



**Big Ten Academic Alliance Libraries  
Discovery-to-Delivery (D2D)  
Phase 2  
Final Report**

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# CIC D2D Phase 2 Final Report

## Executive Summary

### Purpose and Charge

The work of the CIC Discovery-to-Delivery Task Force has now spanned two phases, with Phase 1 launched in May 2012 and resulting in the delivery of the [\*Framework for Discovery-to-Fulfillment Systems Planning in the Context of CIC Resource Sharing\*](#) report to the CIC Library Directors in May 2013. In response to this first report, a Phase 2 was requested in February 2014 by the CIC Library Directors. As such, a task force representing public services, interlibrary loan/fulfillment services, and information technology perspectives from across the CIC libraries were charged to:

1. Articulate **core design principles** to guide the modeling of ideal-state, yet achievable, discovery-to-delivery processes.
2. Analyze and illustrate **current state** discovery-to-delivery processes and environments.
3. Propose and illustrate an ideal **future state** discovery-to-delivery process(es).

Work responding to the Phase 2 charge has been conducted and is summarized in the following report. The overall objectives of this work has been to raise awareness around specific interdependencies as they affect decision-making; to sustain, if not enhance, operational effectiveness and efficiency in the support of these services; and, perhaps most importantly, meet the needs and expectations of end users in their information discovery and access activities.

### Recommendations Summary

The report concludes with the following four recommendations (please see the fully-stated recommendations in full Report below, p. 13):

1. *Establish, implement and practice documented “change management” processes in areas of high interdependency across the CIC, especially indicated in areas of shared policies, operations, and systems.* (Immediate/low investment-level)
2. *Marshal the CIC collective expertise and capacities of User Experience (UX) and business/systems analysts to focus on and address common end-user discovery-to-delivery interface fail-points.* (Immediate/low investment-level)
3. *Establish a CIC 3-5 year strategic plan for the interlibrary/resource sharing component of the discovery-to-delivery supply chain.* (Strategic/moderate investment-level)
4. *Aggressively pursue an overall unified technology strategy for the interlibrary component of the CIC discovery-to-delivery supply chain.* (Strategic/moderate investment-level)

These recommendations heartily support the premise that collective action strategies across the CIC, guided by holistic approaches, standard practices, and effective processes to ensure broadly considered and informed decision-making, provides opportunity to advance towards a strongly envisioned future state of discovery and delivery services.

# Report and Recommendations

## I. Background and Charge to the Task Force

The overall work of the CIC Discovery-to-Delivery Task Force spans two phases, with Phase 1 launched in May 2012 and, in response to its first report, Phase 2 charged in February 2014 by the CIC Library Directors.

### Phase 1 – Completed Work

In May 2012, the CIC Library Directors charged a small project team to report on the range of issues and challenges pertaining to providing contemporary resource sharing services in our consortial context (this effort now referred to as Phase 1). The team was asked to pay particular attention to the challenges of creating a more seamless user experience from information “discovery” to “delivery” (or “fulfillment” as the term previously used) The challenges of doing so becoming evident from processes that led to decisions for the CIC to procure and implement UBorrow, institutional decisions regarding participation in OCLC, and by a variety of other factors such as the availability of the Rapid ILL service, and the introduction of web-scale discovery tools into our libraries’ web environments. The team’s work led to an exploration of the larger *information ecosystem* – the intersections, dependencies, and practices associated with facilitating discovery-to-delivery services within and across our libraries – in an attempt to identify themes and practices that could lead to improved integration of this work at either the local or consortial level. This work resulted in delivery of the [\*Framework for Discovery-to-Fulfillment Systems Planning in the Context of CIC Resource Sharing\*](#) report to the CIC Library Directors in May 2013.

### Phase 2 – Rationale and Charge for Current Work

In response to the Phase 1 report, the CIC Library Directors requested that a Phase 2 effort be initiated that would focus on developing a preferred, if not ideal, discovery-to-delivery model. It was noted that such an articulation could influence adoption of standardized approaches that advance both institutional and consortial intentions in this complex service area. The development of this model would to recognize the multidimensional interdependencies of functions (i.e., information discovery systems, information fulfillment systems and services, public services, and user experience design), and institutions (i.e., individual policies, operations, and practices of 15 research libraries joined in consortium, in addition to the community’s relationships with relevant vendors). Additionally, in many cases there are additional local or state interdependencies to be considered, too, as several CIC institutions are the flagship institutions for their statewide systems. These institutions need to balance policies and practices between CIC institutions as their primary peers in resource sharing and delivery and those with statewide obligations.

Noting these motivations, the following Phase 2 charge was issued (abridged version, see Appendix A for full charge):

*A task force representing public services, interlibrary loan/fulfillment services, and information technology perspectives from across the CIC libraries are charged to:*

4. *Articulate **core design principles** to guide the modeling of ideal-state, yet achievable, discovery-to-delivery processes.*
5. *Analyze and illustrate **current state** discovery-to-delivery processes and environments.*
6. *Propose and illustrate an ideal **future state** discovery-to-delivery process(es).*

The overall objectives of Phase 2 work has been to raise awareness around specific interdependencies as they affect decision-making; to sustain, if not enhance, operational effectiveness and efficiency in the support of these services; and, perhaps most importantly, meet the needs and expectations of end users in their information discovery and access activities. This work holds as a premise that collective action approaches across the CIC, guided by a holistic approach and standard practices, provides opportunity to meet these objectives.

#### Task Force Membership

To fulfill this charge, a task force comprised of the following members was formed in February 2014: John Butler, AUL for Data & Technology, University of Minnesota; Barbara Coopey, Assistant Head of Access Services, Penn State University; Lee Konrad, AUL for Technology Strategies and Data Services, University of Wisconsin; and Gary White, Associate Dean for Public Services, University of Maryland.

#### Additional Contributors

The Task Force would like to acknowledge CIC ILL Directors, CIC Library Information Technology Directors (LITD), CIC Public Services Directors for their solicited input and interactions at various points during this Phase 2 work. The Task Force also thanks the institutional participants in the Current State Use Case Analyses exercises: University of Illinois, Indiana University, University of Iowa, University of Maryland, University of Michigan, Michigan State University, University of Minnesota, University of Nebraska, Northwestern University, Ohio State University, Penn State University, and University of Wisconsin. The Task Force is very grateful to analysts Bruce Barton, Lisa Saywell, Heather Weltin (all University of Wisconsin), for the leadership of the design, execution, and analysis of the Current State Use Cases exercise. Finally, the Task Force acknowledges the thoughtful contributions of Hilary Thompson (Maryland), Barbara Coopey (Penn State), Melissa Eighmy Brown (Minnesota) to illustrating an ideal future state of discovery-to-delivery process(es).

