

## **A ConnectNY White Paper**



### **Leveraging and Sharing Resources: A Look at ConnectNY's Technological Infrastructure**

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## **Abstract**

The technology for resource sharing across a consortium (and between consortia) is in a state of rapid change as vendors work towards the interoperability librarians are asking accommodate patrons' needs as well as staff needs for more efficient workflows. With this in mind, the authors looked at what ConnectNY is now using to facilitate resource sharing in support of its mission and considered possibilities for the future. This paper does not specifically recommend a particular system to the reader, rather this paper gives the reader points of consideration, some information about ConnectNY's history, current technologies, patron usability, staff needs, and developing technologies.

Since its inception in 2002, the mission of ConnectNY (CNY) has remained the same: *The mission of ConnectNY is to share collections, leverage resources, and enhance services through cooperative initiatives and coordinated activities.* The ConnectNY Strategic Plan 2015-2020 is focused on achieving the mission by leveraging the collective strength of its members as one organization, building community through collaboration, sharing resources of all types, being entrepreneurial, and focusing on the user experience to achieve this mission. This white paper is a result of the Plan's Goal 4-1: "Evaluate the technology infrastructure of CNY to determine whether it is meeting the mission in the most efficient and cost-effective manner" and the corresponding objective "Prepare a white paper comparing our current technology infrastructure and other available technologies with the needs of the organization." The Strategic Statement corresponding to this is "ConnectNY focuses on the user experience".

The technology for resource sharing across a consortium (and between consortia) is in a state of rapid change as vendors work towards the interoperability librarians are asking accommodate patrons' needs as well as staff needs for more efficient workflows. With this in mind, this Working Group looked at what CNY is now using to facilitate resource sharing in support of its mission and considered possibilities for the future. As the true scope of this paper came into focus the authors decided to concentrate on a select portion of what can be covered in order to truly tackle the question of meeting mission through cost effective and efficient technology. This paper will not specifically recommend a particular system to the reader, rather this paper will give the reader points of consideration, some information about CNY's current technologies, patron usability, staff needs, and developing technologies.

### **History of ConnectNY**

In 2001, the library directors at five academic institutions in New York State (Colgate University, Rensselaer Polytechnic Institute, Rochester Institute of Technology (RIT), St. Lawrence University, and Vassar College) decided to work together to build an efficient and effective resource sharing network. In 2002, this group submitted a proposal and received a planning grant from the Andrew W. Mellon Foundation to begin work on the implementation of a functional resource sharing system. After reviewing the options available in the market, they selected Innovative Interfaces, Inc.'s (II) INN-Reach system. The remainder of the year was spent in implementation and long-range strategy planning for growth of the membership.

In 2003, the group worked on organizational and governance structure while preparing an implementation grant. They received \$250,000 in funding from the Mellon Foundation and were able to purchase the INN-Reach system. During the academic year 2004-2005, the group grew from 5 to 10 members, and by 2008 the membership totaled 14 institutions.

In 2009, CNY became a 501(c)(3) non-profit corporation: CNY (ConnectNY), Inc. The purposes of the Corporation, as set forth in the Certificate of Incorporation, are to provide:

- i. efficient, rapid and cost effective delivery of library materials in both print and digital form amongst its Members;
- ii. a shared union catalog with a single interface that allows for expedited interlibrary loan space between said Members;
- iii. an administrative and support staff structure to implement projects and maintain the technical infrastructure necessary to operate the resource sharing systems;
- iv. opportunities for cost effective enhancements and developments both for local and system-wide resource sharing technologies that foster advanced searching and the delivery of research information; and,
- v. a vehicle necessary to facilitate the ongoing delivery of scholarly content and interlibrary loan services, but also allows for new technical developments as the system evolves.

Today, CNY has grown to include 18 members and the CNY resource sharing infrastructure includes INN-Reach, Encore Discovery, RapidILL, and Empire Library Delivery. Appendix A illustrates an overview of member systems and participation in shared print management.

### **INN-Reach and Encore**

INN-Reach is a user-initiated consortial borrowing system that uses each participating library's patron database to facilitate requesting. The central shared catalog provides the patron with access to materials from each consortia member library in one place. The CNY shared catalog now has more than 8.5 million bibliographic records, giving our patrons the ability to discover and request items easily.

The Encore discovery layer was added in 2010, providing patrons with facets to narrow searches, including a facet for CRL records. CNY Executive Director Pamela Jones is working with Innovative personnel to provide facets for the consortial ebook products.

