

Operationalizing the BIG Collective Collection:

A Case Study of Consolidation vs Autonomy

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Table of Contents

OVERVIEW	1
1 INTRODUCTION: THE BTAA, COLLABORATION, AND COLLECTIVE COLLECTIONS	10
1.1 THE BTAA: AN EXEMPLARY UNION.....	10
1.2 WHAT IS A COLLECTIVE COLLECTION AND DOES BTAA HAVE ONE?	12
1.3 CONSORTIA AND A COORDINATION SPECTRUM.....	16
1.4 STRATEGY: MAXIMIZING EFFICIENCY AND IMPACT THROUGH COLLECTIVE ACTION	23
1.5 CHANGE AND CULTURE	26
2 THE BTAA: A MAJOR ENTERPRISE.....	28
2.1 THE BTAA RESEARCH ENTERPRISE.....	28
2.2 BTAA UNIVERSITY DIRECTIONS	30
2.3 BTAA LIBRARY EXPENDITURES.....	32
2.4 BTAA PRINT COLLECTIONS: STOCKS AND FLOWS	35
3 EFFICIENT NETWORK FULFILLMENT: THE COLLECTIVE COLLECTIONS SERVICE ECOSYSTEM	42
3.1 INTRODUCTION	42
3.2 CURRENT ECOSYSTEM	45
3.3 COORDINATED ECOSYSTEM: A CONTINUUM OF APPROACHES	50
3.4 TARGET ECOSYSTEM	56
4 OPTIMALLY DISTRIBUTED COLLECTIONS: THE COLLECTIONS ECOSYSTEM.....	58
4.1 INTRODUCTION	58
4.2 COLLECTION DIRECTIONS	59
4.3 RETROSPECTIVE AND PROSPECTIVE COLLECTION COORDINATION.....	62
4.4 RETROSPECTIVE COLLECTION COORDINATION: RESOURCE SHARING	64
4.5 RETROSPECTIVE COLLECTION COORDINATION: SHARING OF DIGITALLY CONVERTED BORN-PRINT HOLDINGS	66
4.6 SHARED PRINT AND CURATION OF THE SCHOLARLY/CULTURAL RECORD	67
4.7 PROSPECTIVE COLLECTION COORDINATION.....	70
5 SYSTEMWIDE AWARENESS: A DATA-DRIVEN APPROACH.....	72
5.1 INTRODUCTION	72
5.2 DASHBOARD	73
5.3 OPTIMIZING STOCKS AND FLOWS.....	73
6 RECOMMENDATIONS	75
6.1 SUMMARY RECOMMENDATIONS ORGANIZED BY STACK: ENTERPRISE, APPLICATIONS, COLLECTIONS.....	76
6.2 SUMMARY RECOMMENDATIONS ORGANIZED BY THE FOUR ATTRIBUTES OF A COLLECTIVE COLLECTION.....	81
APPENDIX 1: DRAFT LIBRARY SERVICE FRAMEWORK	83
APPENDIX 2: BTAA FULFILLMENT NETWORKS AND SHARED PRINT PARTNERSHIPS	98

Table of Figures

Figure 1 BTAA Libraries: Requests for Returnables Filled by Selected Fulfillment Networks.....	14
Figure 2 Collective Collection Attributes.....	15
Figure 3 Coordination Spectrum.....	18
Figure 4 Multi-scalar Stocks and Flows	19
Figure 5 Library Service Framework: Functional Stacks.....	20
Figure 6 University Directions: BTAA	31
Figure 7 University Directions: PALCI and OhioLINK (selected institutions)	32
Figure 8 BTAA Library Expenditures: Purchased vs. licensed content (\$).....	33
Figure 9 BTAA Library Expenditures: Purchased vs. licensed content (%)	33
Figure 10 BTAA Library Expenditures: Licensed vs. purchased as share of total materials (2014).....	34
Figure 11 BTAA Library Expenditures: Licensed vs. purchased as share of total materials (2017).....	35
Figure 12 BTAA Collective Collection: Comparative coverage of other collections.....	36
Figure 13 BTAA Libraries: Requests for Returnables Filled by Selected Fulfillment Networks	38
Figure 14 BTAA Libraries: Requests for Returnables Filled by Consortial Networks	39
Figure 15 BTAA Libraries: Intra-consortium Requests Filled by UBBorrow and OCLC ILL	40
Figure 16 Application Components	43
Figure 17 Application Components with Selected Business Functions	43
Figure 18 Component Configurations: Institution- and Network-scale.....	44
Figure 19 Consortial Service Environments.....	46
Figure 20 Current BTAA Service Ecosystem	47
Figure 21 Fulfillment Networks: Rutgers University.....	48
Figure 22 Fulfillment Networks: The Ohio State University	49
Figure 23 BTAA: Adjacent Fulfillment Networks	50
Figure 24 Application-level Integration.....	52
Figure 25 Chaining Fulfillment Networks.....	53
Figure 26 Broker-based Resource Sharing.....	54
Figure 27 Optimized Broker	55
Figure 28 Target BTAA Service Ecosystem	57
Figure 29 Collections Spectrum.....	62
Figure 30 GreenGlass Model Builder	69

Some of a library's work can naturally be done more efficiently in a shared, networked context. Other work is best done locally. [...] The best example of an activity that can be done most appropriately in a networked context is curation. Here I would argue that a library's collection is not owned solely by the library, but by the society or culture that has collected it and put it in the library in the first place. We own the collection as a culture, and we must attend to it as a culture.

Consider, then, the value of scale as seen through the example of HathiTrust. The published record is seen as a collective good (the "collective collection"), and responsibility and costs are shared. The benefits of the collaborative effort allow the partner institutions to see how their institutional needs are interdependent and mutual—serving the interests of one is likely to serve the interests of many. The collaboration also drives down costs, both in the aggregate and for individual institutions. Indeed, we see not only cost containment but also a reduction of costs through consolidation.

John Wilkin¹

Institutions are constantly searching for opportunities to coordinate between local activities and the networks in which they participate. As a result, management of collections happens at multiple levels – within the institution and above the institution level. While this complexity often requires new thinking and new resource investments, it also promises to make collections more valuable to users and offers new efficiencies for libraries.

Karla Strieb²

¹ Wilkin, J.P. (2015). "Meanings of the library today." In A. Crawford (Ed.), *The meaning of the library: a cultural history* (pp. 236-253). Princeton and Oxford: Princeton University Press.

² Strieb, Karla L. "Collaboration: The Master Key to Unlocking Twenty-First-Century Library Collections." In D. Hale (Ed.), *Shared Collections: Collaborative Stewardship* American Library Association, 2015.

Reading this report

This report is written in sections. The aim is that each can be read individually and may appeal to different interests, while together they give a more rounded view.

This Overview, the Introduction (Section 1) and the Recommendations (Section 6) could be read together as a shorter version of the report.

Overview

The BTAA: an interesting case

This is a discussion paper prepared in collaboration with the Big Ten Academic Alliance (BTAA) Library Initiatives. It presents a framework for operationalizing the BTAA collective collection. A collective collection is a collection managed collaboratively across a network of libraries. We have a very specific focus in this paper on the “purchased” or print collection, acknowledging that other areas of library collections are sometimes managed collectively, digitized collections for example.

The BTAA justifiably claims to be the premier academic collaboration in the US. Once described as “the world’s greatest common market in education³,” it leverages the combined research and teaching capacity of major research universities to scale innovation, impact, and economies across its 14 members. Together, the BTAA members have a profound social and economic impact throughout a large part of the US.

Libraries are a central part of the BTAA research, learning, and teaching endeavor. They collectively mobilize major expertise and resources. In fact, the BTAA collection represents more than a fifth of all titles in the North American print book collection. The BTAA libraries align with BTAA goals by collaborating at scale to increase both impact and efficiency.

The BTAA is a research and learning powerhouse, with enormous impact on the social and economic lives of an extended region. Despite some internal variation there is strong alignment of mission and directions. It is the nation’s premier academic collaboration.

The character of library spaces, services, and collections is evolving with changing learning and research behaviors. It is widely recognized that continued autonomous development of large standalone collections does not meet needs and is not efficient. A library cannot collect all that its members would like to see, and much of what it does collect does not get used. At the same time,

library space is being configured around engagement rather than around collections, the long-term stewardship costs of print materials are being recognized, and the role of books in research and learning

³ Wells, Herman B. (1967) “CIC History: A Case Study on Interinstitutional Cooperation” Reprinted with permission from the Fall 1967 issue of the *Educational Record* American Council on Education, Washington, D.C.
<https://www.btaa.org/docs/default-source/news-pub/historyofcic.pdf>

is changing. Libraries are re-evaluating traditional approaches to building, managing, and sharing collections, and are increasingly looking to do this cooperatively.

In this paper, we define and explore key attributes of collective collections and present a series of recommendations designed to advance the BTAA libraries toward a more purposeful coordination of their collections. Doing all that we propose would involve an extensive multi-year program. The approach we recommend here is broadly applicable in other consortium settings as well, which is why we characterize the paper as a case study.

A library cannot collect all that its members would like to see, and much of what it does collect does not get used.

The BTAA presents an instructive case for two reasons. The first has to do with scale. If the BTAA libraries commit to more purposefully coordinating this collective collection, they will make a major contribution to the stewardship of

the scholarly and cultural record, and to new patterns of collection management. This is important for learning and scholarship within the BTAA. Additionally, the scale of the BTAA means that it has important exemplary influence for other universities and consortia. If the BTAA takes stronger action, it will be a model for other groups.

The second reason flows from the urgent debate about library collaboration more broadly. Effective collaboration, the provision of shared infrastructure, and operational sustainability are all now central issues for libraries and the institutions of which they are a part. State consortia have diverse membership and needs, and in some cases may not have the requisite scale to tackle the big challenges research libraries face. In a decentralized political environment, where national provision is rare, BTAA has the scale to command major opportunity. BTAA universities can build important infrastructure and services and they are motivated by a shared focus on the common good that ensures that benefits accrue to a broad community of interest. This makes the BTAA a fascinating example of consortial decision making.

A major contention of this paper is that consortial working involves tradeoffs between consolidation and autonomy. The BTAA libraries lean toward autonomy. The libraries are historically well-resourced, are used to going alone, and have other venues for collaboration. Many of the libraries also work with adjacent state or regional networks (e.g., OhioLINK, CARLI, PALCI), and some have important leadership roles and responsibilities within state consortia that are also managing collective collections. This means that the BTAA may not always be the first natural venue for collaboration, or the incentives for collaboration may be weakened. It also means that it is important to consider partnerships with adjacent networks when considering collective collections work, given the multiple ways in which some of the libraries are embedded.

There are many potential areas where it might make sense for the BTAA to collaboratively source solutions, including research infrastructure, the transformation of scholarly communication, frameworks for sharing expertise, and others. The BTAA libraries have shared activities in some of these areas, but further discussion of them is beyond our scope here.

The BTAA does currently coordinate its collections. It does this largely through resource sharing, shared print repositories, and other means. However, it could do much more to consciously coordinate its collective collection as a shared resource. Coordination could be stronger across libraries. However,

coordination could also be stronger across collecting activities—using resource sharing data to influence shared print directions for example.

[T]he scale of the BTAA means that it has important exemplary influence for other universities and consortia.

We argue that to manage, build, and share an optimized collective collection for over one fifth of the aggregate North American collection is a task worthy of investment. As the management of print collections changes, BTAA is well placed to assume

stewardship responsibilities for a major part of the print scholarly record, to share it more effectively, and to explore new ways of collaboratively building collections into the future. However, this will require a stronger commitment by the libraries to an agreed strategy that sets clear expectations, to common processes and policies, and to investment in shared human and service capacities. And it will require them to swap some local control for mutual interdependence within a network of responsibilities. Importantly, given the symbolic weight of the book collections, and the practical impact on research and learning, building a collective collection will also require socialization within the membership, from the provostial leadership of BTAA through to faculty in each institution, and also within the libraries.

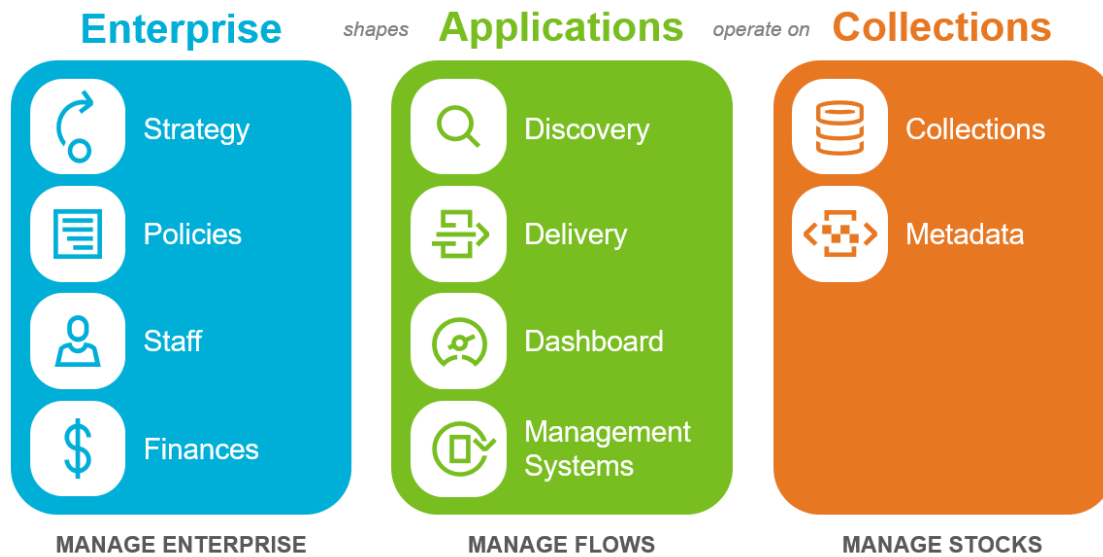
The belief that the BTAA is a powerful shared platform animates this paper. A shared platform that can support a collective collection that delivers greater efficiencies for BTAA and greater impact for each library within their institutions.

The collective collection – frameworks and recommendations

We describe four attributes of a more purposefully coordinated collective collection in **Section 1**:

- 1. Explicit commitments:** More purposeful coordination depends on agreed strategies, processes for decision making and resource allocation, and broadly adopted policy frameworks. The most important element is an actual commitment to manage, build, and share collections in a more coordinated way.
- 2. Efficient network fulfillment:** An effective applications framework is required to allow users to easily discover resources of interest and to have them delivered quickly. We argue that in addition to discovery and delivery, BTAA should increasingly consider aggregating transaction data to support decision-making (we refer to this as dashboard functionality).
- 3. Optimally distributed collections:** More purposeful coordination of collections across the libraries will improve the overall performance of the network. This includes prospective collection development, shared print initiatives, selective digitization, the utilization of shared repositories as logistical hubs, and so on.
- 4. Systemwide awareness:** Effective management depends on good intelligence about the stocks and flows within the network—a unified view of the whole collection and how it is distributed, what ILL flows there are, and so on. Ideally, one would benefit from a unified view of shared print commitments, of items with digital surrogates, and of transaction data. A consolidated view of ILL policies, which could be looked up by applications, would also be beneficial.

We further outline three broad areas where coordination is required to deliver the collective collection. We present each schematically as a stack of elements that potentially require agreement, commitment, or interaction in any service context.



<p>Commit to manage, build, and share a collective collection representing more than a fifth of the North American print book collection.</p> <p>Create momentum through explicit commitments to a collective collection strategy, process and policies, and a group-wide awareness program.</p>	<p>Improve network fulfillment within the BTAA network and across adjacent networks.</p> <p>Integrate resource sharing into collection development processes.</p> <p>Explore a generalized broker architecture and network level data components (holdings, policies, etc.).</p>	<p>Create stronger systemwide awareness through consolidated metadata management and aggregated usage data.</p> <p>More strongly coordinate collections for optimal distribution.</p> <ul style="list-style-type: none"> • Commit to the preservation of the BTAA collective collection as a strategic asset. • Develop network-level prospective collection coordination capacity. • Extend the pool of digital surrogates available.
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These are the Enterprise stack (organizational elements), the applications stack (systems elements), and the collections stack (collections and metadata). The four attributes of a collective collection and the stacks presented here help organize our recommendations. Below the stacks above are our summary recommendations. These are elaborated in **Section 6**.

BTAA libraries collectively manage a substantial share of the scholarly record ... more than a fifth of the titles in the North American print book collection

As we also note in **Section 1**, the trust that develops through the shared work and conversations that consortia encourage is an important precondition for smooth future working. Where there is trust between partners, decisions can be made more

quickly, and shared responsibilities may be accepted more readily.

Two related aspects of systemwide optimization through stronger coordination can be highlighted.

1. **Greater coordination across shared activities.** At present, each area (e.g., digitization, resource sharing, prospective collection development) tends to be managed independently rather than in concert or at least in mutually aware ways. Improved systemwide awareness would facilitate a more holistic approach. Can greater intelligence about resource sharing flows, for example, influence collection development practice or the development of additional print repositories?
2. **Greater coordination across libraries.** Currently, BTAA collaboration around collections is generally secondary to institutional planning. Stronger planning at the network level would facilitate a more shared approach and alignment of institutional behaviors.

The discussion paper: orientation

This paper is structured as follows. Following this opening **Overview**, there are six principal sections. The aim is that each section can be read individually and may appeal to different interests, while together they give a more rounded view.

We include two appendices. **Appendix 1** describes a draft Library Service Framework. A service framework is an abstract depiction of the components of an environment and their interactions. This was an important piece of work, albeit necessarily preliminary and partial. It has helped structure our discussion and we hope it is of more general interest. **Appendix 2** is an enumeration of resource sharing and shared print networks to which BTAA member libraries belong.

BTAA is well placed to assume stewardship responsibilities for a large part of the print scholarly record, to share it more effectively, and to explore new ways of collecting.

Section 1. Introduction: BTAA, collaboration, and collective collections

This section defines the collective collection, lays out the topics and themes of the discussion paper, and introduces frameworks and issues that need to be addressed in any strategic discussions. It

provides a general consideration of collective collections in a BTAA context.

Section 2. The BTAA: a major enterprise

While the BTAA shares some commonality of mission and service orientation, there is still wide variation among member institutions in types of degrees awarded and in the balance between research and instructional expenditures. This creates varying priorities across the BTAA universities and their libraries.

That said, the BTAA universities combine to create a research and learning powerhouse, which is a major component of US educational and research capacity. The libraries also command major collections, expertise and resources.

In this section we briefly quantify BTAA's activity and presence. We also provide some data about the scale of the BTAA collective collection, about the overlap between BTAA libraries and between BTAA libraries and others, and about the flows of materials within BTAA.

Section 3. Efficient network fulfillment: the collective collections service ecosystem

The BTAA service ecosystem is a complex network of overlapping and intersecting systems. Better horizontal integration of service components would enable more effective coordination within and across fulfillment networks and reduce the overall cost and complexity of operations.

This section explores different possible configurations of the application environment supporting collective collections and proposes a target state, with some specific recommendations for how BTAA can participate in its creation.

Section 4. Optimally distributed collections: the collections ecosystem

More strategic and conscious collection coordination across the BTAA will result in long-term benefits to member institutions. To achieve these benefits the libraries will need to agree to greater shared strategy, planning and investment around collections, and to take more of an integrated systemwide view of shared activities. In this way, patterns of use, for example, might be mobilized more purposefully to influence collection development, shared print initiatives or digitization.

As the role and composition of collections change, libraries should think of approaches that rely not only on retrospective coordination of autonomously developed collections (resource sharing, for example) but also on prospective collection coordination (shared acquisitions of strategic materials, for example).

A long-term goal might be to optimize the collection at the BTAA network level for the benefit of all, rather than at the institutional level.

Section 5. Systemwide awareness: a data driven approach

Better coordination of the BTAA collective collection will require stronger systemwide awareness of the disposition and use of collections. This, in turn, will depend on greater consolidation of metadata management, including bibliographic, transaction, and policy data.

This short section discusses the actions needed to develop stronger systemwide awareness through improved data management, aggregation, and analytics.

Section 6. Recommendations

We collect recommendations in this section. Our principal recommendation from which others flow is that the BTAA libraries must decide what their level of commitment is to managing, building, and sharing their collective collection. If they agree to a stronger commitment, they will need to put in place a strategy aligned with shared expectations, and also to strengthen processes around decision-making, shared investment, and planning.

Our emphasis throughout is that the BTAA has choices to make in relation to collective collections. We hope we have provided some frameworks and background to facilitate more effective identification of possible directions. We do not expect that everybody will agree with all our recommendations. This is perfectly natural as setting strategy requires further discussion about choices, priorities, and directions.

Additional remarks

Scope

Our focus in this paper is describing a potential collective collections ecosystem. We follow common usage and emphasize the “purchased” or print collection in this investigation. While this constitutes only a part of most library collections, it is a major area, and advancing all the recommendations we make would be a significant undertaking. We focus on some central issues of relevance to the management of this collection. We do not cover some areas that are important but are embedded in a wider context. User accounts, for example, are an interesting area, and could be implemented on a per-application basis. Doing this in a more generalized way, though, would require a broader discussion.

Of course, a collective approach to other important areas (e.g., scholarly communications, research data management, institutional repositories) may make sense, but these are outside the scope of this paper. We do discuss the importance of strategy to provide a filter for decisions.

We include suggestions about staging implementation in the recommendations, however a fuller discussion of implementation depends on choices the group makes about priorities, investments, organization, and so on. Changes of this type will also need to include socialization and advocacy within the BTAA, across the libraries, and on campuses.

Background reports: the D2D reports and the UBorrow Program Evaluation

The BTAA libraries produced a series of reports on discovery to delivery and present several recommendations for improving resource sharing systems and services. Given the depth and detail of those reports we do not seek to repeat their content and liberally refer to their recommendations here. Rather than continually referring to them individually we collectively refer to them as the BTAA D2D Reports, or just the D2D reports. They are available on the BTAA website.⁴

We also acknowledge the November 2017 program evaluation of UBorrow which notes the BTAA commitment to the service, reviews its use, and describes improvements in recent years as well as work yet to be done.⁵ We mention this several times also as important background.

The evolving service provider environment

There have been significant developments between conception and completion of this project, notably in the resource sharing arena. Project ReShare aims to build a new resource sharing platform and has advanced with participation from some BTAA members.⁶ Ex Libris has also announced resource sharing plans and as this report was being finalized announced the acquisition of RapidILL.⁷ The BTAA relies on systems and services from OCLC to carry out many relevant functions. We refer to particular products and services where it seems appropriate, or as examples. However, our main focus is to provide some general frameworks for how collective collections might be managed.

The BTAA members

The BTAA has 14 member universities. The BTAA Library Initiative includes the libraries of all the BTAA universities plus The University of Chicago Library. For convenience we refer to the BTAA libraries or the BTAA throughout the document. In these cases, we are referring to the 15 members of the Library Initiative, unless the context suggests we mean the parent BTAA organization.

Terminology

We use network, consortium, system, in their usual and sometimes slightly ambiguous senses. However, when talking about BTAA, OhioLINK, MeLCat, and other consortia in the context of their work as a system of interacting services, we tend to say **network**, to emphasize salient elements of membership, interaction, and so on.

We generally use the phrase **fulfillment network** to designate a resource sharing network or other fulfillment agency. This is to acknowledge that fulfillment within a collective collections ecosystem may originate with various organizations/agencies.

⁴ <https://www.btaa.org/library/discover-to-deliver/reports>

⁵ <http://www.btaa.org/docs/default-source/programevals/uborrow-program-evaluation-nov2017.pdf>

⁶ <https://projectreshare.org/about/>

⁷ <https://www.exlibrisgroup.com/press-release/ex-libris-acquires-rapidill-provider-of-leading-resource-sharing-solutions/>

Finally, we use the phrase **adjacent networks** for the other networks in which some member libraries do collective collections work. We use the term in connection with the state and regional networks that are important for some of the libraries (e.g., Minitex, OhioLINK, PALCI, CARLI or for partners like HathiTrust).

Section overview:

The BTAA is a research and learning powerhouse, with enormous impact on the social and economic lives of an extended region. Despite some internal variation there is strong alignment of mission and directions. It is the nation's premier academic collaboration.

The BTAA libraries also command powerful aggregate expertise and resources. Together, their collections represent over one fifth of the titles in the North American print book collection. This is potentially a major platform for shared services, especially at a time when libraries are urgently questioning how best to organize for efficiency and impact.

However, the BTAA currently weakly coordinates library capacities. Members are relatively well resourced institutions who are used to acting autonomously. Strategy, policies and services are institutionally driven. Several libraries participate in adjacent state or regional networks with parallel collective collection initiatives.

In this section, we introduce the collective collection, lay out the topics and themes of the discussion paper, and introduce some frameworks and issues that will have to be addressed in any strategic discussions. It provides a general consideration of collective collections in a BTAA context.

We recommend that the BTAA libraries develop a plan to operationalize their collective collection for the good of the BTAA and for the scholarly community generally.

1 Introduction: The BTAA, collaboration, and collective collections

1.1 The BTAA: an exemplary union

The universities in the Big Ten Academic Alliance (BTAA) represent an extraordinary richness of research and learning capacities. Research expenditures across the group exceed the Ivy League and University of California combined. The majority are flagship public institutions with broad, inclusive, and ambitious missions. They are joined by leading private institutions with distinguished research profiles. Individually, they are central to the social and economic health of the regions they serve; together they are an unparalleled social and research engine. The BTAA seeks to leverage the scale of what they justifiably call the "nation's premier academic collaboration."

This scale is also evident in the BTAA's libraries. Together they mobilize wide and deep expertise, curate a large part of the scholarly and cultural record, exercise major buying power, and disclose to the world the rich scholarly and cultural resources of their institutions. Together, the BTAA libraries steward over one fifth of the print titles in the US.

Growth in the BTAA has increased the geographic reach of the consortium as well as the diversity of its institutional members, each bound to a different set of regional and consortium peers and partners. Some

BTAA member libraries also participate in parallel state or regional networks; for example, The Ohio State University and OhioLINK. In fact, the flagship public institutions are often important anchors for statewide activity, and state-level participation may be an important part of their mission. The role of the University of Minnesota in Minitex is an important example. Of course, the level of participation in adjacent networks varies widely across the group, and for some it is a less strong factor.

The central challenge for BTAA is determining what distinctive mix of programs and services will differentiate it from other groups and maximize its value for a group of strong, relatively well-resourced and autonomous institutions with various other affiliations. The challenge for member institutions is managing the coordination costs of partnering with multiple groups and deciding what should most effectively be done in a BTAA context.

In practice, while these multiple networks potentially offer great value (as Karla Strieb notes in the opening quote), they can also compete for attention, staff time, and resources. This multi-network collaboration must be managed by each library and factored into BTAA planning.

Scale is an important issue here. The US has a decentralized library model; there is little national coordination of infrastructure, services, or development. There is a lot of energy at the consortial and state level around coordinating such activity, and some things may be best done at that scale.

The unparalleled scale and relative coherence of the BTAA libraries working together means that the group has extraordinary opportunity. Ironically, however, this may also be an impediment to shared activity, as, individually, the BTAA libraries are well-resourced and have other venues for collaboration. Historically, the incentives to work together may not have been strong.

