Interoperability and Standards

Abstract

Chapter 2 of Library Technology Reports *(vol. 49, no. 1) "Resource Sharing in Libraries: Concepts, Products, Technologies, and Trends" discusses the major international standards, protocols, and pragmatic technical approaches that support resource sharing activities. The ISO ILL protocol established as the international standard has seen inconsistent adoption; APIs now provide similar capabilities while interest in developing a new version of the standard has recently gained momentum.*

Any given resource-sharing environment gains flexibility through the ability to communicate with external systems. By their nature, resource-sharing systems need the ability to send and receive information related to the submission of a request and the various possible steps involved in its fulfillment. Interlibrary loan and resource-sharing arenas benefit from standardized protocols for passing messages and requests from one system to another rather than each operating within its own proprietary environment.

Many different resource-sharing scenarios require the interchange of messages, including

- the submission of a request from a local library system to an interlibrary loan fulfillment agency
- the handoff of a request from a regional resource-sharing system to a global interlibrary loan agency
- automated transmission of requests processed by an interlibrary loan office to a fulfillment service
- transfer of requests from discovery services to fulfillment agencies
- communications between integrated library systems and resource-sharing systems to automate the processing of requested materials in the local circulation modules

In support of these automated processes, standards have emerged specifically related to the messaging involved in interlibrary loan requests; existing protocols already in place related to library circulation transactions and discovery are used as well.

ISO ILL

An international standard, ISO 10160 and 10161, commonly called ISO ILL, has been in development for over two decades. It has an interesting history of pioneering development, spotty implementation, and growing obsolescence. The rise and fall of ISO ILL illustrate the long-standing and ongoing need for a standard method to route requests related to ILL among diverse systems as well as the incredible complexity involved.

Canada was the center of pioneering efforts in the peer-to-peer interlibrary loan. During the 1980s, in support of its interlibrary loan service, the National Library of Canada developed a set of messages, or scripts, which could be passed via electronic mail to submit a request or other related operations. This ILL messaging protocol became the Canadian National Standard. In parallel to the Canadian National Standard, Canada Institute for Scientific and Technical Information, which operated a major document delivery service, created its own message scripts, received via e-mail, to automate requests. This Generic Script Messaging, or GSM, remains in use even today by resource-sharing services in Canada.[1]

The International Organization for Standards began work in 1991 on a protocol, based on the Canadian National Standard, for interlibrary loan transactions. Following two years of work, the initial version of ISO 10160/10161, generally known as ISO ILL, was published in two parts, the first (10160) dealing with the

service definition, and the second (10161) defining the protocol specification and conformance statements. A revision to the protocol was issued in 1997. A third edition of the ISO ILL protocol was developed by the ILL Protocol Implementors Group (IPIG) in 2003 but was not ratified by ISO voting members, mostly due to concerns that it was not backwardly compatible with previous versions. Version 2 remains as the current standard. In 2007, ISO reaffirmed Version 2 of the ILL standard for an additional five years. Collections Canada serves as the maintenance agency for the ISO standard.[2]

With the formalization of the standard, a number of systems began incorporating it to transport requests for resources to external systems or services, but the number of systems supporting the protocol was never especially large. As we will see in the following section, some of the systems that currently support the ISO ILL protocol include OCLC's WorldCat Resource Sharing system, Auto-Graphics ShareIT, Relais ILL, and VDX. The standard is used by the national interlibrary loan systems in Canada, New Zealand, and Australia.

It is clear that the use of ISO ILL in its current form is in decline. ISO ILL is based on lower-level constructs, such as ASN.1 and BER (Basic Encoding Rules), which were appropriate Open Systems Interconnection (OSI) protocol stacks common at the time of its initial development, but are not consistent with current technologies based on Internet technologies. ISO ILL has proven to be difficult to implement, requiring tedious testing and validation with each system that intends to exchange messages. Many of the systems that previously supported the protocol have since dropped its use. Docline, the document delivery service of the US National Library of Medicine, dropped use of ISO ILL in January 2007.[3]

