STAFF COST SAVINGS

FROM IMPLEMENTING THE NISO CIRCULATION INTERCHANGE PROTOCOL (NCIP)

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INTRODUCTION

This article provides an overview of the NCIP standard and associated profiles, discusses how the standard and profiles help streamline a library's workflow, and summarizes library activities the standard does not support. It then illustrates how libraries can benefit from implementing NCIP between their resource sharing and circulation systems by describing several NCIP implementations. Finally, this article provides a tool for individuals to measure potential staff cost savings when using an NCIP-compliant resource sharing system. The paper and calculator will help state librarians, statewide resource sharing managers, library directors, and resource sharing staff to understand how implementing NCIP will streamline library workflow and reduce staff costs.

WHAT IS NCIP?

The NISO Circulation Interchange Protocol (NCIP) is a technical standard, or communications protocol, approved by the National Information Standards Organization (NISO) and the American National Standards Institute (ANSI) that defines the exchange of messages between and among computer-based applications to enable them to perform the functions necessary to lend and borrow items, to provide controlled access to electronic resources, and to facilitate co-operative management of these functions. It is intended to facilitate interoperability between dissimilar circulation systems in a consortium or library group. The standard assumes that the consortium has existing agreements to cooperate and share materials using a circulation-based model. NCIP also streamlines resource sharing within a library as it permits the library's resource sharing or interlibrary loan (ILL) system to interact with its local circulation system. Finally, the standard permits a library's self-service kiosk to interact with its circulation system.

NCIP is a technical standard that enables a library's circulation system to interact with one or more other circulation, resource-sharing, or self-service systems.

The standard is formally known as ANSI/NIS0 Z39.83- 2008, NISO Circulation Interchange Protocol (NCIP), Parts I and 2. Version 2, approved in 2008, brought enhanced extensibility, improved self-service and error handling, and addressed issues that surrounded the first version of the standard.

> Part 1: Protocol defines the messages, data elements, and associated rules of syntax and semantics.
> Part 2: Implementation Profile I defines a practical implementation structure for NCIP.

The NCIP protocol includes 46 messages; each message has an initiating query (e.g., from the ILL system to the circulation system) and a response (e.g., from the circulation system back to the ILL system.) Another way of looking at NCIP messages is based on their behavior.

There are three significant types of behaviors:

1. Inquiries or lookups: Examples: What is the name associated with ID 987654321? How many books does the patron have checked out? What are their titles?

2. Actions: Examples: Authenticate the user. Check out this item. Place a reserve on this title. Return this item. Register this individual as a new user.

3. Notifications: Examples: The ILL system informs the circulation system that the item has been checked in. The ILL system informs the circulation system that the item has been returned.

The standard is maintained by the NICO NCIP Standing Committee (NCIP-SC), formed by the NCIP Implementers Group. Through in-person meetings and monthly conference calls, the group reviews reported bugs and enhancement requests, plans educational activities to promote and publicize the standard, and serves as an advisory body to the NCIP Maintenance Agency, EnvisionWare, Inc.

NCIP Core Messages

In 2009 the NCIP Standing Committee developed a core message set to simplify implementation, address the perceived barriers to implementing version 1, and to facilitate support of a common, baseline workflow. The Committee identified which NCIP messages had already been implemented by vendors and, from that list, defined a core message set for resource sharing.

For the resource sharing core message set, the resource-sharing system always sends the messages to the circulation system and the circulation system always responds. This decision was based on the way vendors had already implemented NCIP messaging. The full standard also provides for the circulation system to initiate messages.

The nine messages in the resource sharing core message set are:

1. Accept Item
2. Cancel Request Item
3. Check in Item
4. Check Out Item
5. Lookup Item
6. Lookup User
7. Recall Item
8. Renew Item
9. Request Item

NCIP Application Profiles

An Application Profile describes how the NCIP protocol is used to support a specific environment or process with a given set of practices and policies. Each application profile prescribes the specific set of NCIP messages needed to support that application. Three key application profiles support the NCIP protocol: circulation/interlibrary loan (CILL) interaction, direct consortial borrowing (DCB), and self-service circulation.

