



# Next Generation Resource Delivery: Management System and UX Functional Requirements

Report of the BTAA Discovery to Delivery Project Action Committee

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## Executive Summary

The Big Ten Academic Alliance Discovery to Delivery Project Action Team (D2D Action) submitted its report [A Vision for Next Generation Resource Delivery](#) on November 17, 2016. On February 7, 2017 staff from BTAA libraries participated in a conference call organized by Dean Barbara Dewey from Pennsylvania State University. After that call, a new committee was formed to write functional requirements required to support the outlined vision.

The November report envisions a discovery to delivery process where the library's principal discovery tool answers the patron's question, "How can I get this item through my library?", in a simple and straightforward way. Even when the known item cannot be located in or resolved to via the principal discovery tool, it should still be possible for patrons to ask this question. In this vision, the mainline discovery tool seamlessly incorporates ILL and document delivery as tools to resolve how the item can be delivered post discovery.

We acknowledge that sometimes the answer to the "how can I get this" question above is complex. It may involve several delivery options and associated trade-offs for both the patron and the library. Our goal is to sketch ways in which we can empower patrons to make more informed delivery decisions. We envision an interface that gently guides patrons towards the library-preferred best practice delivery options most suited to their population while providing those patrons with expanded opportunities to communicate the urgency of their need and how important they consider the item. In other words, the delivery choice interface presents a smart, customized set of user-specific options.

Behind this interface we envisioned smart integration of fulfillment systems that would improve the service we provide to our patrons while helping us manage our costs. Smart fulfillment means intelligent, rule-based request routing to the appropriate fulfillment system. The factors to weigh include resource format, delivery time, costs, and the patron's delivery requirements.

Equally important is the development of a robust patron account interface, a My Account page, where patrons can manage all their library transactions--their loans and requests, as well as a list of known items they have discovered but not yet acted on. Regardless of which backend library staff system or workflow is assigned the delivery task, all of a patron's requests, loans, delivered documents and saved records of interest should display together in the patron's personalized space. The system should also provide real-time request status information including next steps and options. We envision an improved, coordinated communication-rich patron experience in which updates on fulfillment status are delivered through the patron's preferred communication channel.

The November vision report was light on detail. This report provides some of the details needed to make the vision a reality cooperatively with our vendors. The functional requirements we

outline here are abstract descriptions rather than detailed specifications or designs. We believe that, at this level of design and behavioral specifications, many approaches are possible. Identifying the most effective approach will depend crucially on contextualizing its presentation within a given discovery platform. Vendor usability teams in collaboration with library early adopters will sort out the low level details. Similarly, the integration architecture for smart fulfillment and the details of protocols and APIs for systems integration are best left to builders of the systems in collaboration with partner libraries. We advocate for open APIs so that systems libraries build support their local customizations and the tools can interact within these complex environments.

The delivery functional requirements described below were developed cooperatively with input from a number of other libraries and consortia outside the BTAA with additional input from the BTAA ILL directors group. The discovery functional requirements have not been shared with or commented upon by others yet. This report should be shared with any patron facing groups, such as reference or instruction, within the BTAA as well as any groups responsible for discovery layer development or system integration so those groups can comment.

Ultimately, this report should provide a starting point for a conversation between vendors and libraries with the goal of improving patron's discovery-to-delivery process. To achieve this, the report must be public, discoverable and widely shared. Endorsements from other groups should be encouraged. Larger in-person meetings consisting of both vendor representatives and library staff would provide opportunities to explore practical pathways to implementing the ideas outlined below.

## Charge

- Document resource requirements based upon the Vision for the Next Generation Resource Delivery: report of the BTAA D2D Committee Action Committee.
- Deliverable: Report detailing functional requirements of a next generation resource delivery management system and discovery UX.

## Introduction

Usability testing has demonstrated patrons find the existing discovery to delivery process difficult to navigate. Our library backend systems are isolated from each other, therefore request management is challenging and requests are often duplicated. Patrons lack a single "my account" page or place to manage all of their library transactions and staff must switch between multiple systems to manage a single patron request.

We begin by exploring the discovery layer. We describe the most common inputs to a discovery layer, present ideas of how delivery options could best display for the patron, and discuss how

the display of these options should be constructed based upon locally defined best practices and service decisions.

A serious weakness in our current patron interfaces is the lack of a unified patron dashboard or place where patrons can see and manage all of their library transactions in one place. Such a “My Account” function must be developed and vendors must provide such functionality in a vendor and platform neutral way. Furthermore, they must permit the extraction of request data from their system for display in another vendor’s patron interface. Patrons do not want and are confused by siloed patron interfaces built on backend library systems. These do not provide good customer service and must be abolished.