ILL is currently developing APIs to replace the Direct Consortial Borrowing (DCB) server CNY used for our Voyager member libraries. The APIs potentially offer greater interoperability with non-ILL library systems/platforms. In addition, when these APIs are complete, migrating away from the DCB server will result in cost savings to CNY. At this time, the amount of that savings is unknown. Once the API is implemented, workflow will be improved, as there will no longer be a need to run INN-Reach as a client separate from the non-ILL system.

In the past, non-III libraries paid extra to access INN-Reach. This practice is being discontinued. Going forward, new CNY members will receive the same pricing regardless of the ILS or platform being used. Also, the annual maintenance cost for Voyager libraries will be the same as for III libraries beginning in 2017.

CNY member implementation costs for INN-Reach have traditionally been a one-time large fee followed by annual maintenance. III, as is the case with many vendors, is moving to a subscription-based hosted service business model. At some point, it may be advantageous to offer the subscription model to new members, however Pamela Jones was able to secure an attractive tiered-pricing initial fee with annual maintenance costs that is more cost effective for our members than the subscription model.

RIT hosted CNY's server and received compensation for this service until 2010, at which time the Library Directors Council made the decision to have INN-Reach hosted by III.

Annual maintenance fees are paid for INN-Reach in addition to the hosting fee. The annual costs for the INN-Reach maintenance, the Encore subscription, hosting for INN-Reach and Encore, and the DCB maintenance have remained the same for FY 2014/2015 through FY 2016/2017. This was negotiated in February 2015.

INN-Reach has proved easy for patrons to use, especially for selecting and requesting print materials. However, the consortial DDA project has highlighted the complexity of managing bibliographic records at both the consortial and individual member library levels, which may lead to decreased discoverability. If the consortial DDA vendor bibliographic records could be loaded automatically as targeted collections into the ConnectNY shared catalog Encore Discovery layer, this may result in improved workflow. Another factor affecting the discoverability of resources is CNY's lack of shared practices regarding contribution to the central catalog. The aforementioned challenges provide CNY with the opportunity to develop new shared practices and work with vendors to provide technology that works well for patrons and for staff.

### **RapidILL**

As an extension to the resource sharing of print materials across CNY, the consortia added document delivery to its infrastructure after considering the IDS Project, III's ArticleReach, and RapidILL. The CNY Rapid pod has proven very effective in delivering non-returns quickly. RapidILL can be used in conjunction with most traditional ILL systems or can be used as a stand-alone interface. At the present time 17 of our 18 members facilitate RapidILL via ILLiad.

### **Empire Library Delivery**

CNY's members use Empire Library Delivery (ELD) to facilitate delivery of physical materials across New York State. The Empire State Library Network maintains ELD (<https://www.esln.org/services/empire-library-delivery/>). CNY members maintain a five-day per week delivery subscription with ELD.

One aspect to note is that UPS Campus Ship was utilized for the peer-to-peer pilot with NExpress. Should CNY choose to add member institutions from outside New York State, this will affect delivery methods and costs, as well as staff workflow. Pamela Jones is participating in a statewide committee evaluating and re-envisioning the delivery service. Intrastate delivery will be part of this group's agenda.

### **Patron Usability**

The International Organization for Standardization (ISO), in its Ergonomic Requirements for Office Work with Visual Display Terminals (1998), defines usability as the "extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (Section 3, Definitions). *Effectiveness* refers to how accurately and completely a user is able to fulfill a specified goal, *efficiency* refers to the extent of resources used to attain that goal, *satisfaction* encompasses users' comfort and positive attitude toward a product, and *context of use* includes the users, tasks, environment, and, for our specific purposes in this paper, the equipment used—namely, the CNY technology system.

According to feedback regarding patron experience with our current system gathered at the recent CNY Collaboration Day held at Colgate University, CNY is easy to use—providing excellent discoverability and fast delivery of print and documents; utilizes patron-initiated requesting; and has a user-friendly interface. Students and faculty recognize the value of CNY and use it—as evidenced by the 31,977 fulfilled requests across the consortium for the year 2015. Patrons appear to be satisfied with their experience using CNY, so, applying the ISO definition of usability stated above, it is left to us to evaluate whether we might improve the effectiveness and efficiency of our system.

The patron interface of our CNY catalog via the Encore discovery layer provides a single search box with the option of advanced search, and results are sorted by relevance, with the option to sort by date and title, as well as many facets to refine the search. A request button appears prominently next to each entry, making it simple for patrons to request items. Other features include a "book cart", where patrons may gather items they are interested in before committing to request them, and an email option for both single entries and book cart lists. The interface does not provide suggestions to help patrons find relevant search terms, but it does "remember" search terms previously used in the session and will list them as you begin to type words using the same letters.