Circulation/interlibrary loan interaction (CILL): NCIP supports the linking of a library's circulation system and its interlibrary loan system. Without NCIP, a library staff member must check out an item to be loaned on the circulation system and then separately update the request in the ILL system to indicate the item has been shipped. On the borrowing side, a library staff member may need to create a temporary bibliographic and item record manually in the local circulation system to be able to check out the borrowed item to the patron. By using NCIP the library's circulation system and its ILL system can exchange information about patrons and items automatically eliminating duplicate data entry, lessening manual intervention, and ensuring consistency in loan information, bibliographic information, and transaction updates.

Direct Consortial Borrowing (DCB): Some library consortia now share materials among members and track them as circulation transactions rather than interlibrary loan transactions. In this way, the individual circulation systems record and track loans without the need of a separate interlibrary loan system. To date, DCB has generally been implemented using a third-party software application interfacing between disparate circulation systems. The DCB application manages transactions and uses NCIP messages to communicate with the local circulation systems.

Self Service: Some libraries provide self-service online circulation systems to allow patrons to do their own checkout and status tracking. NCIP supports a self-service application, including an offline recovery mode.

The CILL Profile and the Interlibrary Loan Workflow

The NCIP-compliant CILL Profile defines the complete set of messages needed to manage interlibrary loan transactions between a library's ILL system and its circulation system.

On the borrowing side, when a patron logs into the ILL system, the ILL system sends an NCIP message to the circulation system to validate the status of the individual. A valid, unblocked patron can search, find records, and submit ILL requests. When the requested item arrives at the borrowing library and the staff member updates the request to *Received*, the ILL system sends an NCIP message to the circulation system to create a temporary bibliographic and item record. Depending on local policies the ILL or circulation system can electronically notify the patron. The circulation staff member checks out the item to the patron, who is notified that the item is ready for pick-up. When the patron returns the item to the library, the ILL staff member updates the ILL request to *Returned*, which triggers the NCIP message to the circulation system to discharge the item from the patron. Depending on the local circulation system, the temporary bibliographic and item record may be removed or suppressed, but this functionality is outside the NCIP standard. Additional NCIP messages support renewals, recalls, overdues, and all other typical borrowing functions.

On the lending side, a new request is received in the ILL system and a staff member retrieves the item from the stacks or branch library. At the time of shipment to the requesting library, the ILL staff member updates the ILL transaction to *Shipped* and an NCIP message is sent to the circulation system, which checks the item out to the borrowing library. When the item is returned to the ILL department. the staff member updates the ILL request to *Checked In* and the ILL system sends an NCIP message to the circulation system to discharge the item from the borrowing library. Additional NCIP messages support other lending functions suds as recalling an item, sending an overdue notice, and sending fines or fees.

A typical, and manual, borrowing workflow may include 22 or more steps. With NCIP, the number of borrowing steps is reduced by 50 percent to just 11 steps. On the lending side, the traditional manual workflow of 14 steps is reduced to 8 steps when using NCIP, or 42% fewer steps. The detailed workflow comparison with and without NCIP is available on the NISO ISQ website. The specific steps each ILL staff member performs may vary depending on local policies and workflow. However, this workflow reflects a typical borrowing and lending transaction.

WITHOUT NCIP VS. WITH NCIP

A typical, and manual, borrowing workflow may include 22 or more steps. NCIP reduces the number of borrowing steps by 50%, to just 11 steps.

The traditional manual lending workflow includes about 14 steps. NCIP reduces the number of lending steps by 42% to just 8 steps.

IMPLEMENTING NCIP: CASE STUDIES

VERNON PARISH LIBRARY

NCIP reduced processing time by 80%; saving Vernon Parish 69 hours per year on borrowing.

