such as loan periods and fines assessed.
- The interests of participating libraries in emphasizing their branding and identity in online catalog search and display pages may conflict.
- The funding model for an automation environment shared by independent libraries varies, but usually involves distributing costs among participants according to a formula that includes factors such as service population, size of geographic service area, size of collection, or other variables. In some cases, the consortium may be funded centrally by a state agency or other sponsor.
- Materials may be owned by the individual libraries. Though available for borrowing by patrons affiliated with any library in the consortium, returned materials must be routed to the owning facility.
- An ILS shared within a consortium may also include multibranch libraries. The loan rules and other policies for how materials circulate within these groups may be different from those for the overall consortium.

A shared ILS provides opportunities for libraries to gain benefits not just in resource sharing, but also in lowering their overall automation costs. The costs of participating in a shared ILS in almost all cases will be less than the library operating its own implementation. The total expense of operating the system, including the costs for the ILS software and maintenance, hardware, and technical and administrative personnel, can be distributed among consortial participants. A shared ILS also avoids the expense of the add-on consortial borrowing infrastructure. A consortially shared ILS also provides opportunities for other services, such as centralized acquisitions and cataloging. According to Leon and Kress, the cost per transaction in this model averages $3.88, versus $12.11 for traditional interlibrary loan transactions.[2]

Participating in a shared ILS raises various issues of policy and practice. The participating members may elect to adopt a simplified set of circulation policies for loan periods, numbers of allowed renewals, fines, and other operational parameters. A shared ILS, however, would allow each library to maintain separate policies as needed.

An ILS shared by a consortium provides inherent resource-sharing capabilities. Through the use of common automation infrastructure with a comprehensive database that spans the materials of all the collection members, patrons have access to a large aggregate collection, a much larger pool of materials than any member library could offer individually.

One of the key features of such a consortially shared ILS involves allowing patrons to request materials, either from their own local library or any other

library in the consortium, through a simple hold operation as provided through the online catalog and circulation modules. Placing a hold triggers a message to the home library of the item, which is pulled and routed to the requesting library. By using the built-in capabilities of the circulation system, fulfilling a request is inexpensive and fast, depending on the efficiencies of the consortium's courier service among its members.

These ILS implementations shared within a consortium can serve a large number of libraries. One of the ongoing trends involves continual expansion of the size of these shared ILS consortia, often through the consolidation resulting from the mergers of previously separate consortia. In the current era of infinitely scalable computing platforms, the number of libraries that can reasonably share the common infrastructure of an ILS may be virtually unlimited. Ambitions for state-wide or national automation infrastructure may be within grasp.

The Role of Discovery

Resource-sharing environments often involve a discovery layer that allows library patrons or personnel to search the universe of materials available. Such a discovery layer can take one of several different forms, including the physical and virtual union catalogs discussed above.

One of the major trends in the library technology arena over the last few years has been the development and adoption of discovery environments of ever wider scope. Index-based or "Web-scale" discovery services have emerged that search the body of articles and other materials represented within a library's subscriptions to electronic resources in addition to the books and other physical items managed locally. Products in this genre include Summon from Serials

Solutions, Primo Central from Ex Libris, EBSCO Discovery Service, and OCLC's WorldCat Local. Three of these discovery environments—Summon, Primo Central, and EBSCO Discovery Service—are based on indexes maintained by the discovery service provider of electronic content blended with records harvested from the library's local automation system. While this approach has great potential in providing access to articles held by the library and to the broader universe of electronic content, it focuses on the physical materials held by the library. To search for physical items beyond the library's holdings, patrons might need to perform another search in a consortial catalog or WorldCat.org. WorldCat Local has stronger discovery capabilities for physical materials since it intrinsically searches the entire WorldCat database, giving preferential relevance ordering to materials held by the user's home library. Materials not owned by the library and available through interlibrary loan, or in some cases through consortial borrowing, are presented as a standard feature.

A library typically features a search box for its online catalog on its website. Depending on the configuration of the library's automation environment, this search box may provide access to the holdings of the local library system or consortium. To find materials not held within the system, the patron would need to also search any consortial catalogs available or WorldCat.

Notes

1. Ann Cress, "The Latest Wave," *Library Journal* 129, no. 16 (October 1, 2004), www.libraryjournal.com/article/CA456235.html.
2. Lars Leon and Nancy Kress, "Looking at Resource Sharing Costs," *Interlending & Document Supply* 40, no. 2 (2012): 81–87.