USING RESOURCE SHARING STANDARDS IN THE

ORBIS CASCADE ALLIANCE

CONSORTIAL BORROWING SYSTEM
In December 2008, the Orbis Cascade Alliance (“the Alliance”) migrated to WorldCat Navigator (“Navigator”) to support consortial borrowing. Consortial borrowing is different from interlibrary loan (ILL) in that it is both unmediated and fully automated so it uses a much more streamlined circulation workflow. The purpose of Navigator is to allow any patron from an Alliance member library to request items owned by any Alliance library and provide the staff functionality necessary to process those requests.

Navigator serves TWO distinct proposes:

1. **Patron discovery**: This is provided by a group instance of WorldCat Local (http://summit.orbiscascade.org) where patrons can see and place unmediated requests for items owned by the Alliance, as well as those not held by the Alliance, in one discovery system.

2. **Staff request processing**: Consortial borrowing is a cross between traditional circulation and ILL workflows. To serve patron needs and allow efficient request processing, the system automates functions such as placing holds, checking materials in and out of each local ILS, creating temporary bibliographic and item records, and triggering notices to patrons. Standards play an essential role in automating resource sharing within the Alliance. However, there are certain critical functions where standards cannot yet be used so workarounds have been implemented.

**Background**

The Alliance is a consortium of 36 academic libraries in the Pacific Northwest that serves a combined total of roughly 250,000 patrons. The member libraries of Orbis Cascade Alliance are committed to making their combined collections available as a single collection—meaning that any patron can check out materials from any library without limitation.

From 1995 to 2008, the Alliance used Innovative Interfaces’ (III) INN-Reach software to facilitate borrowing and lending of materials. INN-Reach allowed libraries with III Millennium systems to use a basic circulation workflow for consortial borrowing. By policy, Alliance patrons requested physical materials from any library as if they were a local patron. Non-returnables such as article photocopies were requested via ILL.

In March of 2008, the Alliance’s governing body voted to migrate to a new consortial borrowing system: OCLC’s WorldCat Navigator. In December 2008, the Alliance started using Navigator in production. Although INN-Reach and Navigator are designed to fulfill many of the same functions, Navigator also supports discovery and processing of ILL materials and other nonreturnable requests and, since it is based on standards, Navigator is potentially better suited to groups with multiple ILS platforms.

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Limitations of standards in resource sharing
While standards have been essential to the success of Navigator, standards support alone would not have been sufficient for a successful resource sharing product. Excluding authentication with local campus systems and authorization issues, all that Navigator needs to function well is good Z39.50 and NISO Circulation Interchange Protocol (NCIP) support. However, the Millennium systems that Alliance libraries use can neither initiate NCIP messages nor respond to them from Navigator. Moreover, for reasons that will be discussed later, using Z39.50 is problematic for providing consortial borrowing services.

The reality is that standards are helpful for facilitating certain operations, but not others—even when a standard exists specifically to support that function. The general challenges to using standards for resource sharing include the following:

- Available standards do not adequately address some practical concerns. For example, if implemented strictly, patrons must pick up items at their affiliated library and no other.
- Systems implement standards in unusable or suboptimal ways. Screen scraping is faster and more reliable than using standards for some operations.
- Data necessary to use the standard properly do not exist, are inconsistent, or are provided in a form that cannot be used directly. For example, automatic volume selection is problematic because enumeration is expressed inconsistently.

Standards-based services in Navigator
There are several opportunities for standards support in the lifecycle of a typical consortial request:

1. Identifying requestable materials (lending)
2. Authenticating patrons (borrowing)
3. Placing holds (lending and borrowing)
4. Checking materials in/out (lending and borrowing)
5. Shipping/Receiving (lending and borrowing)
6. Generating temporary records (borrowing)

Although the list appears formidable, only a small number of standards are usable in some form by Navigator in the Alliance set up:

1. Z39.50: Identification of lendable materials
2. LDAP, Shibboleth: Patron authentication
3. NCIP: Place holds, ship, check in/out
4. MARC: Identification
5. OpenURL: Redirection of requests for non-loanable materials

Additionally, if an item desired by the patron is not loanable (i.e., it is electronic or the request should be fulfilled as a nonreturnable), Navigator must redirect the request to a system designed to facilitate such requests.