These issues have become critical as the digital network has changed the reach and ambition of library collaboration. The BTAA libraries have the capacity to build sustainable shared infrastructure, to innovate around new directions, and to accelerate development by scaling learning and the diverse expertise of its members across the collaborative. The BTAA can provide exemplary service and organizational models. Given current questions about the sustainability of organizations in the library space, this is an interesting and important strategic concern for BTAA libraries.

We argue that the BTAA has the scale to make a significant impact in the stewardship of the scholarly record and is at the right level to do this. The evolution of resource sharing within BTAA and across BTAA and adjacent networks has been explored fruitfully by the group, and the resource sharing environment is evolving rapidly. The BTAA is well placed to contribute to that evolution.

Collective impact depends on a stark strategic choice. Is BTAA a central venue where member libraries want to invest attention and resources, and commit to shared approaches? Or will libraries continue to unilaterally invest in other initiatives without considering BTAA as a natural venue to innovate and evolve? Is the BTAA a venue where libraries can successfully collaborate at scale for efficiency and impact?

We believe that BTAA should be a more central venue for collaborative activity, and it is the exemplary opportunity that BTAA offers in the collective collections space that motivates this paper.

1.2 What is a collective collection and does BTAA have one?

1.2.1 The collective collection

Collective collections are collections addressed at a level above the individual institution, in a network context. We are seeing a trend toward more managed collective collections for four reasons:

1. to **extend the reach of materials** available to users beyond those available at one library
2. to make their management **more efficient** (by sharing costs and responsibilities)
3. to coordinate collections above the individual library level, allowing individual libraries to **specialize** and contribute more extensively within a defined network of responsibilities
4. to collaboratively steward the **scholarly and cultural record**

The service motivations for creating collective collections are:

- to provide an integrated and convenient discovery and fulfillment user experience across the collection, making a broad range of resources available to users in ways that make most sense for them— an Amazon-like experience
- to collectively steward the significant part of the print scholarly and cultural record that is in the BTAA library collections

To achieve either or both goals, BTAA would have to commit to a stronger shared strategy, to more coordinated services, and to greater investment. For example, the advantage of consortial borrowing is that user satisfaction is enhanced by the strong coordination which assures an integrated user experience and rapid delivery. The use of the ReCAP shared collection increased significantly when the shared index was added to individual library discovery layers. As described later, there is evidence that the use of UBBorrow has increased with greater integration between discovery and delivery components and with more consistent policies around loan periods. More could be done along these lines.

In this paper we focus on the “purchased” print collection—books (and serials) that sit on library shelves. However, we inevitably discuss other collections, notably digital versions of these acquired collections. We provide some further context about collections and collection directions in **Section 4**.

1.2.2 Retrospective and prospective collections

We can make an important distinction between collective collections developed through retrospective and prospective collection coordination.^{8,9} This is really about the level of coordination across the consortium of collection development strategy and practice.

⁸ We introduce the terms “prospective collection coordination” and “retrospective collection coordination” here and define more fully in **Section 4**. Our usage is influenced by: Strieb, Karla L. "Shared Collections: Collaborative Stewardship, Chapter 1: Collaboration: The Master Key to Unlocking Twenty-First-Century Library Collections." American Library Association, 2015.

⁹ Turner, Christine N. "E-resource acquisitions in academic library consortia." *Library Resources & Technical Services* 58, no. 1 (2014): 33-48.

In the current model, collections are optimized locally and only retrospectively considered consortially. Shared approaches are layered over relatively autonomously developed collections. While there is some acceptance that this model is inefficient, it has been easier to achieve in practice than a prospective model. This is because it does not require strong coordination of institutional collection strategies and also because the risk of working with legacy collections seems less. We can identify three important strands of retrospective collections activity, in each of which the BTAA has been active:

1. Resource sharing: providing access to the resources of the full network to all members, and increasingly interacting with other fulfillment networks and services
2. Shared print: coordinating stewardship of the print and scholarly record at the network level
3. Digitization: selective digitization of collections

A prospective collection coordination model offers stronger coordination of collecting activity across the network. This could be based on some division of collecting responsibilities and better awareness of systemwide distribution of collections, or even on a move of some decision-making and budget to the center (shared acquisition of e-books for example). In this model, collecting activity could be optimized across the network rather than at the individual library level.¹⁰ While attractive in theory, prospective collection coordination has proved difficult in practice and is not widely adopted outside of some niche areas. There is some concern that coordination costs are high, potentially reducing local responsiveness (to particular faculty or learning needs), and there is reluctance to surrender local decision making or local control over budgets.

In our discussions we sensed a real desire to make progress with a prospective coordination model, while acknowledging the difficulties. Several areas for potential attention were identified, which we discuss in more detail in **Section 4**. These include investing in shared open access collections, shared e-book collections, or beginning to coordinate acquisitions in specific subject areas.

1.2.3 More conscious coordination

As libraries manage down print collections, look at shared print models, and digitize collections, and as electronic books become more commonplace, this “invisible hand” approach is less adequate.

We can characterize a collective collection by reach, by level of coordination, and by services offered. For example, a collective collection may be broad and loosely coordinated (e.g., all the materials visible through WorldCat) or it may be closely circumscribed and tightly coordinated or consolidated (e.g., the shared collection in ReCAP). At the WorldCat collective

collection level, services are discoverability and, for some materials, resource sharing. At the ReCAP shared collection level, services are discoverability, resource sharing, consolidated management, and preservation of the print scholarly record.

¹⁰ Of course, BTAA does some central licensing of the journal literature.

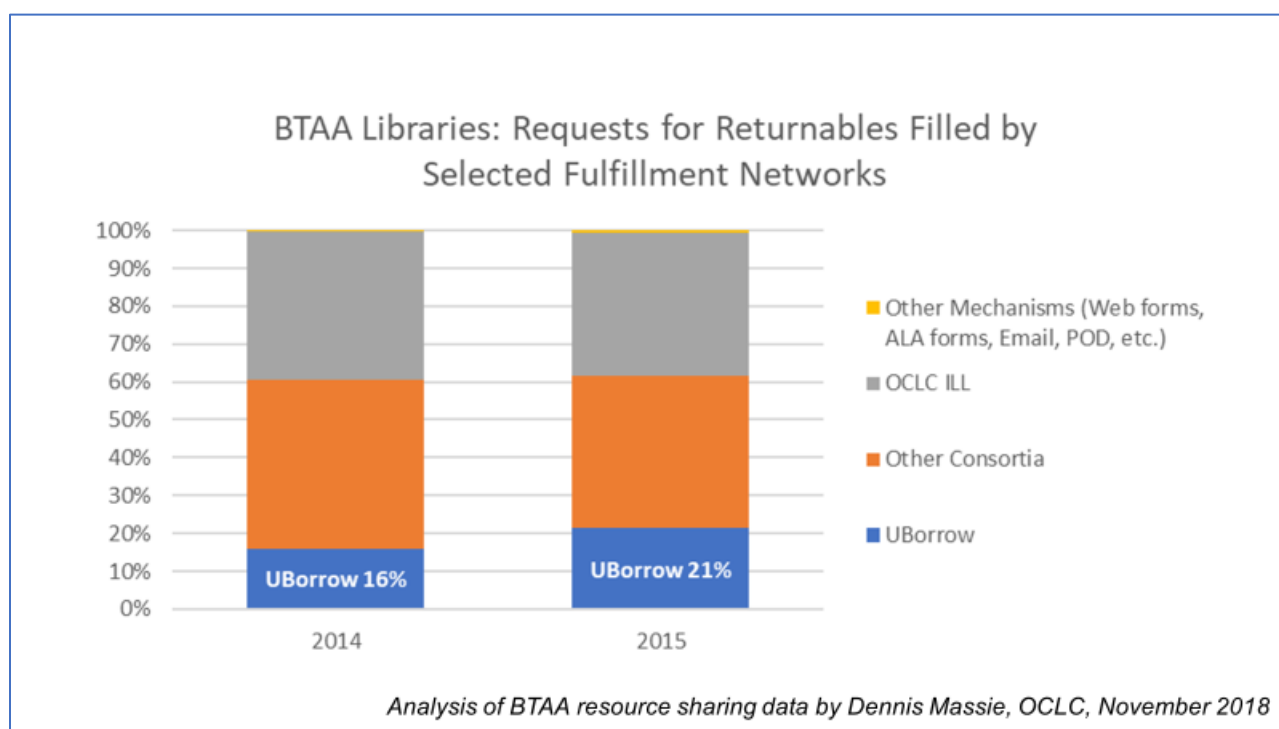


Figure 1 BTAA Libraries: Requests for Returnables Filled by Selected Fulfillment Networks

The BTAA collective collection sits between these two examples. It is largely manifest through the UBorrow resource sharing system, the BTAA Shared Print Repositories, and digitized materials in HathiTrust. These are not strongly coordinated with each other. UBorrow is less strongly coordinated than some other consortial borrowing systems, which has been recognized and is being addressed. Traffic going through UBorrow has been increasing, yet in 2015 it represented 12% of all requests and 21% of requests for returnables. It represented 35% of overall consortial borrowing among the libraries, adding in traffic through adjacent networks. Interestingly, OCLC ILL represented 52% of intra-consortium requests. (Resource sharing data is discussed in **Section 2**, where some changes since 2015 are noted.) The BTAA has also been a leader in shared print discussions and has established two shared print repositories. Additionally, eight BTAA libraries have committed to retain more than six million monograph volumes as part of the HathiTrust Shared Monographs program. BTAA also played a foundational role in the HathiTrust and has significant digital collections.

Prospective collection coordination, stewarding the scholarly record, digitization, and effective resource sharing demand more conscious coordination within a network of explicit commitments.

From one perspective this is significant shared activity. However, there is much more that could be done. The libraries do not strongly coordinate collection development with each other. And the individual collection areas are not strongly coordinated in a more holistic view of a coordinated collective collection.

In BTAA, as elsewhere, the collective collection was guided by the “invisible hand” of aggregate local policies and decisions. Historically, collections evolved autonomously and locally within individual libraries. Stewardship of this resource was a benign side-effect of the massive distribution involved in the print model. To some extent this is still the dominant model.

As libraries manage down print collections, look at shared print models, and digitize collections, and as electronic books become more commonplace, this “invisible hand” approach is less adequate. Print collections have come to share some of the characteristics of digital collections where distribution does not involve physical redundancy, and more active intervention or conscious coordination is required in their management. Prospective collection coordination, stewarding the scholarly record, digitization and effective resource sharing demand more conscious coordination within a network of explicit commitments.¹¹

So, it is clear that the BTAA manages a collective collection. However, stronger coordination would allow more value to be created. We describe four attributes of a more consciously coordinated collective collection in Figure 2. Each involves decisions about investment of attention and resources.

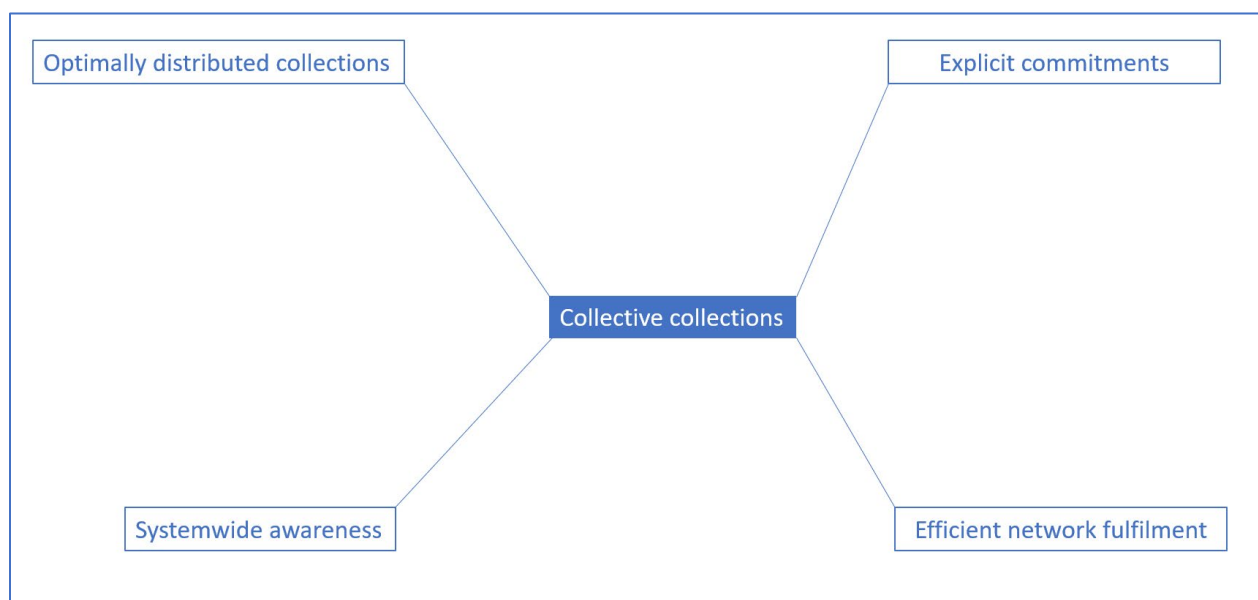


Figure 2 Collective Collection Attributes

1. **Explicit commitments:** More purposeful coordination depends on agreed strategies, processes for decision making and resource allocation, and broadly adopted policy frameworks. The most important element is an actual commitment to manage, build and share collections in a more coordinated way. Processes for decision making, resource allocation, oversight and review, sourcing, and so on, need to be developed.

¹¹ These remarks are based on: Lavoie, Brian, and Constance Malpas. *Stewardship of the Evolving Scholarly Record: From the Invisible Hand to Conscious Coordination*. OCLC Online Computer Library Center, Inc. 6565 Kilgour Place, Dublin, OH 43017, 2015. This report also influences the selection of attributes of a collective collection.

2. **Efficient network fulfillment:** An effective applications framework is required to allow users to easily discover resources of interest and to have them delivered quickly. We argue that in addition to discovery and delivery, BTAA should increasingly consider aggregating transaction data to support decision-making, which we refer to as dashboard functionality. The applications framework is a principal focus of the D2D reports.
3. **Optimally distributed collections:** Current approaches are layered over autonomously developed collections. More purposeful coordination of collections across the libraries will improve the overall performance of the network. This includes investigation of prospective collection development, shared print initiatives, selective digitization, the utilization of shared repositories as logistical hubs, and so on.
4. **Systemwide awareness:** Effective management depends on good intelligence about the stocks and flows within the network: a unified view of the whole collection and how it is distributed, what ILL flows there are, and so on. Ideally, one would benefit from a unified view of shared print commitments, of items with digital surrogates, and of transaction data. A consolidated view of ILL policies, which could be looked up by applications, would also benefit.

We argue that 1 and 4 will benefit from greater consolidation, and that 2 and 3 will benefit from stronger coordination. Our recommendations focus on moving these four areas forward. We discuss consortia, consolidation, and coordination in the next section.

1.3 Consortia and a coordination spectrum

1.3.1 Tradeoffs between consolidation and autonomy

Consortia coordinate activity and resources across their membership to achieve their goals. We can envisage a spectrum depending on how strongly coordinated activities are, stretching from libraries who agree to consolidate significant resources to libraries who agree to cooperate but retain a high degree of autonomy. Coordination typically involves **tradeoffs between consolidation and autonomy**.

The unparalleled scale and relative coherence of the BTAA libraries working together means that it has extraordinary opportunity.

Consolidation represents a very strong form of coordination, where there is some unification of capacity (e.g., infrastructure, planning, expertise) to achieve economies of scale or greater impact. HathiTrust represents a consolidated approach.

Collections, infrastructure, and service provision have been consolidated to create operational efficiencies and gravitational attraction on the internet. The BTAA made a deliberate choice to take advantage of the network to reorganize costly, institution-scale operations in a consolidated fashion. Critically, this included planning and resources. At the other end of the spectrum is cooperation, where autonomous institutions may agree to act together for separate benefit.

Between these poles, there may be more—or less—coordination of activities. This is where BTAA naturally resides, as a consortium of significant research libraries with considerable independent capacity.

Growth in the Big Ten Academic Alliance has increased the geographic reach of the consortium as well as the diversity of its institutional members, each bound to a different set of regional and consortium peers and partners.

The strength of coordination varies significantly across consortia. The Orbis Cascade Alliance, for example, is highly coordinated: indeed, it is consolidated around a shared library system. The Ontario Council of University Libraries coordinates significant activities, consolidating important infrastructure in the Scholars Portal. PALNI (the Private

Academic Library Network of Indiana) promotes a model of “deep collaboration.” The California Digital Library also provides extended shared infrastructure and services to UC campuses (acknowledging that UC is a single entity).

Consortia also vary enormously by organizational structure (e.g., self-standing membership organization, state sponsored, etc.), scale, and type of member.¹² An important distinction (discussed in **Section 2**) is between consortia of peer organizations and consortia that bring together different types of libraries. The BTAA is broadly a consortium of peer organizations, which means that it has considerable shared interests and opportunities for shared activity. The library collaboration has the political advantage of rolling up to the broader BTAA collaboration, overseen by the provosts.

The right level of coordination will vary depending on choices made by the participants. Different elements may be consolidated, such as discovery, while others remain somewhat autonomous, such as collection development policies. This, in turn, sets up some tradeoffs, which are very relevant in the BTAA context.

- **Efficiency vs control.** Local control is perceived as important for political or service reasons, but the efficiency of the overall system can be improved if individual libraries give up some local control to central coordination. Think of institutional repositories, for example, or the diversity of different systems in use. The D2D reports noted that decision-making was highly local, and emphatically recommended stronger central coordination of governance, planning, information exchange, and process at the BTAA level. It is interesting to think of an Amazon-like experience in this regard, given that this is often cited as an aspiration. If “Amazon-like” is indeed a benchmark that BTAA aspires to, then clear decisions have to be taken to remove delay, uncertainty, and discretion from the discovery to delivery supply chain. Major internet companies are massively consolidated and impose strict service levels on participating partners. It is difficult to provide an Amazon-like experience over multiple, relatively autonomous, services with different priorities, imperfectly aligned policies, different interfaces, and different service levels. Clearly, an important attribute here is speed of delivery. However, even where delivery is not as rapid, predictability or tracking is now a desired attribute. Of course, a library collaboration may not achieve, or want to

¹² There is an extensive discussion of consortia roles, types and challenges in: Dempsey, Lorcan (2019) “What Collaboration Means to Me: Library collaboration is hard; effective collaboration is harder,” *Collaborative Librarianship*: Vol. 10 : Iss. 4 , Article 3. <https://digitalcommons.du.edu/collaborativelibrarianship/vol10/iss4/3> and Lorcan Dempsey, “The Powers of Library Consortia 1: How Consortia Scale Capacity, Learning, Innovation and Influence.” Lorcan Dempsey's Weblog, OCLC, 28 February 2018, <http://orweblog.oclc.org/the-powers-of-library-consortia-1-how-consortia-scale-capacitylearning-innovation-and-influence/>

achieve, that level of consolidation, but it is important to understand the tradeoffs—local control of multiple independent components will inevitably slow performance.

- **Institutional vs systemwide optimization.** Optimizing at these two different levels may result in different paths. BTAA has favored institutional over systemwide planning. For example, collections are optimized locally rather than at the BTAA level.
- **Ideal vs pragmatic.** Progress is often incremental, piecemeal, negotiated, and retrofitted on existing solutions. The option to build anew or to re-engineer is not always available or desirable. The D2D reports describe how the current resource sharing apparatus in BTAA could be improved. However, the library director interviews clearly showed that for some the current arrangement is good enough and is not a candidate for additional investment.

There is some consolidation in BTAA (around journal licensing, notably); however, the libraries act relatively autonomously, which limits the shared benefit to be realized through BTAA. Together, these issues underline the importance of making choices while understanding the tradeoffs involved.

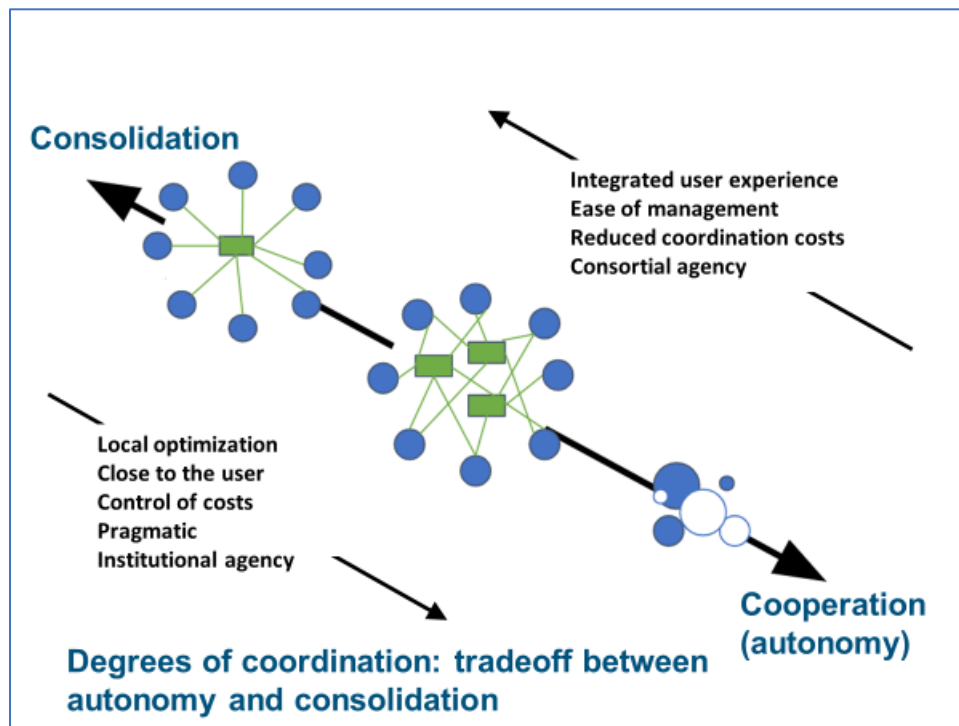


Figure 3 Coordination Spectrum

1.3.2 Coordination costs and interoperability

There is a temptation to underestimate the cost of coordinating systems, libraries, collections, policies, strategies, and so on across the BTAA.

To look at this in more detail we present three areas where coordination is necessary to deliver shared services. We present each as a stack of elements that potentially require agreement, commitment, or coordination.¹³ They are an enterprise stack (the organizational context), an applications stack (the systems context), and a collections stack (the context around metadata and collections).

And interoperability is not a technical issue only. Adding a new system, or swapping one for another, touches a variety of elements in the network: agreed policies, staff commitment to configuration or working groups, and so on.

We emphasize all three in discussions of coordination or interoperability. When any new element is added to the network, elements in each stack may need coordination. This is a very important point: when looked at in isolation, a new initiative, application, or partnership may appear straightforward, but when added to a network of interdependent parts it

may create new integration challenges, new governance decisions, new data integration or interoperability points, and so on.

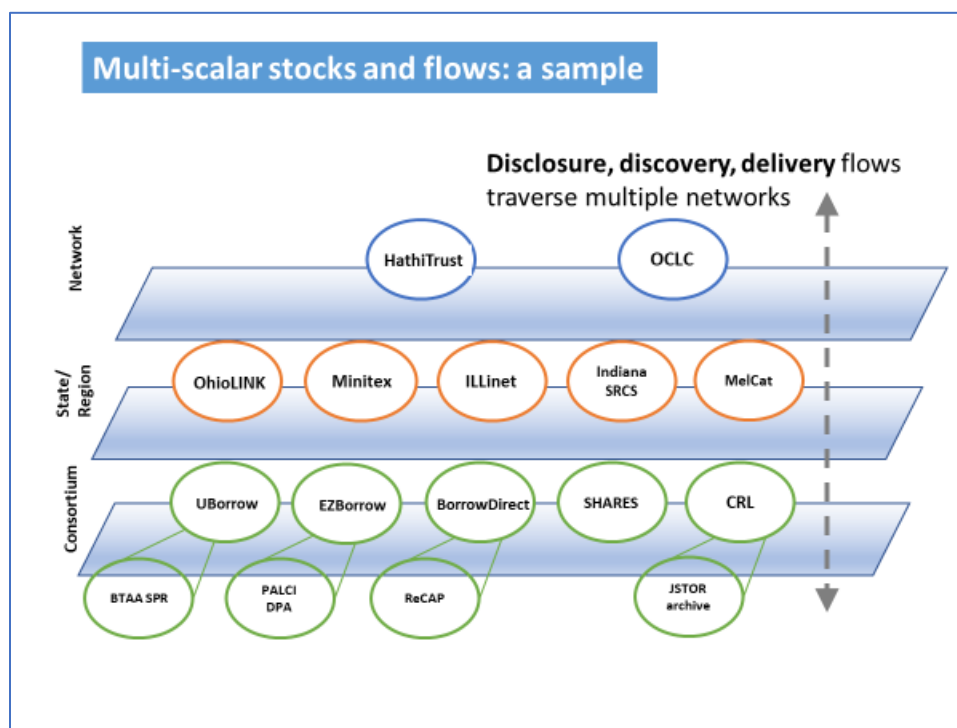


Figure 4 Multi-scalar Stocks and Flows

For example, when a new library joins the network, it may have different ILL policies or already belong to another consortium with different policies; it will have a management system which needs to interwork with coordinating applications (Figure 4). And on the library side, there may now be an additional set of oversight committees or working groups to service within the network; there may be additional human

¹³ These draw on the work presented in [Appendix 1: Draft Library Service Framework](#). A service framework is an abstract functional model of a domain. In this paper we present an outline of what such a service framework might look like.

intervention to do lookups or requesting to a new system. When a shared storage system joins, it similarly has policies, applications, and metadata connections. Adding a new system, or swapping one for another, touches a variety of elements in the network: agreed policies, staff commitment to configuration or working groups, etc.

The **enterprise stack**, shown in Figure 5, includes strategy and policies, the elements that shape activity and direction, as well as staff and finance, which advance the work. We argue that these would benefit from greater consolidation in the BTAA context, making commitments explicit at the BTAA level and increasing the agency of the executive staff.

The diversity of affiliations for both resource sharing and shared print diffuse energy and commitment in a BTAA context. There is a coordination cost for participation in any such initiative—from sitting on boards and advisory committees, to participating in technical working groups, to adapting workflows.

Coordination of policy frameworks is also key to exploring working across networks.