These features, according to Xiaohua (2014), are all desirable characteristics of user-centered design that have been adopted from Google and Amazon. In a usability study of web-based enterprise information systems, Shuangyuan, Shuqin, and Zhonghui (2013) list several characteristics that affect web service usability, including:

- *Content* – relevance, timeliness of information, layout/readability, fast processing,
- *Ease of use* – ease of navigation, helpful prompts/search tips, simplicity of operation,
- *Interaction* – communication between user and the information network satisfies user needs/goals, and
- *Personalization* – such as the ability to save items in a list, or otherwise interact with the system in a personalized way.

Again, our system generally lives up to patron/web usability desired characteristics, with the one notable exception being that it does not supply search tips/relevant search terms. This may be a feature to look for in a new system or to improve in our current one.

Much goes on behind the user interface, however, that may affect user experience without the users' knowledge. Interoperability of systems is essential for the fast and easy processing of requests, and time saved on the back end, in staff workflow, translates to faster turnaround for patrons.

In addition, content is in two places. Patrons search in their native system first before being directed to CNY. This is not onerous, but is there a way to make the user experience seamless? Lori Bowen Ayre (2015) calls the shared library system with a single shared catalog the "holy grail" of library automation. Aside from cost savings and simplification of staff workflows (e.g., no duplicate data entry, no ILL paperwork, no book wrappers [p. 42]), a shared library system benefits patrons because they can request items from other libraries in the consortium in exactly the same way they do from their own library, without any need to search another catalog and sign in to another system.

Marshall Breeding (2015) also puts the shared library system forth as a good option, stating that it can mean significant changes to workflows and policies at individual libraries but also a seamless experience for the patron and a great cost savings to the participating libraries. For CNY, sharing a library system would alleviate many of the problems associated with patron and bibliographic database loads/deletes and resource sharing processing, and it would save the cost of maintaining a separate overlay system. Management of technology could be simplified, easing the redundancy of effort across the consortium.

CNY is doing well in the area of patron satisfaction and usability, but there is always room for improvement. Some suggestions gathered at the CNY

Collaboration Day include incorporating CNY collections into member discovery layers and incorporating e-resource content (e.g., e-book DDA records) as a facet in the CNY discovery layer. These suggestions indicate the desire for a seamless discovery experience, and possibly point toward a single system. Certainly, the trend is moving toward integration and interoperability, and whatever system CNY chooses ought to be well equipped to adapt to future demands:

Products that lock libraries into current practices—and do not enable the new and emerging bibliographic frameworks and new models of resource procurement—could impede their ability to take advantage of these developments. The selection of a new system must balance the requirements needed to sustain library operations in the present and the short-term future. It must also demonstrate the flexibility and extensibility to adapt to the changes anticipated in the not-too-distant next phase of resource management. (Breeding, 2015, p. 6)

### **Aspirations for Staff-Side Technology**

Staff-side users include staff and librarians working in circulation, technical services, systems administration, and the like. These are the backend users involved in maintaining and administering the system, processing records, and handling requests.

In reviewing literature and speaking with staff the following themes emerged regarding aspirations for staff-side technology.

- Simple interfacing
  - Intuitive and attractive - Software users commonly desire attractive and intuitive interfaces. “The way a person feels about an object or a thing influences how successful they will be in using it” (Berkun, 2000). A clean interface enables productivity. The current interface for INN-Reach has great potential to be improved upon, especially for non-III ILS libraries.
  - Cloud-based client - Administering clients can be tedious and time consuming. With a web-based client, no special software needs to be installed or maintained on individual workstations. The user can login from any Internet enabled machine with a browser and complete necessary tasks.
- Streamlined workflows
  - Automated workflows – Currently, many workflows require a number of manual steps to be taken in order to complete the task at hand. For example, when a book is ready to be sent out or returned, staff is required to hand write information onto labels that are attached to the physical item. It would be more

efficient for the system to generate a label and print it with the required information. More automation will save staff time and effort.