Finally, we describe the functional requirements for a robust forward-looking resource delivery management system. We envision a platform that manages requests primarily by making calls to other systems, routes items as needed, and does not duplicate other library systems’ functionality, particularly circulation functions. These requirements emerged from the November report’s recommendations, the February 24, 2017 [Vision](#) document and Kurt Munson’s efforts to coordinate BTAA, Ivies Plus and GWLA’s efforts to define and document our common needs and expectations. Since all research libraries share these common needs, particularly in resource delivery, speaking with one coordinated voice will provide needed clarity. Thus we can focus vendor development so their products will meet everyone’s needs.

## Next Generation Discovery UX - Functional Requirements

### The library’s principal discovery platform

A library’s principal discovery platform supports the discovery and some fulfillment UX components for articles, books, and serials in print and electronic formats, in addition to less robust access to digital collections be they open access or archival materials. In other words, a fulfillment UX points to locally held or accessible content. Several commercial web scale platforms--ProQuest Summon & Ex Libris Primo, EBSCO EDS, and OCLC WorldCat--provide a unified interface for most or all of these resources types. The principal discovery layer for some libraries consists of a mix of open source or locally developed discovery tools--Blacklight or VUFind--and a commercial article discovery database.

The UX for fulfillment components, i.e., delivery, supports two types of resolution. First, to an available item be it an online resource accessed via a click through path or a physical holding record with location information. Second, requests options for physical resources, including in some cases, document delivery display. Typically, only items owned or licensed by the library are discoverable in the principal discovery platform and fulfillment options are presented only for

items discoverable there. The fulfillment options presented depend upon policies for that individual's patron category and display only after authentication.

ILL and document delivery for items not locally owned or licensed are not incorporated into the principal discovery platform.

The patron's library account information--loans, requests, fines, lists, and preferences--is easily accessed from the principal discovery layer but this account information is limited to locally owned materials only.

Libraries also subscribe to resource databases of varying levels of breadth and specialization, but we will not include these in our discussion. Rather, we are concentrating on the principal discovery layer.

## Extensions to the library's principal discovery platform

Our objective is to provide a single interface to answer the question: "Can I get this item through my library?". (See [Appendix A](#) for Core Behaviors) Currently, our principal discovery platforms answer this question affirmatively for items discoverable there and present locally available items for access or loan. However, when an item is not discoverable in the platform because it is not owned or licensed by the library, the existing platform does not present a fulfillment option even though the library can obtain the item through ILL or document delivery. And, typically, the platform does not present an ILL or document delivery workflow in cases where an item is owned or licensed but is not presently available.

We propose extending the functionality of the principal discovery platform to support these two additional use cases:

1. A known item is not discoverable in the platform but can be obtained by the library.
2. An item is discoverable but although not presently available, could be obtained by the library in a sufficiently timely manner to meet the patron's need.

To be sure, libraries currently support these use cases, but that support is via two or more distinct systems with different patron interfaces. Our proposal is to bring UX support of these uses cases and workflows together in one system and to present them within the library's principal discovery platform.

Note that we are not proposing that we expand what can be discovered in the principal discovery platform. We do not believe that there is any advantage to doing that given what we know about patron discovery behaviors. Very often discovery happens outside of library systems. Patrons turn to libraries for fulfillment.

## High level requirements

The requirements outlined below are described abstractly, without a detailed specification of particular behaviors. We can imagine a number of ways of implementing this functionality, but we look to platform owners to determine which approaches will provide the best patron experience within the context of their platform.

## Discovery inputs to the discovery platform

1. A search entered by a patron into the discovery platform search box or advanced search. (Vendor discretion: the types of searches supported, e.g. author, title, subject; the search scopes, e.g. books, articles; the search facets; the fields supported in an advanced search; support for boolean logic, left anchored searches, authority-based searches, etc.)
2. OpenURL, DOI, and other resolvable resource references, e.g. standards and report numbers. An embedded resource resolver accepts HTTP GET requests as forwarded from other contexts, e.g. GetIT links in databases, Google Books, or WorldCat.
3. A citation entry box/upload point. The patron provides a citation in a standard format as text. The citation handler parses the citation into its components, e.g. authors, title, publication, date, etc. and prompts the user to verify and edit the components. An openURL is created from the edited components and routed to the resolver. (Vendor discretion: which and how many citation formats are supported; whether a set of citations can be submitted at one time; whether exported citations from citation tools in their native format, e.g. Zotero, can be submitted.)

## Fulfillment options presented by the discovery platform

With these inputs as starting points, the patron uses the discovery platform to resolve to the known item. In some cases--openURL, citation--the discovery platform could resolve directly to the resource and present access options. In other cases, the patron would browse search results, refine her search, and so on before finding the known item she seeks. Finally, some of the time the known item will not be found through the discovery platform. Discovery will fail to resolve when the known item is not held by the library. And discovery can fail because the patron's input or search execution is poor.