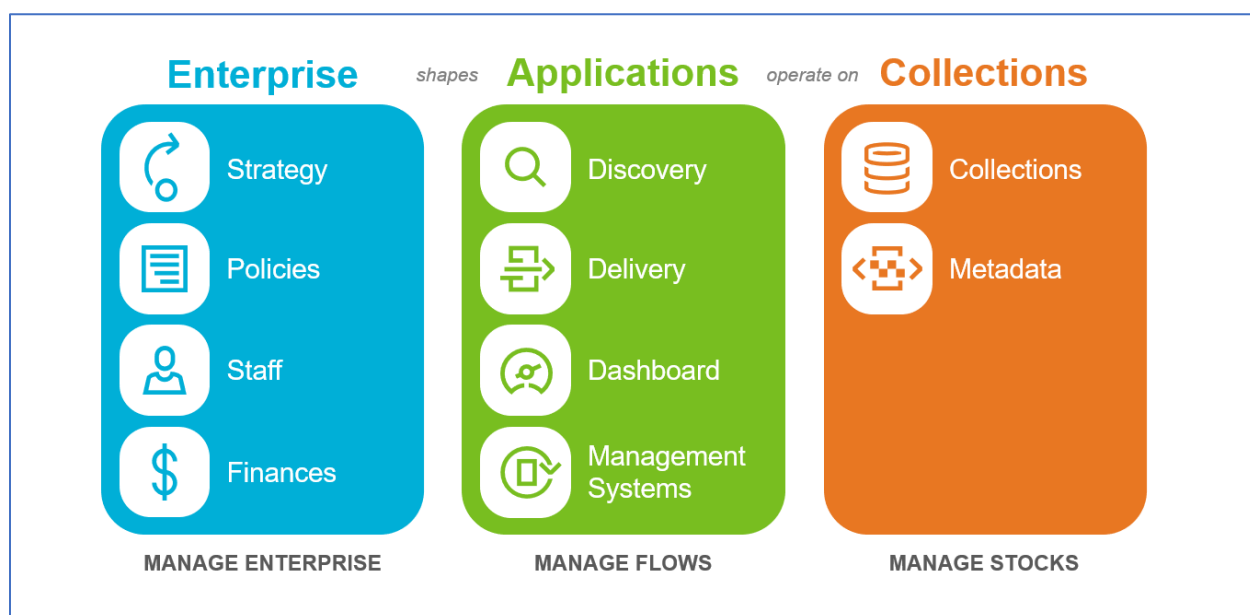


Figure 5 Library Service Framework: Functional Stacks

The **applications stack** and interworking between systems is a central interest of the D2D reports.

[W]hen looked at in isolation, a new initiative, service or partnership may appear straightforward, but when added to a network of interdependent parts it may create new integration challenges, new governance decisions, new data integration points, and so on.

The libraries already cooperate within a broad network through WorldShare ILL, which allows ad hoc cooperation with libraries throughout the US and the world. WorldShare ILL is also used intra-consortially between BTAA members in parallel to UBorrow. Consortial borrowing systems run on various coordinating applications (e.g., D2D in UBorrow). Some

consortia have moved to further consolidation around instances of the same library system (e.g., the use of INN-Reach in OhioLINK, or of Alma in I-Share), or in a further step, around a shared instance of an integrated library system (e.g., WMS in PALNI).

Resource sharing is evolving. There is interest in greater communication between consortia, as well as working across multiple fulfillment options, and at the same time libraries participate in several networks. This means that each library has a resource sharing environment that coordinates many components, including UBorrow.

The current system environment consists of vertically integrated stacks (resource sharing systems, library management systems, discovery environments) with some systemwide aggregation of data for discovery, management, or decision support purposes. Systemwide services are lacking, such as access management or the type of fee management provided within the WorldShare ILL network. We identify three overlapping levels of coordination across this broader array in **Section 3**, where we discuss the BTAA applications ecosystem:

- **Interoperability** between components (e.g., where a resource sharing system interacts with a library system using Z39.50 or NCIP or some other approach).
- The use of a **middleware** layer to abstract away some of the underlying complexity. Of course, this cannot entirely hide underlying differences of policies, or always work well across boundaries. And it must still interoperate with systems and services in the backend. A nascent example in a BTAA context is the combination of ILLiad add-ons and a D2D web service to automate the process of finding requestable BTAA locations for new ILLiad requests for books. This has simplified the process for the patron, as it is behind the scenes, and for staff, who don't have to mediate requests.
- **Refactoring** the ecosystem, thinking about some greater consolidation (e.g., discovery), allowing multiple discovery systems to talk to multiple delivery systems, having unified network access to systemwide policy and holdings data, collecting transaction data, having more "intelligent" middleware or **broker** services, and so on.

Currently, there is not consolidated discovery of collections in BTAA through a dedicated discovery interface. UBorrow searches catalogs using Z39.50. A central index could be implemented in a variety of ways and would improve discovery, although steps would still have to be taken to determine availability and logic for request routing.

The dashboard application has two important elements that are currently underdeveloped but recognized as critical to evolved systems. The first is a user account, which provides a record of interactions, requests, etc., to a user. Of course, this is now familiar from consumer services, which are also used to tracking delivery. We have not discussed this in detail here, given the issues of providing it across multiple systems and networks.

The second is a dashboard, which supports analytics or decision support and presents a view of reports on aggregated usage and descriptive data. This also is now familiar in various analytics tools and is increasingly important to the collective management of collections, potentially supporting load balancing across storage facilities, acquisitions recommendations, identifying candidates for digitization, and more.

Effective operation depends on availability of consistent metadata across systems. Consolidation of transaction data to support better systemwide calibration of collections would be useful.

Finally, we note that “interoperability” is sometimes invoked in discussions as an easy answer, or as a purely technical issue. However, it is important to understand that interoperability is neither. It is a deliberate choice based on particular cases. There has certainly been a trend toward consolidation in the last few years. Think of how consolidated discovery layers largely replaced metasearch applications that relied on interoperability. In the broader environment our web experience tends to revolve around large consolidated services (Google Scholar, Amazon, Wikipedia, Twitter), leading in more recent years to concerns about such concentration.

In the environment under discussion here, interoperability is essential, as there is a variety of systems and services involved. But we have learned that interoperability is not friction free. The more autonomous the parts are, the more difficult it is to provide a unified experience over them. Many of the user experience issues raised in the D2D reports arise at the boundaries between components. There are opportunities for consolidation around library systems, or discovery, or other areas and these are discussed further in **Section 3**. However, given the need to work across adjacent networks, or the desire to make the shared print repositories more integral to the system in the future, or the push to add additional fulfillment options (e.g., purchase, open access resources), the BTAA likely will be operating in an ecosystem requiring some interoperability for a while.

This means that understanding the full context of interoperability in any particular case is important. This is not a purely technical issue. Interoperability cannot hide different policy regimes for instance, or substitute for a lack of consistent policies. Systems and formats change over time and have to be monitored.

Finally, and interestingly, interoperability can sometimes be deliberate autonomy strategy—rather than changing an existing system or approach that may in fact be the optimal path, interoperability may be favored as a way of maintaining local control.

There is room for greater consolidation in the **Collections Stack**. Collections and metadata are largely institutionally based and decisions about them institutionally driven. This limits systemwide effectiveness. Consolidated metadata provides systemwide awareness, which supports cohesion and decision-making. Better descriptive and transaction data is needed to truly manage a collection collectively.

Finally, we might note that interoperability is sometimes a deliberate autonomy strategy—rather than changing an existing system or approach which may in fact be the optimal path, interoperability is favored as a way of maintaining local control.

There is no aggregation of descriptive metadata at the BTAA level. As the character of collecting continues to change under the pressure of cooperation and the network, we argue that it would make sense for BTAA libraries to develop a consolidated view of their metadata, to develop a consolidated unified view of shared print commitments, and to develop a

consolidated view of what has been digitized. A BTAA shared index would have several uses. The data

might also be maintained as part of WorldCat (the OCLC Control Number is a valuable systemwide control number) and synchronized with HathiTrust or other sources.

As we note throughout, collections strategy is largely library based. Investment or selection choices are not optimized across the group. There is some consolidation in the Shared Print Repositories (SPRs) but only of journal content. We argue that BTAA should look at greater consolidation of the print resource in two important ways. First, the systemwide management of the scholarly record would benefit from stronger coordination—looking at the management of monographs as well as journals, at the optimum number of copies within the system, and at logistical optimization in repositories. Second, we recommend that BTAA take some strategic steps toward prospective collection coordination and put in place the decision and policy steps required to make progress. Several areas for attention are identified in **Section 4** and noted in the recommendations. A recommended approach to improving systemwide awareness in BTAA collections management is presented in **Section 5**.

1.4 Strategy: maximizing efficiency and impact through collective action

The vision of BTAA is to be the “most responsive and effective framework” for academic collaboration. It is very clear from director interviews that BTAA is valued as a collaborative venue for peers. From these interviews, some strategic lines emerge:

- **Making shared expectations explicit—an agreed strategy.** BTAA is well-positioned to provide a model for collaboration at scale. To do so will require an explicit strategy, both generally and specific to collective collections. One reason for the diffusion of effort within BTAA is that the libraries are drawn into various collaborations to get their work done: being more explicit about BTAA intentions would counter this. One of the advantages of consortial activity is that trust develops through shared practices, which, in turn, facilitates consensus and expedites decision making. However, from the library perspective, the BTAA is an organization in some flux. It is absorbing new members who did not share in historical decision making. There is considerable turnover of directors. Several directors are very newly appointed (some during the writing of this report) and several more have been appointed within the last five years. This means that there are different expectations of what BTAA might or should do. It also means that individual statements about BTAA may reflect expectations that in fact are not the current consensus, as a shared view of scope and ambition needs to be newly socialized within the group.
- **Establishing process—making and implementing decisions.** There is disparate thinking about how proposals should be agreed upon and advanced. It would be useful to have a process for proposals, for approval, for agreeing to relative commitment of resources, for specialist review, and so on. Agreed processes for shared decision making would improve cohesion and clarity.
- **Strengthen the executive function.** While BTAA Libraries has a consolidated staff resource, much of the work gets done through committees and working groups or is initiated by the directors. This naturally favors some decentralization or autonomy in approach. We are also

aware that the opportunity cost of committees/working groups is becoming more visible, as libraries increasingly consider the real cost (time as well as money) of their range of memberships. If BTAA wishes to engage in a significant program of work, it would need to strengthen the central office, hold it accountable for advancing the goals of the consortium, and give it more agency and process.

- **Commitment to BTAA as a venue.** The BTAA libraries have leaned toward local decision-making and have limited consortium-level agreement. There are some exceptions to this, notably in the area of consolidated consortial licensing. However, for the reasons discussed here, they may not see BTAA as the natural venue for a particular area of work and do in fact regularly look to other groups or affiliations. The group needs to decide what areas of working together would incentivize change in behavior. We believe that BTAA has the scale, institutional alignment, and collective mission to make it a sensible platform for shared approaches. Managing collective collections is one such area.
- **Multi-scalar collaboration—embedded at different levels.** BTAA members consort at different levels to manage collective collections. WorldCat, CRL, and HathiTrust are important venues in different ways, at a level above BTAA. At another level, we have noted that many of the libraries participate in adjacent networks at state or regional level. Indeed, for some, an important part of their public mission is to assume statewide leadership roles. The Ohio State University or the University of Minnesota, for example, play important roles in relation to OhioLINK and Minitex respectively. For other libraries such as Northwestern, this is not a major factor. This means that libraries can be embedded in multiple managed collective collections at different levels, and that involvement in adjacent networks is variably important to the libraries. Despite this variability across the libraries, BTAA library planning should directly address the interaction with the adjacent networks given their importance to some members. This may expand BTAA opportunity, acknowledging some coordination costs and diversification of types of libraries. But it is also important for those libraries who will continue to work across BTAA and other networks.

In addition, there are several general consortial considerations:

- **Scoping.** What shared investments will have the most impact for the group as a whole? What is most strategic for the group to advance together? Does their shared mission make some areas deserve more attention? One of the observed issues with the collective collections discussion is that it is not clear how it would rank against other activities (e.g., a research data management platform or other possible shared investments).
- **Right-Scaling.** We have argued that the BTAA has the scale to make a significant impact. It has greater reach and capacity than many state or regional consortia. For example, it is big enough to have a significant impact on stewarding the print scholarly record and to work with others towards a national approach.
- **Sourcing.** BTAA does not have shared development and operational capacity in the way, say, that CDL does in the University of California or Scholars Portal does in Ontario. Should it move in that direction? Should it procure systems from third party providers? Should it develop centers of excellence at individual libraries (the HathiTrust model)? This is an

important area of much interest, which goes beyond our scope here. How does the community secure long-term infrastructure?

The following are some activities in play among peer groups of research libraries:

- **The scholarly publishing ecosystem:** The University of California's decision to terminate discussion with Elsevier has galvanized opinion. What role does BTAA have in the evolution of new scholarly communication models and "transformative agreements"?
- **The new infrastructure of research:** Universities are acquiring capacities for research data management, research information management, digital scholarship, and publishing platforms. Universities, publishers, disciplinary groups, and others are involved in building new research infrastructure. Sourcing models vary—from local build, to shared community platforms, to procurement from emerging vendors. Is there a role for BTAA here?
- **Mobilizing scarce expertise:** Even though the libraries individually encompass broad expertise, there are opportunities to share scarce expert resources across libraries. There has been some work on sharing cataloging expertise. Other areas might be around licensing, specific subjects, technology, legal, and so on.
- **Scaling learning and innovation**—Several members of BTAA are members of the University Innovation Alliance, which aims to develop models to scale innovation across the group. BTAA members are also individually members of many organizations which scale learning and innovation, such as ARL, CNI, DLF, OCLC RLP, and Educause. What is the BTAA view of how it can accelerate and scale learning and innovation within the group?
- **Preserving the scholarly record**—As noted, the collective scholarly resource of BTAA is significant, and BTAA has a major role here.

This list could be extended. Further discussion of these topics is outside of our scope here. But it is against this range of possible activities that attention to the collective collection must be weighed. We sensed variable enthusiasm for investment in collective collections in the director interviews. However, there was also variable appreciation of what collective collections might involve. Some focused on resource sharing, and, certainly, we heard a view that while it can be incrementally improved (as outlined in the D2D reports), it might not be an area for major investment (especially given that UBBorrow is seen as an added value rather than as core infrastructure by some of the libraries).

However, one could argue that this variability is not surprising given that a compelling collective collections vision has not been presented. We believe that the collective management of the print collection is a major task and one that is deserving of BTAA strategic attention and investment. Further sections of this report explore aspects of collective collections in more depth. Managing, building, and sharing a collective collection comprising over 20% of the print titles in North America is an appropriate goal for the BTAA libraries. And our recommendations outline what needs to be addressed to meet this challenge.

1.5 Change and culture

The recommendations in this report would further move the BTAA toward a new way of managing collections, where there is a change in the balance between local institutional emphasis and a more collective BTAA emphasis. Change needs to be approached carefully to increase chances of success. We have outlined a framework for collective collections, but success will ultimately depend on responsiveness to organizational, professional, and cultural expectations and sensitivities.

In particular, we briefly highlight here the importance of two areas: socializing this work with campus communities and the nurturing of trust and other “soft powers” within consortial working.

1.5.1 Working with campus communities

Given the ongoing central role of print collections in the identity of the library, and given their importance in the working lives of many students and faculty, reconfiguring collections requires careful preparation and consultation on campuses.

The ultimate purpose of a collective collections initiative is not necessarily to reduce the overall collection, but to more purposefully nurture the richness possible within the collective approach.

A distinctive characteristic of the BTAA Libraries Initiative is that it is part of the overall BTAA organization and as such has provostial oversight. Buy-in at this level is important to success. Whatever direction is decided, it will also be important to socialize directions on

individual campuses and to advance in carefully evolutionary ways.

There is a strong story here, including such elements as more ready access to a much broader collection than it is possible to build on one campus, ready access to specialist resources and expertise within the network, rapid and predictable delivery, a guarantee of conscious stewardship of the scholarly and cultural record, and more informed building of collections. The ultimate purpose of a collective collections initiative is not necessarily to reduce the overall collection, but to more purposefully nurture the richness possible within the collective approach—and to back this up with efficient delivery. Of course, this has to be balanced against a perception of reduced local access or control.

It would be sensible to collectively develop an advocacy toolkit that could be adapted for local use, and to think about the elements of a BTAA-level awareness program that would engage campus partners in fruitful discussion of directions and priorities.

1.5.2 The importance of trust and the soft powers of consortia

Many of the principal values that consortia deliver emerge through working together—they are not explicit products or services as such, but rather are emergent properties of the collaborative environment that the consortium facilitates. For example, consortia can scale learning, innovation, and best practices across members through shared working, informal mentoring, collaborative problem solving, staff

transfers, succession within the consortium, and so on.¹⁴ This is an important reason for the persistence and power of consortia, and in some cases they are beginning to encourage this through more purposeful design of leadership, learning, or collaborative opportunities.

A core component of this power is how it nurtures trust. The importance of learning through shared practices highlights the importance of people networks developed through working groups, expert groups, workshops, conferences, shared training, and sharing of expertise. Those networks, in turn, foster trust and ongoing serendipitous interactions. Trust is important in encouraging an environment of frank discussion and challenge: colleagues become confident offering advice, sharing expertise, and pooling uncertainty.¹⁵

This trust has enormous value in facilitating decision making, increasing tolerance for risk, and providing confidence to enter into relations of mutual dependence.

We have presented some frameworks around collective collections here but an important prerequisite to success is a collaborative culture of trust throughout the consortium—at the director level and within more specialist areas. This is something that always needs conscious support and attention, especially in this period of leadership transition.

¹⁴ Dempsey, Lorcan (2019) "What Collaboration Means to Me: Library collaboration is hard; effective collaboration is harder," *Collaborative Librarianship*: Vol. 10 : Iss. 4 , Article 3. Available at: <https://digitalcommons.du.edu/collaborativelibrarianship/vol10/iss4/3>

¹⁵ Dempsey, Lorcan (2018) "The Powers of Library Consortia 2: Soft Power and Purposeful Mobilization: Scaling Learning and Innovation." Lorcan Dempsey's Weblog, 2 July 2018. Available at: [Http://orweblog.oclc.org/the-powers-of-library-consortia-2-soft-power-and-purposeful-mobilization-scaling-learning-and-innovation/](http://orweblog.oclc.org/the-powers-of-library-consortia-2-soft-power-and-purposeful-mobilization-scaling-learning-and-innovation/).

Section overview:

While BTAA member institutions share some commonality of mission and service orientation, there is still wide variation among institutions in types of degrees awarded and in the balance between research and instructional expenditures. This creates varying priorities across the BTAA universities and their libraries. That said, the BTAA universities combine to create a research and learning powerhouse, which is a major component of US educational and research capacity.

The libraries also command major collections, expertise, and resources.

In this section we briefly quantify BTAA's activity and presence. We also provide some data about the scale of the BTAA collective collection, about the overlap among BTAA libraries and between BTAA libraries and others, and about the flows of materials within BTAA.

2 The BTAA: a major enterprise

2.1 The BTAA research enterprise

BTAA is a “big research” enterprise. In 2017/18, the alliance reported more than \$10 billion in aggregate research expenditures; on average, BTAA member universities each spent more than \$700 million to support faculty and graduate level research.¹⁶ Total funded research at BTAA exceeds research expenditures in the University of California system (\$4.4 billion) and Ivy League universities (\$4.4 billion) combined.¹⁷ Collectively, BTAA universities produce about 15% of the research publications in the United States.¹⁸

From a strategic planning perspective, the shared institutional priorities of BTAA confer a significant advantage...

Provosts and other university administrators in the BTAA recognize that the scale of the consortium's research enterprise is a differentiator in the intense competition for federal research dollars, enabling member institutions to compete

more successfully for grants and contracts. Big Ten universities collaborate on large-scale infrastructure, such as the OmniSOC cyber-security initiative, and joint research projects, such as the Health Equity Initiative. Members also co-invest in shared infrastructure and services (e.g., a high-speed data network, distance-learning platform, faculty development programs) that expand research capacity at all BTAA universities. Collaboration among BTAA libraries to share cataloging expertise, pool research resources,

¹⁶ http://www.btaa.org/docs/default-source/research-data/at-a-glance_2017btaa.pdf

¹⁷ <http://www.btaa.org/docs/default-source/reports/btaa-annual-report-16-17-accessible.pdf>

¹⁸ <http://www.btaa.org/about/news-and-publications/news/2019/06/10/sustaining-values-and-scholarship-a-statement-by-the-provosts-of-the-big-ten-academic-alliance>

and negotiate licensing agreements is just one illustration of how the consortium leverages its scale to maximize the impact of university-based research.

The Big Ten consortium is also a major teaching and learning enterprise, with more than half a million students enrolled in 2017/18 (nearly three times the number enrolled by the University of California system) and more than 150,000 degrees granted in a single academic year.¹⁹ Full-time undergraduate students account for more than two thirds of total BTAA enrollment, and baccalaureate degrees represent a similar share of total degree production.²⁰ As these figures suggest, undergraduate education remains a core focus of Big Ten institutions. Indeed, institutional spending on instruction outstrips expenditures on research: on average, BTAA universities allocated 36% of core expenses to instruction in 2016/17, compared to 24% on research.²¹ BTAA institutions leverage the scale of their collective educational enterprise to provide access to a range of specialized courses (including rarely taught languages) that would be difficult to sustain in a single university.²²

Despite these commonalities, important differences exist within the Big Ten. For instance, the relative emphasis on undergraduate education versus research and professional education can vary widely. In 2016/17, 82% of the degrees awarded by Penn State University were baccalaureate level, compared to 28% at Northwestern, where master's degrees account for the majority (59%) of awards. The size of institutional budgets in member universities also differs, sometimes dramatically. Core expenses in the largest BTAA university (University of Michigan) are nearly four times those in the smallest (University of Nebraska), judged by total dollars.²³ All BTAA institutions are top-tier, research-intensive universities; however, the range of activities they support and the resources available to them differ.

The scope, as well as the relative intensity, of educational and research activity varies across the BTAA. Purdue and the University of Illinois award a greater share of degrees and certificates in engineering, relative to other disciplines, than other BTAA institutions; Indiana and Northwestern have a greater relative emphasis on business, management, and marketing. Some disciplines marginal to the educational emphasis in most BTAA institutions represent a substantially greater share of degrees at one or two of the universities. For example, Education and Communication each account for an average 5% of degrees

¹⁹ http://www.btaa.org/docs/default-source/research-data/at-a-glance_2017btaa.pdf The University of California system (comprising 10 campuses) enrolled a total of 280,380 students in Fall term 2017. <https://www.universityofcalifornia.edu/infocenter/fall-enrollment-glance>

²⁰ Data on degrees and certificates awarded are based on IPEDS data (Number of students receiving awards/degrees, by award level, race/ethnicity, gender and age) reported by BTAA institutions for 2016/17.

²¹ Data on institutional spending is based on "Instruction expenses as a percent of total core expenses (GASB/FASB)" and "Research expenses as a share of total core expenses (GASB/FASB)" reported to IPEDS in 2016/17.

²² BTAA runs a distance learning platform (CourseShare) that enables cross-institutional participation in specialized courses, including area studies and less commonly taught languages. <http://www.btaa.org/resources-for/faculty/courseshare/introduction>

²³ In 2016/17, total core expenses at the University of Michigan amounted to \$3.19 billion; at the University of Nebraska-Lincoln total expenses amounted to \$852 million. Source: "Core expenses total dollars (GASB) (DRV2017)", IPEDS.

awarded by individual BTAA universities; in 2016/17, the University of Nebraska awarded 11% of its degrees to Education majors and Northwestern awarded 12% to Communications majors.²⁴

While Big Ten universities share a common mission (contributing to the public good through education and knowledge creation) and realize significant benefit through BTAA collaboration, the member institutions also consort with other groups to pursue mutual goals. Flagship institutions that collaborate with Big Ten peers in some areas also work with partners in their respective state systems on other issues. Three BTAA institutions participate in the University Innovation Alliance (UIA) to share best practices in broadening access to higher education while improving graduation rates, for example. Growth in the Big Ten consortium has increased not only the geographic reach of the consortium but also the diversity of its institutional members, each bound to a different set of regional and consortium peers and partners.

2.2 BTAA university directions

In a recent project, OCLC Research and Ithaka S+R examined emerging institutional directions in four-year colleges and universities in the United States.²⁵ Using a mix of quantitative and qualitative data, we developed a method for identifying the directional emphasis of university activity and exploring the impact of this on academic library service planning. In a consortium context, this method can be applied to explore high-level university directions across the group, and to highlight areas both of shared interest and of diverging institutional priorities.

Figure 6 depicts the distribution of university activity within the BTAA along three axes: doctoral level research, baccalaureate-level arts and sciences education, and career-directed education. As can be readily seen, the relative distribution of activity along these three dimensions is remarkably uniform for the 14 BTAA universities. Despite their differences, Big Ten institutions are clearly united around a common set of priorities, most notably a strong directional emphasis on advanced research combined with a shared focus on undergraduate teaching and learning. Activity related to professional education (professional master's and doctoral degrees, as well as business-focused undergraduate programs) varies more widely but is generally less prominent.

²⁴ Data on disciplinary awards and certificates are based on IPEDS data (Completions: Awards/degrees conferred by program [2010 CIP classification]) reported by BTAA universities in 2016/17.

²⁵ <https://www.oclc.org/research/themes/systemwide-library/library-futures.html>

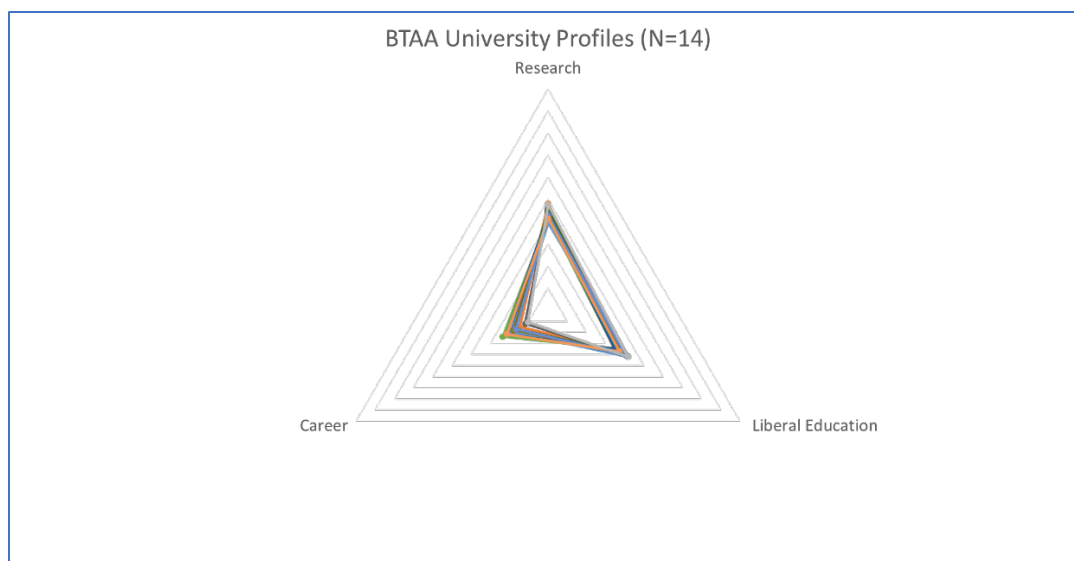


Figure 6 University Directions: BTAA

Despite their differences, Big Ten institutions are clearly united around a common set of priorities, most notably a strong directional emphasis on advanced research combined with a shared focus on undergraduate teaching and learning.

The uniformity of university directions within the BTAA contrasts sharply with group profiles for other consortia in which Big Ten universities are active. For convenience, we present only a subset of the institutions in two major academic consortia: OhioLINK and PALCI. Even when two-year institutions are excluded from the data, the diversity of

institutional directions in these groups is quite evident (Figure 7). The library service needs of institutions in these consortia will differ dramatically: a residential liberal arts college requires different library support than a health sciences training institute or research-intensive university. An institution that enrolls a majority of part-time and online students will have different expectations of the library than an institution that mostly serves full-time, on campus learners. A university that supports data-intensive research will have different library needs than a college with an emphasis on creative arts. Diversity and increasing divergence in institutional directions in some consortium settings will make it harder to align around a vision of shared library services or infrastructure.