- No double work - Users want the ability to complete all steps in a single interface. This is particularly problematic for non-III libraries where actions must be taken in the INN-Reach system and information must then be re-keyed into the library's main ILS, such as Voyager. It is noteworthy that III is developing an API solution to alleviate this issue.
- Minimal clicks - The number of clicks to execute common tasks should be nominal.
- Actionable items are clear - Clear indicators alert users to actionable items such as pending. Visual alerts could appear on a main screen within the client or staff could be alerted via notification.
- Simple searching - Searching for information within the system is simple with a variety of search options available to staff.
- Speedy processing - All computing actions, especially client loads, occur quickly.
- Easy communication - Ways to send notifications to staff or patrons at lending or borrowing libraries should be conveniently available from within the client.
- E-Resource record processing - Currently owned systems present significant challenges for technical services staff in dealing with e-resource record loads. This paper will not go into detail regarding these challenges but staff would greatly benefit from technological and workflow-based solutions in this area.
- Effortless reporting
  - Currently, staff at III libraries and non-III libraries alike expend a great deal of manual effort to retain information to generate statistics from simple tracking of loaned items to collection development. Retaining information, report creation, and report generation should be simple and available within the client.
- System interoperability
  - Automatic loads - Records for holdings and patrons are automatically loaded and updated. Minimal intervention from staff is required.
  - Real time - Systems should communicate in real time. For example, when a borrowed item is renewed by a patron, that information is automatically and immediately communicated to the lending system with all related records updated accordingly.
  - Pass-through authentication - Staff and patrons alike should be able to authenticate using their own network credentials via LDAP, Shibboleth, or other single sign-on solutions. This integration should be a standard feature of the system.

- E-Resources - The system can handle e-resources from a variety of platforms with ease.
- Transparency
  - Request processing - Staff can easily view and report on what stage of the borrowing and lending process an item is in.
  - Data load and profiles - It is clear which items are being made available for borrowing in CNY and which users are allowed to borrow. Patron and holding record load and update profiles are accessible and easily configurable.
- Support
  - Training - Training for all levels of staff should be available for newly implemented libraries as well as continued education sessions for longtime users and introductory sessions for new staff.
  - Assistance - When a problem arises, it should be easy to get support from the software provider. There should be quick turnaround and a clear path for issue escalation. A knowledgeable, responsive community should also be available to assist with user questions or issues.

### **Resource Sharing Approaches and Associated Systems**

Our research uncovered a handful of solutions that facilitate effective resource sharing. These solutions have been divided into categories based on the resource sharing methodology to which they correspond. The three main technological models CNY should consider are:

1. Circulation-based.
2. Enhanced ILL.
3. Shared Library Management System.

#### **Circulation-based Model**

Also referred to as the overlay model, the circulation-based model can be defined as a solution utilizing an intermediary, connector system for record compiling, request management, and load balancing between individual libraries that is facilitated through a library's circulation module and coupled with a shared catalog. This is the current methodology employed by CNY. All requests are unmediated and patron-driven. The systems that fall into this category include Auto-Graphics' SHAREit, Relais' D2D, and Innovative's INN-Reach. Regarding these models, Ayre and Stockton (2014) conclude, "The only scenario where the overlay approach works efficiently is when the resource sharing product and the ILS product are provided by the same vendor (e.g., Innovative's Millennium and INN-Reach product and Auto-Graphics Agent Verso and SHAREit products). In these cases, the integration is proprietary so libraries not using the vendor's ILS

tend to have a very sub-standard experience, but the libraries on the resource sharing vendor's ILS have an excellent experience" (p. 17).

Auto-Graphics' SHAREit relies heavily on the NCIP protocol to circulate physical materials via what seems to be a web-based client. According to Breeding (2013), the "resource discovery component of SHAREit can be configured as a physical union catalog of records transferred and synchronized from participating library systems, a virtual union catalog based on broadcast Z39.50 queries, or a hybrid of the two. Auto-Graphics also offers a federated search portal" (p. 23).

In their 2014 report, Ayre and Stockton did not recommend SHAREit as a viable resource sharing option, as it was "not actually in production anywhere" but did say due to Auto-Graphics' "long history as a resource sharing software supplier, there is hope that the company will make the necessary adjustments to their infrastructure and get back on track with their new product" (p. 15). It is possible that the Mississippi Library Commission and Massachusetts Virtual Catalog run SHAREit, though this has not been officially confirmed.

Relais' D2D was developed as a resource sharing solution for libraries with varying local library systems. Its associated union catalog is a virtual one with search results returned using Z39.50 (Ayers & Stockton, 2014). According to Relais, D2D can process requests for physical and digital materials, utilizes load balancing, allows for unmediated requesting, and can communicate requests via NCIP, ESIP, SIP2 and screen scraping (Relais International, n.d.).