### Access options for resolved searches

1. The discovery platform displays holdings information including: call number, location, availability, and terms of use to the patron when the item can be directly accessed by the patron. Examples of terms of use: a reserve item might be available for a two hour loan or a reference item might be available for use only in the library.
2. The discovery platform provides a means of requesting that the item be paged and delivered. The item may be delivered to a pick up location or to an address either

selected or specified by the patron depending on local practices. This option includes an estimate of delivery arrival and costs if any. When there are significant differences in delivery time and cost depending on from which library, ILL partner, vendor in the case of a purchase, etcetera this option will present multiple times. See the fuller discussion on request options below.

3. The discovery platform provides a mechanism to request copy of a portion of the item and the copy is delivered to the patron via a means of the patron's choosing. As with other options, estimated delivery times and costs are provided.

Some means of ranking preferences among options, ruling out unacceptable options, or restricting the number of options a patron can select are variations on how access options for resolved searches could be presented.

However these options are presented, the fulfillment service's options handler must prevent the duplication of requests. A patron's selection of one or more options to "cover her bases" should not result in both a local paging order and an ILL request in the same transaction, for example. Ideally, a fulfillment service would detect functionally duplicative requests across transactions.

#### Options for unresolved searches

4. The discovery platform provides a means of forwarding the search into another external discovery tool, e.g. a database or WorldCat. Having discovered the resource in the external tool, the patron submits an ILL or document delivery request through the discovery platform.
5. The discovery platform provides a means to request that a librarian locate and determine delivery options based on a citation or identifier. If the request is not interactive via Library chat, for example, the option provides an estimate of response time from the librarian.

These two options should always be available to the patron.

#### Option for all searches

6. A patron can save her search in her personal resource list so the search can be re-executed later. This type of personal resource list is currently a common tool within library discovery platforms (e.g. Primo's eShelf for new UI Favorites). Ideally, this list should allow patrons to submit their "Get this" requests directly from this list, in the same way that items are ordered through Amazon.

#### Intelligent options display

Our goal is to shield patrons from the details of how libraries organize and provide their services. The proliferation of options threatens to replicate our organization and practices in merely another guise.

Equivalent options from a patron's point of view should be presented under a single collapsed option. For example, a recall vs. a pull request from remote storage vs. an ILL request are functionally equivalent to a patron. When all options result in roughly the same service--a book is delivered to a pick up location in roughly the same time (for example)--nothing useful is conveyed by presenting three options. A single "request" option should display and the estimated delivery time should indicate the minimum probable delivery time (or the delivery time for the option the routing algorithm, whether automated or a rule a librarian follows, would pick). We would only want to present more than one request option if distinct options present a marked trade off to the patron: option A has fast delivery but includes a fee; option B is slower but free. Keeping in mind, the benefit and costs are potentially more important to the library than to the patron. Option A has fast delivery but costs the library more; option B is slower but cheaper. Presenting the patron with this choice invites her to make a socially conscious decision to benefit her university community. While both scenarios involve a trade off from the patron's point of view, there is a meaningful choice between significant differences.

## Structuring/nudging patron decisions

The options listed above imply varying levels of service and expense to both the library and the patron. Libraries, seeking to control their costs or to promote specific services, may prefer that some options be selected rather than others most of the time.

The library should be able to order the presentation of options with the aim of nudging the patron to choose the preferred options. The options should be presented in such a way that the patron can make an informed decision both about factors that affect them, such as estimated delivery and cost to them, and about factors that affect the library, such as library processing and shipping costs. This engages patrons in a community of stewardship for library resources.

## Supporting library service decisions

For requests that the library will fulfill through ILL or purchase, the time to delivery and the cost may fall outside of acceptable parameters to either the patron or to the library or to both. When possible, alternatives should be presented.

To support decision making by librarians, when the patron selects an access option that will invoke external services beyond the control the library, the discovery platform will prompt the patron to declare a need-by date (next week, in two weeks, this month) and an urgency metric (critical, might be interesting, central to my dissertation). These inputs can help the fulfillment librarian decide which source to use for the material, or to notify the patron early in the process if the resource cannot be obtained in time to meet the patron's delivery or cost requirements.



## Patron service classes

Libraries often provide different levels of service based on patron type. For example, office delivery is often available exclusively to faculty members. Undergraduates may pay a processing fee for some options that other patrons do not pay. The discovery platform should selectively present only the options available to patrons, based upon their status. Moreover, these options should be structured in such a way as to guide the patron to the preferred delivery mechanism. In other words, the one that best meets both their needs and the library's too. If multiple options exist, these should be clearly communicated and ordered in terms of preference. The options should communicate what service the option will provide the patron thereby allowing them to make informed decisions and choices.