From a strategic planning perspective, the shared institutional priorities of BTAA confer a significant advantage: identifying a small number of high-value areas for collective library action is feasible. The scale of BTAA investment in library collections, continued faculty expectation of access to specialized, world-class resources, and the distinctive stewardship responsibility of research libraries suggest that joint action on managing the BTAA's collective collection will be one such priority.

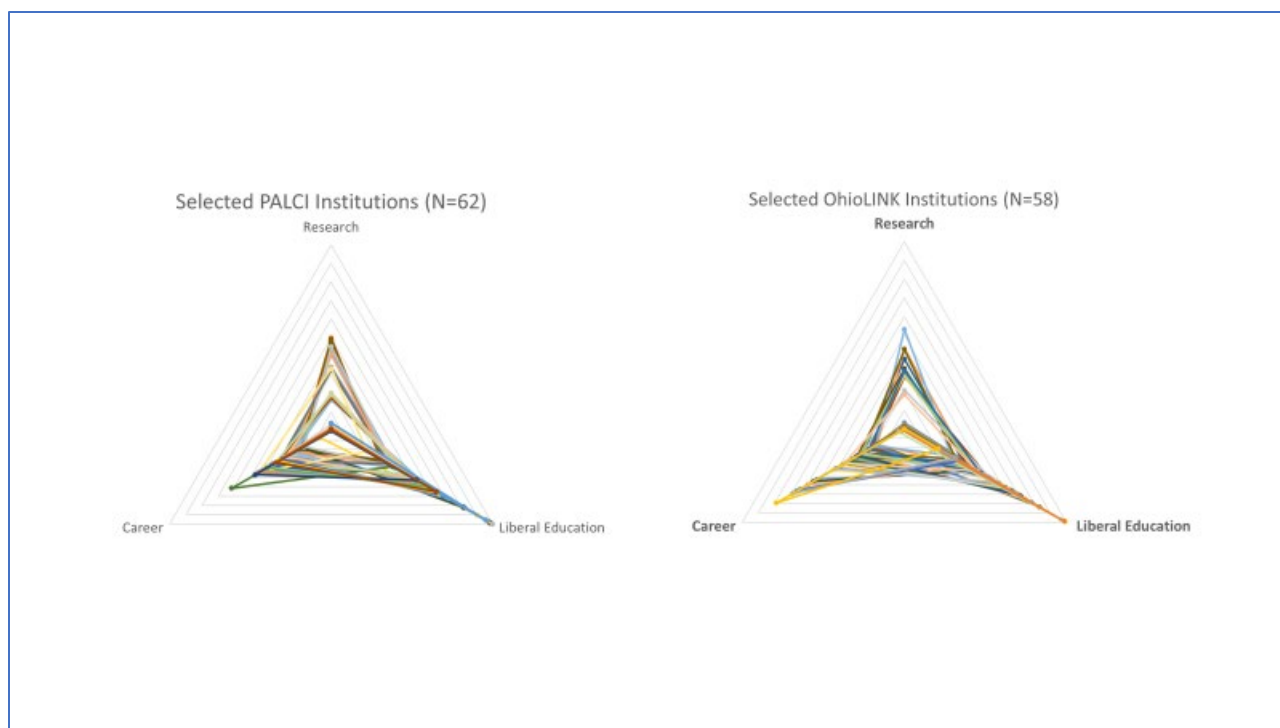


Figure 7 University Directions: PALCI and OhioLINK (selected institutions)

2.3 BTAA library expenditures

The scale of current BTAA library investment is impressive. Aggregate BTAA library expenditures topped \$650M in 2017, with more than \$250 million (39%) spent on library materials.²⁶ Expenditures on licensed electronic content account for more than 75% of average BTAA library spending on materials and more than 30% of the total library budget. In practical terms, on average BTAA libraries are spending nearly as much on licensed content as staff salaries. Purchased print materials represent a smaller, but still significant share of BTAA library spending, amounting to 20% of average BTAA materials expenditures.

Looking at BTAA library spending patterns over time, a general trend toward increased investment in licensed content is evident (and consistent with general academic library spending trends). Between 2014 and 2017, average BTAA expenditures on ongoing subscriptions grew steadily, while spending on purchased inventory declined (modestly), as can be seen in Figure 8. Average spending on licensed resources increased from 73% to 76% of materials; spending on purchased content fell from 23% to 20%, as shown in Figure 9.

²⁶ Analysis based on IPEDS Academic Library Survey data for BTAA universities (plus University of Chicago) for 2017.

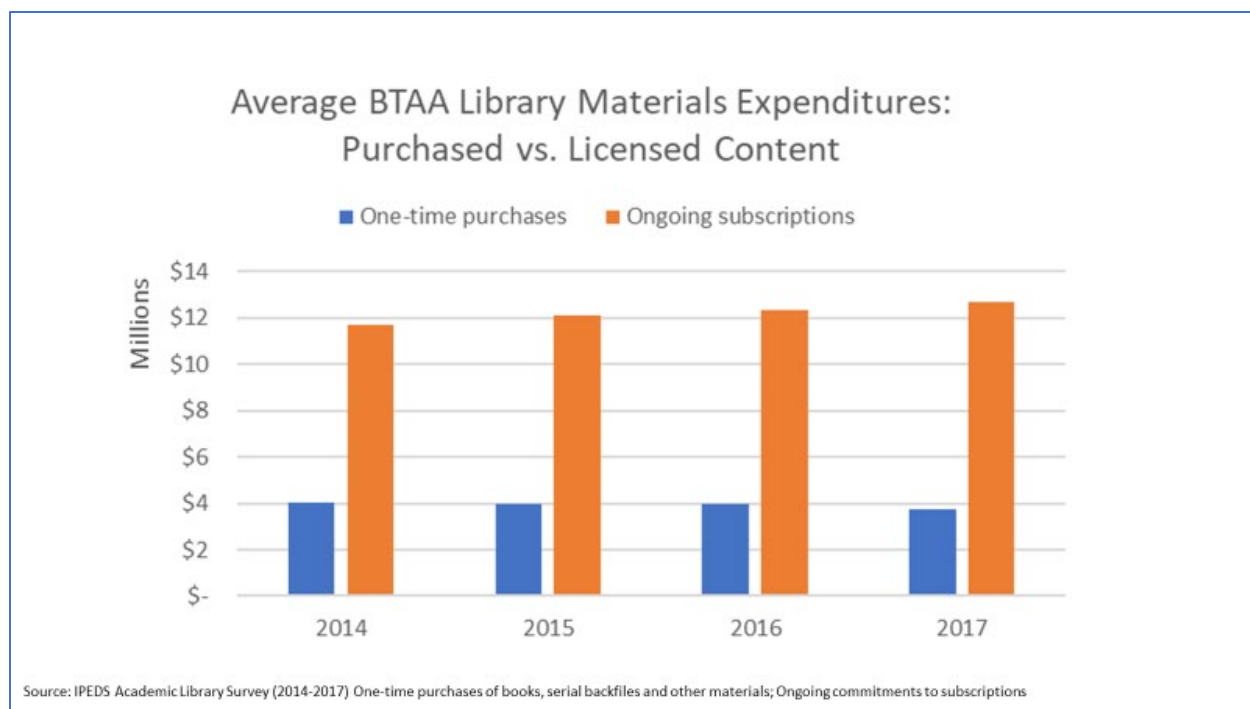


Figure 8 BTAA Library Expenditures: Purchased vs. licensed content (\$)

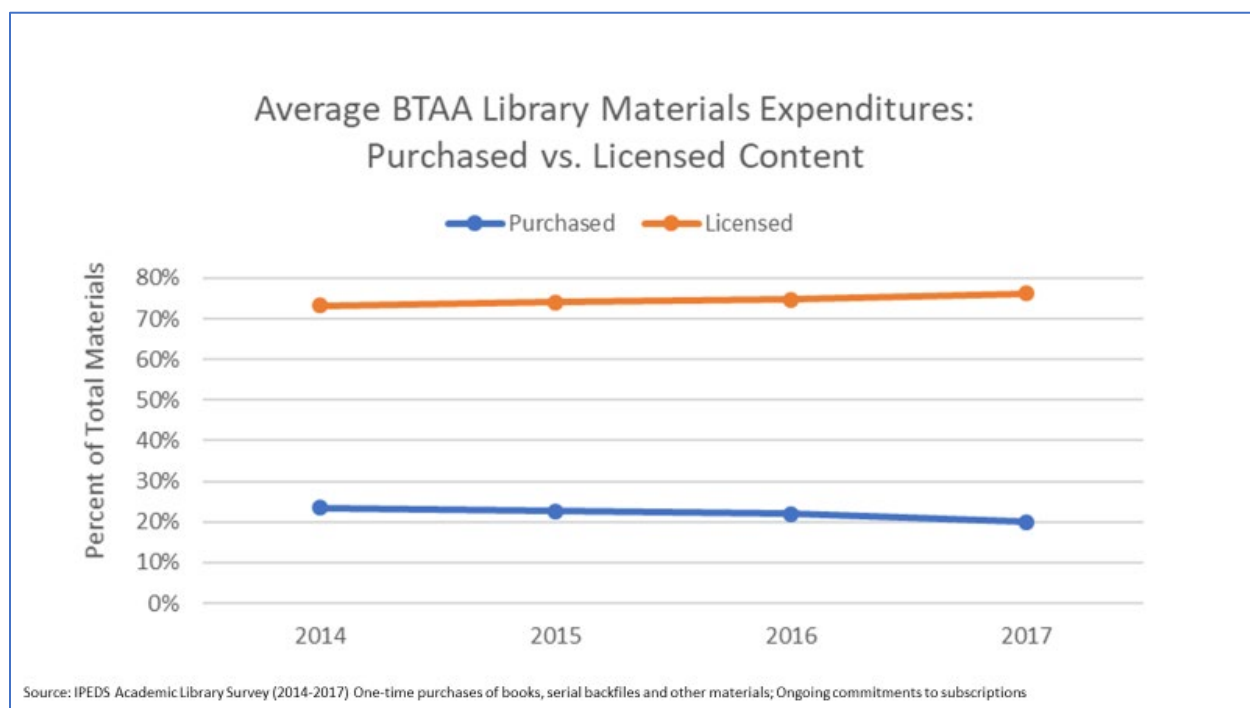


Figure 9 BTAA Library Expenditures: Purchased vs. licensed content (%)

For individual BTAA libraries, these trends are playing out differently. Figure 10 compares the relative spend on purchased and subscription resources for the 15 BTAA libraries in 2014. There are clear outliers at each end of the spectrum; however, most institutions made above-average investments (>23% of total

materials spending) in purchased content, while only a few were making above-average investments (>73%) in licensed content.

Some BTAA libraries will feel a strong responsibility to expanding and preserving print collections; others may pursue an aggressive e-first strategy aligned with evolving institutional goals. It's no longer possible to rely on an "invisible hand" approach to building and managing the collective collection.

By 2017, a wider variance in institutional acquisition patterns is evident (Figure 11). While a majority of BTAA libraries were still allocating an above-average share of the materials budget to print, the difference in allocation grew, reflected in a greater "step" variation between institutions. At the same time, a larger number of BTAA libraries were allocating an above-average share of expenditures to licensed content.

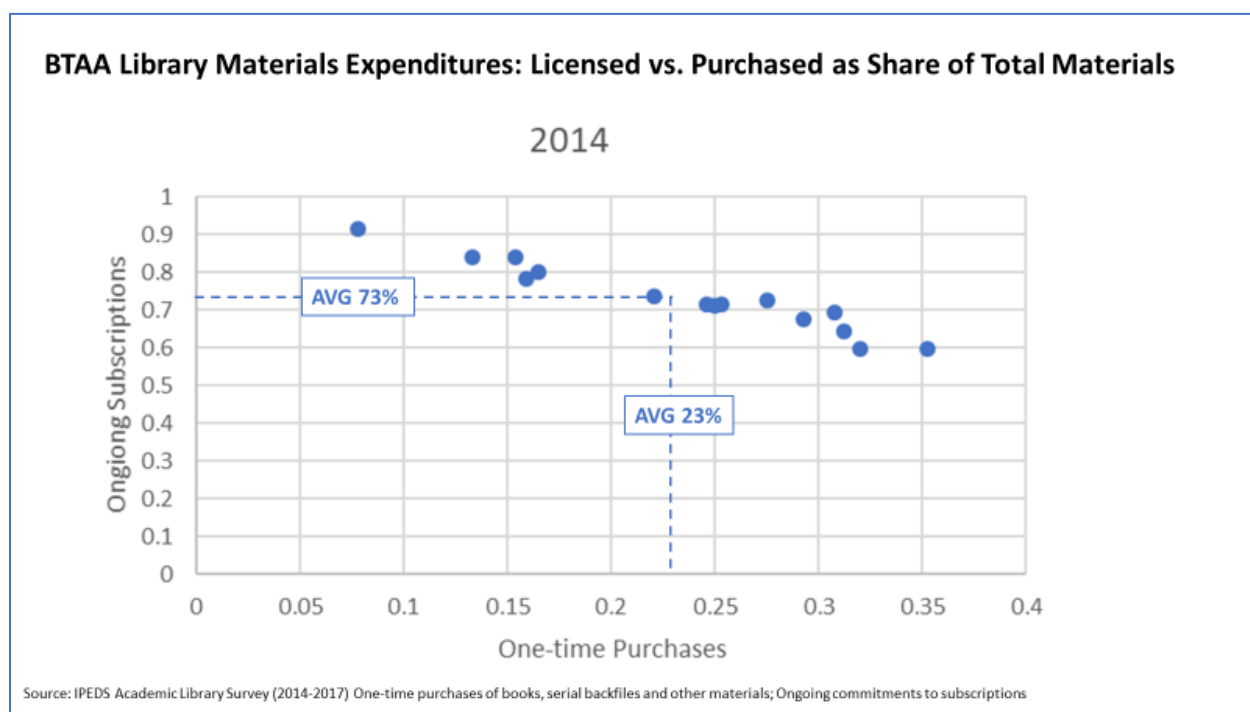


Figure 10 BTAA Library Expenditures: Licensed vs. purchased as share of total materials (2014)

The shift toward an e-dominant acquisitions model is stronger for some institutions than others. For example, there has been a shift in this direction for Maryland, Nebraska, Purdue, and Wisconsin, while Indiana, Michigan and Northwestern continue to maintain relatively substantial investments in print. Of course, there are various factors at play here, including both strategic intent and size of budget. This variability in collecting patterns across institutions is another reason for embracing a more deliberately coordinated approach to collections management. Some BTAA libraries will feel a strong responsibility to expand and preserve print collections; others may pursue an aggressive e-first strategy aligned with

evolving institutional goals and budgetary pressures. It's no longer possible to rely on an "invisible hand" approach to building and managing the collective collection.

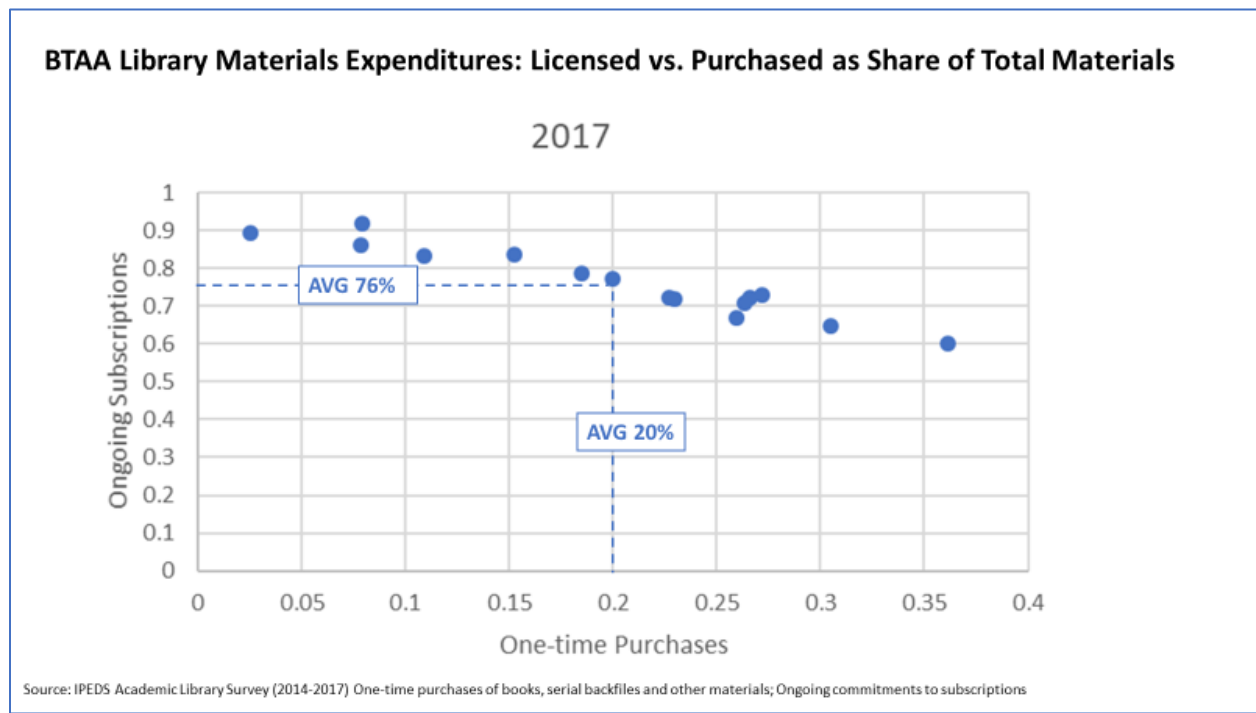


Figure 11 BTAA Library Expenditures: Licensed vs. purchased as share of total materials (2017)

2.4 BTAA print collections: stocks and flows

Here we look briefly at two dimensions of the BTAA library enterprise. First, we provide a supply-side view of the BTAA collective collection, i.e., the aggregate stock managed by member libraries. Second, we examine the demand-side flows of resource sharing activity within the group, to better understand how the collective resource is used and how it is supplemented by holdings outside of BTAA libraries.

2.4.1 A supply-side view of the BTAA collective collection

BTAA libraries reported aggregate holdings of more than 113 million volumes in 2016/17, including both books and journals.²⁷ Using data in WorldCat, we can further define the scope and scale of the BTAA collective collection. As of January 2019, BTAA libraries registered holdings on 13 million discrete print book titles, with an average of three BTAA holdings per title. To understand the vast scope of the BTAA collection, it is helpful to compare it to other "mega-scale" library resources. It represents:

- more than a fifth (22%) of all print book titles held in North America

²⁷ http://www.btaa.org/docs/default-source/research-data/at-a-glance_2016btaa.pdf?sfvrsn=2

- more than a third (36%) of print book titles held in ARL libraries
- almost half (46%) of titles held by Ivy Plus libraries
- more than half (53%) of titles in the area spanning the “Chi-Pitts” (Chicago to Pittsburgh) megaregion

As these numbers suggest, BTAA libraries collectively manage a substantial share of the scholarly record (Figure 12). Some of these resources are widely duplicated in other libraries, but many are not. These scarcely- or even uniquely-held resources constitute a distinctive asset and a special stewardship responsibility.

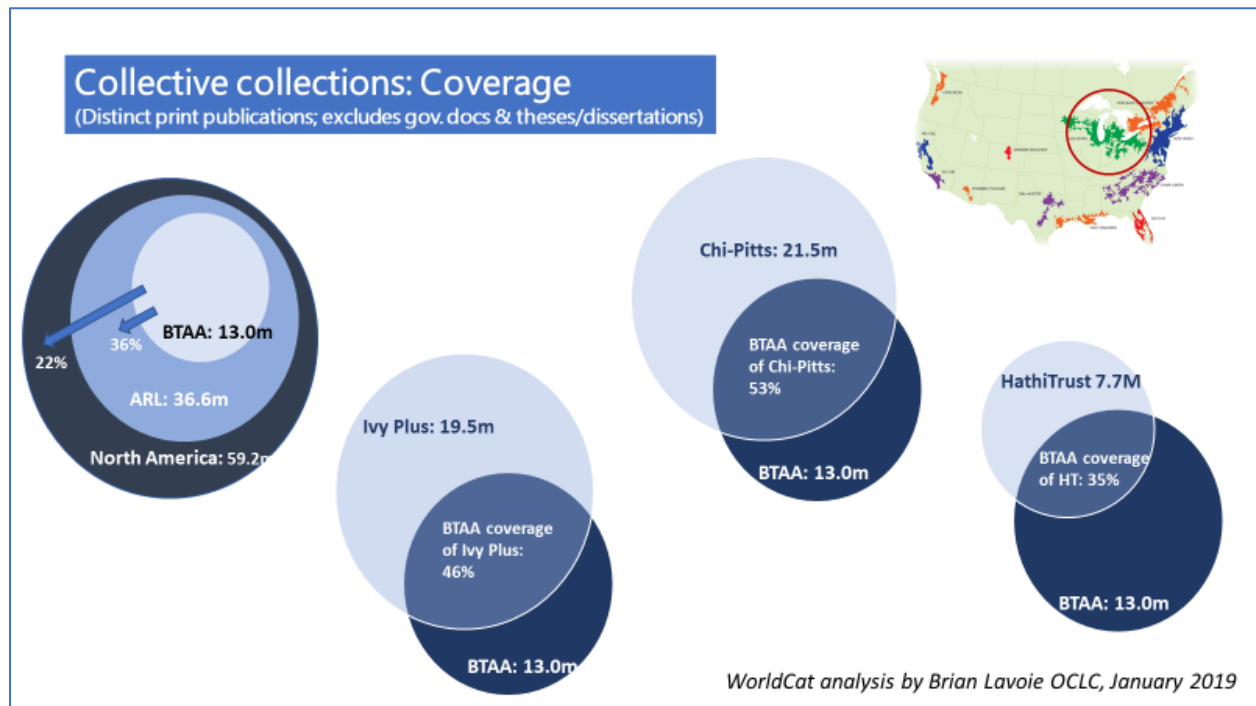


Figure 12 BTAA Collective Collection: Comparative coverage of other collections

We used a snapshot of BTAA library data in OCLC’s GreenGlass decision-support platform to explore the level of duplication *within* the BTAA group and *between* the BTAA and other libraries. As noted, the overall level of duplication within the BTAA is relatively modest for print books. This is typical for research libraries, which tend to collect deeply in specialist areas and hold large historical collections of material that are intrinsically rare and no longer available for purchase. Within the BTAA, we find:

- more than half (51%) of titles in the BTAA shared collection are held in a single BTAA location
- more than two-thirds (68%) of titles are held in fewer than three BTAA locations
- a small fraction (6%) of titles are duplicated in ten or more BTAA locations

While duplication levels within the BTAA are modest, a significant share (88%) of the print book collection is duplicated in other US libraries.

- almost a third (32%) of titles are held by more than 24 libraries in the US, including BTAA libraries
- about a fifth (21%) of titles are held by more than 49 libraries in the US

- nearly 2 million titles in the BTAA print book collection (13%) are held by more than 99 US libraries

This pattern is not unexpected. On the one hand, we see that rareness is common within the BTAA library collections—library collections have many items that are held by no, or only a few, other BTAA libraries. On the other hand, when one scales up to the US aggregate collection, it appears that only about one eighth of the BTAA collection is unique.

2.4.2 A demand-side view of the BTAA collective collection

OCLC analysis of BTAA inter-lending statistics indicates that while overall collection sharing activity by consortium members has declined in recent years, demand for returnables (books and other physical media shipped from and returned to the lending library) has increased. While alternative fulfillment mechanisms for articles and chapters have emerged (e.g., purchase-on-demand services or linking to open access versions of content), library-to-library lending remains the dominant mode of fulfillment for books. Fulfillment draws on a variety of networks, including consortial partnerships like BTAA or CRL, as well as regional networks like I-Share or OhioLINK, and more loosely coordinated resource-sharing groups (i.e., manually defined lender strings) in WorldShare ILL. Individual libraries vary in their reliance on different networks and have different drivers in terms of choice of network, as we note below. In the consortial borrowing model, greater efficiencies are generally possible as libraries are governed by common rules, rely on common infrastructure, and have generally committed to some mutual interdependence.

As mounting e-resource costs put greater pressure on local print acquisitions budgets, and as users now have expectations for prompt and preferably predictable delivery, the need for efficient inter-lending grows: mobilizing the collective collection becomes increasingly important. UBBorrow provides some of these advantages.

Within BTAA, individual libraries prioritize resource-sharing networks differently. Thus, Rutgers University prefers to fulfill requests through the PALCI EZBorrow network, while Northwestern University relies heavily on BTAA and UBBorrow. A variety of factors influence library preferences for different resource-sharing networks: Illinois, OSU, and Penn State feel a special responsibility to participate in their respective regional networks; Chicago, Northwestern, Minnesota, and Michigan leverage the BTAA peer network with direct, unmediated borrowing via UBBorrow; Rutgers favors regional providers that provide quicker turnaround than BTAA. Use of WorldShare ILL for intra-consortial borrowing is also common with some libraries. While these flexible arrangements maximize autonomy of member libraries, they also diminish the overall impact of UBBorrow as shared infrastructure.

Individual BTAA libraries report participation in anywhere from four to seven different resource sharing partnerships, with an average of five per library.²⁸ Each group has its own policies (loan period, costs, packaging guidelines, etc.) and associated workflows. Some rely on specialized infrastructure, such as INN-Reach for OhioLINK and MeLCat, a shared Voyager system for IShare (moving to Alma), Auto-graphics SHAREit for Indiana SRCS, and OCLC's D2D for UBBorrow, BorrowDirect and EZBorrow. There are stitching costs in managing collection sharing operations across these different networks.

²⁸ BTAA fulfillment networks and shared print partnerships (as of 2018) are detailed in [Appendix 2](#).

In 2015, the first year in which all 15 BTAA libraries implemented UBorrow, more than 114,000 requests were placed through the system—an impressive figure, representing a nearly a four-fold increase over the number of requests processed in 2012, its first full year of operation. In 2018, total UBorrow requests surpassed 143,000 transactions (including both mediated and unmediated requests).²⁹ Yet, while the volume of UBorrow transactions has grown year over year, it represents a part only of the consortium's trade in returnable lending (Figure 13), amounting to about a fifth of all activity in 2015. As noted, consortial borrowing networks are an important source of fulfillment, accounting for 60% of BTAA transactions in recent years. Still, the global network of suppliers that participate in OCLC ILL (now known as WorldShare ILL) remains an important part of the BTAA resource sharing ecosystem, filling nearly 40% of requests for returnable items in 2015.