Vernon Parish Library in Louisiana implemented NCIP between LoanSHARK, an Auto-Graphics AGent Resource Sharing system, and its circulation system, The Library Corporation's (TLC) Library Solutions. According to Howard Coy, Library Director, the implementation process was drawn out. Vernon Parish first began working with TLC in January 2007 and in March 2007, was given a "realistic" timeline of three months. In January 2008, Auto-Graphics began discussions with TLC and started testing in October of that year. In February, 2009 TLC added another staff member to work on and complete the coding to support NCIP and by June of that year, TLC installed NCIP on Vernon Parish's circulation server. Vernon Parish finally began using NCIP in a production mode in February, 2010. This extended timetable illustrates the complexity of a library working with two vendors, each with different development schedules.

On the borrowing side, NCIP adds a bibliographic record of the borrowed item to the circulation database. The circulation system automatically removes the record when the loaned item has been returned. Although this step is outside of the NCIP standard, it is a great workflow enhancement. The patron's circulation record now shows complete title/author information rather than brief, and possibly inaccurate, information entered by a staff member in the pre-NCIP workflow.

The time to process an ILL transaction is now "a fraction of the time it once took." Although Vernon Parish did not quantify the staff cost savings it gained, it is possible to estimate those savings. In 2009 Vernon Parish borrowed an average of 43 items per month, or 516 items annually. If it took 10 minutes to process a borrowing request using the pre-NCIP workflow, and NCIP reduced processing time by 80% (both typical times), Vernon Parish saved 4,128 minutes per year on borrowing, or 69 hours. If the ILL staff members reduced their processing time by 90% , Vernon Parish would have saved 4,644 minutes, or 77 hours. Vernon Parish has implemented only the borrowing side of NCIP because at the time Vernon Parish implemented NCIP, TLC had no immediate plans to implement the NCIP messages required to support lending.

Howard Coy summed up their experience: "I don't know how we functioned so long without NCIP."

EAST HAMPTON, CONNECTICUT PUBLIC LIBRARY

End-to-end borrowing supported by CILL takes 61% less time to execute than requests that require staff intervention.

East Hampton, Connecticut Public Library implemented NCIP between reQuest, an AGent Resource Sharing system from Auto-Graphics, Inc., and its local circulation system, VERSO. According to Library Director Sue Berescik, "Roughly speaking, the Auto-Graphics Circulation-Interlibrary Loan Links CILL has allowed us to reduce the amount of time we spend on ILL borrowing and lending requests by 55.5%, while increasing our ILL volume from 1,472 requests in 2007 to 2,449 requests in 2009, or a 66% increase. Our library staff would not have been able to handle the significant increase in ILL requests without CILL. We continue to see the greatest staff time savings on the borrowing side. End-to-end, borrowing supported by CILL takes 61% less time to execute than requests that require staff intervention."

Berescik also reported that the efficiencies provided by CILL in the reduction of the number of steps to complete ILL transactions has allowed staff to provide less "on-system" time managing interlibrary loan requests. Specifically:

> Before CILL, about 20 of 24 allocated staff hours per week were spent on interlibrary loan, or 83.3% of the allocated hours.

> After CILL, 5 of 18 allocated staff hours per week are spent on interlibrary loan, or just 27.8% of the allocated hours.

She concluded: "Overall, CILL has provided us with time savings both in the form of fewer hours and a lower percentage of total hours spent on ILL. This has provided us with the opportunity to divert resources to supporting public programs, person-to-person services, and both traditional and technological outreach efforts."

BOSTON LIBRARY CONSORTIUM

SirsiDynix estimated that an NCIP-enabled circulation system reduced costs by up to 75% -- to less than $8 per transaction compared with the average of nearly $30 for a mediated interlibrary loan transaction.