## Communications and My Account

Patrons want a single place, My Account, to centrally manage all of their requests, loans and delivered documents in addition to citations they have not acted upon yet. This need was observed during recent usability testing at the University of Minnesota ([Appendix C](#)). The discovery layer, scoped as a holistic patron interface, is the logical place for this though the display of requests managed by external systems will require integration development. Requests, regardless of type, format or status, should display on a single dashboard with item specific details such as request status, due dates, hypertext links to electronic documents, transit information both local or delivery from other libraries. Historical data should display too. The patron interface should display potential format and status specific options to promote effective request management.

Management includes communication, so the My Account should contain copies of communications sent from the library to the patron and from the the patron to the library. Individual request statuses and changes to statuses should display to the patron so they can make informed decisions concerning how they would prefer their requests be processed.

## Integration between the discovery platforms and backend systems

The discovery layer populates the request form with metadata and the patron's delivery preferences. Locally configured business logic performs request routing, sending the request to the locally-defined preferred fulfillment source. A matrix of patron status, item information, both metadata and availability, coupled with local policy definitions for provisioning materials provides the logic for automated request submission into the preferred fulfillment workflow. Requests requiring mediation are sequestered for staff review. These requests, defined as edge in the classification of cases outlines in [Appendix B](#), fall outside the scope of the automated request process outlined in this document.

# Next Generation Resource Delivery Management System--Functional Requirements

We envision a next generation Resource Delivery Management System (RDMS) that

- integrates with the discovery layer to provide delivery options to patrons presented there and to accept the patron's delivery selections to initiate delivery workflows;
- automates delivery workflows to select the optimal routing of requests to fulfillment partners based on patron needs and library preferences;
- integrates with and works alongside the library's Library Services Platform (LSP) to obtain patron information or to pass request and loan data to the LSP to manage circulation;
- integrates with fulfillment network management systems such as Relais, Rapid, or OCLC Worldshare ILL to identify fulfillment partners and to manage request transmissions;
- manages request and item delivery tracking, and billing of local patrons and other libraries; and
- generates and manages communications with patrons about request status and availability related messaging.

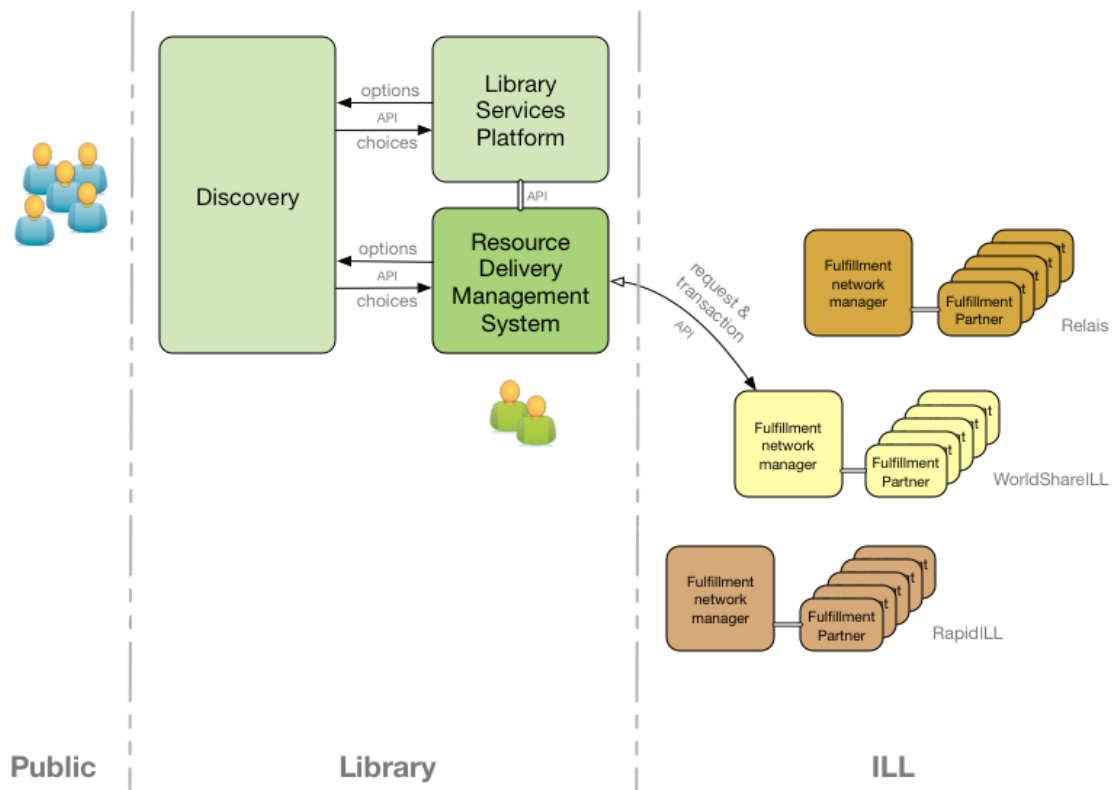
The goal is smart fulfillment. Smart fulfillment brings together policy-driven structuring of choices for the patron, policy-driven and automated routing of requests to fulfillment networks, and ultimately reduced mediation by librarians for routine ILL transactions.