Ayre and Stockton conclude (2014), "Relais is a very good option for a group of libraries that need to share materials but do not want to share the same ILS or ILS vendor. The product is stable and well supported by a company that has a great deal of experience and knowledge about interlibrary lending... The products and the company are adding features and functionality on a regular basis. Relais is currently developing a web version of their staff client" (p. 13). Examples of consortial users include Greater Western Library Alliance and MARINA.

Innovative's INN-Reach, our current solution, loads records from individual libraries to a central server, where the bulk of the request processing occurs and records for the union catalog are stored. A library with Ill's Millennium or Sierra ILS uses their native circulation client to fulfill requests. On the other hand, non-Ill libraries must install a separate DCB client to fill requests. Staff at these libraries "must also check out each item in their local system as well as through the DCB staff interface since there is no real-time communication between the INN-Reach system and the local ILS. When items are borrowed from other libraries, staff at the requesting library must manually create and manage temporary item records within their local system. Libraries receiving an item from a resource sharing partner must create and manage temporary bib records as well" (Ayers & Stockton, 2014). Additionally, non-Ill libraries must export holding and patron

data on a daily basis. Communication between the central server and native ILL libraries occurs in real time while holdings and patron information for non-ILL libraries is only as current as the most recent data load. INN-Reach was not designed to process requests for electronic materials, but the product is stable and mature. Recently, there seems to be renewed interest by Innovative on further INN-Reach development.

Ayre and Stockton (2014) conclude, “The INN-Reach product is a viable product for any group of libraries that wishes to implement a resource sharing system with multiple ILS solutions. We believe that a quote from George Machovec sums up the solution well, ‘What it does, it does well. Just don’t expect it to do more.’... With INN-Reach, libraries using an ILS from Innovative will probably always have a more integrated resource sharing experience than libraries using an ILS from another vendor. No other resource sharing solution offers the same level of circulation interoperability as INN-Reach does for Innovative ILS clients” (p. 10). Other consortia using INN-Reach include Colorado Alliance of Research Libraries, MOBIUS, and OhioLINK.

### **Enhanced ILL Model**

Also known as peer-to-peer ILL (Breeding, 2013), this model is designed to run equally well with any ILS product. By leveraging existing infrastructure, such as ILLiad, which is used by 17 of our 18 members, this model offers the potential for significant cost savings via automated workflows and reduced paper trails by leveraging the existing ILL system’s request management capabilities.

Additionally, platform neutrality can drive consistency in workflow, which could save time and allow staff to more widely share expertise. However, while IDS can operate with any library ILS or platform, IDS is not platform neutral, as OCLC ILLiad is required. Via IDS, patrons find articles via the usual means, such as local discovery or WorldCat, and place an ILL request that is funneled through IDS’s enhanced ILL logic. Turnaround times are significantly faster than traditional document delivery ILL. Information Delivery Services (IDS) Project and RapidILL are two service providers in this area. Innovative’s Article Reach is a third service provider.

IDS Project is a group of nearly 80 libraries in New York and several from surrounding states that is run out of SUNY Geneseo. IDS developed IDS Logic, a service that uses ILLiad’s Server Addon functionality to determine item availability, facilitate unmediated article and loan requests, load balance, send notifications, and more.

Performance commitments are in place with turnaround expectations set at 48-hours for articles and 72-hours for physical materials. Physical items are distributed via Empire Library Delivery.

Additionally, IDS is committed to best practices and community. Best practices and troubleshooting suggestions are shared often on their active listserv, via the Workflow Toolkit, and with an annual conference. They also run a Mentor Program “which assigns volunteer applications and systems specialists from current member libraries to each new member. Through both onsite visits and regular communications, the mentors help the staff at the joining library to configure ILLiad, optimize their workflows, and implement the technical requirements of the IDS Project” (IDS Project, 2016).

To access materials, patrons can use local discovery tools, WorldCat, or IDS Search. IDS Search is a discovery overlay that relies on APIs from Worldcat, Google Books, and availability scripts. Through a single filter, a patron could choose to view local items only, a specified group, or all related WorldCat items in a single environment (IDS Project, 2016a).

RapidILL is “composed of groups of libraries referred to as ‘pods.’ Pods are created to support peer or consortium resource sharing...Rapid works with all of the major Interlibrary Loan management software packages including Clio, ILLiad, and Relais” (RapidILL, n.d.) to determine item availability, facilitate unmediated article and loan requests, load balance, and other tasks. A library can also use Rapid’s own system rather than the aforementioned systems. CNY currently uses RapidILL to share articles.