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## **II. Fulfillment of Task Force Charge**

The following summarized the Task Force's work and recommendation to the three specific charge points (detailed above).

***Charge #1: Articulate core design principles to guide the modeling of ideal-state, yet achievable, discovery-to-delivery processes. Stated principles ought to help to ensure clarity and rationale of decision-making, as well as the realization of enhanced end user experience, and highly effective and efficient services operations.***

In response, the following recommended set of principles and suggested high-level requirements following each principle has been drafted in consultation with the CIC ILL Directors, Public Services Directors, and the Library Information Technology Directors groups.

### **Principles to Guide CIC Investments in Discovery-to-Delivery Architectures**

#### **Principle #1: Provide an optimal end-user experience.**

Suggested high-level requirements -- the overall discovery-to-delivery solution should:

- a. Position state-of-the-art web-scale discovery systems *in front of* smart fulfillment mechanisms in ways that provide a cohesive and seamless interaction for the end user.
- b. Provide user-centric interfaces, that uses terminology that is understandable and useful to end users.
- c. Ensure simplicity and clarity around service options, and direction regarding steps and decision points in user workflows (e.g., next step options if item is unavailable, purchase options, etc.).
- d. Present consistent fulfillment options regardless of product used.
- e. Provide expected user conveniences relevant to the overall D2D workflow including, but not limited to, the:
  - i. pre-population of user request forms
  - ii. retention user identity information throughout the process, minimizing authentication events and other duplicative processes (such as re-doing searches as a result of lost identity information).
- f. Provide expected user controls relevant to the overall D2D workflow including, but not limited to, allowing users to:
  - i. set “need-by” dates.
  - ii. integrate ILL requests/loans with other personal fulfillment activity in “my account” (including tracking progress, expected delivery dates, cancellation options, renewal requests, etc.).
- g. Provide configurable push notifications and updates regarding transaction statuses.
- h. Minimize fulfillment time for items not immediately available at point of discovery (i.e., electronically or "on shelf").
- i. Reduce overall complexity of D2D processes for end users through seamless back-end integrations, rendering the order-request part of process to a near “invisible” state. Integrations would be established to search different systems for optimal fulfillment routes based on pre-determined or user-defined parameters such as needed turnaround time, location, patron status.

**Principle #2: Use efficient and cost-effective means to support service operations.**

Suggested high-level requirements -- the overall solution should:

- a. Help to minimize overall costs per transaction.
- b. Realize “total cost” economies that consider all aspects of operations support (i.e., IT systems, data management and processing, public service staff, logistical support, etc.)
- c. Scale effectively to meet increasing demand level.
- d. Allow load balancing to attempt an approximate a net 1:1 ratio of borrows to loans per institution as much as possible.
- e. Help to reserve human capacities for tasks requiring human judgment.
- f. Support advancement of increased and cost-effective resource sharing capacities across the CIC.

**Principle #3: Use appropriate technologies to ensure the fullest possible interoperability across the CIC’s diverse technology environments.**

Suggested high-level requirements -- the overall solution should:

- a. Interoperate effectively across the range of institutionally-preferred discovery/search environments.

- b. Be based on open standards and use open architectures (upon which further interoperability, extensions, and integrations can be built).
- c. Be non-proprietary with respect to business process and data exchange protocols.
- d. Be scalable and able to meet performance benchmarks.
- e. Be browser-agnostic.
- f. Use responsive web interface design.
- g. Use contemporary technologies, acknowledging the rapidly evolving information discovery, indexing, access, and delivery environments and supporting technologies.

***Charge #2: Analyze and illustrate current state discovery-to-delivery processes and environments.***  
*This analysis is expected to help develop a common understanding of the overall existing business processes, where interdependencies and decisions points are located (involving both consortial members and vendors), where divergences of practice may exist, and potential opportunities for future streamlining and standardization.*

To achieve a *current state* picture, the Task Force pursued four activities: A) a CIC interlibrary loan borrowing activities and trend analysis based on recent years of self-reported ARL statistics, B) Preliminary OCLC analysis of the most recent 5 years of self-reported CIC borrowing and lending ILL data, including sharing done among the CIC libraries as well as the resource sharing that the 15 CIC institutions do with all partners and consortia via every system or method they each use; C) Profiling CIC discovery and ILL Architectures; and D) conducting empirical discovery-to-delivery use case analyses within current CIC library web interfaces. Findings are summarized below.

#### A) CIC Interlibrary Loan Trends

A longitudinal view of CIC ILL *borrowing* statistics, as self-reported to ARL (see table below), shows an overall and steady decrease of 12% across CIC libraries over five years (from 2009-2013), with the exceptions of University of Chicago (up 101%), Rutgers University (up 55%) and Northwestern University (up 15%). All other CIC libraries were either flat or down over the five year period.

#### B) OCLC’s Preliminary Analysis of Most Recent Years of Self-reported CIC Borrowing and Lending ILL Activity

There are three methodological phases of this study, currently underway at the time of this writing<sup>1</sup>), commissioned by the CIC ILL Directors to OCLC and Dennis Massie, Program Officer, OCLC Research. This study and analysis intends to:

1. Identify aggregate trends through tracking the volume in all 15 CIC libraries resource sharing activities, inclusive of returnables and non-returnables over five years across all the different sharing methods.
2. Investigate the activity of individual institutions, comparing each institution's numbers with group averages, and interview staff at each institution to gain some insight into the “why” behind perceived trends.

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<sup>1</sup> Completion of a final report of this study is expected in early 2016, at which time a written report to the CIC ILL Directors group will be submitted.

3. Investigate the interactions within the CIC libraries consortium via OCLC ILL as new members join UBBorrow, where OCLC has access to detailed data not provided by the participants; also to see if there is any correlation between trends in the self-reported ILL data and other data that is publicly available, such as each institution's library materials budget, expenditures overall per student, etc.