When the Boston Library Consortium implemented the NCIP-compliant SirsiDynix URSA direct consortial borrowing system in 2003, SirsiDynix estimated that an NCIP-enabled circulation system reduced costs by up to 75%, to less than $8 per transaction compared with the average of nearly $30 for a mediated interlibrary loan transaction." These estimates include staff, communication, delivery, and other direct costs associated with the transaction.

What NCIP Does Not Support/Require

The NCIP standard was written with one basic assumption: the item to be shared is known. Thus, the standard does not support the discovery of an item, which is done using other standards such as Z39.50. NCIP does not require participating libraries to lend items; whether a specific item is made available to send to the requesting library is a local library's or consortium's policy.

NCIP does not require libraries to change policies such as the length of the loan period, whether renewals are granted, whether fees are charged, or how to handle lost or damaged items. Those policies are set by individual lenders, or may be set by a consortium, and NCIP messaging will support those local policies.

From a technical perspective, the base standard, Part I, does not dictate how messages are conveyed. Part 2, the Implementation Profile, describes how messages are encoded (XML) and transmitted (HTTP, HTTPS, or TCP/IP.) To date, the vendors who have implemented NCIP have all followed the Part 2 Implementation Profile I methods, but that is not a requirement of the standard protocol defined in Part I.

Challenges Implementing NCIP

Library vendors are at various stages of implementing NCIP with their integrated library system (ILS) and resource-sharing systems and have not consistently implemented the same set of messages. Thus once a consortium or individual library decides to implement NCIP, a number of barriers may need to be overcome.

At the consortium level, the ILL system may support only a few of the NCIP messages, but not all of the messages included in the CILL Profile. Some ILL systems support only the patron authentication message, so staff cost savings will be minimal as staff members will still need to perform duplicative steps to process ILL requests once the patron has been authenticated. Some ILL systems may support the resource sharing core messages, but not the additional messages in the CILL Profile, again, minimizing workflow efficiencies.

The local library may not have an NCIP-compliant circulation system. Many ILS vendors charge an additional fee for the NCIP module, and the library may not have purchased this module.

If a local library has an NCIP-compliant circulation system it may be using an ILL system that is not NCIP- compliant. Some ILS vendors have opted not to implement NCIP or complete testing with other NCIP implementers. In these cases, the library will not be able to improve their ILL workflow until their vendor adds NCIP compliance to their product.

Most ILS vendors have currently implemented NCIP as a responder only. That is, the circulation system can respond to a query from the resource sharing system but is unable to initiate an NCIP message. Having the circulation system function as a responder only has significant limitations for improving the ILL workflow. For example, a patron will need to return the borrowed item to the ILL office, not to the circulation desk. If the item is returned to the circulation desk, circulation staff would discharge the item from the patron's record, but the circulation system could not send an NCIP message to the ILL system asking the ILL system to update the ILL request to *Returned*. The circulation staff member would need to ask the ILL staff member to update the ILL request manually. Similarly, an item loaned by the local library will need to be returned to the ILL department rather than to circulation desk as the ILL system must send the NCIP message to the circulation system directing the circulation system to check in the item from the borrowing library. The inability for the circulation system to initiate any NCIP messages requires library staff to modify internal procedures so that their workflow fits the limitations of the circulation system rather than the NCIP implementation supporting whatever workflow they have.

How much will YOU save?
Use the NCIP savings calculator
www.auto-graphics.com/ncip-savings-calculator/

Cost Savings Using NCIP

The cost savings enjoyed by Vernon Parish Library and East Hampton Public Library (see the Case Studies page) may be greater or lesser than what other libraries have realized. But their averages will be used to illustrate the potential savings that can be realized by using the NCIP CILL Profile between a library's resource sharing system and its circulation system.

Figure I estimates staff cost savings on a statewide level for several states using the Agent Resource Sharing system. Several scenarios are provided:

» All libraries using the ILL system have NCIP-compliant circulation systems.
» 75% of the libraries are NCIP-compliant.
» 50% are NCIP-compliant.
» Just 25% of the libraries have NCIP-compliant circulation systems.