[Figure 1](#) shows the relationship between the RDMS and existing components of the library ecosystem, including the library's principal discovery tool, LSP, and what we are calling here fulfillment network management systems.

A fulfillment network for our purposes is a set of libraries, generally coordinating through a shared resource sharing system, that will loan resources to partners through ILL or will scan locally held print materials. A fulfillment network management system (FNMS) is able to determine whether a network member library holds an item, whether the item is available for loan or scanning to answer a fulfillment query--Can a member of this network fill this request for this item? And the FNMS accepts and routes fulfillment requests to member libraries. From the RDMS's point of view, a FNMS is a black box. Resource-type deflection rules associated with a member library, for example, would be applied by the FNMS when determining whether it could fulfill a request; the RDMS sees only the result of this determination.

Figure 1

### Next Generation Discovery to Delivery



### RDMS APIs and protocols

The RDMS communicates with other components of the Library system ecosystem through APIs and protocols at three principal points of integration (corresponding roughly to the links that link the RDMS to other systems in the diagram above):

- Options/Choices API integration with Discovery
- Patrons/Circulation API/NCIP integration with the LSP
- Fulfillment query/request/ILL transactions API integration with fulfillment network managers

Suitable APIs and protocols may exist to support some of these integrations, e.g. ISO 18626 and NCIP. In other cases, e.g. options/choices, an API or protocol standard does not exist and would need development and standardized implementation.

## RDMS Staff User Experience

The RDMS has a library staff facing user interface in which librarians perform:

- integrated searching of external bibliographic databases;
- integrated searching of external systems' member and policies directories;
- request/routing queue monitoring;
- routing mediation for when automated routing fails to resolve to or select a fulfillment target;
- patron record management ;
- delivery queue management and tracking;
- communications queue management;
- billing of patrons and other libraries;
- copyright management;
- data analytics and management reporting;
- administrative configuration.

Above we define essential, expected, and required staff workflows. Other integrations beyond library specific systems will also be needed, including for example: integrations with local institutional authorization and authentication mechanisms; with institutionally mandated credit card/debit card payment systems; and with shipment tracking systems for UPS, FedEx, etc., all based on industry standards. Increased and nuanced support for the range of item identifiers, local lending workflows, consortial or ex-consortial tiering with load balancing strategies must also exist.

Moreover, appropriate routing and request completion mechanisms need development as part of the smart unmediated routing of requests. In this area, we specifically call out to the ILS and LSP platforms to provide tools for request submission to acquisitions, financial system integrations and patron hold requests. In other words, a mechanisms supporting seamless purchase to placement on the hold shelf workflows should be developed.

Mediation of the request to fulfillment, in whatever form that may take--automated or staff mediated--should resolve to a single place where patrons can see all of their requests. How this occurs is internal to the systems but paramount is their interoperability and ability to communicate between themselves without staff intervention.

## Vision

To achieve the goals outlined above, we envision a web-based ISO 18626 compliant resource delivery management system that is built upon newly developed standard protocols. Success for that system is defined as one that effectively supports our patron's needs and expectations for quick and efficient delivery of resources. Vendors, suppliers and library staff must cooperate to create such a replacement to our outdated, siloed systems which are based upon outdated protocols and backoffice products unable to transfer request across systems given their disparate individual capabilities. A supplier-neutral, vendor-neutral system based upon current and emerging technologies must be created from a new foundation that leverages these contemporary tools to effectively meet patrons' needs as they, the customers and consumers, define them rather than delivery based upon what an existing library systems can do. Part of this will also involve developing a resource sharing standard protocol that allows local institutions to profile delivery options so that they can expose and integrate the standard into disparate discovery systems. This resource sharing standard protocol should be submitted to NISO for development as an industry standard.

## General Requirements

The resource delivery management system manages the identification of potential suppliers, request submission, item tracking, delivery and billing of both local patrons and other libraries. It avoids duplication of data or information stored in other systems. Rather, data is pulled from external systems via APIs or other protocols as needed. A robust open architecture allowing for the extraction of data for external manipulation/processing coupled with the ability to write back into the system is the system's foundation. In other words, full Create, Read, Update, and Delete function support via RESTful APIs will provide the system with tools to support both internal and external communication.