*Preliminary and highly-summarized findings* of the first phase of the study follow (see Appendix B for slightly more detailed slides of these early findings, as provided by OCLC's Dennis Massie, October 2015):

- Overall CIC collection sharing activity is trending downward, slightly at 7.3% (2011-2015)
- Via OCLC, from 2011-2015, CIC collection sharing of returnables is trending upward (with lending +12.8% and borrowing +17.3%); and non-returnables trending downward (with lending -26.3% and borrowing -19.6%)
- Other consortial borrowing activity that eight of the CIC institutions participate in is trending downward (lending -15.9% and borrowing -17%)
- CIC UBBorrow collection sharing, for both borrowing and lending, has been ascending significantly since inception from 23,382 filled requests in 2012 to 191,275 filled requests in 2015
- Excluding UBBorrow activity, from 2013 to 2015, CIC collection sharing activity via OCLC is trending downward for both borrowing and lending (-12.2%)
- UBBorrow has begun to dominate CIC usage of OCLC ILL (2013-2015)
- In UBBorrow activity, five of the 15 CIC libraries are *net borrowers*, and the remaining 10 are *net lenders*.
  - The Task Force further observes that currently four of the five *net borrowers* prominently feature UBBorrow as a *discovery* option on the home/portal page of their library's web site. These same four CIC libraries also tend to have a higher percentage of unmediated (patron initiated) searches in UBBorrow than mediated (staff initiated). (See the "UBorrow Universe" slide in Appendix B for more details.) The observations here suggest a correlation between privileging UBBorrow as a discovery tool and the UBBorrow net borrowing/net lending imbalance across the CIC. Finally, as stated in the Task Force's Phase 1 report, and worth noting here again: "*Presenting UBBorrow -- primarily a fulfillment service -- to users as a discovery tool has raised a dilemma. On the one hand, it neatly moves closer to the ideal of seamlessness between discovery and fulfillment functions for the user. On the other hand, UBBorrow does not rise to meet the new standard of (and user expectations for) web-scale search and discovery services.*" (Phase 1 Report, p.12).

#### C) Profile of CIC Discovery and ILL Architectures

All CIC libraries support a discovery system or service from either a major vendor or locally-supported open source application.<sup>2</sup> The systems and their respective indexes and interfaces, not unexpectedly, bear differing scopes and configurations across the CIC libraries. As emphasized in the Task Force's Phase 1 report, it is realistic to expect a continued state of diverse discovery technologies and systems across the CIC libraries and that emphasis is best focused on maximizing interoperability and complementary use of these technologies in the discovery-to-delivery chain.

All CIC library discovery systems/services are configured to interact with link resolvers that provide access to locally owned or licensed full text, catalog records and, on a more limited basis, a requesting option to either Interlibrary Loan or ILLiad. All use some standard form of user authentication (CAS, Cosign, InCommons/Shibboleth, EZProxy). And, in perhaps in the one exception to the known technological diversity across the consortium, *all* CIC libraries use ILLiad, the interlibrary loan management system provided by Atlas Systems. All CIC libraries use UBorrow (Relais), with the majority now employing it for unmediated borrowing services. Many libraries have obligations to state or non-CIC consortial systems, which may or may not be integrated in their Discovery Service, and can bring complexity to operational functions as well as to the end user's experience in determining service choice and eligibility within a given interface.

Since its CIC implementation in 2011-12, request activity within the UBorrow system, which provides for unmediated requesting of returnable items, has grown continuously. Cumulatively, over 230,000 items have been requested through UBorrow, with a rough pattern emerging of 60% unmediated to 40% mediated requests. A major advantage of UBorrow is its ability to identify and send requests to libraries with available items. Around 80% of UBorrow requests are filled by the first available lender, expediting delivery. Also since its implementation, the CIC ILL Directors have worked with Relais to contract for a Relais web services option, which would allow for ILL requests to be submitted to and handled by the backend system without the user needing to interact with the Relais Z39.50 discovery web interface to submit a request.

Finally, RapidILL, a behind-the-scenes expedited article delivery system, is used by eight CIC libraries. Participants agree to reciprocal free lending and a response time of 24 hours. The average delivery time for articles here is 12 hours.

#### D) Discovery-to-Delivery Use Case Analyses

During Summer/Fall 2014, twelve CIC libraries participated in an informal empirical study, "Current State Analysis of D2D Use Cases for Unavailable Known Items." This exercise involved making observations of end-users (or "naïve" library staff members, when end-users were not available) searching for two articles and two books within their library's website (including discovery system) or via Google Scholar.

As a result, most libraries agreed that their library web sites were generally complicated and confusing with different vendor tools and varying levels of interoperability, thus presenting a complex discovery-to-delivery process for end users. Results showed that across these CIC institutions, article discovery-to-delivery works relatively well. Standard discovery/database vendors provide interoperability via a link resolver to either full-text or

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<sup>2</sup> The most recent survey of discovery systems in use across CIC libraries shows the following distribution: Ex Libris Primo (5), EBSCO EDS (3), ProQuest Summon (3), OCLC WorldCat Local (2), VuFind (2).

an OpenURL link to ILLiad. Google Scholar works well directing a user to library full text or back to the library, but initial setup is required if using library remote access.

In the course of this analysis, the effort uncovered a common fail-point across CIC libraries when ILLiad services were invoked by means of a link resolver connection. An entire end-user discovery and request process could abruptly fail due to inability to retain the OpenURL metadata in state if a user had to newly register for an ILLiad account in the middle of a discovery=>resolver=>ILL request process. Fortunately, a solution to this particular problem was found in ILLiad documentation that eliminates this problem: adding the “formstate tag” coding on new user web pages. Once the necessary coding is added on ILLiad pages, the openURL connection works and information is transferred into an ILLiad request form, even though the new user was directed to complete an ILLiad profile.

To smooth this issue even further, some institutions have implemented automated, daily ILLiad account provisioning procedures, so that users are never faced with the need to establish an ILLiad account. In the interest of leveraging federated authentication protocols and making management of this interoperability lightweight all around, discussions with Atlas are currently underway to determine whether methods using Shibboleth (and passing identity and institutional attributes) might be employed that could obviate the need for separate ILLiad accounts at all in order to use the service.

The use case exercises revealed that the discovery-to-delivery flow for books (or “returnables”) was complex and resulted in more “dead ends” than articles (or “non-returnables”). Also revealed was a considerable variety among libraries depending on which discovery systems used. A specific discovery system (and there are five different systems in use across the CIC libraries), along with its configuration, influences or perhaps even biases the discoverability of resources. Relatedly, a specific system will also have bearing on how fulfillment (or request and delivery) of a returnable is achieved. For example, libraries using WorldCat Local have an up-front ILL approach for returnables, whereas discovery systems from e-resource vendors like ProQuest Summon privilege access to article and e-resource content.

Differential policies across institutions were also seen as likely to complicate workflow decisions when they involve returnables, much more so than with non-returnables. For example, some institutions allow an ILL to be placed if the item is checked out, whereas others do not allow, or prefer to direct the user to a recall for the checked out item. However, coinciding with the implementation of UBorrow, the CIC libraries enacted a service enhancement by agreeing to a standardized 12-week loan period with no recalls for all circulating monographs.