These estimates assume that a staff member spends 10 minutes in processing one borrowing or lending request and also assume a conservative 50% savings in staff time to process borrowing and lending requests after NCIP has been implemented (or now 5 minutes per request). The savings will be significantly greater if libraries realized a 60 to 75% savings in the amount of time a staff member spends processing one ILL request - a possibility demonstrated by case studies.

These estimates illustrate the significant savings in staff time possible in a state even if only one quarter of the libraries using an NCIP-compliant resource sharing system have an NCIP-compliant circulation system. Savings may be even greater in libraries that take more than ten minutes to process one request due to more complicated or labor- intensive procedures.

As East Hampton Public Library has done, staff cost savings at the local level can be used to have existing staff perform other library functions that have increased need and value to the library and its patrons.

Statewide System	2009-2010 Filled Borrowing & Lending Requests	Number of Hours to Process ILL Requests Statewide				
		Without NCIP	25% NCIP Circ Systems	50% NCIP Circ Systems	75% NCIP Circ Systems	100% NCIP Circ Systems
Connecticut	193,284	32,214	28,187	24,161	20,134	16,107
Kansas	153,049	25,508	22,320	19,131	15,943	12,754
Louisiana	136,676	22,779	19,932	17,085	14,237	11,390
Mississippi	17,027	2,838	2,483	2,128	1,774	1,419
New Jersey	167,971	27,995	24,496	20,996	17,497	13,998
Wisconsin	167,971	27,995	24,496	20,996	17,497	13,998

Calculating Your Cost Savings Using the NCIP Savings Calculator

Developed by Auto-Graphics, the NCIP Savings Calculator permits librarians at the state or individual library level to estimate the total staff cost savings when implementing NCIP between the resource sharing system and one or more local circulation systems.

On the individual library calculator, a user simply enters the hourly rate of the relevant staff member(s), the number of borrowing and/or lending transactions, and selects the number of minutes to process one borrowing request and the minutes for one lending request. The calculator then displays the annual number of hours staff members spend processing ILL requests with and without an NCIP-compliant system, the separate staff cost savings related to lending and borrowing, and the total savings for the library. This calculation assumes a 50% savings in the amount of time to process an ILL request when using NCIP.

Consider an example where a library has an average of 3,444 borrowing transactions and 3,331 lending transactions for the previous fiscal year. If 10 minutes each were saved in processing borrowing and lending transactions, the library would realize a savings of approximately 1/3 of a staff position that could be spent on other tasks. This is equivalent to a staff cost savings of $14,115, assuming an hourly rate of $25.00.

The Statewide Calculator is a tool for state librarians to determine potential statewide savings, but it also works for a consortium. After the user enters the average staff salary and the annual system-wide borrowing and lending transactions, it calculates staff cost savings for each alternative of 25, 50, 75, or 100% of libraries within the state having NCIP-compliant circulation systems interacting with the state's NCIP-compliant resource sharing system.

Conclusion

Implementing NCIP saves significant staff time both for the individual local library and aggregated at the statewide or consortial level. The saved staff time can be directly translated into cost-savings for staff who would be freed to perform other library tasks. Patron satisfaction is increased because libraries are obtaining needed items more quickly as a result of more efficient and less labor-intensive workflow. The quantified aggregated savings can be used to validate a substantial return on investment from the purchase and implementation of the NCIP-compliant resource sharing system.

For example, if just 25 percent of the libraries in New Jersey implemented NCIP in their local circulation systems, the number of hours library staff members spend processing requests would drop from approximately 28,000 to 24,500 hours, or a 13% reduction. If one-half of New Jersey libraries used NCIP with Jersey-CAT, the Auto-Graphics' Resource Sharing system, the total number of hours required to process ILL requests would drop by 25 percent. Savings like these are the most compelling reason to implement the NISO Circulation Interchange Protocol.