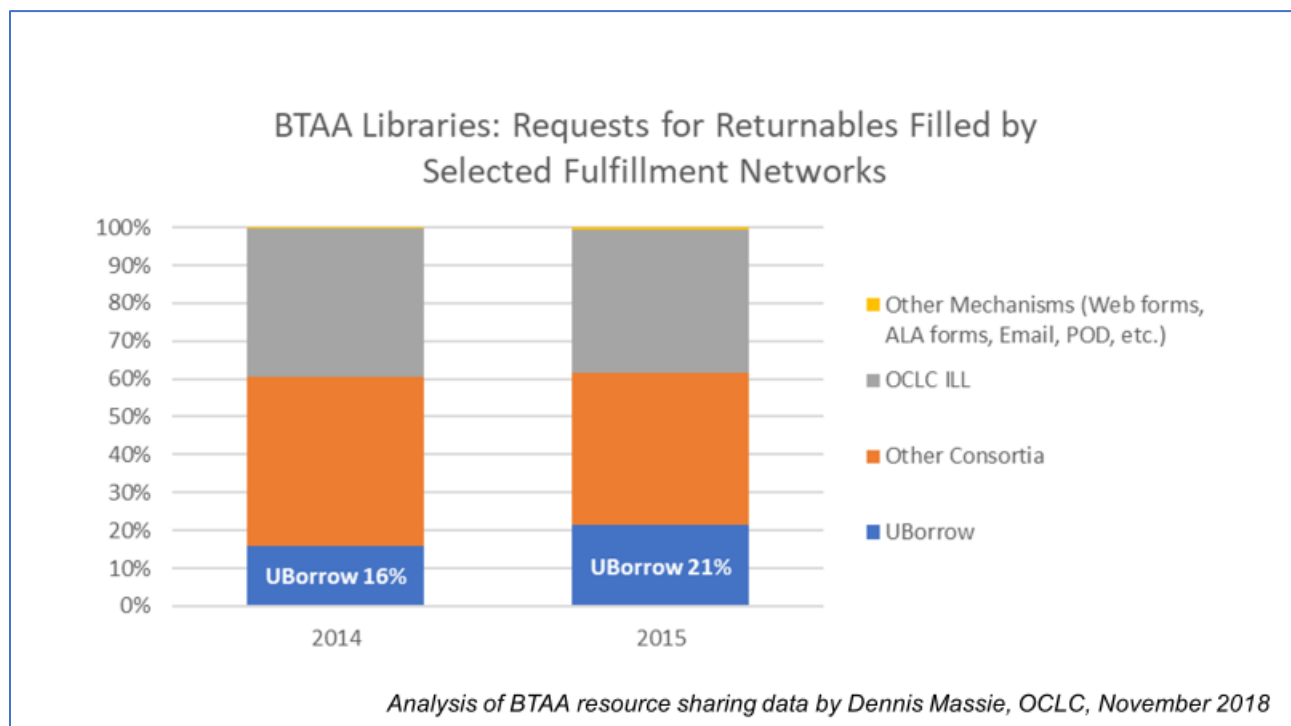


Figure 13 BTAA Libraries: Requests for Returnables Filled by Selected Fulfillment Networks

The growing importance of UBorrow as a fulfillment platform for BTAA libraries is evident when one compares the share of requests filled through UBorrow and other consortial networks (Figure 14). Between 2014 and 2015, the share of BTAA requests that were filled via UBorrow increased by nearly a third, rising from 26% to 35% of all consortium-filled BTAA requests. This is significant, as it demonstrates that UBorrow is enabling the BTAA collective collection to deliver more value to member libraries, meeting a growing share of the consortium's demand for library-owned content.³⁰

²⁹ Figures based on calendar year totals for mediated and unmediated requests processed through UBorrow for 2012, 2015 and 2018. See <https://reports.lib.uchicago.edu/uborrow/>

³⁰ The data presented in Figures 13-15 were self-reported by BTAA libraries as part of an OCLC Research project in 2015. Two of the BTAA libraries that participated in the project did not report activity from consortial borrowing arrangements other than UBorrow. Thus, the actual volume of consortial borrowing could be greater than is

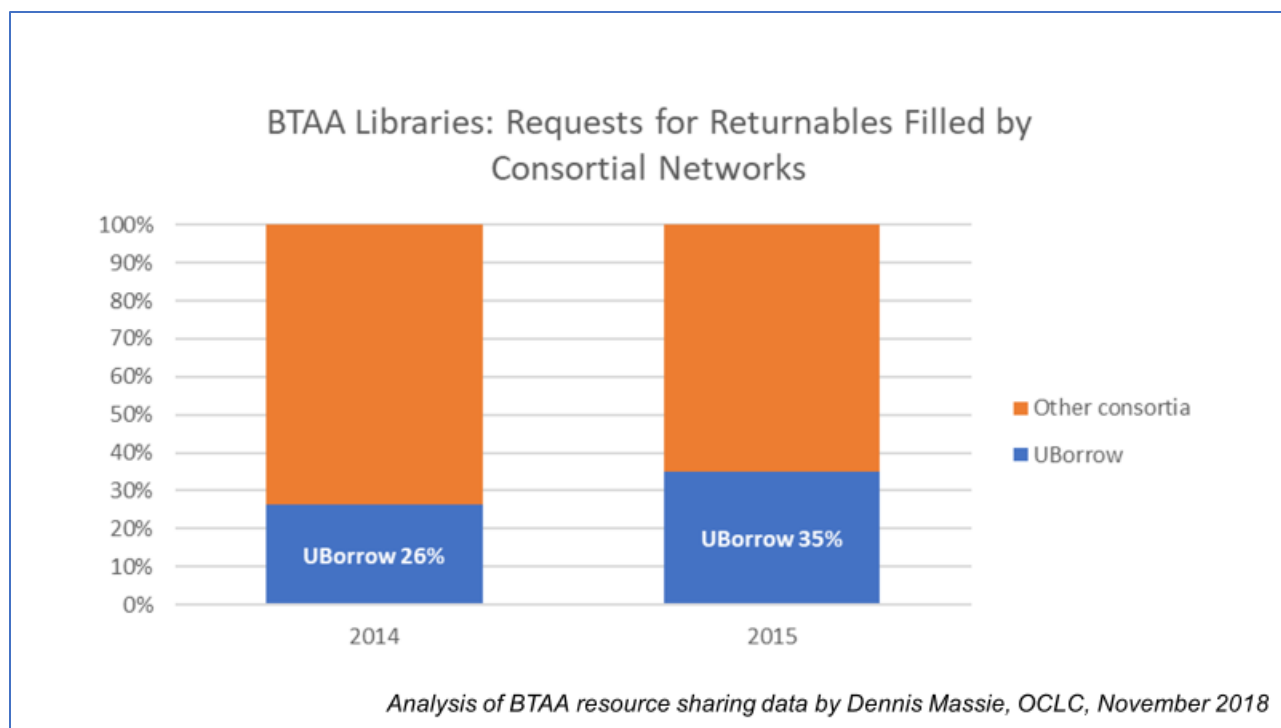


Figure 14 BTAA Libraries: Requests for Returnables Filled by Consortial Networks

It is important to recognize that intra-consortium fulfillment for BTAA libraries is not exclusively reliant on UBBorrow. Member libraries also borrow and loan materials within the group using WorldShare ILL. As shown in Figure 15, more than half of all in-group requests were filled via OCLC ILL in 2014 and 2015. The reasons for requesting BTAA items outside of the UBBorrow platform vary. Participating libraries expose only certain portions of their collections on the UBBorrow platform, so requests for some materials must be processed outside the system. And, as documented in the D2D reports, surfacing the UBBorrow collection in local discovery environments for direct, patron-initiated requesting (when this is desired) presents some challenges. The Direct Request service within WorldShare ILL, which facilitates patron-initiated requesting, is a particularly popular feature that likely accounts for some of the continued reliance on WorldShare ILL for intra-BTAA requesting.

Between 2014 and 2015, the total volume of intra-consortium borrowing within BTAA increased by 12%, rising from about 360,000 loans to nearly 400,000. The share of intra-consortium transactions that passed through UBBorrow rose from 40% to 48%. Nevertheless, the continued importance of WorldShare ILL for in-group lending is noteworthy and demonstrates that demand for the BTAA collective collection is greater than what is reflected in UBBorrow transactions alone. The 2017 UBBorrow Program Evaluation reports that 66% of loan requests were supplied from within the BTAA collective collection, and attributes increased reliance on the consortium's library resources to implementation of the UBBorrow system.³¹

reflected here, and the share of UBBorrow lending relative to other consortium lending may be somewhat different. Nevertheless, the overall trend of growth in UBBorrow lending is relevant and based on comparable data sources for the years reported here.

³¹ P. 5 in BTAA UBBorrow Review Committee (November 2017). *UBorrow Program Evaluation*
<http://www.btaa.org/docs/default-source/programevals/uborrow-program-evaluation-nov2017.pdf>

However, it seems clear that continued access to a broader swath of BTAA library resources via WorldShare ILL remains an important part of the BTAA collections ecosystem.

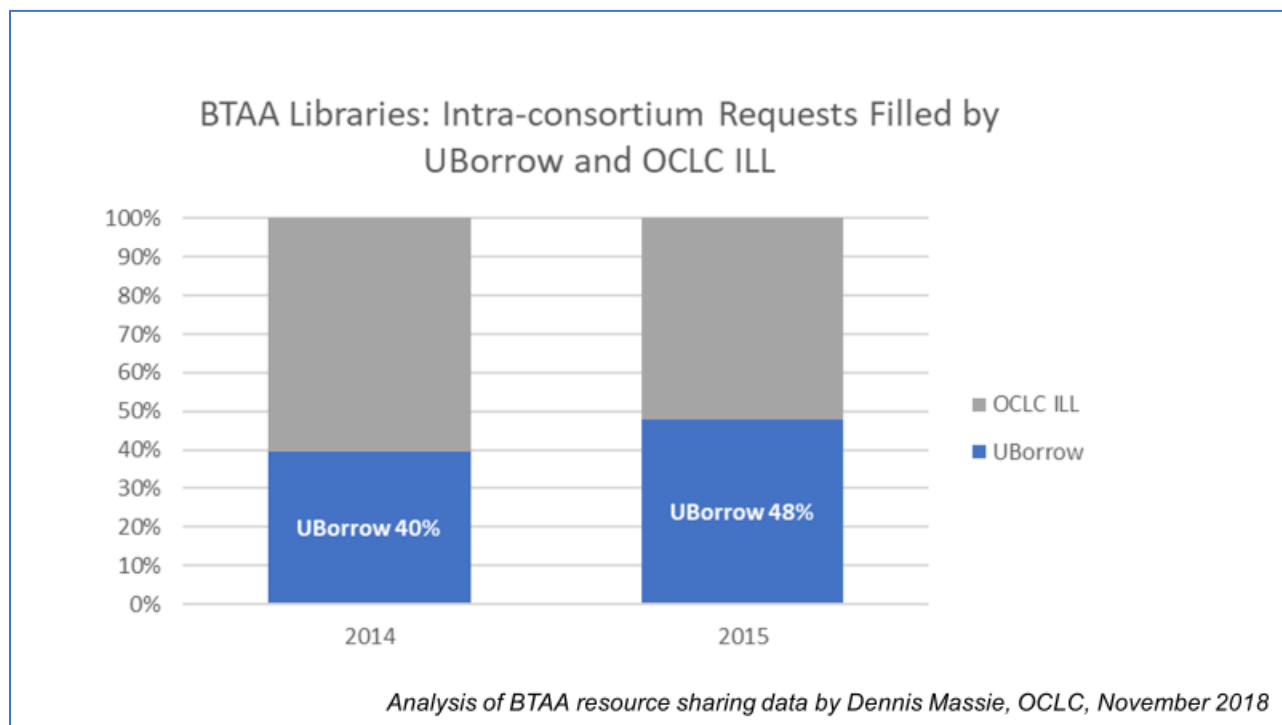


Figure 15 BTAA Libraries: Intra-consortium Requests Filled by UBorrow and OCLC ILL

Of course, the situation continues to change. For example, Indiana University joined UBorrow in 2018. The 2017 UBorrow Program Evaluation describes the ongoing improvements being made to UBorrow, including infrastructure and integration enhancements and policy implementation (e.g., extended loan periods), and records a progressive increase in requests channeled through it.

Finally, the BTAA Program Evaluation notes a desire to improve load balancing within the system as the benefits of participation are not felt equally across the group. They report that in 2016 five libraries (Northwestern, Maryland, Minnesota, Chicago, and Michigan) accounted for 64% of UBorrow requests, while all the BTAA libraries fulfill a roughly similar number of requests. They note that the use by some libraries of adjacent networks is one factor here. However, others included variations in how the service may be presented or implemented (for example, UBorrow promoted locally vs. integrated into catalogs or resolvers).

It is clear that resource sharing within BTAA continues to evolve. The use of UBorrow is growing and steps have been taken to further improve the experience through agreed loan periods and better integration between discovery and delivery for users and staff. At the same time, WorldShare ILL and adjacent networks are important parts of the ecosystem. For some libraries their participation in adjacent networks is an important part of their local operations and for this reason BTAA must consider how the BTAA ecosystem interoperates with the adjacent networks.

Resource sharing more generally also continues to evolve and to become a more general fulfillment option. The library may decide to borrow an item, to acquire it, or to locate an open access version. It may

need to interact with digitization on demand or controlled digital lending services. In this way, resource sharing is becoming very much an enabler of the shift towards the facilitated collection, where the goal is not so much to assemble a local collection but to provide access on demand to resources that fulfill a particular research or learning need.

Section overview:

The BTAA service ecosystem is a complex network of overlapping and intersecting systems. Better horizontal integration of service components would enable more effective coordination within and across fulfillment networks and reduce the overall cost and complexity of operations.

This section explores different possible configurations of the application environment supporting collective collections and proposes a target state, with some specific recommendations for how BTAA can participate in its creation.

3 Efficient network fulfillment: the collective collections service ecosystem

3.1 Introduction

If optimizing network fulfillment is a strategic priority, deliberate and coordinated action will be needed to rationalize the existing service ecosystem. Specifically, BTAA libraries will need to prioritize collective action in these ways:

- **Consolidate and simplify policy frameworks** across the BTAA to harmonize service expectations and provide greater predictability
- **Provide unified discovery of BTAA collections** with a shared index, group catalog, or other mechanism
- **Improve horizontal integration of the multiple, vertically integrated discovery and delivery applications** across the BTAA and networks important to BTAA members. Contribute to the development of a generalized broker architecture to manage across services and network level data components (holdings, policies, etc.)
- **Clarify requirements for dashboard services or applications** to provide strategic intelligence for managing the BTAA collective collection

These recommendations are broadly consistent with those put forward in BTAA D2D reports. Here we extend and build upon findings from the reports and focus on how the service ecosystem could be reconfigured to enable better coordination *within* BTAA and *across* BTAA and other networks.

Figure 16 uses our service framework to isolate relevant functional components of the resource sharing ecosystem. At the center are three broad categories of applications supporting discovery, delivery, and dashboard. These are typically integrated vertically in individual institutions (e.g., Primo and D2D, or WorldCat Local and INN-Reach) but are decomposed in this view. Surrounding the applications are a variety of data sources that inform service delivery: metadata about collections supports discovery; collections inventory is invoked for fulfillment; policies dictate service profiles and are reflected in dashboard performance reporting (e.g., benchmarking against established inter-lending turnaround

times). Transaction data about requests are aggregated for reporting to users (for account management) and library staff for monitoring the performance of the fulfillment network.

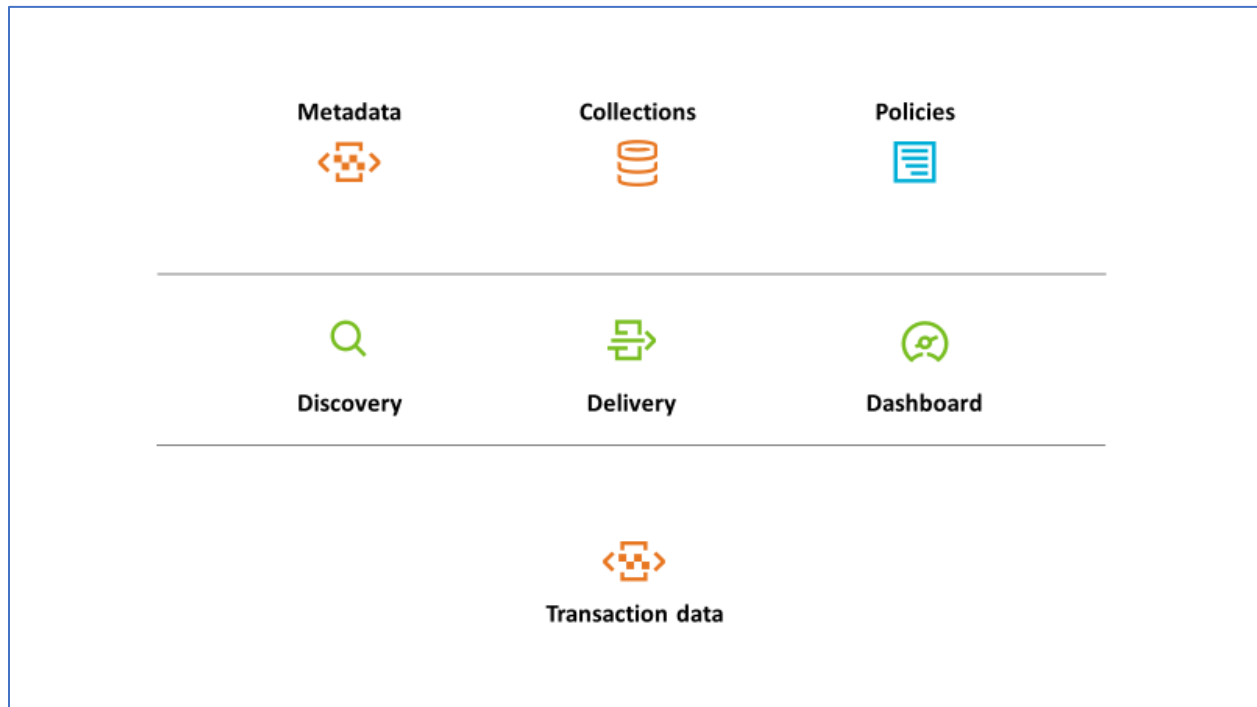


Figure 16 Application Components

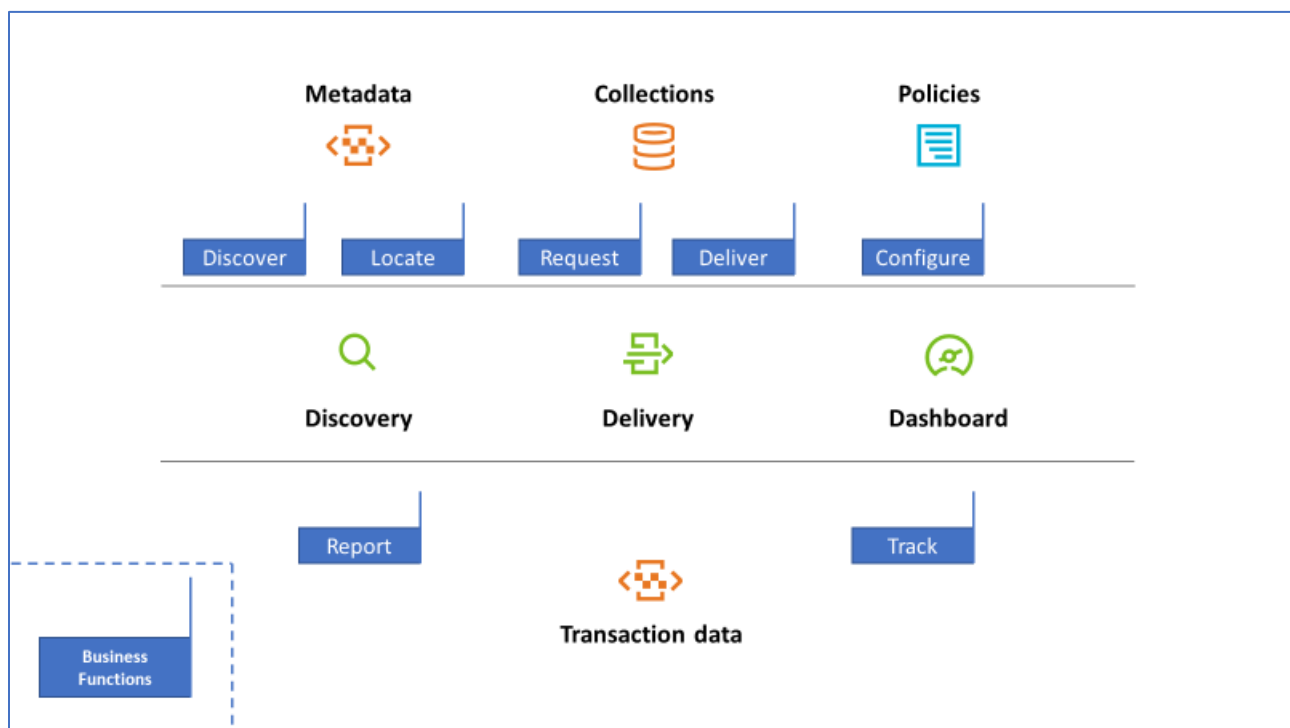


Figure 17 Application Components with Selected Business Functions

Figure 17 introduces some generic business functions that the application layer is generally expected to support: Discovery, Request, Locate, Deliver, etc. We include just a few illustrative examples of these functions. The goal here is to suggest how different components can be combined to create a system that supports end-to-end discovery, delivery, and management of a collective collection. One area where BTAA could exercise its influence is prioritizing the business functions most critical to integrating discovery, delivery, and management across the complex applications ecosystem. (We return to this in our recommendations in **Section 6.**)

[M]ost libraries manage interactions across a mix of fulfillment networks, with correspondingly differing applications, policies, etc.

The components identified here can be combined and configured in various ways. Individual libraries and fulfillment networks will each have some combination of components from the Enterprise, Applications, and Collections

stacks. As shown in Figure 18, this results in duplication of some components at institution- and group- or network-scale. Strategies and policies are set locally and within groups; applications (discovery environments, management systems) will be implemented at institution-scale and group-scale; collections inventory and metadata are managed locally as well as consortially. Managing the interactions between these can become complex. And, again, we emphasize how much more complex this gets when you work across multiple networks as you multiply interactions between policies, applications, collections, and so on.

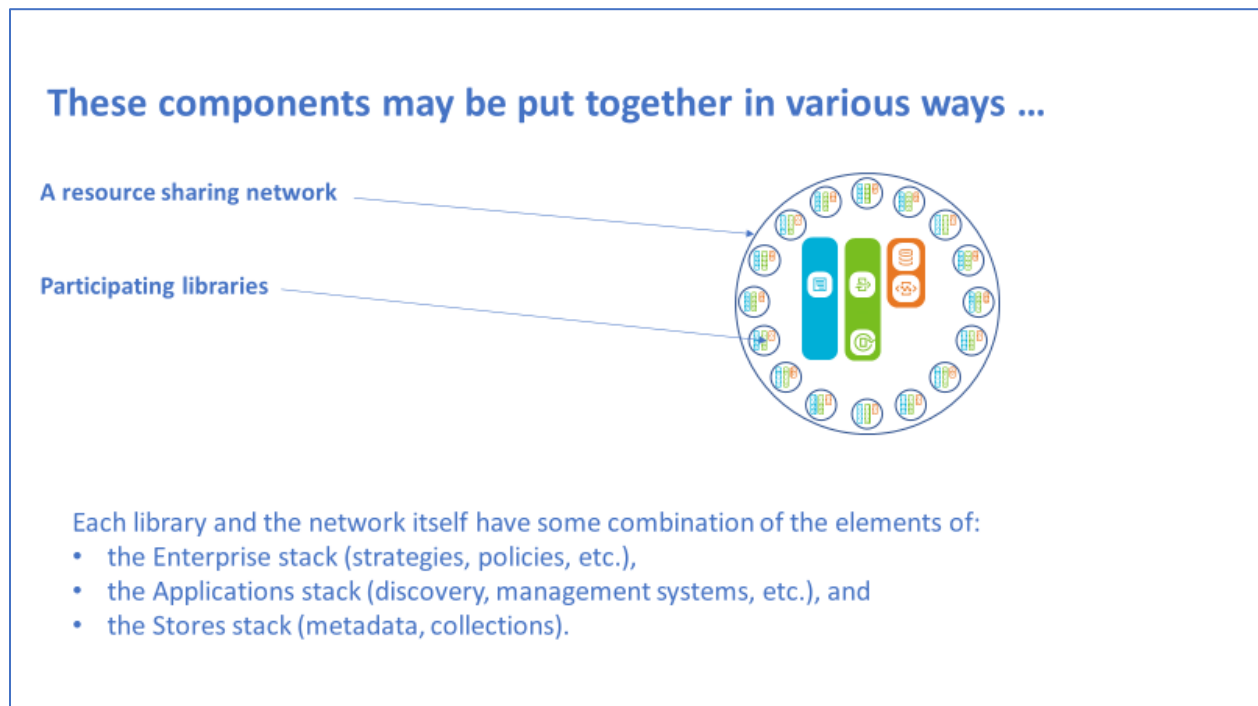


Figure 18 Component Configurations: Institution- and Network-scale

3.2 Current ecosystem

In the current ecosystem, consortia implement a variety of different applications to support group-scale discovery and delivery. The result is a range of fulfillment networks that assemble the core components in a variety of ways. There is some working across these, notably using an ILL manager like ILLiad but also from discovery layers. But there is also some siloization and in many cases interaction relies on human intervention.

Figure 19 shows common ways in which resource sharing fulfillment networks are implemented, arrayed along the cooperation-to-consolidation continuum. Our positioning here is directional rather than definitive—there are no fixed categories and the environment continues to change with developing library and consortial needs as well as with evolving offerings from service providers. At one end, WorldShare ILL enables a broad array of institutions to share resources in a loosely federated network of cooperating institutions. Within this network, there is an opportunity to build more closely coordinating groups in the form of custom holdings groups. Libraries use WorldShare ILL to request in a global network of libraries, but also for intra-consortial BTAA requesting.

At the other end, a group-scale ILS provides more consolidated operational integration. In this model, a group of libraries use a shared instance of an ILS and resource sharing becomes a function of circulation. Examples here are PALNI and Orbis Cascade Alliance. Between these two endpoints there may be progressively more coordinated approaches. For example, at the consortial borrowing level and in different ways, OCLC D2D, SHAREit from Autographics, or Rapid ILL allow groups of libraries to more closely coordinate resource sharing networks. INN-Reach is an example of libraries using different instances of the same ILS with a federating resource sharing application working across them, as in OhioLINK. Libraries using Ex Libris Alma may also federate into resource sharing networks as in the CARLI I-Share implementation currently underway or TRAC in Iowa/Nebraska.



Figure 19 Consortial Service Environments

Of course, these approaches are not mutually exclusive, and can meet different as well as overlapping needs. The trade-offs between autonomy and consolidation discussed above very much come into play here. A shared ILS platform requires a high degree of consolidation, through shared planning, policy making, and investment across member institutions. It will typically have a relatively small number of members, agreeing to coordinate closely, and enshrining their shared commitments in clear agreements. WorldShare ILL, on the other hand, allows thousands of libraries worldwide to collaborate to share resources. It allows relatively autonomous libraries to participate in a broad network without multiple bilateral agreements.

Most libraries manage interactions across a mix of these fulfillment networks, with correspondingly differing applications, policies, etc. ILL management applications such as ILLiad and Tipasa enable some integration between systems, and discovery layers can be configured to direct requests to designated fulfillment networks. However, there is still reliance on human expertise and labor to triage requests and direct them to appropriate fulfillment networks. Additional human labor is typically required if a request is unfilled and must be redirected to an alternative network.