**Charge #3: Propose and illustrate an ideal future state discovery-to-delivery process(es).**  
*Articulate changes and investments needed to close the gap between current and future states.*

To frame the picture of an *ideal future state for discovery-to-delivery processes*, the Task Force turned for input to a sample of public service/ILL experts from selected CIC institutions (Maryland, Minnesota, Penn State). The result is a prioritized list of features, functions, interface conventions, and architectural components that were worthy of consideration in improving CIC D2D environments, by means of development or

influencing vendor roadmaps. These are keyed further below to categories identified in the [Principles to Guide CIC Investments in Discovery-to-Delivery Architectures](#).

Considerations of a future state first begins with an overarching statement offered by one of the public service/ILL expert contributors:

*Interlibrary Loan now more than ever should be utilizing marketing strategies for promotion of our service that is so important to researchers and students. In doing so, Interlibrary Loan needs to make sure the service is easily usable and meets user expectations. How well are we meeting the needs of students, distance education patrons and those with disabilities? Interlibrary Loan should be investing in streamlined interoperability between library systems and exploring the efficiencies that can be obtained through API web services. It is with these ideas in mind that we should evaluate changes that we should strive for in an ideal future state of Interlibrary Loan.*

### Priority Elements of an Ideal Future State Design

#### **1. Unified User Interface**

- It is important to create a seamless experience for the user by only displaying one option that supports interlibrary loan or local paging within discovery systems. This could be achieved in part through the use of APIs for behind-the-scenes submission of requests to external systems.
- Smart fulfillment. Once a user selects content with a single request button (e.g., via an OpenURL link resolving service option), behind-the-scenes logic, based on predetermined and customizable criteria, would determine which system to use for fulfillment. This might work in a way similar to the functionality of RapidILL within ILLiad, which searches by ISSN and sends article requests to lending libraries or returns the article request with local availability information. OCLC direct request has the feature that can send a loan to a customizable predetermined set of libraries and ILLiad can have routing rules for this, so this is already possible.
- The user should be presented the same consistent 'request' button within various systems, databases, web pages. (Limitations: vendors don't collaborate with other vendors; vendors limit local customization)

#### **2. Unified User Accounts**

- Patrons should be able to manage all aspects of requesting loans and copy of both locally-owned and interlibrary loan items through a single library account, regardless of the back-end systems involved in fulfillment.
- Utilizing web services functionality, integrate fulfillment activities for all forms of local borrowing, resource-sharing, and electronic delivery into a single, meta-account with customizable notifications.
- All physical checkouts of locally borrowed and ILL items should be within the user's 'my library account' regardless of what system was used to request it. This needs to be a dynamic interoperability for circulation, renewals, recalls and restrictions such as library use only at the item level. NCIP (NISO Circulation Interchange Protocol) could be used for communication between the ILL system and the ILS.

### **3. User Notifications, Delivery Estimation, and Tracking**

- User notifications for requested items of both locally-owned and interlibrary loan items should be centralized and consistent, regardless of fulfillment method.
- Fulfillment notifications should be expanded and customizable by users. Users would only have to configure the notifications once—but could be developed independently, provided that the account associated with each fulfillment system had the same options. Additional notifications that align with user expectations for online shopping should be provided (e.g., order confirmation, estimated delivery, item shipped, etc.). Users should be able to select which alerts to receive and the preferred method (e.g. email, text, both).
- Users should be provided with a delivery estimate before submitting the request (based on real-time availability from multiple fulfillment options), regardless of what system was used to request it. This could be done by scoping a search based on availability and/or by providing the user with an anticipated delivery timeframe at the point of request (e.g. “This item should be available within one week. Do you want to request it?”). Consortium catalogs should have the ability to estimate delivery based on geographic location of lending libraries. Users should be able to understand at the time of requesting what format is available and to clarify their preference, such as for download, loan, or purchase.
- Tracking and status notifications should be customizable. Some patrons may want to know the status of each step of the request process, whereas others do not. While a user does not need to know how a request is being filled, knowing when the item will be available is critical. Patrons regularly express a need to know when an item has been shipped from a lending library and is on the way. It would need to be clear that material has been shipped from a lending library or if it has been shipped to the user’s office or home.

### **4. Service Visibility/Ubiquity within User Interface**

- Explore the use of current technology (e.g., web services) and strive to enter into collaborative efforts with information providers to increase visibility of Interlibrary Loan across databases, platforms and websites, perhaps even those outside of libraries (e.g., Google Scholar connecting users with their library). There are many users of online courses, distance programs, and off campus research centers that may not know they have access to a library service that can provide them with resources outside of their reach.

### **5. Other Suggestions, Comments and Opinions**

- Improve dissemination of consortium-wide resource sharing data to inform cooperative collection development/realignment.
- Increase Interlibrary Loan service for any material not available locally, such as lost, missing, claimed returned or checked out items. Consider purchasing lost or missing materials ordered through Interlibrary Loan through the library’s on-demand program.
- Investigate back-end interoperability with digitization, local paging and acquisitions systems.
- Apply accessibility compliance (OCR compliance) to all digitally shared articles and books.
- Investigate peer-to-peer requesting between the CIC libraries who share the same ILS. Networks of libraries can currently be configured in, for example, Ex Libris Alma for Resource Sharing activities. A move towards sharing our resources

within the same network by using compatible barcodes for circulation and bypassing other systems such as OCLC will strengthen our collaborative efforts, especially towards a shared print collection and cooperative collection development.

- Fulfill all copy requests electronically within ILLiad regardless of whether the print or electronic copy was found.
  - Concentrate CIC ILL technology and systems investments in ILLiad (Atlas). ILLiad is standard system used by most libraries and users are familiar with it when they go to another university. ILLiad is a flexible, locally customizable product that can be utilized for many services. Atlas is responsive to user community, proactive in its development, and will work with a library for specific local conditions.
  - Investigate ways to connect users who are discovering elsewhere with library applications that can complete fulfillment (e.g., Google Scholar). Investigate whether ILLiad can be a player in extending this concept. Employ system application programming interfaces that can connect the user with the library regardless of which website he/she is using. The user can plug in/identify their library or university (which would be an OpenURL address to ILLiad). The user can add this “API” to their laptop or any device. When an item is discovered elsewhere, the user can deploy the API which will connect the user to an ILLiad request form. Then, with a “fulfillment management service” within ILLiad, the request will be sent through a customized, prioritized list of lending systems. Atlas already has developed the “addon” technology which, with some additional programming, can be used within the “fulfillment management service” to assist in the seamless discovery to delivery process.
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### **III. Related Involvements During Phase 2 Work**

During the course of Phase 2 work, the Task Force was asked to consult and make recommendations on a number of in-play planning and development activities in areas related to CIC-level discovery-to-delivery operations. These included:

- *Discovery and Access to Materials in the CIC Shared Print Repository Report*; comments requested by the CIC CLI Director, October 2013; the Task Force (interim status between phases) responded with commentary and key questions. Specifically, it sought the Directors’ feedback on whether this case, along with other similar cases, provides opportunity to set a CIC standard for discovery and fulfillment services related to CIC consortially--supported resources. (See Appendix C for full Task Force recommendation.)
- *Relais Discovery Web Services Proposal*; initiated by the CIC ILL Directors in working with Relais, January 2014; the Task Force endorsed the direction and architectural principles undergirding this proposal to operationalize an API/web service to the Relais system. The review of this proposal employed the Task Force’s proposed *Principles to Guide CIC Investments in Discovery-to-Delivery Architectures (presented above)*.
- *Relais D2D Hybrid SOLR Indexing- Z39.50 Architecture Proposal*; initiated by the CIC ILL Directors in working with Relais, March 2014. In formulating a response to this proposal, the Task Force sought and received extended feedback from CIC public services and information technology

leaders. In reviewing responses, the Task Force found insufficient support from the CIC LITD community for the proposal, citing major questions regarding the cost/benefit of the proposed architecture and its overall value proposition. As a result, the Task Force recommended no further pursuit of the proposal. (See Appendix D for full Task Force recommendation.)

- *Atlas Addon for ILLiad-UBorrow Integration*; out of joint discussions between CIC ILL Directors, the Task Force, and other interested technologists and service personnel from across the CIC around testing the commissioned Relais web service/API, emerged the idea to pursue a seamless integration between ILLiad (Atlas) and UBorrow (Relais) functions. If enabled, this could allow loan requests received in ILLiad to be automatically sent out via the UBorrow API. The delivery of the Atlas Addon is pending, as of mid-October 2015.

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#### **IV. Recommendations**

Guided by its charge, the analysis and findings of the Task Force led to the following four recommendations, which are presented in two groups -- *Operational with low investment needed* and *Strategic with moderate investment needed*.

##### Operational / Low Investment-level

1. **Establish, implement and practice documented “change management” processes in areas of high interdependency across the CIC, especially indicated in areas of shared policies, operations, and systems.** The discovery-to-delivery service area, one of extensive interdependency not only across the consortium but also within each participating institution, needs such a governance process and discipline. The Task force recommends putting in place agreed-upon and documented processes for proposing, reviewing, selecting, testing, approving and implementing technology and service changes affecting multiple functions across multiple participating institutions. For D2D, inputs are essential from multiple institutional and functional perspectives including those of public services, interlibrary loan, information technology, collection development and acquisitions, to name the obvious ones. The governance aspect of this recommendation is that overall review and especially decision-making processes be guided by a set of guiding principles, agreed to by consortial partners (see proposed [Principles to Guide CIC Investments in Discovery-to-Delivery Architectures](#), submitted by this task force.) This recommendation strongly echoes the leading recommendation made in the Task Force’s Phase 1 report, which read:

##### Recommendation

*Formalize and document standardized processes for CIC resource sharing systems deployments and operational planning, decision-making, and execution. Elements of a standardized process may include articulation of:*

- *End user requirements, expectations, and priorities*
- *Operational requirements*
- *Financial requirements and implications*
- *Technology requirements and implications*
- *Contractual requirements and other institutional commitments or constraints*
- *Policy considerations*
- *Decision-making authorities and sign-off processes*

2. **Marshal the CIC collective expertise and capacities of User Experience (UX) and business/systems analysts to focus on and address common end-user discovery-to-delivery interface fail-points.** Often, it is the small failings within a library's web interface that can lead to end-user frustration, incompleteness of task, and abandonment of service. The task force's engagement with CIC libraries' staff to conduct a "current state" analysis of several typical end user tasks in existing interfaces revealed (or emphasized) key points of failure previously under-recognized by library staff. This activity, if developed and executed as a shared practice, holds potential for low-cost/high-impact results for end user success. To further this recommendation, it is advised that the CIC libraries draw upon its collective UX Analysis expertise in the form of a task force or user group to construct lightweight, yet effective usability testing protocols that can be applied to a standard set of relevant end user tasks. These protocols can be applied as baseline tests and/or when changes are introduced into end user workflows and interfaces. Open sharing of these findings holds potential for multiplier impact and the identification of exemplars to cultivate model interface designs.

#### Strategic / Moderate Investment-level

3. **Establish a CIC 3-5 year strategic plan for the interlibrary/resource sharing component of the discovery-to-delivery supply chain.** This would help balance opportunism that is often sparked in a rapidly changing technology environment with sound principles of strategic planning (i.e., trends analysis, use of future state analysis and prioritization of service development, and consideration of resource constraints/parameters). In consideration of strategic interests and appetites for continuous improvement, there is need for the *levels of investment here to be proportionate to levels of future need and demand*, as may be forecasted through ILL service data trends, shifts in the broader environment as related to e-content publishing and on-demand provisioning, emerging resource sharing systems, and other relevant data. To further this recommendation, it is advised that a consultant work with a task force representing the interdependent service/functional areas in discovery-to-access service and support areas. Current ILL historical and trend analysis work that the CIC is conducting with OCLC would be expected to inform this planning.
4. **Aggressively pursue an overall unified technology strategy for the interlibrary component of the CIC discovery-to-delivery supply chain.** While this may most appropriately be an outcome of strategic planning, there is known fragmentation (and, therefore, overhead) in the current ILL ecosystem that can be reduced through greater unification of ILL management systems and enhanced interface between discovery and ILL systems. Herein may also be opportunity for the CIC to exert collective market approaches to service/system licensing, as well as influencing more expeditious product development (i.e., system vendors are expectedly reluctant to commit to "one-off" development for single or few institutions and even more so when development involves more than one vendor). Acknowledged are specific constraints that individual institutions may have due to multiple consortial operational relationships. To further this recommendation, it is advised that an independent consultant well-versed in these technologies and their markets be commissioned to analyze the current state and recommend a solution(s). Furthering interactions with the [NISO Discovery to Delivery Topic Committee](#) and or its members may aid guide strategy development.

These recommendations heartily support the premise that collective action strategies across the CIC, guided by holistic approaches, standard practices, and effective processes to ensure broadly considered and informed decision-making, provides opportunity to advance towards a strongly envisioned future state of discovery and delivery services.