To participate, holdings files are sent to Rapid’s central database. Members commit to certain standards for turnaround time and a number of reporting options exist to track items and meet turnaround commitments.

Last year, Rapid added options for physical material as well as book chapter sharing through RapidR. Most members are not yet subscribed to this service, however. RapidILL is a cooperative and members include Amherst College, MIT, Tufts University, University of Mass. Dartmouth, Wellesley College, and Williams College.

### **Shared Library Services Platform Model**

Marshall Breeding (2015) describes the library services platform as, “a type of library resource management system with a set of characteristics that differ substantially from the longstanding genre of integrated library system” (p. 6). In this model, member libraries would join together to collectively purchase a single library services platform and create shared policies and workflows as appropriate. Breeding (2015) and Ayers (2015) alike extoll the benefits of this methodology citing significant cost savings, native resource sharing, simplified access to shared collections or digital resources, pooled expertise and knowledge sharing, improved patron experience, optimized workflow, and more.

One key benefit of the library services platform is cloud-based, multitenant architecture. Enis (2016) explains:

With multitenancy, a vendor hosts a single instance of a software application that serves multiple customers, or “tenants.” In single tenant architecture, software applications are installed on individual servers or computers, or remotely hosted by a vendor as one instance of software per customer. (Forward Thinking, para. 2)

One key benefit of multitenancy is that a vendor can apply updates, bug fixes, and upgrades once, and all of its customers are immediately operating on the same updated software. This enables vendors to apply updates and fixes more frequently than would be possible in single tenant architectures. Alma, for example, has released monthly revisions/updates ever since its initial launch in 2012. Multitenant architecture also greatly simplifies the aggregation and analysis of data from all “tenants,” which, in this case, is a boon for library usage analytics.

Recommended systems include Ex Libris’ Alma, Kual Open Library Environment, and OCLC’s WorldShare Management Services, all of which have been developed from the ground up and are not based on existing product architecture.

Alma is described by Ex Libris (2015) as a Unified Resource Management solution that “supports the entire suite of library operations - selection, acquisition, metadata management, digitization, and fulfillment...regardless of format or location...by pulling together workflows for print, electronic, and digital material Alma strives to increase efficiency and provide analytics for the whole collection”. As a multitenant, cloud-based platform there is no need to install clients on workstations, cross-institutional borrowing is built-in, and there is a very robust analytic and reporting toolset. Additionally, the Network Zone is available as a specific digital space for collaborative cataloging and reporting. Discovery services can be provided by Primo or Summon.

Consortia using Alma include Orbis Cascade Alliance, Minnesota Bridge Consortium, and BIBSYS Consortium.

Kuali Open Library Environment (OLE) is defined by Breeding (2015) as “an open-source resource management system developed through a series of initiatives with funding from The Andrew W. Mellon Foundation....The software was designed to manage print and electronic materials and to support the workflows that correspond to the processing of each format...[C]reated as an enterprise-level business System... Kuali OLE is being created through a community-source development model” (p. 28). Kuali OLE is in production at University of Chicago and Lehigh University some core functionality is still being developed. There seems to be a high level of commitment from some large

academic libraries such as Duke University, Villanova University, and the University of Michigan. Cornell University intends to go live on Kuali OLE in 2017. Breeding (2015) suggests, “[l]ibraries especially interested in open source software may find it worthwhile to wait to observe the progress of Kuali OLE, especially regarding the anticipated capabilities to also manage electronic resources” (p. 16).

Kuali OLE does not have native, patron facing discovery but is intended to be able to integrate with a variety of currently available systems.

While there is no consortium currently running this system, VALID out of New Jersey and a group of academic libraries in Florida have expressed interest.

“OCLC WorldShare Management Services provides capabilities to manage a library’s collection of electronic resources in addition to its print collections holdings via a component called WorldShare License Manager. OCLC has created a knowledge base of e-resource holdings to facilitate the management of these resources” (Breeding, 2015, p. 31).

The recently released WorldShare Report Designer “a tool that enables WMS libraries to draw on data regarding acquisitions, circulation, metadata, resource sharing, discovery, ERM, and other library functions and build custom visualizations and reports” (Enis, 2016, Next Generation, para. 3). Discovery is provided by the WorldCat Discovery Service.

WMS is another multitenant platform providing many of the same benefits as other cloud-based LSPs, though the system does not seem to be as robust when it comes to consortial functionality.