Section 1 introduced our “stacks” framework as a way of conceptualizing three classes of interdependent components in the library service environment. Applying this framework to the BTAA as shown in Figure 20, we can identify areas where group-scale coordination is relatively weak or strong. In the applications stack, consortium level coordination is limited: institutions have implemented Uborrow differently and rely on various combinations of additional fulfillment networks, resulting in a fragmented discovery environment and complex resource sharing operations. There is no central aggregation of transaction data for monitoring or optimizing operations across BTAA or for supporting end-user account

management (the dashboard application). While several BTAA libraries have converged around a common ILS platform (Alma), management systems are implemented locally. There is currently no planned ILS consolidation across the whole group, although this has been discussed as an option. If this were to happen, coordination with other fulfillment networks is still necessary. BTAA-level coordination of the Enterprise and Collection stacks is also limited. In the absence of strong central coordination, individual libraries are required to maintain a complete local stack in each of the three areas, and to manage a complex set of interactions with partners in other networks.

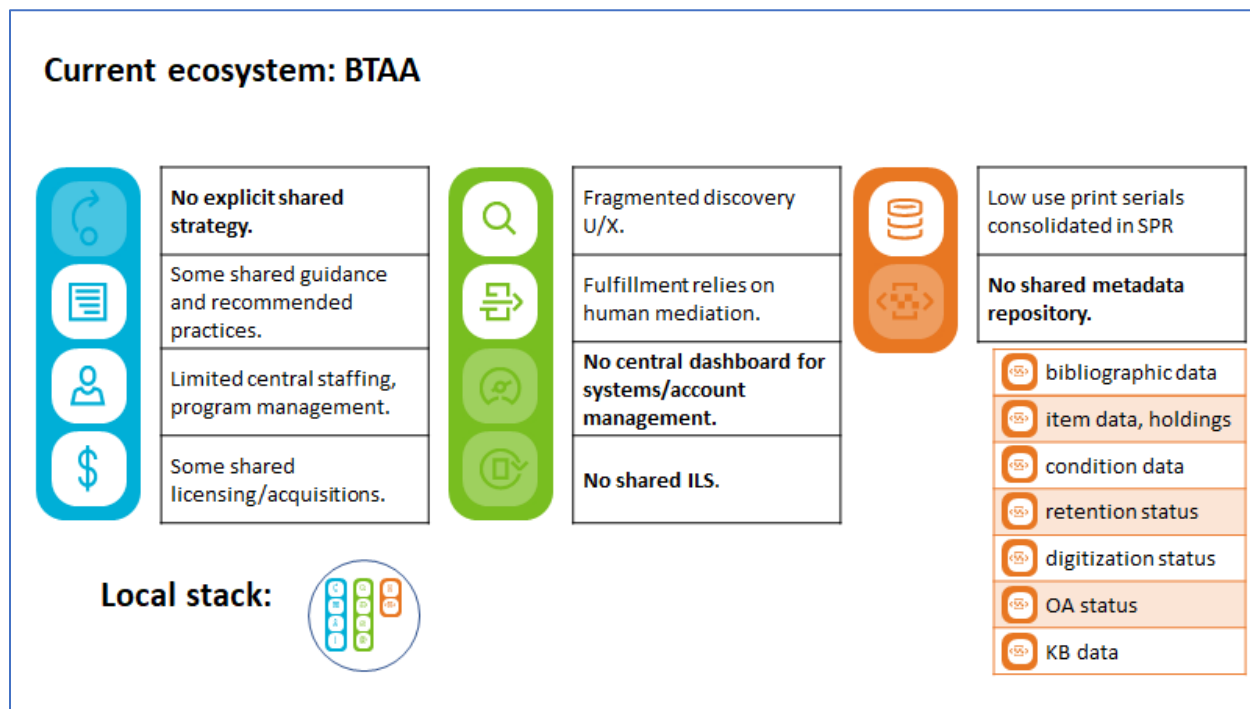


Figure 20 Current BTAA Service Ecosystem

Consider the choices BTAA libraries make when organizing their resource sharing operations. Rutgers University libraries participate in at least seven different resource sharing groups, with varying levels of coordination capacity (Figure 21). Some of these relationships are stickier than others and a consortium that is more strongly coordinated, with robust Enterprise, Applications, and Collections infrastructure, will exercise more pull than weakly coordinated groups. BTAA, PALCI, and RAPID offer relatively efficient coordination of inter-lending with some automation of availability, requesting, and load-leveling within those groups. Nonetheless, each borrowing request from Rutgers requires human mediation, since library staff must decide *which* of the networks to invoke as a potential supplier. The absence of an automated “switching” mechanism for routing requests *between* groups (based on holdings, availability, policies, and more) means that request-handling requires human intervention. As one director observed, “complexity explodes at the seams” between groups.

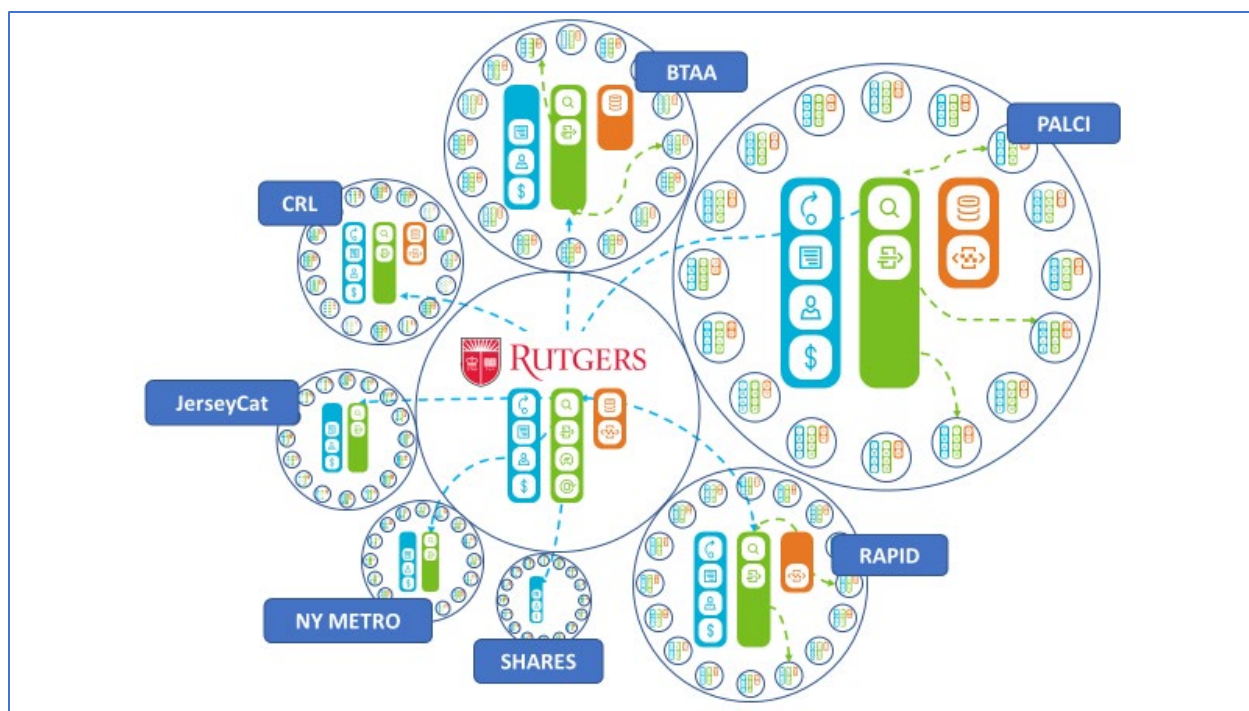


Figure 21 Fulfillment Networks: Rutgers University

Overlapping and intersecting with these resource sharing networks are the various shared print preservation programs in which Rutgers participates, including the BTAA Shared Print Repository (SPR), CRL's JSTOR and shared journal archive, and the PALCI Distributed Print Archive. There is no common application or policy infrastructure underpinning these programs, and no integration with resource sharing applications or workflows. Consequently, resource sharing and shared print, two functional areas that are key to managing the collective collection, are effectively managed separately, reducing operational efficiency.

The situation at The Ohio State University (see Figure 22) is not much different. OSU libraries are embedded in numerous resource sharing networks, with differing levels of coordination. BTAA libraries could potentially fulfill a large share of OSU inter-lending requests; however, OSU patron requests are systematically directed to OhioLINK for fulfillment. This is primarily due to the strategic importance of OhioLINK as a state partner, but the mutual dependence of OSU and OhioLINK is reinforced by the efficient coordination of the consortium, underpinned by shared infrastructure (including a common ILS platform) and strategic vision. Like Rutgers, OSU participates in a range of multi-scalar shared print efforts, including the BTAA-SPR, the Ohio regional depository network, and HathiTrust's Shared Print program. Currently, there is no programmatic coordination of activity across these activities, and limited integration between shared print and resource sharing operations.

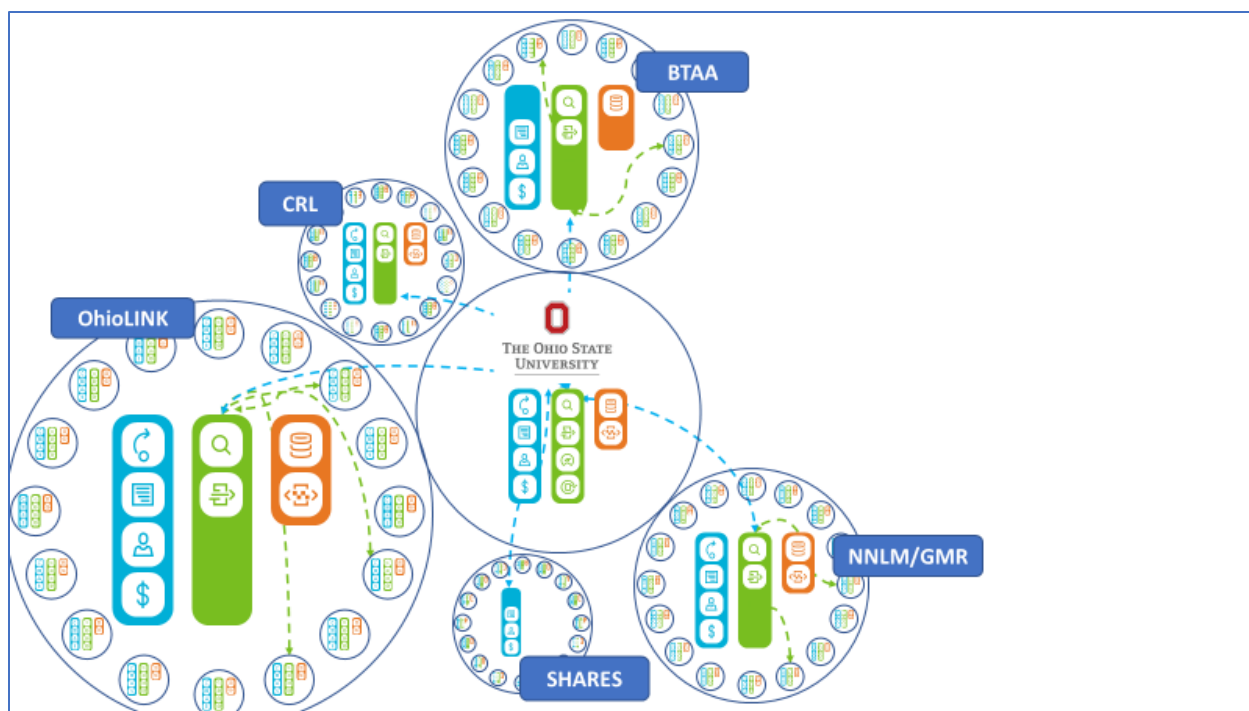


Figure 22 Fulfillment Networks: The Ohio State University

As these examples suggest, individual BTAA members bear a significant coordination burden. They manage relationships with multiple networks, each of which relies on a different configuration of Enterprise, Application and Collection stacks.

Thus, while interoperability reduces complexity for the end user (a single “request it” option, a single discovery interface) or systems administrator (simplifying applications integration), it does not rationalize the underlying service components, because they are, by design, independent.

The overall picture of collection sharing activity in the BTAA is complex, even in our schematic rendering in Figure 23. This is not surprising given the independent development of the libraries, the variety of fulfillment options involved, and the historic pattern of resource sharing activity. Each library must balance the benefits and tradeoffs of coordination with multiple partners, for inter-lending and document fulfillment, as well as for

shared print activities. There is currently no central coordination of metadata flows from member libraries to important data hubs like WorldCat, HathiTrust, or PAPR. There is as yet limited centralized management information (dashboard) to support collective decision making about, or even understanding of, the distribution of collections, flows of requests, and important dependencies. Greater coordination could improve network efficiencies and increase the stickiness of the BTAA partnership.

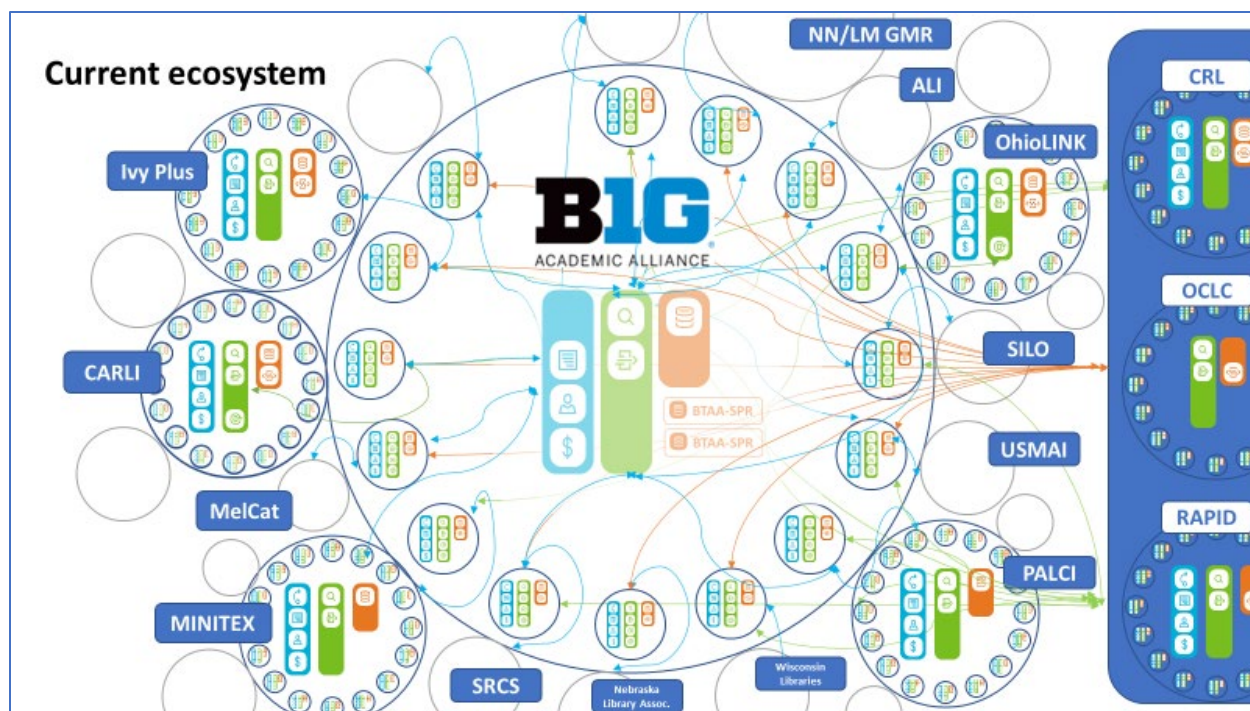


Figure 23 BTAA: Adjacent Fulfillment Networks

3.3 Coordinated ecosystem: a continuum of approaches

For convenience of description, we suggest there are broadly three main approaches to coordinating operations across this complex systems environment.

Again, these emphases are directional rather than definitive:

- application-level interoperability, typically supported by standard protocols or APIs that exchange data between applications
- middleware that abstracts away some of the underlying complexity of different application environments, providing a central hub which communicates with various applications
- re-engineering the systems environment, through a systematic refactoring of underlying operations and consolidation of key components such as policy and holdings data

The first approach reflects the current situation. The second is the approach recommended in the BTAA D2D reports. The third suggests a direction which could improve performance but would require some industry collaboration to achieve.

And, of course these approaches are not mutually exclusive, but reflect greater coordination of the environment. Note again that the environment we have to look at it is not just UBBorrow, but the range of services used by individual libraries in this area.

It will be readily apparent that we are purposefully hiding architectural complexity and design choices in the following discussion, as well as fine-grained operational detail of the BTAA environment. There is some further high-level treatment of components and interactions in the collective collections ecosystem in the Service Framework appendix (**Appendix 1**). In the chaining case we discuss below, for example, we note some interest in being able to transmit requests directly between fulfillment networks. Of course, this could be done in various ways and with different levels of functional sophistication. Think, for example, of the discover/locate/request sequence, where one wants to know if an item exists (discover), whether an instance is available (locate), and to carry out a service on it (request). A minimal approach might be to communicate a request without any forward knowledge about whether it is held, whether it is available, or under what terms or service levels it might be available, and to see what happens. Such forward knowledge could be provided by access to an index of holdings (to say whether it is held), to circulation status (to say whether it is available), and to a policies directory (to say under what terms it is available). And the index, circulation status, and policies could, in turn, be available in different ways—to be looked up dynamically or in more consolidated ways as searchable resources to players in the ecosystem.

3.3.1 Application-level interoperability

The current ecosystem comprises local library management systems, integrated discovery and delivery systems, ILL managers, and others. These are mostly vertically integrated: they combine discovery, delivery, etc., in one application. Individual libraries configure local systems to maximize interoperability. Operation depends on interoperability between a variety of applications and uses a mix of standard and proprietary approaches.

This mix is a natural outcome of the pattern of library automation, which has evolved around local library systems optimized for managing local collections. Resource sharing tended to happen outside of those systems. There is a separate ILL management system (ILLiad in this case) and messaging infrastructure (WorldShare ILL or consortial borrowing systems). More recently, the scope of the ILS has broadened to begin to include group functionality, allowing libraries to share materials within the group using it.

In general, fragmentation delivers a poorer user experience and can dampen use. Removing or obscuring fragmentation can improve the experience and increase use. A good example is provided by the impact of closer integration between discovery and delivery as briefly mentioned in **Section 1**: the combination of an ILLiad add-on and a D2D web service allows patron requests to be automatically converted to UBorrow requests. This generated 45% of new UBorrow requests as of late 2017 and is a good example of why interoperability is important in the current environment.³² The end-user is shielded from complexity and the need for staff mediation is removed. Adoption of a common loan period throughout the group was also implemented in late 2018. Together, these steps have increased UBorrow traffic and improved the experience.

If one looks at UBorrow alone, a recent description of evolution can be found in the UBorrow Program Evaluation 2017. It relies on consortial borrowing software (D2D) from OCLC and ILL management software from Atlas Systems (ILLiad). Discovery systems or resolvers can communicate with Atlas with OpenURL. D2D communicates with local systems to determine holdings via Z39.50. In addition, requests

³² *UBorrow: program evaluation*. November 2017. <http://www.btaa.org/docs/default-source/programevals/uborrow-program-evaluation-nov2017.pdf>

may be sent to WorldShare ILL. NCIP permits lookups for availability. D2D has developed requesting logic to do request routing and load balancing based on several factors including library preferences.

However, as we know, the resource sharing environment is more complex than this. Some libraries participate in one or more adjacent networks for resource sharing. And they may use other delivery systems for document delivery. There are also other service elements such as HathiTrust or CRL. And in the future one may want to more effectively integrate the shared print repositories into the systems framework. ILL management applications provide valuable assistance in tracking activity or in moving between networks, and OpenURLs are used to communicate between discovery systems or resolvers and ILLiad or other systems.

In this environment, then, communication between discovery applications and backend delivery systems depends on a variety of interoperability points, as shown in Figure 24.

Policy differences are a critical non-technical issue. As noted at various points in this report, expert human knowledge of policy frameworks is sometimes needed to identify relevant fulfillment networks and route requests appropriately.

Thus, while interoperability reduces complexity for the end user (a single “request it” option, a single discovery interface) or systems administrator (simplifying applications integration), it does not rationalize the underlying service components, because they are, by design, independent. Human expertise and staff mediation are still required to move requests between UBBorrow and RapidILL, for example, or to execute lookups against various registries of library holdings or retention commitments, etc.

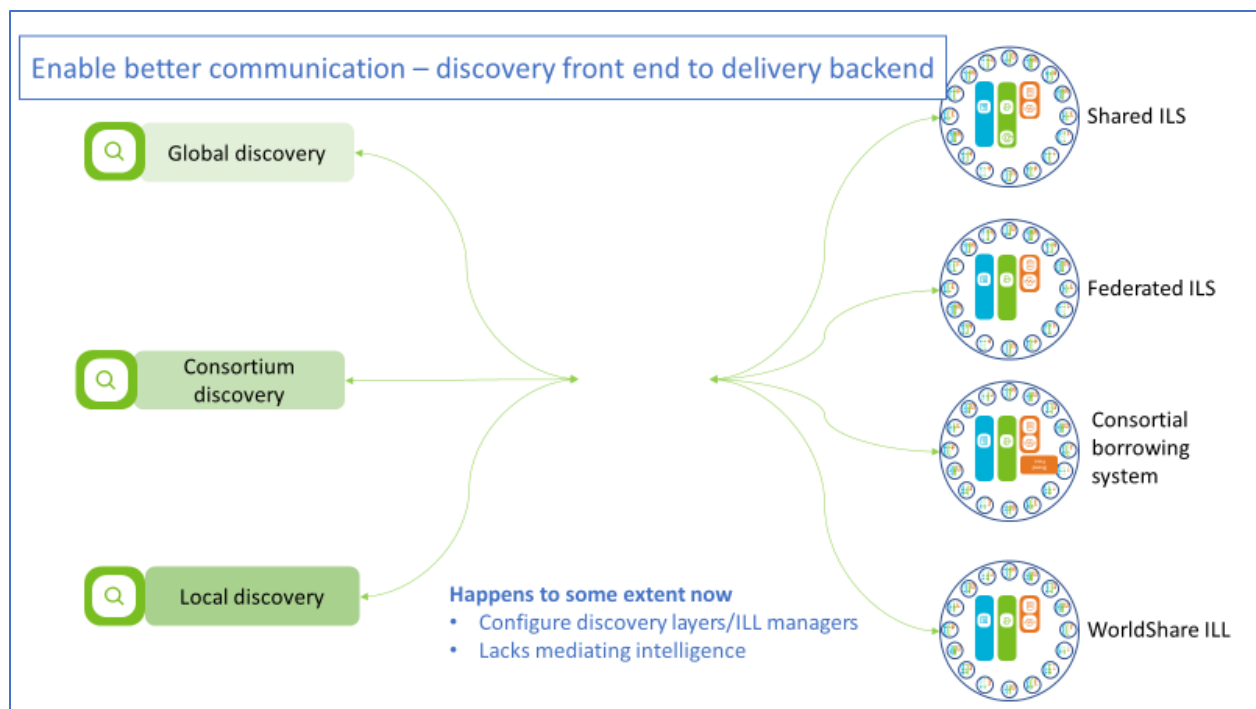


Figure 24 Application-level Integration

One of the approaches currently being explored by BTAA and others is to pass requests from one consortial fulfillment network to another with minimal human intervention (Figure 25), we call chaining. This is not done directly now, although discussions around the ReShare initiative, for example, have discussed this as a possibility.³³ However, managing request routing, load balancing, policy frameworks, and so on are still an issue.

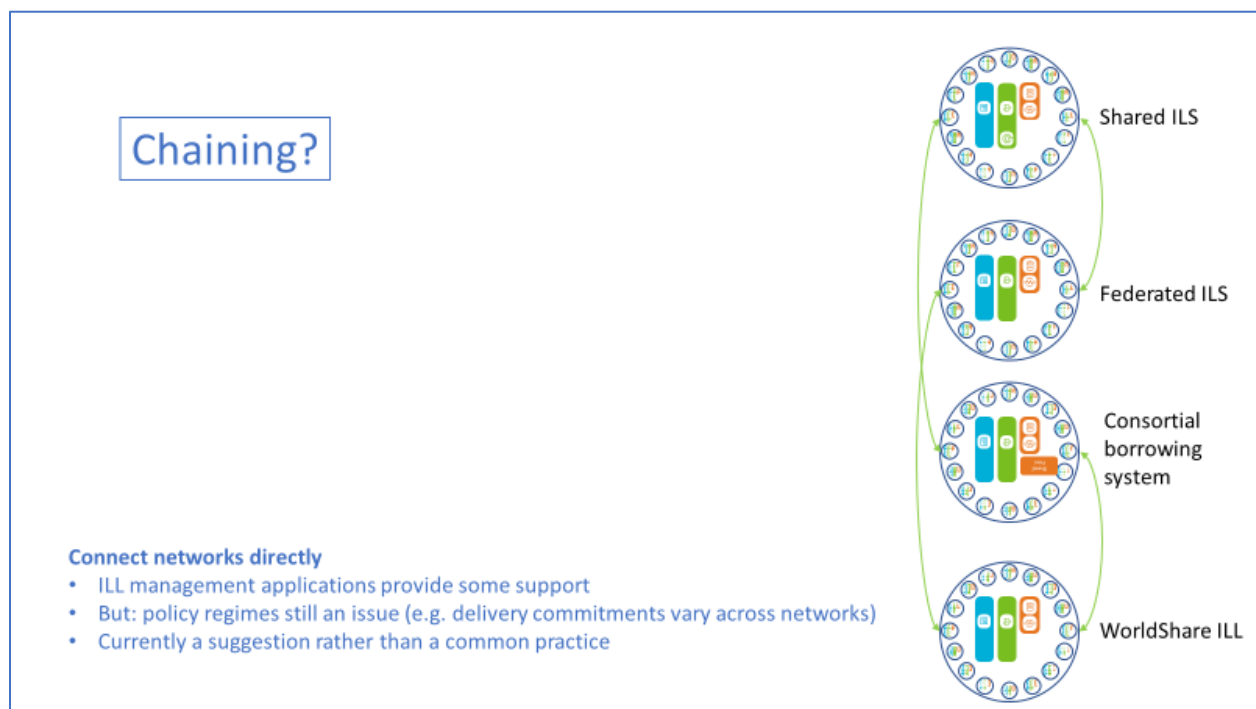


Figure 25 Chaining Fulfillment Networks

3.3.2 Broker service or middleware

Middleware is software that aims to reduce complexity in the user environment by providing a layer in which different applications can communicate. It does not resolve the underlying complexity but provides an environment where it can be managed and made less intrusive. We use “broker” to refer to this middleware layer. A broker manages interactions between independent systems and services. A broker may be more (or less) functional—in terms of the number of disparate systems it can interact with (to discover, locate, or request items); or the intelligence it incorporates to make decisions about routing, service selection, etc.; or the data it collects about transactions. Ideally, one would want a broker to be functional enough to remove human interactions.

Of course, a broker also relies on interoperability—what it adds is some management of the interactions between underlying interoperating applications and services, and it incorporates some intelligence about selection and use of those services. However, the broker remains limited by latency, breakages, or other inefficiencies in the underlying interactions between components.

³³ <http://projectreshare.org/>

The Shared Collections Service Bus (SCSB) initiative at ReCAP is an example of a middleware hub or broker that connects discovery and inventory management systems at ReCAP partner libraries.³⁴ In the ReCAP model, a central index is created by the SCSB middleware. This index can be searched itself as a target or shared back with participating libraries for inclusion in their discovery layers.