## **Appendix A**

### **CIC Discovery-to-Delivery Phase 2 Charge**

#### **Overview and Objectives**

In response to the May 2013 report, *Framework for Discovery-to-Fulfillment Systems Planning in the Context of CIC Resource Sharing* [need URL], the CIC Library Directors have requested that focused attention be given to developing a preferred, if not ideal, discovery-to-delivery model. Such an articulation may influence adoption of standardized approaches that advance both institutional and consortial intentions in this complex service area. The development of this model needs to recognize the multidimensional interdependencies of functions (i.e., information discovery systems, information fulfillment systems and services, public services, and user experience design), and institutions (i.e., individual policies, operations, and practices of 15 research libraries joined in consortium, in addition to the community's relationships with relevant vendors). " In many cases, there are additional local or state interdependencies to be considered, too, as several CIC institutions are the flagship institutions for their statewide systems. Although they look to CIC institutions as their primary peers in resource sharing and delivery, they have to balance policies and practices with statewide obligations.

The overall objectives of this work are to raise awareness around specific interdependencies as they affect decision-making; to sustain, if not enhance, operational effectiveness and efficiency in the support of these services; and, perhaps most importantly, meet the needs and expectations of end users in their information discovery and access activities. This work holds as a premise that collective action approaches across the CIC, guided by a holistic approach and standard practices, provides opportunity to meet these objectives.

#### **Charge**

A task force representing public services, interlibrary loan/fulfillment services, and information technology perspectives from across the CIC libraries are charged to:

1. Articulate core design principles to guide the modeling of ideal-state, yet achievable, discovery-to-delivery processes. Stated principles ought to help to ensure clarity and rationale of decision-making, as well as the realization of enhanced end user experience, and highly effective and efficient services operations.
2. Analyze and illustrate *current state* discovery-to-delivery processes and environments. This analysis is expected to help develop a common understanding of the overall existing business processes, where interdependencies and decisions points are located (involving both consortial members and vendors), where divergences of practice may exist, and potential opportunities for future streamlining and standardization.
3. Propose and illustrate an ideal *future state* discovery-to-delivery process(es). Articulate changes and investments needed to close the gap between current and future states.

#### **Membership**

The task force membership consists of:

- John Butler, AUL for Data & Technology, University of Minnesota
- Barbara Coopey, Assistant Head of Access Services, Penn State University
- Lee Konrad, AUL for Technology Strategies and Data Services, University of Wisconsin
- Gary White, Associate Dean for Public Services, University of Maryland

### **Sponsors**

Representing the CIC Library Directors in sponsorship of this task force are:

- Wendy Pradt Lougee, University Librarian and McKnight Presidential Professor, University of Minnesota
- Ed Van Gemert, Vice Provost for Libraries and University Librarian, University of Wisconsin

### **Timeframe**

A final report is due in advance of the May 2014 CIC Library Directors meeting. Interim reporting to the sponsors will take place in the intervening time.

## Appendix B

OCLC's Preliminary Analysis of Most Recent Years of Self-reported CIC Borrowing and Lending ILL Activity; Slides by Dennis Massie, OCLC Research, October 2015.



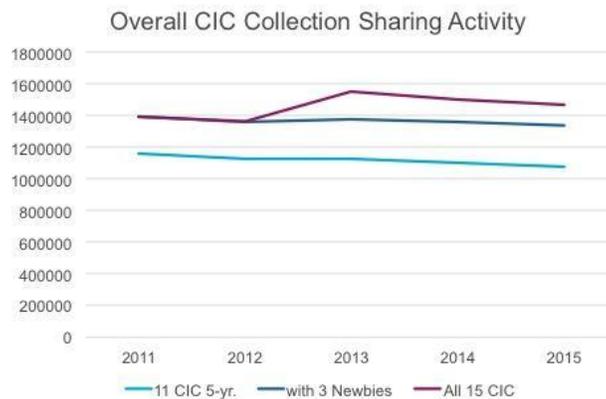
October 26, 2015

### Preliminary Results CIC ILL Study, First Phase

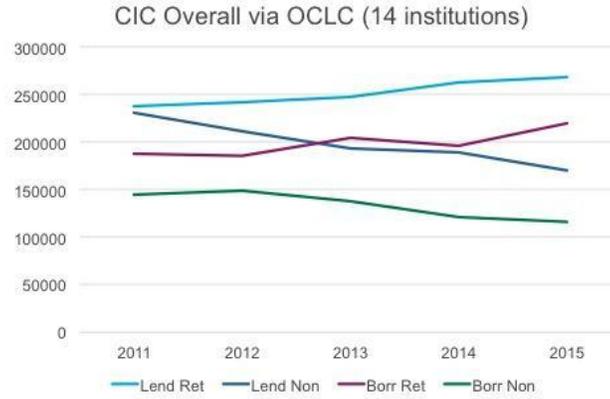
**Dennis Massie**  
Program Officer, OCLC Research



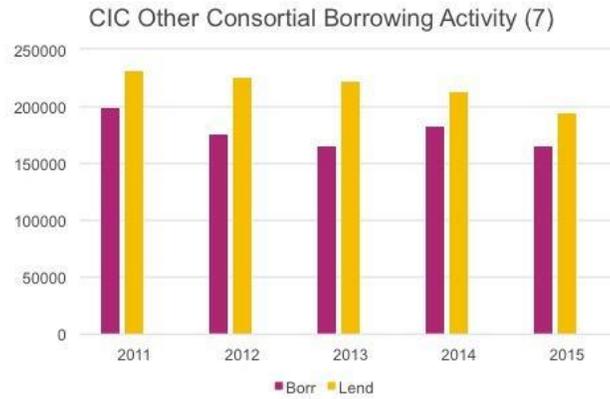
**Total sharing activity is going down.**



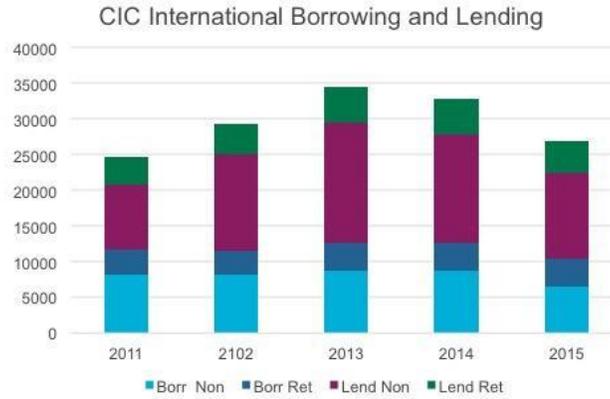
## On OCLC, Sharing Ret's up, Non's down.



## Other Consortial Borrowing: Down-ish.



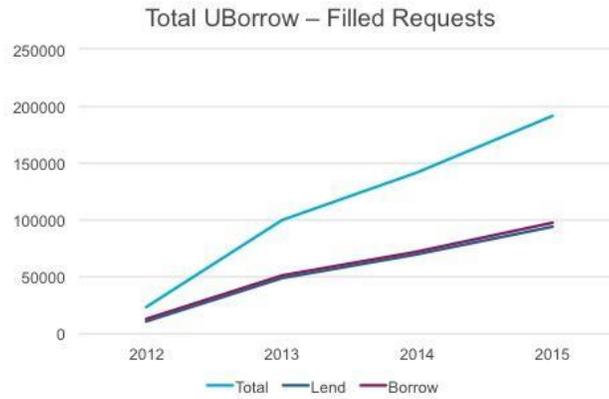
## International lending of Non-ret's is big.