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**Figure 1: WorldCat Navigator Architecture**
Figure 1 demonstrates the basic operation of Navigator. When a user requests an item from the worldcat.org platform, the item information is transferred to a master authentication service. This service consults local authentication services at the member institutions. Upon successful authentication, a user object is sent back to the master authentication service and this is transmitted to the Navigator Request Engine (NRE). NRE only knows how to interact with an ILS using NCIP 1.0. However, since none of the systems in the Alliance support that standard, NRE interacts with a layer known as the Circulation Gateway which translates these messages into actions the local catalogs can understand. The Circulation Gateway is capable of translating these messages into a wide variety of actions, including direct database calls, calling APIs, and other techniques including screen scraping.
Standards do not address some practical concerns

If all data were accurate and standards support were ideal, a number of practical considerations would still introduce considerable challenges. Consider the relatively “easy” use case of using Z39.50 to discover lendable materials. Z39.50 cannot be used in a relevancy-based metasearch of the 36 Alliance catalogs because effective relevancy algorithms require unified indexes and performance of broadcast searches is unacceptable. For this reason, Navigator relies on WorldCat holdings to determine which materials to present to patrons.

Even after a patron has identified a particular item, using Z39.50 is still problematic. Z39.50 has no mechanism for limiting result sets, so even a search on a single unique control number can result in thousands of items being returned leading to poor performance as well as not returning useful information such as summary holding statements and electronic links.

The NCIP standard also has some inherent limitations. The NCIP protocol does not allow borrowing libraries to change the due date that was transmitted by the lending library.

The NCIP protocol does not allow borrowing libraries to change the due date that was transmitted by the lending library. NCIP also presumes institutions will not act on transactions when they are neither the lending nor borrowing library. While this may sound sensible, Alliance patrons may pick up requested materials at any member library, and they may drop them off at any member library. Especially with the growth of distance education programs, it is common for the most convenient library to be located far from the patron’s home library—in many cases, hundreds of miles. Consequently, workarounds that address NCIP’s limitations are necessary to provide this popular service for patrons.

The Alliance libraries address the due date issue by using the borrowing library ILS to perform all circulation functions. The NCIP Accept Item message to the Circulation Gateway triggers the automatic creation of a bibliographic and item record on which a hold is placed. Those actions allow an automatic alert to be sent to patrons informing them that the item can be retrieved from the service desk of their choice. To allow patrons to pick up materials at other libraries, Alliance patrons have had to maintain separate sets of credentials for each institution where they pick up items.

A longer-term solution that is currently being discussed involves using the patron’s home library system to manage the transaction. This allows all circulation activity to be managed in a single place, and it avoids confusion with ILL transactions. Patrons have universal borrowing privileges within the Alliance, but those privileges do not extend to ILL. No elegant solution to allowing patrons to drop materials off anywhere has yet been identified. Currently, these materials are sent to the lending library which must then inform the borrowing library that the material has been returned.

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**Systems implement standards in unusable or suboptimal ways**

NCIP attracts a great deal of attention in the resource sharing community because it defines a protocol specifically designed to support direct consortial borrowing and facilitate exchange of data between circulation and interlibrary loan (ILL) applications. However, confusion surrounding this standard in both the library and vendor communities has been a significant barrier to its use in production work. (Version 2.0 of NCIP, which isn’t yet supported by Navigator or any other resource sharing product, was developed to overcome technical limitations in NCIP 1.0.)

Originally, NCIP was conceived as a toolkit-style standard with no minimum requirements for compliance beyond supporting at least one of 45 services, although in 2009 a set of nine core messages was defined. NCIP has many practical applications, and, to illustrate why requirements for compliance seem low, it makes little sense for a self-checkout machine to send messages related to creating/deleting users or agencies, generating user notices, recalling items, and the like. As a practical matter, no circulation system as of this writing supports NCIP messages as an initiator—it appears that implementations have been designed to work with brokering systems developed by the same vendor.

Presuming support of all defined services and all optional parameters—something that no system does—NCIP still does not define how data within the messages are structured, how to transport that data, or what to do with the message when it is received. This allows great flexibility, but it results in far less predictable behavior of NCIP initiators and responders.