OCLC documents its support of ISO ILL, including its Protocol Implementation Conformance Statement.[4] OCLC provides a listing of libraries that have been profiled to use ISO ILL, which include only a handful of US libraries that use FDX or had previously used RLG. A large number of libraries in Japan, affiliated through the National Institute of Informatics (NII), have also been profiled to submit requests to WorldCat Resource Sharing via the ISO ILL protocol. In the March 2012 meeting of the NCC ILL/DD Committee, it was mentioned that OCLC will phase out the use of the ISO ILL protocol.[5]

Activity is underway to redevelop the ISO ILL standard. At the Berlin ISO meeting in May 2012, ISO ILL Version 2 was ratified for an additional five years, and the decision was made that some minor editorial corrections would be implemented by Library and Archives Canada. More important, it was also recommended that a new international standard be drafted. An ad hoc group, including national representation from Australia, Canada, Denmark, Finland, Germany, Japan, New Zealand, the United Kingdom, and NISO, as well as the British Library and members from the infrastructure committee of the Rethinking Resource Sharing initiative, is working on drafting and putting forward a proposal for a new ISO ILL protocol. As opposed to the complex and fragile nature of the current ISO ILL, the new protocol is intended be as simple as possible and based on current stateless Web services technologies in order to foster wide implementation. The Danish National Library is leading the work to prepare the draft, which is due to be submitted to ISO in October 2012.[6]

Application Programming Interfaces

One of the general trends seen recently in the resource-sharing arena, consistent with other areas of library technology, involves the increased emphasis on application programming interfaces (APIs) implemented as RESTful (REpresentational State Transfer) Web services. OCLC, for example, has developed a set of APIs for WorldCat Resource Sharing that provides much of the same capabilities as the ISO ILL protocol and that can be implemented with far less complexity. Many third-party applications, such as ILLiad, use this API to transfer requests and exchange messages with World-Cat Resource Sharing.

OpenURL Request Transfer Message

Another approach that has been developed in this arena builds on the OpenURL protocol. Designed to transfer messages from discovery systems to fulfillment services, the Request Transfer Message encodes messages in similar form to the ISO ILL protocol as an XML document and encoded within the OpenURL syntax. Request Transfer Message has been defined as an OpenURL community profile, which defines the messages and data elements supported. The Request Transfer Message will include metadata describing the various entities involved. Mandatory elements include the Referent, or the item of interest; the Requestor; and type of service requested. Optional elements include the referrer that generated the request; the referring entity, such as the article that contains the citation of the item of interest; and the base URL of the resolver. Detailed information describing all the elements of the OpenURL Request Transfer Message is available on the NISO website.

Request Transfer Message: A Community Profile of OpenURL
www.openurl.info/registry/docs/doc/Request_Transfer_Message_v5_3.doc

NISO Circulation Interchange Protocol (NCIP)

The automation of resource-sharing activities often involves interactions with the circulation module of an integrated library system. Direct consortial borrowing systems, for example, may need to perform a set of transactions to allow a patron from one partner library to place a request for an item held by another and for the libraries to use the functionality of their respective ILS circulation modules to manage the fulfillment of the request. The NISO Circulation Interchange Protocol, or NCIP, provides a set of procedures related to patron and item records in an ILS and the ability to perform operations related to circulation. The NCIP standard was initially published in 2002.

3M Library Systems, a major developer of self-service circulation equipment, developed the Standard Interchange Protocol, or SIP. This protocol includes directives related to patron and item records of an ILS and allows an external system, such as a self-check station, to perform circulation-related transactions. SIP was originally published in 1993, with a second version adopted in 2006. Version 3 of the protocol was developed in 2011. The SIP protocol was originally proposed by 3M and developed in conjunction with other related organizations, especially those involved with developing integrated library systems or self-service hardware and software. Although owned by 3M, SIP has been very widely implemented. In June 2012, 3M transferred ownership of the SIP protocol to NISO.[7]

SIP2 has been widely implemented, finding support in almost all of the major integrated library systems. Most of the ILS providers charge a separate license fee for their SIP module. Although NCIP includes similar capabilities, it has not been widely used in the library self-service arena.

Z39.50

Z39.50 was created as the international search and retrieval standard for bibliographic systems, primarily those based on MARC records. SRU (Search and Retrieve via URL) provides most of the capabilities of Z39.50 using current Web-based protocols rather than the older ASN.1 and BER constructs. This protocol is very widely implemented with almost all integrated library systems offering a Z39.50 service, usually as an optional module.