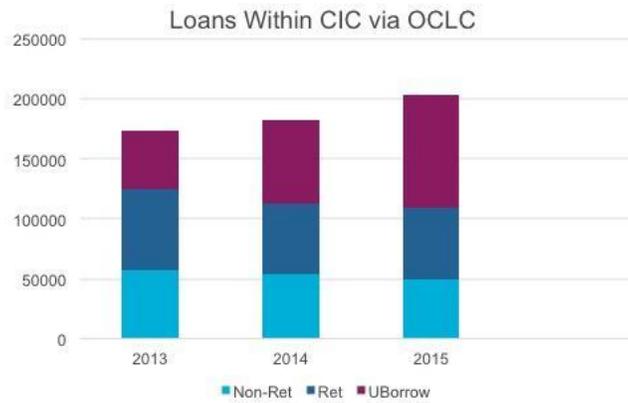
## Non-UBorrow CIC OCLC traffic down.



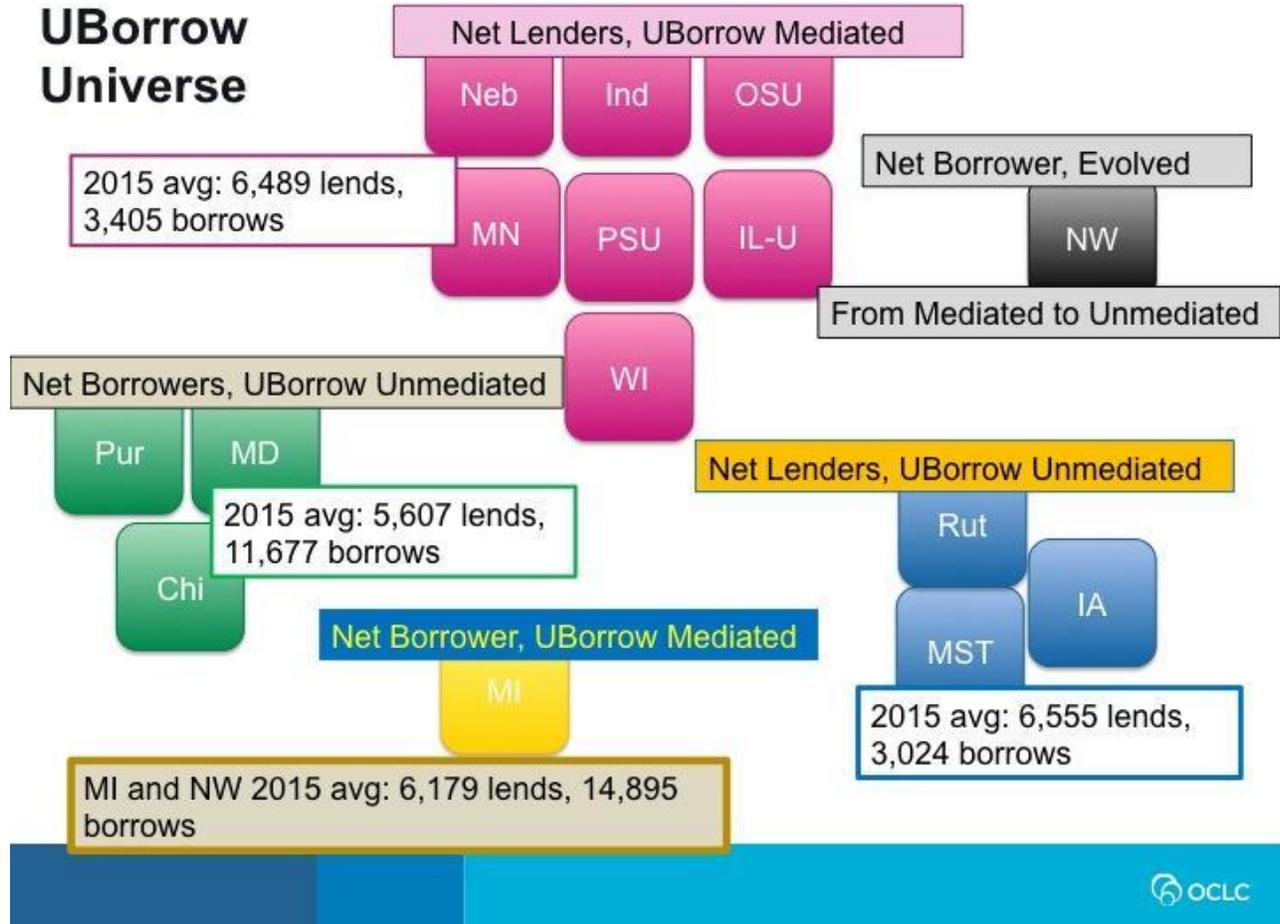
## UBorrow traffic is way, way up.



## UBorrow dominates CIC usage of OCLC ILL.



# UBorrow Universe



## **Appendix C**

**Task Force Response to the *Discovery and Access to Materials in the CIC Shared Print Repository Report***; as requested by the CIC CLI Director, and excerpted as part of a larger update on related activities, November 2013

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8 -Nov -2013

TO: CIC Directors

FR: Discovery to Fulfillment Working Group (John Butler, Barbara Coopey, Lee Konrad, Gary White)

RE: Update

<excerpt begins>

The CIC Discovery Task Force has recently been asked to respond to the report, “Discovery and Access to Materials in the CIC Shared Print Repository,” submitted by the CIC Shared Print Repository (SPR) Discovery and Access Working Group. The report provides an analysis of options and does not make recommendations. Rather, it defers to each institution to make its own decisions in the context of its own discovery needs and preferences related to materials in the SPR. While the Task Force has not yet had opportunity for full deliberation of the report, the Task Force seeks the Directors’ feedback on whether this case, along with other similar cases, provides opportunity to set a CIC standard for discovery and fulfillment services related to CIC consortially--supported resources.