Two current consortial customers are the Private Academic Library Network of Indiana (PALNI) AND LIBROS.

### **Resource Sharing Developments: New Technology**

Predicting the future isn't a high-percentage shot, especially regarding technology. But one can look at the present and try to determine which way it is leaning. This section aims to be vendor neutral and based upon an understanding of protocols, yet the most significant developments are likely to be driven by the vendors of library software and digital content.

The model for resource sharing is the extension of borrowing privileges to other institutions, which then in turn loans the item to their own patron. The resource sharing protocols that facilitate this process principally define the format and content of the message exchange. NCIP (NISO Circulation Interchange Protocol) defines a repertoire of messages and associated rules to perform the functions necessary to lend items, to provide controlled access to electronic resources,

and to facilitate co-operative management of these functions. SIP is a proprietary protocol developed by the 3M Corp. but made publicly available. The protocol specifies the format of messages exchanged between systems. It does not define how a connection between the two systems is established.

INN-Reach has been described as a hub-and-spoke system with a central server as the hub and member libraries routing its requests through the server. Patrons can search the database, see item status and place their own unmediated requests in real time. Locally, the staff handles the request similar to a local patron by checking it out, then preparing it for pickup by a courier.

Another resource sharing model is provided by OCLC; providing a central database and using software known as "VDX" for identifying owning libraries and routing the requests.

Systems like the IDS Project require staff mediation, with robust software developed to handle and route requests more efficiently than tradition ILL.

The development of discovery layers by companies that also vend content has led to a drive to provide a total solution, bundling a discovery layer, knowledge base, and Library Services Platform into a complete solution.

Technological changes in the general environment have made a significant impact on our society and the expectations of our users. Mobile communication technology with limited screen size has driven the development of user interfaces that are simpler and more intuitive. Standard visual cues provide a more uniform experience and the browser, empowered and extended by HTML5 and JavaScript, is becoming the primary platform for application development. On the backend, Application Programming Interfaces, known as RESTful APIs, provide data and services. The result is user experience across all platforms and devices that does not need specialized knowledge or training to accomplish routine tasks such as requesting a book or article that the library does not own.

The future direction of resource sharing is likely to continue in a direction to provide more efficient, streamlined processes. Innovative Interfaces plans to integrate all of its latest cloud-based technologies with INN-Reach and ArticleReach to deliver an enhanced product combining the discovery of both books and articles and the ability to directly request these items via RESTful APIs with partner libraries. A knowledgebase product with consortial capabilities is also in development.

Ill's development is mirrored by the maneuvering and strategic decisions of other competing vendors. Resource sharing is an emerging development for Library Services Platforms. Ex Libris's Alma core functionality includes resource sharing with other Alma libraries, as items discovered through the Primo discovery layer can be requested directly from partner libraries.

EBSCO recently announced a partnership with Kuali OLE that will provide the vendors with the functionality of an LSP. This will complete the triangle of LSP, knowledgebase and discovery layer that is necessary to provide a comprehensive solution for libraries. The integration of resource sharing into these new systems is an important development, albeit one that is vendor specific.

### **Conclusion**

With the information provided in this paper, the authors hope the reader will understand the history of CNY and how the organization has applied technology to facilitate resource sharing across the consortium. While resource sharing is at the core of CNY services, further leveraging of the power of the consortium is also paramount to a discussion of technologies. The collaboratively owned ebook collection procured via a DDA model points to the necessity for metadata management of e-resources for the members. All goals of the strategic plan will ultimately feed into any discussion of systems and technology that can best realize the mission of CNY.

Different resource sharing methodologies offer varying levels of added value and commitment. A substantial shift in CNY cultural thinking in terms of resource sharing may be necessary to truly meet our mission and maximize value for all libraries while driving innovation. Continuing to offer INN-Reach is the path of least resistance, but the organization should consider newly developed products to enhance efficiency and usability as they become available. Enhanced ILL may be an easy enough switch technologically, but, as with any model, it should be determined whether it adds to the patron experience, drives innovation, and/or creates staff efficiencies. Lastly, moving to a shared system such as Alma would require the dedication of time in the planning stages and a significant shift in what resource sharing means to CNY but may present our members with an incredible value proposition in terms of cost savings and collaboration. Appendix B lists the vendors considered by the authors.