The BTAA D2D reports recommended middleware as a solution to the current discovery and delivery environment. As noted above, some broker-like activity has been built into the current framework, as part of applications like ILLiad or D2D or custom-built as add-ons. The broker facilitates what the D2D reports call “smart fulfillment.”

As yet, no generalized architecture for broker-based discovery and delivery has been proposed in this environment. Achieving community agreement on the core business functions that a generic broker architecture should support is a worthwhile goal, to which BTAA can contribute valuable insight and expertise.

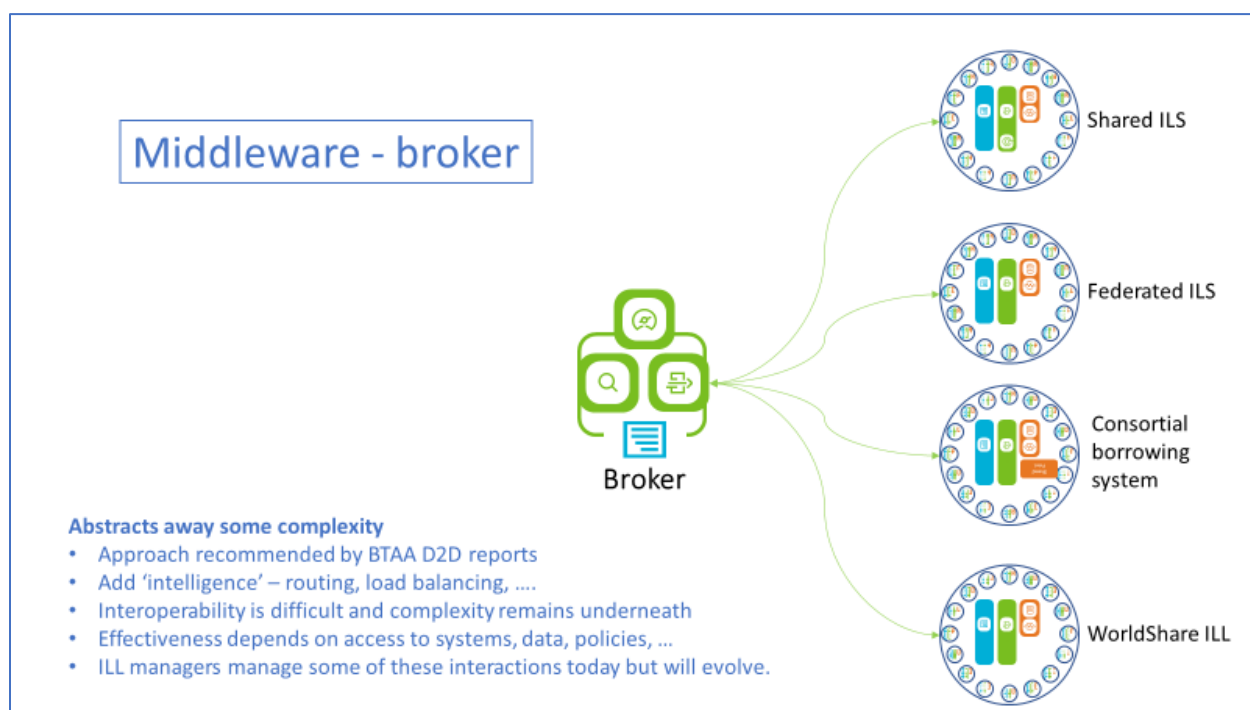


Figure 26 Broker-based Resource Sharing

Scalability is a key issue for middleware solutions: how many spokes can be connected to the hub (Figure 26)? The overhead of achieving interoperability with multiple systems is considerable and incentives to support an ever-widening variety of integration points are limited. The effectiveness of a central brokering solution ultimately depends on access to data about collections, usage, access policies, and more. Consolidation of some data sources (collections metadata, policies), systems (group-scale discovery) and inventory (shared physical collections) can improve efficiency and scalability.

³⁴ <https://recap.princeton.edu/collections-services/shared-collections/SCSB>

3.3.3 Refactoring

A third option for improving coordination is to reduce underlying complexity in the systems environment itself. Some of this would be achieved by decomposing the vertical stacks and recombining them horizontally.

A prime example here is to think of further separating discovery from delivery, so that a discovery component can communicate with several delivery components, and a delivery component can accept requests from several discovery sources. Another example would be to consolidate discovery into a BTAA-level discovery experience, or a WorldCat-level discovery experience, which could communicate with the BTAA delivery component, or indeed one of the delivery systems in the other networks. Discovery could also be addressed by adding a shared BTAA index to each library discovery layer. This last approach is taken with ReCAP for example, and scalability across a group this size would need to be explored. A third example would be to consolidate user transactions across some part of the network in order to have better analytics to support decisions (through a dashboard like application). Policies are also relevant here—both the infrastructure to access them and the nature of the policies themselves. Having a shared policy directory allows different applications to query it. However, it would also be useful to reduce unnecessary variation in policies, acknowledging that uniformity simplifies operations.

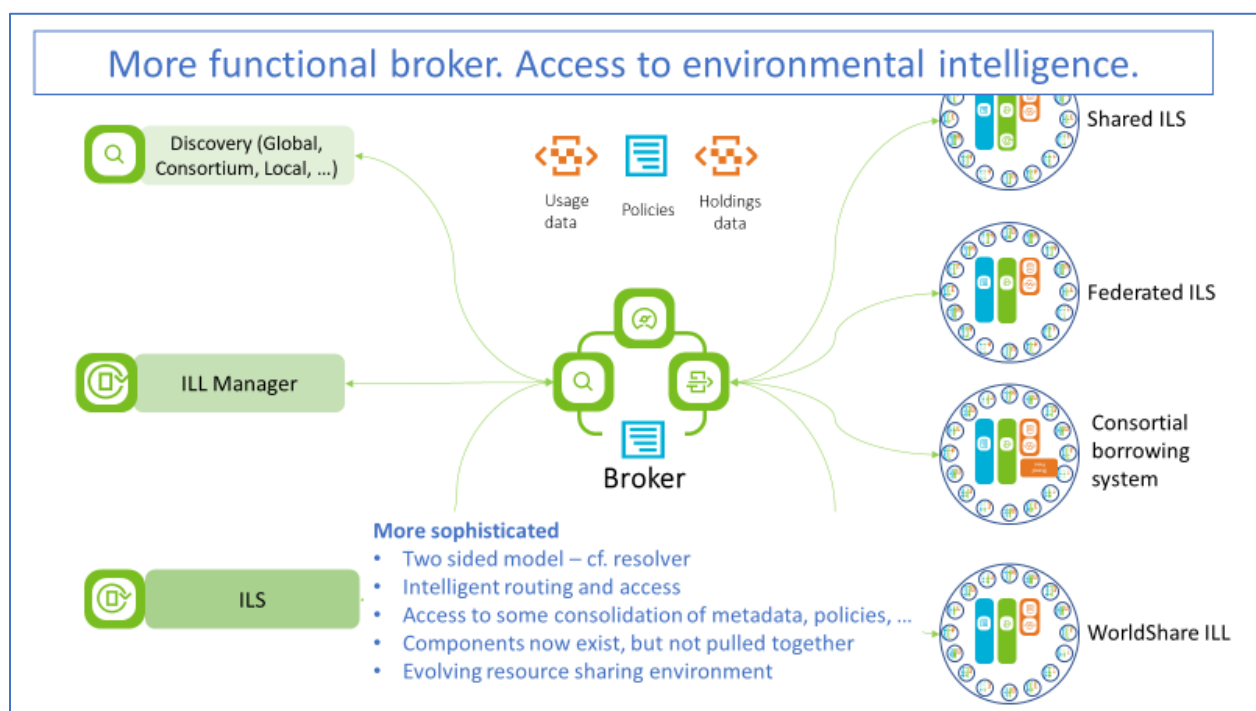


Figure 27 Optimized Broker

Decomposition and reconsolidation of service components would lead to a reduction in the number of systems requiring integration and reduce overall complexity (Figure 27). Ideally it would also facilitate the introduction of new systems, as there would be fewer and more well understood connection points.

The kind of refactoring described here is not trivial. It would require realignment of existing systems and services. Agreements about the shared data layer (access to holdings data, transaction data, policies) would also be needed. And it raises important questions about the tradeoffs of scaling across multiple networks: a key advantage of consortial borrowing is improved control over experience, delivery times, and so on. How will service levels and “localization” be impacted when multiple fulfillment networks are coordinated?

However, it would also be useful to reduce unnecessary variation in policies, acknowledging that uniformity simplifies operations.

A two-sided broker model is key here as well, to manage interactions between components. Our focus here has been resource fulfillment networks. Of course, one could expect the broker to develop in additional directions—to refer items for

acquisition based on some logic, to buy items, to look for open access materials, or to identify digital copies. Elsewhere, we discuss controlled digital lending, another option that will potentially need to be managed in this environment.

3.4 Target ecosystem

The resource sharing environment is evolving at a rapid pace—there are ongoing developments around “smart” fulfillment, unmediated request routing and broker-based models within consortia and a variety of service providers. UBorrow itself has seen quite a few changes with increased participation, traffic, and some standardization of policy.

BTAA is well positioned to influence future service directions by contributing to the development of a generalized broker architecture and further specifying requirements for a shared data layer.

BTAA can maximize its impact on the broader library systems environment by leveraging its expertise and influence to improve resource sharing within and especially across fulfillment networks.

While there may be greater consolidation of the ILS in the future, the BTAA libraries still have to work across adjacent networks as well as other fulfillment networks (e.g., for spot acquisitions or for open access materials). We envision a future BTAA service ecosystem (see Figure 28) in which individual libraries are likely to maintain a high level of

institutional autonomy for some time, while also realizing that they can make important gains in efficiency and impact.

These gains will be enabled by agreeing to greater coordination of elements in the BTAA applications stack, alongside some changes in the enterprise and collections stacks. Better horizontal integration of discovery services will provide a more unified discovery environment for the end user (discovery). This could be achieved in various ways as suggested above (a search of a shared index, addition of shared index to local discovery environments, search of a centralized service like WorldCat, etc.). A move to smart fulfillment through improved broker services will leverage the BTAA collective collection to better effect

and broaden access to the resources of adjacent networks (delivery). BTAA policy frameworks will be further harmonized and consolidated so that service level expectations are more uniform across the consortium.

Finally, better management of the collective collection will be achieved by more effectively harnessing data across networks, providing BTAA managers with improved systemwide awareness (dashboard). This includes metadata about holdings, transactions, and such thing as shared print retention commitments. In **Section 5**, we identify several actions BTAA libraries can take to develop stronger systemwide awareness. In particular, it is important to have access to shared policy data and shared holdings data.

BTAA can maximize its impact on the broader library systems environment by leveraging its expertise and influence to improve resource sharing *within* and especially *across* fulfillment networks. Exploring broker-based approaches to network-level discovery and delivery, and refining requirements for dashboard management services are areas where BTAA involvement will deliver most value.

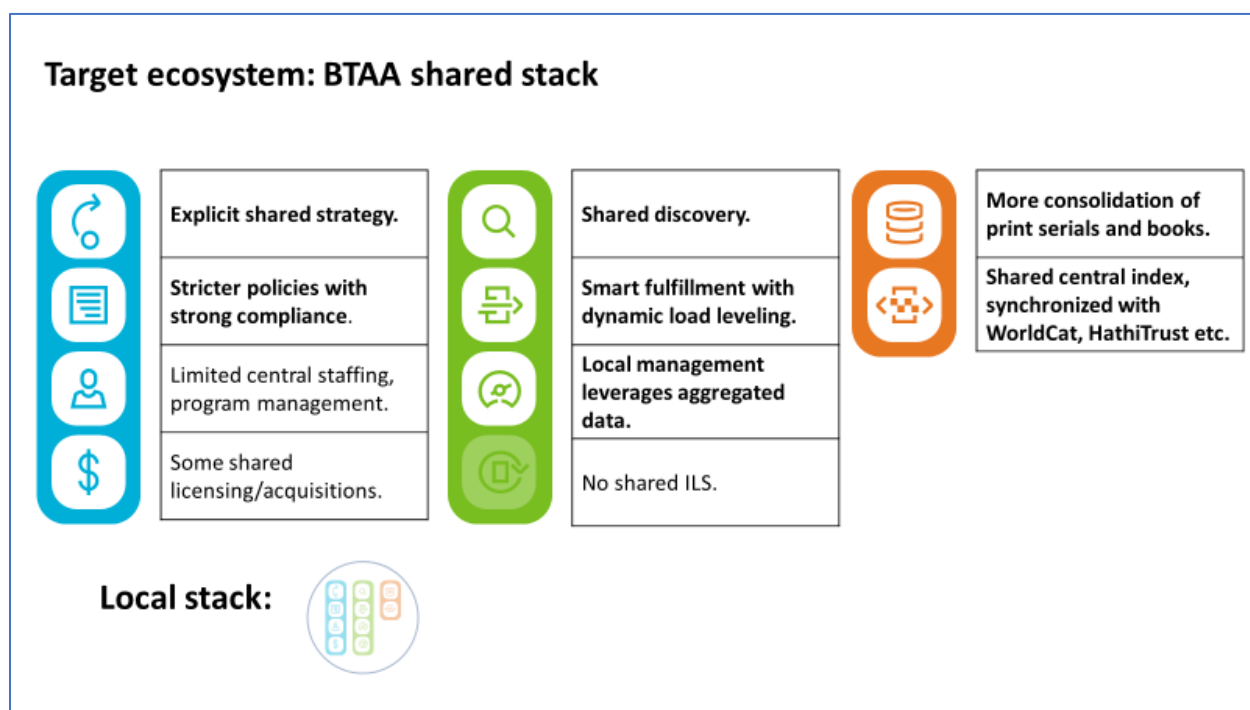


Figure 28 Target BTAA Service Ecosystem

Section overview:

More strategic and conscious collection coordination across the BTAA will result in long-term benefits to member institutions. To achieve these benefits the libraries will need to agree to greater shared strategy, planning, and investment, and to take more of an integrated systemwide view of shared activities. In this way, patterns of use, for example, might be mobilized more purposefully to influence collection development, shared print initiatives, or digitization.

As the role and composition of collections change, libraries should think of approaches that rely not only on retrospective coordination of autonomously developed collections (resource sharing, for example) but also on prospective collection coordination (shared acquisitions of strategic materials, for example).

A long-term goal might be to optimize the collection at the BTAA network level for the benefit of all, rather than at the institutional level.

4 Optimally distributed collections: the collections ecosystem

4.1 Introduction

BTAA is well-placed in terms of institutional alignment and broad geographic presence to more purposefully coordinate managing, building, and sharing their collections. Moving in this direction requires a decision to optimize collections at the BTAA network level.

We highlight two related aspects of systemwide optimization through stronger coordination:

1. **Greater coordination across shared activities.** We have already introduced various areas of coordinated collections under the general umbrella categories of prospective and retrospective collection coordination. At present, each area tends to be managed independently rather than in concert or in mutually aware ways. Optimization would be substantially facilitated by better **systemwide awareness**, that is, a systemwide view of data about collections, usage, policies, and other elements of the ecosystem. Can greater intelligence about resource sharing flows, for example, influence collection development practice or the development of additional print repositories? We discuss this briefly in **Section 5**.
2. **Greater coordination across libraries.** Currently, BTAA collaboration around collections is

Optimization would be substantially facilitated by better systemwide awareness, a systemwide view of data about collections, usage, policies, and so on.

generally secondary to institutional planning. Local control trumps a systemwide perspective; collection development is largely autonomous rather than coordinated. For some libraries, planning within adjacent networks is important. Stronger planning

at the network level would facilitate a more shared approach and alignment of institutional behaviors. (Remember, we are largely talking about purchased collections here, acknowledging that the situation with licensed collections is somewhat different.)

If optimizing the BTAA collective collection in this way is a strategic priority, deliberate and coordinated action is necessary to address some or all of these areas:

- **Align (and monitor) prospective acquisitions** to more optimally distribute collections, and so that materials budgets can be allocated to more distinctive materials (**prospective collection coordination**).
- **Further consolidate existing inventory** by extending the BTAA-SPR to include low-use monographs as well as print journals. Such consolidation supports both stewardship of the scholarly record and improved access. This should be coordinated with access to digital surrogates and some investigation of controlled digital lending.
- Prioritize **long-term preservation** of the collective BTAA print book collection as a distinctive asset representing well over one fifth of distinct publications in the North American print collection.
- Decide how much resource to put into **improving discovery and delivery** of the shared BTAA collection and explore smoother interworking with adjacent networks (e.g., Ivy Plus, MelCat OhioLINK).
- **Broaden access to legacy collections** through targeted digitization, by, for example, gap-filling in HathiTrust, enabling further rationalization of print inventory.
- Create **stronger systemwide awareness** through a more coordinated approach to holdings data and shared print commitments, more strongly agreed resource sharing policies, and aggregated usage data.

4.2 Collection directions

The collective collection is one aspect of big shifts in thinking about collections and their role in libraries. This is a major topic and full description is beyond our scope here, but here are some trends of interest.

- The library collection is no longer central to our users' information lives. They live in a network environment rich in information resources. This means that the goal of the library is no longer to build a large local collection, but rather to facilitate access to the resources that meet research and learning needs wherever they are. This idea of **collections as a service**³⁵ or the **facilitated collection**³⁶ is an important shift of attention. The collective collection is an important part of this trend as it extends the reach of what a single library can provide.
- There is an overall shift to managing collections in **cooperative settings** in order to expand access and share costs. We have discussed the print collective collection here, but there is also

³⁵ Way, Doug. "Transforming monograph collections with a model of collections as a service." *portal: Libraries and the Academy* 17.2 (2017): 283-294.

³⁶ Dempsey, Lorcan. "Library collections in the life of the user: two directions." *Liber quarterly* 26.4 (2016)

shared licensing, aggregation of digital materials, and so on. Managing the collective collection in broad regional groups makes sense.

- As research and learning behaviors change in a network environment, universities and libraries increasingly support researcher workflows and the creation, management, and sharing of digital research and learning objects (research data, expertise profiles, etc.). This **inside-out focus** is an important element of research library operations.
- A large part of the **cultural and scholarly record will become openly available** in coming years as materials are more broadly shared, as a larger part of publishing adopts a pay to publish model, and as government, funder and institutional mandates take action.

Licensed collections

Major changes are underway with the licensed collection, and consortia are considering their role as catalysts of change in the scholarly communication ecosystem. As a consortium of leading research institutions, BTAA has a major stake in this ecosystem.

- The move to open access in various forms is advancing but without a single trajectory. Materials will be made available open access in different ways (e.g., institutional repositories, publisher websites, subject repositories) and with different conditions attached.
- The licensing model, and the big deal, that have so characterized collection building activity in recent years, continue to be pressured. Single article purchase, resource sharing, and facilitated access to open access materials are critical elements in overall provision. Transition will involve an uneven mix of pay to publish and pay to read options. Research institutions are considering “transformative agreements.”

Purchased/monograph collections

- Print monograph budgets have been squeezed as a higher proportion of collection budgets go on licensed materials. That said, print management commands a disproportionately large amount of staff time. We discussed the general shift of expenditure from purchased to licensed in **Section 2**, although we also noted that it was uneven across the BTAA libraries.
- Even though there is growing acceptance that the historic method of local collection building is increasingly inefficient and mismatched with requirements, it is still the dominant model. The just-in-case model means that individual collections are under used (the OCLC service Sustainable Collection Services has analyzed the collections of 281 academic libraries of all types since 2012. 48% of the items in those collections had zero circulation use.)
- The collective print collection is important for many libraries. Libraries increasingly recognize that they can buy only a part of what they need and are turning to cooperative arrangements. Libraries are managing down their print collections to release space for higher value activities, which in turn is driving growth in shared print initiatives. This underlines again the advantages of working with shared data about collections and transactions, to inform decisions.
- The natural corollary of greater sharing is increased local specialization—libraries are thinking about how they respond to local emphases in research or learning interests.

- There is a shift to acquisition of monographs in electronic form, with opportunities for shared purchase. At the same time, on-demand approaches are emerging as well as a strong interest in using data about usage and collections to drive acquisitions. The integration of ebooks into resource sharing models is of great interest, subject to licensing and workflow solutions.

Special collections

- As collections become more general and shared, the distinctive has come more into focus. Support for local research as well as disclosure of special collections to the broader community have become more important. There is also an interest in coordinated development of distinctive collections to avoid unnecessary duplication or competition.

Institutional research and learning materials

- Research is collaborative, facilitated by automated workflows (e.g., laboratory information systems, scientific workflow systems, lab note-books, citation management, scholarly networking sites) and generates a variety of potentially sharable research artifacts such as software, research data, preprints/articles, textual corpora, methods, and workflows. A variety of organizations including publishers are looking at providing support for research workflows, and also at support for managing and aggregating these research artifacts.
- Open educational resources are also a focus of increased attention.
- Libraries are stepping up to a role helping create, manage, and disclose research and learning materials across campus.

The schematic in Figure 29 shows a collections spectrum, from the “owned” collection to a broadly facilitated collection.

In this paper, we are interested in how that owned print collection has expanded: first into the borrowed collection, then into the shared print collection and the emerging interest in shared digital collections based on this (notably HathiTrust). Elements of the print collection are also becoming demand driven in the context of PDA or DDA approaches, but also more broadly in the context of an expected shift to more data-driven selection. This diversification adds complexity to the collective collections environment.

Resource sharing is also morphing, becoming a focus for facilitating access to a broader range of materials than the aggregate library collections.

Of course, BTAA also has a potential role in relation to other collective collections, especially based on unique institutional materials, although those are outside of our scope here. These include:

- Images/special collections/archives: These tend to be aggregated at higher levels (e.g., DPLA) or in regional “digital library” systems (e.g., Minnesota Digital Library). Does it make sense to do this at the BTAA level?
- Research materials: It certainly makes sense to consider a collective approach to institutional repository materials and to research data management at the BTAA level, as well as to research information management (expertise and research profiles especially). If enhancing the collective reputation of BTAA were a goal, it would make sense to look at this.

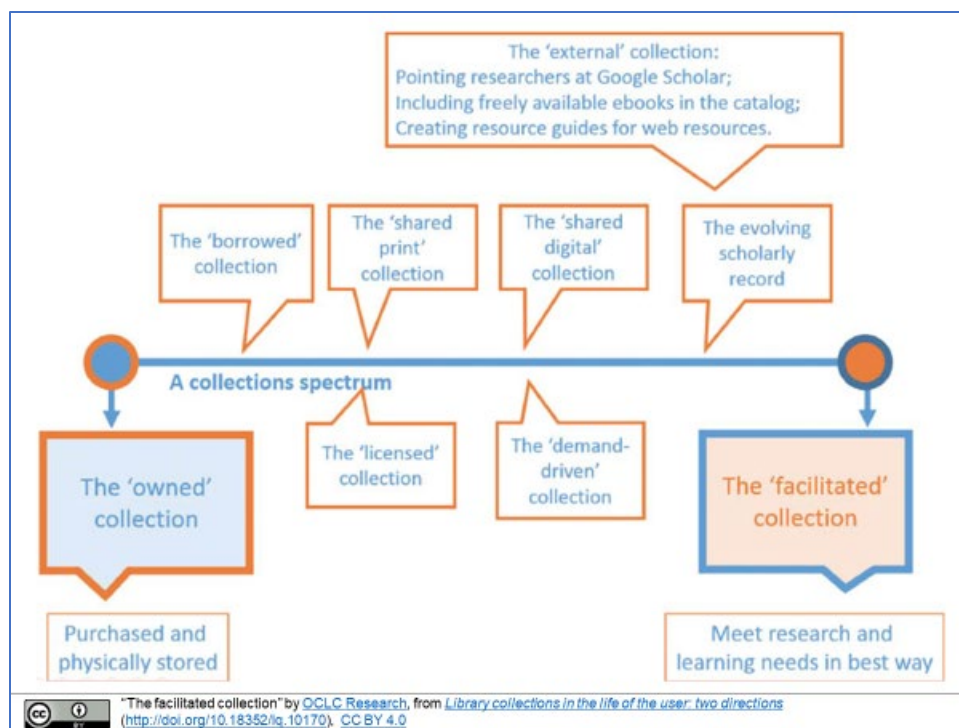


Figure 29 Collections Spectrum

4.3 Retrospective and prospective collection coordination

The dominant model of the collective collection in the BTAA flows from a **retrospective collection coordination** model. Institutional collections are managed relatively autonomously, and then coordinating services are layered across these collections. In practice, there are three important service areas that are managed in this way:

- resource sharing: extending the available collection
- digitization: broadening access to the available collection
- shared print: consolidating collections to improve efficiency, access and preservation of the scholarly, and cultural record

A more ambitious view of collection coordination would involve planning ahead to ensure that BTAA libraries more effectively address needs across the consortium.

In this context, strategy and policy around collection development remain relatively autonomous and institutionally based. Strategy is about optimization of the local collection in response to local needs. While there is an agreement to cooperate, it does not extend to re-

alignment of collection development policies to optimize the BTAA collective collection. In such models of collaboration, there is no obligation to supply particular works; or even to have acquired the work in the first place. Effectively this could be seen as a form of post-hoc, low-impact mutual altruism.

A more ambitious view of collection coordination would involve planning ahead to ensure that BTAA libraries more effectively address needs across the consortium. It would assume a sustainable network of interdependence going forward; a network of trusted partners who have a commitment to systemwide optimization as the best way of meeting local needs. This would require a much more strongly coordinated approach. This is **prospective collection coordination**.

In **Section 2** we documented the scale of BTAA collections and borrowing activity. Based on BTAA data in GreenGlass we noted:

- more than half (51%) of titles in the BTAA shared collection are held in a single BTAA location
- more than two-thirds (68%) of titles are held in fewer than three BTAA locations
- a small fraction (6%) of titles are duplicated in ten or more BTAA locations

Hence, all BTAA campuses—regardless of collection size—stand to gain from efficient protocols for borrowing and lending needed works. In some instances, filling a one-time user need through borrowing is a cost-effective alternative to purchase. In other cases—it would be interesting to know how many—purchase is not an alternative because the needed item is only available in a library collection.

We also noted that the BTAA coverage of the Chi-Pitts mega-region was 53%. Many of the adjacent networks are in this region including PALCI, OhioLINK, and I-Share.

So, historical collecting patterns within the BTAA have produced an aggregate resource that provides BTAA faculty and students with access to a substantial share of the scholarly record, including resources that are relatively scarce or even unique within the larger North American library system. However, the collection is not comprehensive, and is certainly supplemented for many libraries by adjacent networks and by the broader network of WorldShare ILL.

In this context, the work by Thacker et al. from the University of Illinois is of interest.³⁷ From the abstract:

The authors conclude with an argument that communities of institutions could develop highly structured cooperative collection building efforts in the area studies that would permit them to redirect resources strategically, collecting area studies materials both more deeply across the community and with a greater emphasis on primary source materials.

And in terms which interestingly echo our attributes of more coordinated collective collections:

Similarly, works focused on rethinking resource sharing efforts, the availability of more robust data about our collections, and the prospect of retaining a cohesive—if distributed—corpus all lend credence to the notion that libraries should deliver “everything” from a collective collection.

The 2017 Program Evaluation also noted the clear value of continuing to manage the BTAA collective collection in support of collective and individual library goals.