Specifically, given:

- the near -ubiquity of web-scale discovery systems across CIC libraries, a model that embraces large-scale aggregation of searchable metadata representing works within and beyond our local collections;
- the scaled and efficient way in which these data can be consolidated for collective access and use (compared to institution-by-institution record-loading approaches);
- the consortial investments that we have committed to making available resources and services such as the SPPR, CRL, the HathiTrust, and others (e.g., arXiv, SSRN);
- the investments that we have made in services to ensure the access to these resources (i.e., electronically or via physical delivery); and
- the affirmed goal of creating a coherent and successful experience for our users,

**Should the CIC Libraries move towards a standard (and expectation) of making these consortially--supported resources discoverable through our institutions’ primary discovery interfaces (i.e., local catalog, discovery layer, or blended)?**

<excerpt ends>

## **Appendix D**

### **Relais D2D Hybrid SOLR Indexing- Z39.50 Architecture Proposal**

Response and Recommendation by the CIC Discovery-to-Delivery (D2D) Task Force; October 2014

In support of its work with the CIC ILL Directors group, the [CIC Discovery-to-Delivery Task Force](#) (Lee Konrad, Wisconsin; Barbara Coopey, Penn State, Gary White, Maryland, and John Butler, Minnesota) requested input from the CIC Library Information Technology Directors (CIC LITD) on a technology development proposal by Relais, working with Index-Data to develop a hybrid SOLR Indexing- Z39.50 architecture in support of CIC Interlibrary Loan services. The proposed architecture featured a SOLR-based index for discovery services that could turn to the Z39.50-based Relais system for holdings and availability information and its request functions (including unmediated). The proposal would have CIC institutions contract with Index-Data to generate and maintain a centralized SOLR/Lucene index comprised of consolidated CIC UBorrow catalogs. The intent of this proposed architecture would be to mitigate some of the problems associated with Z39.50 searching, including retrieval slowness and diverse Z39.50 configurations.

The brief proposal (3 pages) contained a section, "Effort required by participating libraries," which read:

*Any library who wishes to use the central index in lieu of their local Z39.50 server must make a dump of their bibliographic catalog available, in MARC21 format, on a webserver. The harvester will check the file daily for changes, and retrieve and re-index databases as often as needed: The library is free to decide how often to update the file. The simplest approach is often to provide a complete dump of the catalog, but if the library prefers to provide incremental updates, this is possible as well.*

To prompt input from the CIC LITD on this proposal, the following two questions were posed:

1. How supportable would you find making your bibliographic catalog data continually available (and refreshed) for harvesting by the central index?
2. Are there other models, perhaps existing, that ought to be considered for leveraging as an alternative to creating the proposed aggregation for the sole purpose of unmediated interlibrary fulfillment?

Responses from CIC LITD were received from 9 individuals at 6 different institutions<sup>3</sup> and are summarized in the following Plus/Delta table.

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<sup>3</sup> Institutions of responding individuals were Michigan State, Minnesota, Nebraska, Northwestern, Penn State, and Rutgers.

| Plus (+)   | Delta ( $\Delta$ )  |
|--|---|
| <ul style="list-style-type: none"> <li>● Faster response time: with Z39.50, broad search can take over 10 seconds to load; narrowly defined searches (such as known-item) load in 2-4 seconds. In general, SOLR-based searching is significantly faster.</li> <li>● Potential to overcome search retrieval limits of some Z39.50 configurations (i.e., some systems, like ILL, cap retrieval limit at 500; others are unlimited, and much in-between).</li> <li>● SOLR index searching could potentially allow search for items using criteria that are not easily searched via the Z39.50 protocol (e.g., by language).</li> <li>● <i>If</i> UBorrow is to be considered a discovery layer to the collections of all the CIC libraries, then the increased cost and complexity of the hybrid Relais-Index-Data architecture <i>may</i> be worth it. <i>However</i>, the simpler introduction of the Relais APIs would allow for integration of Relais into robust primary discovery tools for search and rely on the Relais application to supply holdings and availability information and to support unmediated request functions.</li> </ul> | <ul style="list-style-type: none"> <li>● This would increase costs of and complexity to the overall UBorrow architecture. It would require each library to generate and update a “shadow” catalog of bib records, which could accurately track additions and deletions from the database in a timely way. In short, there is perceived significant data ETL overhead, for each institution (3 institutions echoed this concern)</li> <li>● This solution would introduce a new form of data latency (only as current as last extract). For the primary purpose of fulfillment (discovery is not the primary purpose here), what is needed most from a solution is accurate holdings and availability information and quick response for known-item or well-defined searches (i.e., not open-ended discovery)</li> <li>● Solution does not address how duplicate records would be handled on the index side; a challenge that would likely be exacerbated by record inconsistencies. Record du-duping has presented itself as a significant challenge in other SOLR-based consortial discovery indexes. For de-duping to work, there must be comprehensive and consistent availability of unique identifiers, such as OCLC numbers (ISBNs and ISSN are not sufficient). There are significant numbers of records that lack OCLC identifiers or that place them in the wrong field or use inconsistent syntax.</li> <li>● System resources overhead is significant,, though it may be mitigated some by use of incremental updates, rather than full data loads</li> <li>● The proposed solution is over-engineered; solving a problem that is not as big as the solution (e.g., patterned use of D2D is for known-item searches, where Z39.50. “Do we really need another union catalog, when we are mostly looking to UBorrow as an ILL tool?”)</li> <li>● Proposed solution would require everyone to commit to the methodology, and at a perceived greater resource expense than</li> </ul> |

|  |   |
|--|---|
|  | <p>running Z39.50 as the end-to-end solution.</p> <ul style="list-style-type: none"> <li>• This would likely result in unevenness of ETL (extract-transform-load) from institution to institution, possibly resulting in unevenness of currency and request distribution inequities.</li> <li>• Not scale-appropriate (may be OK for smaller institutions)</li> <li>• The hybrid solution is still dependent on Z39.50 and its weaknesses for retrieval of holdings and availability information from individual catalogs. While Z39.50 made be a legacy data exchange protocol, it is still a standard. The hybrid solution may not be standards-based at all and could possibly be proprietary, posing possible future interoperability and migration constraints.</li> </ul> |
|--|---|

### Questions

In addition, the proposal raised the following fundamental questions about problem identification, and the right-scaling of a solution to the identified problem:

- What exactly is the problem we are trying to solve, and how consequential is the problem?
- What might the effect of webscale discovery systems be on ILL borrowing trends moving forward?
- “Is the juice worth the squeeze?” when presented with a decision of unknown marginal gain. Does the problem statement and solution adequately sell the need for even the minimal work implied? The case faces an even steeper hill since status quo Z39.50 libraries do not appear to be disadvantaged by this proposal.

### Recommendation

The CIC Discovery-to-Delivery Task Force currently finds insufficient support from the CIC LITD community for the Relais D2D Hybrid SOLR Indexing- Z39.50 proposal, citing major questions regarding the cost/benefit of the proposed architecture and its overall value proposition. As a result, the Task Force does not recommend further pursuit of the proposal.