These requirements include:

- **Request Initiation Mechanism:** The discovery layer provides a mechanism to create a request by the combination of item metadata and patron identification information. Upon submission, locally defined rules are applied and the request is routed per library preferences.
- **Patron Provisioning:** Patrons are identified by a locally defined library identifier which provides a hook to call external systems which then provide additional information about that individual at point of need. Proxy patrons are supported.
- **Request Data:** The system integrates with local systems both staff (Integrated Library System or Library Services Platform) and discovery layers to perform:
  - automated item searching,
  - request submission and
  - local item record creation based upon locally defined policies.

- **Circulation:** As borrowing loans are ultimately circulations, the system uses protocols such as NCIP for the placement of requests and those requests are managed as holds in the local LSP which also performs all patron-facing communications and circulation functions. NCIP functionality works for lending transactions as well; placing holds in the local system for incoming requests, when currently available, and desired by a lending institution.

## Staff Interface

The staff interface is customizable in terms of display layout for field placement, field exclusion or custom inclusion with granular user permissions granting access to only needed information, color coding by module with displays for the full life story of a request, copies of all communications to and from the patron and all potential or discarded lenders, and any notes added by the system, staff or patron. Thus a system for recording communications or reactions is required.

The staff tool manages and processes:

- patron requests for locally owned materials,
- borrowing requests to other libraries,
- purchase and selection of materials from commercial suppliers or as part of a local purchase-on-demand program
- requests from other libraries.

### Library Specific Customizations:

- **Tiers and Load Leveling:** Tiering of branches, consortia, and regional locations should minimize shipping costs and/or turnaround time, while load leveling within those groups distributes the burden of shipping and labor costs equitably. Both tiering and load leveling should be customizable to each group's needs.
- **Lending Workflow:** Multiple loan periods are supported and applied automatically based upon borrowing library status or item format. The system will only place requests for items on-shelf in loanable collections at both local collections and at partner libraries. Thus pull slip are printed with call number and location on them at the lending library's preferred location be that a central location or a branch, and the slips are easily customizable through a WYSIWYG type editing tool to allow for special integrations such as local barcode numbers or special delivery locations.
- The system also integrates communication to a Remote Storage Management Systems, both stand alone and shared, for retrieval.

## Use of Standard Identifiers

- **Identifiers:** Borrowing loan and article requests placed by patrons that lack standardized numbers will be searched in the background to find close matches, reducing staff mediation. Requests that are placed with standard numbers, such as ISBN, ISSN, OCLC, DOI, and PubMed ID, will match without mediation, regardless of the format of the item, eliminating the need to locate alternative OCLC records for books vs e-books,

articles vs serials only available online, and the like. The fulfillment network (OCLC, Relais, Rapid, LSP) system will know which libraries accept requests for each material type and will deflect automatically based on their criteria.

- **Barcodes:** The lending library's item barcode or barcodes must be stored and searchable within the system because this provides a unique identifier for every unique item sent so individual pieces can be tracked as easily as the entire transactions or group they make up.

## Flexibility & Customization

Support of local policies, practices and processes with robust customization options including system routing of requests. The local workflows and local tools, not the platform into which a request is placed or processed, drive the processing. Thus, it is supplier neutral and vendor neutral. This allows the library to define how requests are processed rather than the system into which those request are submitted dictating local workflows.

Customized internal widgets for searching the local discovery tool, other discovery tools and commercial providers are included. These widgets can write into the system. Locally defined and developed customized batch processing of requests is supported within the system as part of the open platform. Users- both patrons and staff- can create customized apps for the platform, share these, and other customers can use them too. Interoperability and communication between the resource delivery management system and external request management platforms (Rapid, Docline, WorldShareILL, Relais, shared catalog consortial borrowing systems, CCC Get it now, British Library, etc.) is required as is automated/unmediated smart routing between these systems managed by the resource delivery management system.

## Service Integrations

- **Shipping & Handling:** Integrated UPS/FedEX/DHL/USPS tracking at the individual request level displays this information dynamically to both staff and patrons.
- **Copyright Management:** The system will manage copyright compliance for requests that fall within the CONTU guidelines in a flexible way that allows libraries to configure the number of years and number of titles requested per year for copyright. Ability to mark items as "Copyright Already Paid" manually and according to document supplier. It will also integrate with the Copyright Clearance Center to track base fee and submission of copyright payments.
- **Electronic Delivery:** The system includes an electronic delivery mechanism and document management including automated batch processing for staff with direct linking to items in the patron dashboard, as well as document editing capabilities.