For example, a major NCIP pilot project in Montana experienced consistent issues with holds being placed on items held by the wrong library in shared systems. This occurred because the hold was placed on a bibliographic item, and then the local system frequently selected an item to fill the request from a different library than the one that the request was routed to. In December 2007, the pilot was discontinued because it was increasing staff workload rather than reducing it. In fact, one of the findings of the final report was that NCIP 1.0 was not ready for production use.

The problem in the Montana NCIP pilot is not inherent to the NCIP standard because the NCIP protocol defines an Agency ID which could theoretically be used by the responder to prevent this specific problem. Alternatively, separate responders could be created within the shared system for each library. In short, the devil is in the details and the only way to know what will work is to test.

In addition, system architecture impacts which capabilities standards can provide. For example, NRE queues Navigator transactions each minute and sends NCIP messages serially. As a practical matter, this means that it is not even theoretically possible to give users real time feedback on whether their transactions were successful. Patrons receive failure notices via e-mail sometimes long after they thought their request was successful.

Alliance systems do not support the NCIP services required by Navigator, so OCLC created the Circulation Gateway to translate NRE NCIP messages into actions on the catalog. For example, an Accept Item NCIP message triggers the creation of temporary bibliographic and item records that are loaded into the catalog using the same mechanism that processing staff at local libraries have been using for many years.

**Necessary data do not exist, are inconsistent, or are unusable**

For standards to work properly, data must be complete, accurate, and consistent. Since variability is inevitable, all levels of Alliance’s Navigator implementation are affected. At the discovery level, bytes 6 and 7 in the MARC leader— which determine material type and bibliographic level respectively—change fulfillment options and display. For example, items coded as electronic resources generate a button that points to an OpenURL resolver and items coded as serials generate a button that directs the request to the patron’s ILL system. Discovery of electronic materials is still problematic, as it is not possible to attach holdings to many electronic resources. In addition, when libraries attach electronic holdings to the paper print resource record in their local catalog or when a monographic series that contains an entire volume that should be sent to the patron is encoded as a serial, the fulfillment options will not appear properly.

Navigator also has no way to accurately place holds on requests made for enumerated volumes. The multitude of ways libraries express volume data in their catalogs and the variety of ways that patrons ask for these items led to a workaround
where a hold is placed on the first available item, but the generated paging slip shows the volume that the patron requested. When the requested volume is shipped, the hold for the volume that the patron placed the hold on is cancelled. This workaround is labor intensive and results in patrons getting the wrong item.

Once the patron finds an item she wants, authentication presents the next information challenge. Several Alliance institutions serve over 20,000 patrons, so manually maintaining patron files is unacceptable. Ideally, authentication would be provided by campus LDAP or Shibboleth implementations. However, these campus systems do not classify patrons the same way that library systems do. They do not know if patrons have not returned books or have unpaid fines, and they don't know when the patron record expires. In addition, almost all Alliance libraries must provide service to people who are not directly part of the institution—visiting and emeritus faculty, community members, etc. These patrons will also not be in the campus authentication systems. Fortunately, these authentication challenges are trivial to address because the EZProxy software that OCLC requires can consult multiple authentication sources simultaneously and allows programmatic mapping of missing values.

Conclusions
Most of the discussion here focuses on the challenges of using standards for consortial borrowing at the Alliance. Despite these issues and others, the advantages outweigh the disadvantages. Thanks to OpenURL, the same discovery interface patrons use for consortial borrowing allows them to request items via ILL or search for electronic resources.

More importantly, Navigator’s standards-based interfaces make it possible for libraries with different ILS systems to join the Alliance’s consortial borrowing system and provide a mechanism by which Alliance members can migrate to other systems without leaving the consortium. No system lasts forever and there is virtually no chance that all libraries would have the staff and monetary resources to migrate at the same time, but standards make it possible for new systems to communicate with Navigator via NCIP or one of the Circulation Gateway’s supported protocols. As a result, libraries can migrate to new systems as technology cycles progress without disrupting either local or consortial level services to patrons.

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KYLE BANERJEE <banerjek@uoregon.edu> is Digital Services Program Manager and ANYA N. ARNOLD <anyaa@uoregon.edu> is Resource Sharing Program Manager at the Orbis Cascade Alliance <orbiscascade.org>.