Many resource-sharing environments include a discovery component to allow patrons to search a body of available resources. One of the techniques used to provide this discovery capability creates a virtual union catalog by dynamically searching multiple bibliographic sources. A direct consortial borrowing system, for example, might involve a virtual union catalog based on the catalog data available in the ILS of each participating library. Virtual union catalogs as part of resource-sharing systems generally rely on Z39.50 as their underlying search-and-retrieval protocol. Z39.50 is also used to retrieve bibliographic or holdings data in support of individual record displays involved in resource requests.

GoGetter

The Rethinking Resource Sharing initiative was formed out of a group of individuals and organizations interested in making substantial improvements in this area of library service. The initiative developed white papers on relevant topics and produced a manifesto that asserted key values related to the ways that libraries make their resources available beyond

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Principles in the "Manifesto for Rethinking Resource Sharing"

- **Restrictions shall only be imposed as necessary by individual institutions with the goal** that the lowest-possible-barriers-to-fulfillment are presented to the user.

- **Library users shall be given appropriate options** for delivery format, method of delivery, and fulfillment type, including loan, copy, digital copy, and purchase.

- **Global access to sharable resources shall be encouraged** through formal and informal networking agreements with the goal towards lowest-barrier-to-fulfillment.

- **Sharable resources shall include those held in cultural institutions of all sorts:** libraries, archives, museums, and the expertise of those employed in such places.

- **Reference services are a vital component** to resource sharing and delivery and shall be made readily accessible from any initial "can't supply this" response. No material that is findable should be totally unattainable.

- **Libraries should offer service at a fair price** rather than refuse but should strive to achieve services that are not more expensive than commercial services, e.g., bookshops.

- **Library registration should be as easy as signing up for commercial web based services.** Everyone can be a library user.

(from Rethinking Resource Sharing, "A Manifesto for Rethinking Resource Sharing," accessed October 17, 2012, http://rethinkingresourcesharing.org/manifesto.html)

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their immediate clientele. The group's "Manifesto for Rethinking Resource Sharing" asserts the values listed in the sidebar.

The Rethinking Resource Sharing initiative organized committees related to user needs, policies, marketing, delivery, and infrastructure.

The basic charge of the Infrastructure Committee was "To identify the technology framework that makes it possible for users to obtain what they find inside the library or outside on the open Web."[8] In addition to developing an environmental scan of the protocols and standards related to interlibrary loan, the committee launched the GoGetter project, to develop a modular plug-in for web browsers that would present a GetIt button to easily enable an individual to make a request for any item encountered on the Web.[9]

Notes

1. Mary Jackson, "Overview of North American Interlibrary Loan Protocol Activities" (paper presented at 63rd IFLA General Conference, Copenhagen, Denmark, August 31–September 5, 1997), http://archive.ifla.org/IV/ifla63/63jacm.htm.
2. Library and Archives Canada, "ISO ILL Protocol Standards: ISO 10160," Interlibrary Loan Application Standards Maintenance Agency, 1997, www.collectioscanada.gc.ca/iso/ill/stan160.htm.
3. US National Library of Medicine, "Question: Does DOCLINE Support the ISO ILL Protocol?" FAQs, February 7, 2007, last updated July 13, 2012, www.nlm.nih.gov/services/doc_nlm_support_iso.html.
4. OCLC, "ISO ILL: The International Standard for Interlibrary Loan," accessed October 17, 2012, www.oclc.org/isoill.
5. North American Coordinating Council on Japanese Library Resources, "NCC ILL/DD Committee Meeting in Hawaii" (meeting minutes, March 14, 2012), www.nccjapan.net/illdd/documents/ILLDDMinutes2012.pdf.
6. Clare McKeigan and Ed Davidson, "The Future of ILL Interoperability" (presentation at 10th Nordic Resource Sharing, Reference and Collection Management Conference, Reykjavik, Iceland, October 3–5, 2012).
7. NISO, "Standard Interchange Protocol," accessed October 17, 2012, www.niso.org/workrooms/sip.
8. Rethinking Resource Sharing, Interoperability Committee goals, accessed November 13, 2012, http://rethinkingresourcesharing.org/charter.html.
9. Melissa Stockton, "Rethinking Resource Sharing Initiative" (presentation at the Moving Mountains Symposium, Denver, CO, September 25–26, 2008).