- **Document or Item Purchase:** The system will provide seamless access for searching and purchasing from vendors and publishers for the purchase of materials.
- **Payment & Billing:** An integrated automated payment system complements an automated billing system for both patrons and borrowing libraries. Integration with campus or library credit card transaction management systems is included.
- **Communications:** Customizable emails and text message notifications provide mechanisms for staff to communicate with patrons, to other staff in the library or to submit requests to potential stand alone lenders who do not use an integrated system. Likewise copies of emails or text notifications are stored in the system, both to and from patrons. Staff questions to patrons can be answered by patrons updating their requests (years needed, preferred format, etc) within the system instead of via external email chains.

## Reporting & Analysis

The system needs a robust reporting and analysis component. Standardised reports will provide access to generally required and standard metrics such as those required by ARL, AAHSL and state library systems but the system must also supports on the fly searchability for ad hoc queries by standard external tools such as MS Access, Tableau or other data and data visualization tools. Data must be easy to export for manipulation in external tools. Reports should also include system-wide data to allow comparison with other libraries and members of consortia.

## Test Environment

The system must include a robust sandbox environment where all aspects of the system and its interactions with other systems can be tested. This environment includes both test web pages and a test server duplicate of production so staff can experiment with new workflows, customizations, user authentication methods, inter-system integrations and locally developed widgets without having to run these against a production environment.

## Conclusion

Over the preceding pages, we have described a patron interface where smart delivery options powered by intelligent, rule-based request routing to the appropriate fulfillment system integrates request management into the the discovery layer. Thus patrons have a simple to follow, understandable path to resource delivery with appropriate and timely communication. They have a single place to manage all their library transactions. Libraries gain the ability to



nudge patrons toward preferred local delivery practices provided through unmediated and coordinated system to system communication.

Rule-based request routing and systems-level integration through APIs are types of automation that could potentially reduce fulfillment staff costs for typical requests. In the long run, these savings could offset the costs of implementing the features we have described, whether reflected ultimately in product licensing costs or in local IT support for customizations and integrations. However, an analysis of costs and benefits and how these are distributed is beyond the scope of this document. And arguably, implementation costs cannot be known until vendors and libraries are engaged in implementation planning.

## Appendix A

### Core Behaviours

What the patron needs to do	What the UX presents	Where the resource exists	What a librarian needs to do
Obtain a known item: book	A request button	Available on shelf	<ol style="list-style-type: none"> <li>1. Pull and deliver item on the shelf</li> <li>2. If not found on shelf, route request to ILL system with ISBN</li> </ol>
Obtain a known item: journal article (print)	Location A request for the volume (if the volume circulates) A request for a scanned copy	Available on shelf	<ol style="list-style-type: none"> <li>3. Scan and deliver item on the shelf</li> <li>4. If not found on shelf, route request to ILL system with ISSN</li> </ol>
Obtain a known item: journal article (electronic)	A request button	Available in local subscription	<ol style="list-style-type: none"> <li>5. Resolve to URL, and deliver item</li> <li>6. If holdings are wrong, route request to ILL system with ISSN</li> </ol>

Obtain a known item when no local copy is available: book	A request button	At a consortial partner library	1. Unmediated request is sent via web service 2. Mediated if unfilled.
Obtain a known item when no local copy is available: book chapter	A request button	At a consortial partner library	3. Unmediated request is sent via web service 4. Mediated if unfilled.
Obtain a known item when no local copy is available: journal article	A request button	At a consortial partner library	5. Unmediated request is sent via web service 6. Mediated if unfilled.
Obtain a dissertation completed at another university	A request button	At another library	Search for full text, and if not found, send request to granting institution via OCLC.
Obtain a book chapter	A request button	Available on shelf	Scan and deliver pdf
Obtain a book chapter	A request button	Checked out, but on shelf at consortial library	Unmediated request is sent via web service.
Obtain 1987-88 of a newspaper: microfilm	A request button	These years are missing from the library's collection; CRL has it	Mediated request is sent to CRL via OCLC.

## Appendix B

### Classification of cases

The tools described above and their development should address the most common and most commonly requested types of materials and ease the resolution from discovery to delivery. These central items- books, journal articles, DVDs, CDs and scores- have a number of unique

identifiers- ISBN, PMIDs, DOIs, OCLC numbers, etc.- that can and should be more effectively leveraged. Development efforts should focus on these discrete individual works rather than on portions of works, e.g. a journal issue, or items that are unique, e.g. a master's thesis. Stated differently, development should concentrate on common mass-produced items not on the edges or the "long tail". As common items constitute the bulk of materials identified and requested, efforts must concentrate on these.

{Here we classify cases roughly by whether they are frequently encountered "central" to the activities we want to support or should be counted as edge cases--rarely occurring, possibly difficult to support.}

### **Central**

(Items have identifiers, e.g. ISBN, ISSN, OCLC number, or can be reasonably resolved, e.g title, author, date of publication; items are treated as a single piece; items a mass produced.)