In many ways CNY is realizing its mission with the existing infrastructure, but the questions that need to be considered next are:

- Should CNY consider a shared library systems platform as a future possibility to realize the greatest benefit in staff efficiency and patron experience?
  - How would this affect adding new members?
  - How would this be funded?
  - What model of the shared ILS best meets the mission?
- CNY as “place to start” rather than the second catalog to check?
  - If the CNY catalog was the first place to start, what is the next step for further discovery (e.g., IDS project, Rapid Returnables)?

- Can management of some of the technology or metadata management be moved to CNY staff to eliminate redundancy of effort across the consortium or be offered as a service by CNY?
- Can CNY realize benefits now by developing shared practices for the shared catalog that may impact future initiatives/technologies?
- How can cooperative collection development best be supported?
- What is the vision for the future of the organization?
  - How large should it grow in membership?
  - What staffing will the organization need at the corporation level to achieve this vision?
- What system(s) will support new initiatives for the consortia over time?

Whether a new system is considered or not, the authors hope this paper will spark honest and thoughtful dialog among the membership regarding how we define and can realize collaboration through technology. This truly is an opportunity to fully define policies and shared practices, both for the benefit of the consortia as a whole and for individual member libraries.

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## Appendix A

### ConnectNY Member Libraries Overview (May 2016)

| LIBRARY                | ILS            | Discovery on ILS | ILLiad | Rapid ILL | IDS | CRL member | CNY Shared Print | EAST Partner         |
|------------------------|----------------|------------------|--------|-----------|-----|------------|------------------|----------------------|
| <b>Adelphi</b>         | III Sierra     | Encore           | Yes    | Yes       | Yes |            | Yes              | Retention/comparator |
| <b>Bard</b>            | III Millennium | Ebsco            | Yes    | Yes       |     | Yes        | Yes              | Retention/comparator |
| <b>Canisius</b>        | III Sierra     | Summon           | Yes    | Yes       |     | Yes        | Yes              |                      |
| <b>Colgate</b>         | III Sierra     | Encore           | Yes    | Yes       |     | Yes        | Yes              |                      |
| <b>Hamilton</b>        | Voyager        | Summon           | Yes    | Yes       |     | Yes        | Yes              | Retention/comparator |
| <b>HWS</b>             | Voyager        | Summon           | Yes    | Yes       | Yes |            |                  | Data analysis only   |
| <b>LeMoyne</b>         | III Millennium | None             | No     | Yes       |     | Yes        | Yes              |                      |
| <b>Medaille</b>        | III Sierra     | None             | Yes    | Yes       |     |            | Yes              | Supporting           |
| <b>Pace</b>            | III Millennium | Ebsco            | Yes    | Yes       |     |            | Yes              |                      |
| <b>Pratt</b>           | III Millennium | None             | Yes    | Yes       |     |            |                  |                      |
| <b>RIT</b>             | III Millennium | Summon           | Yes    | Yes       | Yes |            |                  |                      |
| <b>RPI</b>             | III Sierra     | Ebsco            | Yes    | Yes       |     |            |                  |                      |
| <b>Siena</b>           | III Millennium | Ebsco            | Yes    | Yes       |     |            |                  | Retention            |
| <b>Skidmore</b>        | Voyager        | Ebsco            | Yes    | Yes       |     | Yes        |                  | Retention            |
| <b>St. Lawrence</b>    | III Sierra     | Encore           | Yes    | Yes       |     |            | Yes              |                      |
| <b>Union</b>           | III Sierra     | Summon           | Yes    | Yes       |     | Yes        | Yes              | Retention/comparator |
| <b>USMA West Point</b> | III Millennium | Ebsco            | Yes    | Yes       |     | Yes        |                  |                      |
| <b>Vassar</b>          | III Sierra     | Summon           | Yes    | Yes       |     | Yes        | Yes              | Retention/comparator |

## **Appendix B**

### **Vendors**

Article/book chapter delivery vendors:

1. RapidILL (can use ILLiad, but RapidILL can be standalone)
2. IDS (must have OCLC's ILLiad)
3. ILL Article Reach

Union/Shared Catalog Vendors (circulation model):

1. ILL
2. AutoGraphics

Next Gen Consortia products:

1. Ex Libris Alma
2. ILL INN-Reach cloud-based platform

Shared ILS/next gen platform

1. ILL
2. Ex Libris Alma
3. OCLC

Print and Document Delivery vendors (ILL model):

1. IDS Project (must use OCLC ILLiad)
2. Relais International's Relais D2D (used in conjunction with one of a number of resource sharing products—another layer)
3. Rapid Returnables (must use OCLC ILLiad)

Discovery layer:

1. Encore
2. Primo