Single printing single volume monographs

Journal articles with DOI and/or ISSN

DVDs

CDs

Scores

### **Edge**

(Unique items or not-contemporary formats) Require human intervention

US Dissertations in print only

Electronic Dissertations (depending on an Institution's Proquest subscription)

Foreign Dissertations

Master's Thesis

Archival materials

LP records

16mm films, or 8mm

Print Newspapers

Microform series

Data sets

### **Principal pain points**

Consistently resolving effectively to locally available holdings of e-resources

Requesting a portion of a title

Competing service options

Grey literature

Born digital

Unique one copy items

Delivery time and loan periods at variance from local materials practice

## Appendix C

### University of Minnesota's Usability Testing

In April of 2017, Minnesota conducted usability testing with three volunteer students. Each student was given a set of tasks to complete; requesting an unavailable book, requesting a chapter of a book, obtaining an article that the U of M does not have access to electronically (but the print journal is held), ordering a DVD, navigating to ILLiad and accessing an article in ILLiad. The following observations and recommendations were written by Amy Drayer and the Usability Testing Team of the University of Minnesota Libraries.

Users who had never used the Interlibrary Loan service struggled with all of the scenarios to some degree. Based upon the observations, there are strong recommendations to:

- Simplify the disparate systems into one interface; and an interim measure, ensure that there are links to the ILL system from Primo's My Account and vice versa.
- Consider other possible displays and language to assist the user in making a choice when more than one service option is presented; the interface of two or three request buttons in discovery does not provide enough information for the user to determine the quickest method of request.
- Perform additional usability testing sessions. Interlibrary Loan has too many touch points for a single round of usability testing to provide enough feedback.

### Observations and Suggestions

Observed Issue	Recommendation
The label "Interlibrary Loan" does not encompass the concept of digitizing copies via "Document Delivery"	Suggest finding a more inclusive service name
The Primo application and Interlibrary Loan application do not seem like separate programs to the user	Consider adding, to the username login dropdown, links to the individual systems for "Catalog", "Interlibrary Loan", etc
Could not come up with a way to find movies, expected something on the home page or in the catalog to continue down a path	Consider adding more prominent messaging in Primo potentially specifically addressing movie requests
Expected the ILL requests to be in Primo My Account	Consider adding Interlibrary Loan menu link in Primo My Account, or a link on the Primo My Account Requests tab
"Get a Chapter" may imply the user can get immediate access to it	Consider less immediate sounding language such as "Request a Chapter"

Participant felt obligated to fill in fields that weren't filled in via the OpenURL, or as much of the optional fields (e.g. chapter specific information)	Make the required fields more obvious
On article form, participant put article title in the first field, which was for journal title, then had to move to the correct field	Consider putting the article fields before journal fields on article form
Participant selected Get a Chapter but did not enter any chapter specific information in the form	Add a check to the form for whether a chapter field has data and prompt user if they meant to get the whole book
Participant (backup test) chose Get It as the quickest method to receive the book where, based on the record, it likely isn't; it is not possible to assess, based on the interface, what option is the quickest	The interface of two or three buttons does not provide enough information for the user to determine the quickest method of request, need to consider other possible displays to assist the user to the best requesting method

### Task Completion

S#	Description	P1	P2	P3	Completion %
1	Unavailable Book Request	Y	Y	Y	100%
2	Internal Available Chapter Request	N	Y	Y	67%
3	Catalog Print-only Article	N	Y	Y	67%
4	Blank Form Other Request	N	Y	Y	67%
5	Navigate to ILLiad	N	Y	N	33%
6	Access Online Article in ILLiad	N	Y	Y	67%
	<b>TOTAL</b>	<b>16.7%</b>	<b>100%</b>	<b>83.3%</b>	<b>67%</b>

### User-Perceived Difficulty (Single Ease Question)

Overall, how difficult did you find this task? (please circle your answer)

Very Easy Very Difficult

1                      2                      3                      4                      5                      6                      7

S#	Description	P1	P2	P3	Total	Mean	Ease Rank
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1	Unavailable Book Request	2	2	2	6	2	1st (tied)
2	Internal Available Chapter Request	5	3	2	10	3.33	3rd
3	Catalog Print-only Article	6	5	4	15	5	5th
4	Blank Form Other Request	7	4	3	14	4.67	4th
5	Navigate to ILLiad	6	1	2	9	3	2nd
6	Access Online Article in ILLiad	4	1	1	6	2	1st (tied)
	<b>TOTAL</b>	<b>30</b>	<b>16</b>	<b>14</b>	<b>70</b>	<b>3.33</b>	