³⁷ Thacker, M. L., Teper, T. H., Lenkart, J., & Coskun, E. (2019). Establishing the Impact of Area Studies Collections and Exploring Opportunities for Collaborative Collecting. *Library Resources & Technical Services*, 63(1), 46.

4.4 Retrospective collection coordination: resource sharing

We have reviewed the level of use of UBorrow, noted that it is variable across the libraries, noted the importance of parallel usage of WorldShare ILL and adjacent networks which are so important to some members, along with other approaches. This poses an important question for BTAA: how much should UBorrow be a focus of shared activity?

This is a strategic question for BTAA and the libraries. The 2017 Program Evaluation is unequivocal: it should continue to be strengthened as core infrastructure.

However, it is also clear that optimization depends on fuller participation, which requires stronger commitment from the libraries, backed up by a more centrally coordinated policy framework around service levels. Again, the Program Evaluation in 2017 described growing use of UBorrow, recommended increased commitment to it as a vehicle to release more value from the rich collections of BTAA, and noted again some important areas for improvement.

This underlines our contention that smooth working depends as much on the Enterprise Stack as on the Applications Stack. Automation can only do so much to iron out differences in practice and policy. Explicit commitments by BTAA libraries—strategy and policies—are a key element of more conscious coordination.

Reviewing the guidelines and policy frameworks of BTAA Library Initiatives makes sense in this context. Consideration should be given to how adherence to guidelines will be monitored and enforced. Predictability in service provision (achieving ILL turn-around benchmarks, upholding retention commitments, meeting repository ingest targets, etc.) is more easily achieved when standard operating procedures are in place. All of this points to the top-line recommendation of the first of the D2D resource sharing reports:

Develop clear governance and decision-making processes in areas of high interdependency. In highly interdependent operational areas in the CIC (e.g., resource sharing), develop well-understood processes for exploring options, planning, decision-making, and execution. Apply "systems" approaches and safeguard against unilateral actions or commitments that constrain collective action. The goal in mounting functionally-interconnected services is that they are richly responsive to the needs and intentions of each institution, as well as to the consortium.³⁸

We believe this recommendation is in line with the general framework presented here; that successful BTAA operational integration across libraries requires a shift from autonomous local decision-making toward more coordinated systemwide planning and management.

³⁸ P. 4 in *Framework for Discovery-to-Fulfillment Systems in the Context of Big Ten Academic Alliance Resource Sharing: A Report to the Big Ten Academic Alliance Library Directors*, presented by John Butler, Barbara Coopey, and Lee Konrad, May 2013. <https://www.btaa.org/docs/default-source/library/d2dmay2013report.pdf>

This coordination would encompass some or all of the following: withdrawal and disposition decisions, staffing levels, performance standards, vendor selection, contractual commitments external to the BTAA, scan-on-demand capabilities, and preservation and format protocols for lending.

[S]uccessful BTAA operational integration across libraries requires a shift from purely autonomous local decision-making toward more coordinated systemwide planning and management.

Some of this coordination is inherent in the BTAA Shared Print Repository agreement to which most BTAA libraries are signatories. The HathiTrust Shared Print Program is another rules-based resource sharing network in which many (but not all) of the BTAA libraries

participate. And of course, the HathiTrust Digital Library, an exemplar of rules-based coordination, originated with an agreement among BTAA (then CIC) library directors to create a shared digital repository. Each of these agreements required years of negotiation and consensus building before common rules and practices were in place.

The rules governing resource sharing among BTAA libraries were revised in December 2018.³⁹ The revised agreement is intended to streamline ILL operations, reducing direct and indirect coordination costs. For example, participating libraries agree to waive certain administrative processing fees, abide by a standard loan period, and fill all requests within two business days. Best practices are set forth but allow for flexible implementation. The following excerpts from the agreement are illustrative of how coordinating norms stop short of impinging on institutional autonomy (italicized emphasis is ours).

- Restrictions on types of material available for lending *should* be kept to a minimum.
- Big Ten libraries are *encouraged* to use this program *in whatever fashion they believe* will provide...
- Certain types of material *might be lent* through a negotiated process.
- Libraries *are encouraged* to lend as many pieces (e.g., volumes, reels, fiche, etc.) as possible.

Such allowances make it easier for members to opt-in to cooperative agreements without fear of local disruption. From a user perspective, however, the variable performance commitments result in uncertainty as to what can be delivered, by when, for how long, and at what cost. When 15 libraries are involved, a great deal of uncertainty is introduced into the ILL experience, both for staff and users. That uncertainty again explodes at the margins as new members, services, and bodies of content are added to the system.

Beyond establishing common expectations, BTAA frameworks and guidelines could provide useful performance benchmarks for monitoring and enforcing service standards. Without adherence to such standards it will be impossible to remotely approach the Amazon-level performance that, as we have noted, is sometimes advanced as a model. Of course, such levels of access may not actually be possible, but they are useful as an aspiration. If this aspiration is real, then a determined emphasis on improved service delivery to patrons should drive policy development, and it should not be impeded by a desire for perfection or compromise consensus.

³⁹ Big Ten Resource Sharing Agreement, January 2019. (Unpublished document provided to authors by BTAA staff.)

Again, a dashboard-like utility would assist in monitoring, managing, and optimizing systemwide performance. In **Section 6**, we explore a range of recommended actions for increasing systemwide awareness in BTAA collections management and resource sharing, including dashboard reporting/analytics.

4.5 Retrospective collection coordination: sharing of digitally converted born-print holdings

The University of Chicago is about 20 miles from Northwestern University, but the University of Nebraska is over 1,250 miles from Rutgers University. This underlines the case for digitization.

There are two important directions here:

1. Increasing the use of existing digital surrogates.
2. Extending the pool of shareable digital surrogates.

4.5.1 Increasing use

Millions of out of copyright works held by BTAA libraries—and others—are available for download to HathiTrust members and are viewable to others. In addition, hundreds of thousands of post-1924 Hathi volumes have been cleared of copyright restrictions and are now available for full viewing.

Recently the Controlled Digital Lending model has received considerable attention, notably because of the Internet Archive initiative in this area.⁴⁰ It is not without challenge, and member universities may be understandably cautious about participation. Nevertheless, the BTAA should consider the viability of implementing this model in partnership with HathiTrust, especially given that 35% of the HathiTrust collective collection is represented in the BTAA collection. Of course, implementing this in itself is a considerable undertaking. There would be considerable coordination across universities about legal and policy issues. Much of this material was digitized by Google and use may be limited by the agreements in place with Google. And then a technical framework would have to be put in place to manage it, preferably integrated with broader collective collections infrastructure.

4.5.2 Extending the pool

The success of HathiTrust rights management and access suggests some directions that the BTAA could pursue to extend the pool of shareable digital surrogates:

- Create BTAA-wide digitization priorities for further conversion of print resources.
- Expand efforts to clear rights of unregistered post-1924 materials, state government documents, university press back-lists, funding agencies, NGOs, and other entities supportive of the mission of research universities.
- Review and, where necessary, seek to revise licensing terms for archival materials where sharing is limited by contract as opposed to copyright.

⁴⁰ Controlled digital lending in libraries. <https://controldigitalending.org/>

- Develop a course of action for digitizing special collections material including manuscripts, maps, illustrations, broadsides, photographs, and other unique content available for sharing under rights agreements.⁴¹

As for commercially digitized, post-1924 material (or pre-1924 material), the BTAA libraries should reach an understanding about the extent to which sharing these acquired works should be a condition for purchase or licensing and advocate accordingly with other library groups as well as with the commercial publishing sector. There are publisher models that permit sharing digitized book content, but the library community has not been consistent or effective in advocating for more open use of the digital book content they acquire.

While the protocols for sending surrogates for journal articles are well established, this is not the case for monographs. Book chapters can sometimes be treated like journal articles, but users often find it difficult to specify that they are requesting a chapter rather than an entire volume, or to judge if the portion of copyrighted material being requested falls within the acceptable guidelines of a potential lending library. This is an area that BTAA might help clarify and advance.

4.6 Shared print and curation of the scholarly/cultural record

BTAA libraries are in a strong position to influence the future of shared print activity, given the broad scope of the BTAA collective collection and the distinctive character of the consortium.

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BTAA libraries have already made a significant investment in consortium-level shared print preservation in the BTAA Shared Print Repository (SPR), established in 2011, and member libraries participate in a wide range of shared print initiatives with other consortia. A substantial share

of BTAA library inventory, totaling millions of volumes, has been committed to long-term retention in the BTAA-SPR and HathiTrust Shared Monographs program.⁴² BTAA participation and leadership in inter-consortium efforts like the Rosemont Shared Print Alliance and the Partnership for Shared Book Collections help ensure that BTAA interests are represented in national planning efforts. Going forward, the consortium can leverage existing investments and maximize its impact by focusing effort in these areas:

⁴¹ Principles and Protocols for Interlibrary Loan of Special Collections Materials, prepared by the BTAA Interlibrary Loan—Special Collections Task Force, February 2018 (Approved by the BTAA Library Directors, April 2018).

⁴² As of January 2019, nearly 9,000 journal titles, comprising 365,000 volumes, have been ingested in the two BTAA-SPR locations. Additionally, many BTAA libraries have committed to retain print versions of monographs in the HathiTrust Digital Library. In total, ten BTAA libraries are participating as retention partners in the HathiTrust Shared Print program. In Phase 1 of the program (2016/2017), eight BTAA libraries registered more than 6 million monograph volumes. (This figure includes some intentional redundancy, as BTAA libraries are retaining multiple copies of some titles.) Seven BTAA libraries have committed to retain print monographs in Phase 2 of the program (2018/2019). See: <http://www.btaa.org/docs/default-source/library/btaa-spr-update--may-2019.pdf>

- **Prioritize long-term preservation of the BTAA print book collection as a distinctive asset.** As discussed in **Section 2**, the BTAA's collective collection represents more than a fifth of the North American print book collection. The consortium has adequate scale to secure this resource through a combination of distributed and consolidated archiving, without imposing an undue burden on any single institution. BTAA libraries have already committed to long-term preservation of more than 6 million monograph volumes as part of the HathiTrust Shared Monographs program, amounting to more than 15% of BTAA print book inventory. A strategy for prioritizing preservation of remaining inventory should be developed. BTAA need not wait for a national consensus to emerge before taking action; strategic partnerships with adjacent networks (HathiTrust, Ivy Plus, OhioLINK, PALCI, etc.) will accelerate progress in this area.
- **Explore extending the BTAA-SPR network to include a repository that can operate as a logistically optimized hub** akin to ReCAP, where inventory can be efficiently consolidated for preservation and resource sharing. The location of such a repository is a logistics question, and it would be good to bring to bear some logistics expertise when thinking about location, acknowledging that other factors are also at play (e.g., willingness to host). The current SPR facilities are in the Great Lakes region, in Illinois and Indiana. Clearly, the expansion of the BTAA has increased the geographic spread of member universities and changed the cooperative dynamic somewhat. Nearly a third of BTAA inventory is managed outside of the Great Lakes region.⁴³
- **Manage duplication against an optimal collective collection of core titles and commit to metadata management practices that improve "systemwide awareness."** There is only modest redundancy in the BTAA's retrospective collections (an average of three BTAA holdings per print book title); however, past collecting patterns clearly show that the total scope of the BTAA collection could be even broader if there was less duplication in purchasing. Whether or not programmatic de-deduplication of retrospective inventory is pursued, there is clearly some value to be gained in better coordinating prospective acquisitions. A disciplined approach to metadata management that ensures that BTAA holdings are accurately represented in major data hubs such as WorldCat, HathiTrust, and PAPER will improve decision support for the consortium, as well as other libraries.

In 2017, BTAA libraries undertook an exploratory project to identify potential opportunities for consortium-level curation of monographic collections. To support this pilot project, OCLC's GreenGlass team compiled a data set of WorldCat holdings set on 33 different OCLC library symbols used by BTAA libraries. Using this data set, different scenarios for distributed archiving can be explored. One of these scenarios proposes that duplication be capped at five BTAA holdings per monographic title, at the edition level. This level of duplication effectively ensures that there is enough redundancy in consortial holdings to meet demands for both access and preservation, while enabling some space recovery. As shown in

⁴³ A majority of BTAA universities (57% excluding the University of Chicago) are based in the Great Lakes region. According to statistics aggregated by BTAA, approximately 32% of total BTAA library volumes are held in the Great Plains and Mid East regions. Moreover, the average collection size of BTAA libraries outside the Great Lakes region is substantially smaller than within the Great Lakes, suggesting the need for efficient resource sharing flows may be greater for members in the Mid East and Great Plains. http://www.btaa.org/docs/default-source/research-data/at-a-glance_2017btaa.pdf

Figure 30 (a screenshot from the GreenGlass model builder), individual BTAA libraries would retain approximately 80% of current inventory in this scenario.

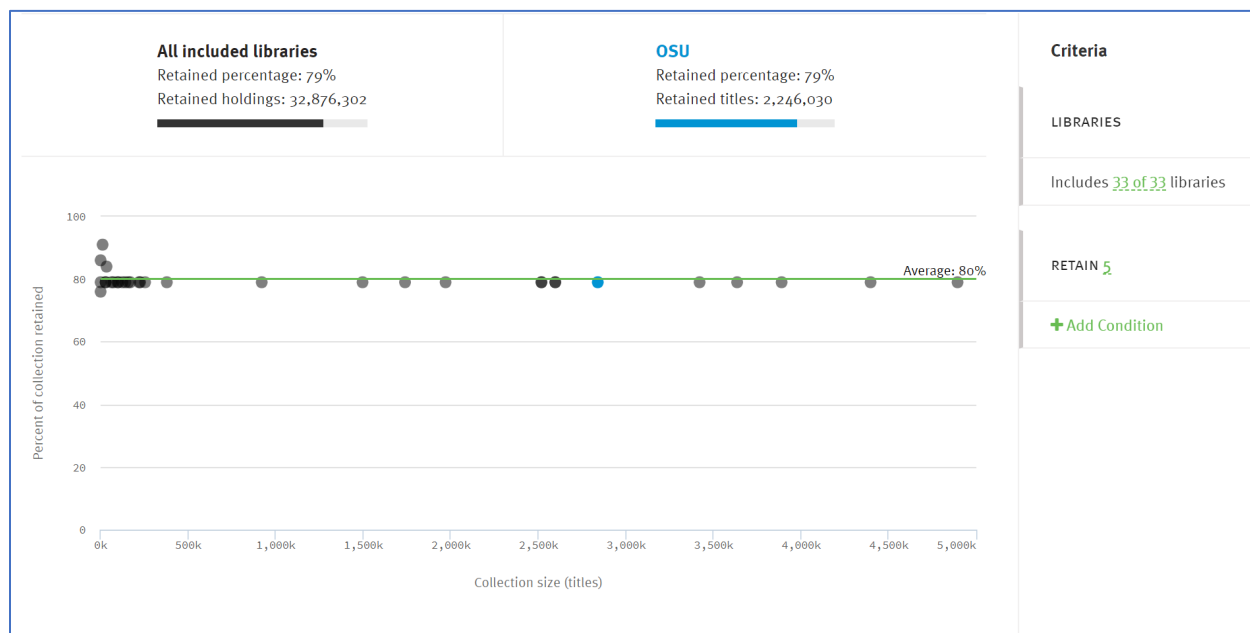


Figure 30 GreenGlass Model Builder

This sort of “collections intelligence” is valuable for coordinating prospective acquisitions, even if it not used for programmatic de-selection of widely held materials. Whatever investment has historically been made in acquiring redundant content (whether optimal duplication is assessed at five holdings or some other number) could be redirected to broaden the scope of the BTAA collective collection. Greater systemwide awareness of how the BTAA collective collection compares to other consortial resources—how it extends holdings in adjacent networks, or duplicates them—can inform strategy, policy, and practices.

However, one could also approach this issue in a different way, in particular to accommodate some latitude of local decision making combined with systemwide optimization. The alternate model would be to build out an optimal collective collection of core titles based on some criteria. And then local collections could duplicate at their discretion, based on local needs or preferences, and in the knowledge that they are adding copies.

Again, the decision maker would benefit from a dashboard to check the availability of a title not held by their library, to predict demand locally based on past usage of similar titles, determine electronic availability, and so on. In this way, any duplication decision is fully informed.

While the current BTAA-SPR is not intended to serve as an access repository, functioning instead as a shared preservation collection, it is worth exploring how a logistically optimized repository designed for efficient resource sharing could accelerate the consortium’s progress in managing shared book collections. The ReCAP consortium’s successful Shared Collection program, which unifies discovery and delivery of a portion of the offsite storage collection, is a useful model here. The project has resulted in

significant gains in access and use of the shared collection, increasing the consortium's return on shared investment in high-density storage.⁴⁴

4.7 Prospective collection coordination

BTAA is already exploring opportunities for action in this area, including a pilot project with Oxford University Press, in which a single print copy of new scholarly monographs is acquired as a shared BTAA preservation resource, with participating libraries benefiting from unlimited access to an e-book version of the same content.⁴⁵ This is a promising area for coordinated action, impacting selection, acquisitions, and preservation workflows. By codifying and documenting some of the associated processes (e.g., a decision process for prioritizing and implementing projects, an agreed on approach to program review/assessment, etc.), BTAA can maximize the scale and impact of such agreements.

Examples of questions to be addressed include:

- What governance structure will be put in place to assess the overall performance of the initiative?
- Who at the university has signing authority to enter into such an ongoing commitment?
- Can the group require a member library to expend resources on a program it no longer perceives to be in its own best interest?
- What if a member library withdraws from the project or group?
- Who will judge when a participating library is complying with or in breach of group agreements?
- Is there a fallback plan for a library confronting unanticipated fiscal exigencies?
- How will the process be amended going forward, and will members be bound to accept amendments, including higher fees or additional requirements?
- How much management authority are the individual member libraries willing to cede to a central authority (BTAA Central or otherwise) to oversee a collection initiative?
- How is compliance with a program assessed—what evidence can one institution present to local faculty, for example, that other institutions are indeed collecting in designated areas?

Two observations are prompted by this list. First, the best should not be the enemy of the good. It would be very easy to continually defer action while detailed policy frameworks are debated. Second, it shows why there is some perceived risk with this approach, given the unknowns.

When the BTAA library Directors/Deans were asked individually to suggest possible courses of action, several ideas were identified that would move the BTAA toward greater consolidation. These included:

- Consolidate the purchase, cataloging, distribution, and preservation of e-books. In other words, the BTAA could work toward a uniform collection of e-monographs, either across the board or in specified subject areas.
- Core e-reference resources could be acquired collectively.
- Western European acquisitions—print and/or digital—could be profiled collectively across the BTAA.

⁴⁴ <https://recap.princeton.edu/collections-services/shared-collections>

⁴⁵ <https://global.oup.com/academic/news/oup-collobrates-academic-alliance>

- Area Studies selection, acquisition, cataloging, and preservation could be addressed by some or all the BTAA schools, acknowledging the role of CRL and other national repositories.
- Create a unified profile for book, journal, data, etc., resources in one or several core curriculum areas (e.g., math, astronomy, psychology, art history, and classics).
- Co-investing in one or more open-access offerings that might positively affect scholarly communication.

There was also some emphasis on a more aggressive negotiating posture for commercial journal and e-book bundles, although that is outside our scope here.

One might add the following to the list:

- Coordinate collecting of special collections and distinctive materials, to improve aggregate coverage and reduce unnecessary competition or unhelpful overlap.

As we have noted, prospective collection coordination has long been an aspiration but presents practical difficulties. It is a classic example of the collective action problem, where local priorities and pressures take precedence over systemwide optimization.

There does not appear to be consensus about the best starting point here. Nevertheless, we can suggest some underlying strategic and tactical questions:

1. Are there particular projects that will deliver quick wins in terms of impact or collaborative potential? Would collaborative acquisition of electronic resources be easier to achieve initially? Or should a project address sharing newer tangible items that might encourage further investment in the D2D infrastructure that supports sharing of retrospective holdings?
2. How much campus—including library staff—input is required for a Director to commit to a program affecting the availability of scholarly resources? What descriptive or analytical materials are needed to secure this input and what is the appropriate timing in advance of calling for a decision?
3. Would a review of experiences elsewhere help to highlight or eliminate certain suggested initiatives? How might such a review be carried out, and how would the Directors determine if factors leading to success or failure elsewhere are germane to the BTAA?

As we have noted, prospective collection coordination has long been an aspiration but presents practical difficulties. It is a classic example of the collective action problem, where local priorities and pressures take precedence over systemwide optimization.

Section overview:

Better coordination of the BTAA collective collection will require stronger systemwide awareness of the disposition and use of collections. This, in turn, will depend on greater consolidation of metadata management, including bibliographic, transaction, and policy data.

This short section discusses the actions needed to develop stronger systemwide awareness through improved data management, aggregation, and analytics.

5 Systemwide awareness: a data-driven approach

5.1 Introduction

We have emphasized the importance of greater systemwide awareness for achieving more efficient coordination of the collective collection. Improved coordination depends on better intelligence about the stocks and flows in the system.

This happens now in some BTAA library operations. Notably, group-scale reporting of UBorrow activity is used to optimize resource sharing operations (e.g., prioritizing request routing based on turnaround time using collection “tiers”).

Improved coordination depends on better intelligence about the stocks and flows in the system.

But this intelligence is not systematically integrated into collection development workflows or planning. A view of collection overlap and distinctiveness could drive digitization or shared print decisions. Group collection analysis could

support scenario-based planning of prospective and retrospective collection coordination. An understanding of group inter-lending patterns could be programmatically leveraged in acquisitions decisions. And so on. While collections analysis informs some project-based efforts, its use is typically isolated and episodic, rather than ongoing.

If BTAA is to develop a more data-driven approach to managing its collective collection, and create stronger systemwide awareness, it will need to prioritize action in the following areas:

- **Consolidate metadata management practices.** Systematically register and maintain BTAA holdings data, print retention commitments, and information about the digitization status of individual items. Establish and enforce common data quality standards to ensure that management intelligence is reliable.
- **Aggregate transaction data,** including local circulation, inter-lending and e-resource usage across the group, and work to **normalize the data using standard identifiers** such as ISBNs, OCLC numbers, or DOs.

- **Aggregate library policy profiles**, including resource sharing, acquisitions and de-selection processes, and work to harmonize these policies across the group (a shared policy on recalls, or faculty-level check-out periods, for example).

Metadata consolidation will be most efficient if data (including bibliographic data, retention commitments, digitization status, and policy profiles) is managed in a single place. Existing cooperative infrastructure, including WorldCat and the OCLC Policies Directory, should be leveraged to maximum effect.

5.2 Dashboard

Throughout this report, we have used the term dashboard to describe a business function that programmatically leverages data to support management decision-making by library staff or patrons. Our use of the term is aspirational: there is no single environment or application that currently delivers management intelligence based on the range of relevant data. The current state of the art for consortium-scale analytics and decision support is not very advanced and improvement will be incremental. Growing awareness and interest in group-scale analytics and decision support is already evident in the demand for custom reporting services provided by CRL, HathiTrust, CDL, and OCLC. And new commercial offerings are emerging, SpringShare's LibInsight, for example. However, there is no reporting or analytics environment that harnesses the combination of bibliographic, holdings, usage, and policies data needed to affect a systemwide optimization of the collections ecosystem; current solutions continue to focus on institution-scale analysis.

A data-driven strategy for improving network fulfillment ... should include a more deliberately coordinated approach to metadata management.

Ideally, a dashboard application would integrate collections intelligence (holdings, formats, levels of duplication) with usage (ILL, circulation data) and other data sources, so that BTAA collection managers could monitor, assess,

and optimize the consortium's collective collection on an ongoing basis. Predictive analytics could inform acquisitions, including the optimal distribution of new title purchases, as well as storage transfers, providing greater predictability and operational efficiency in the SPR. Whether dashboard intelligence is delivered through an application like GreenGlass, or integrated into existing management systems using web services, BTAA can help stimulate further vendor and community development efforts by clarifying requirements and prioritizing specific data needs.

5.3 Optimizing stocks and flows

Collective action on shared print activity will be assisted if BTAA libraries commit to shared policies and practices in metadata and inventory management. The consortium already models good practice in systematically disclosing BTAA-SPR retention commitments in WorldCat and CRL PAPR. Better, more accurate assessment of consortium-level holdings, including duplication levels, would be possible if libraries committed to maintaining up-to-date holdings in WorldCat, and worked together to prioritize data remediation projects, such as adding identifiers (e.g., ISBN, ISSN, OCLC numbers) and maintaining

data currency. Data compiled during the pilot study with GreenGlass indicates that metadata management practices vary within BTAA, with a gap of about 5% (on average) between holdings reflected in the ILS and WorldCat. Though apparently small, such gaps can have a significant impact on measures of duplication—not just within BTAA, but also at larger scales of analysis.

A data-driven strategy for improving network fulfillment, i.e., optimizing flows, should include a more deliberately coordinated approach to metadata management. Identifying and rectifying important gaps (e.g., the absence of standard identifiers) in metadata will reduce coordination costs and contribute to a better and more uniform discovery experience, as well as more efficient fulfillment. Likewise, a more data-aware approach to collections management would leverage greater systemwide awareness to optimize BTAA library inventory.

Alongside ongoing discussions of consolidating bibliographic data in a shared index, BTAA should consider consolidating transaction data for improved decision support. The locus of such an effort would require close consideration, given central BTAA capacity constraints.

6 Recommendations

Our principal recommendation from which others flow is that the BTAA libraries must decide what their level of commitment is to managing, building, and sharing their collective collection. If they agree to a stronger commitment, then they will need to put in place a strategy about what their shared expectations are, and processes around decision-making, shared investment, and planning.

We divide this section in two. In the first, we present recommendations organized by the stacks that we have used throughout (Enterprise, Applications, Collections). In the second, we present the same recommendations organized alongside the attributes of a more consciously coordinated collective collection. In this latter section, we also propose some staging, acknowledging that this is necessarily preliminary, as a fuller view depends on choices the group makes about priorities, investments, organization, and so on.

We hope we have provided some frameworks and background to facilitate more effective identification of possible directions. Four related factors should be borne in mind as the BTAA libraries decide on direction:

1. **A large undertaking.** The sum of what we propose here is a very large program, requiring significant human and financial investment over many years. Indeed, some elements taken on their own represent major initiatives, involving significant capital investment. Think, for example, what would be involved in developing a ReCAP style facility for BTAA, if it were decided that this was something to be pursued. It would require major effort to agree, plan, and implement. Or think about controlled digital lending, which again would require significant coordination and development if it were to be pursued. Nor should the socializing and advocacy work involved be underestimated, within the BTAA leadership, across the libraries, and within academic communities on campus.
2. **An incremental approach.** One does not plan the complete initiative in one go. It is important to have quick wins, to be seen to be making a change, to prioritize areas that will have impact, and to manage risk.
3. **Decision-making, planning, and commitment require processes.** We have emphasized that the group will have to make choices about priorities. One should not expect easy consensus here. Legitimately, there may be different opinions about the relative importance of specific directions, and these are often situational given the different drivers that may be at play in different libraries. Some may feel that collective stewardship of the scholarly and cultural record in BTAA's charge is very important. Others may be less concerned to actively manage this resource. Some may feel it is important to work closely with adjacent networks on alignment. This may be less important to others. Topics like controlled digital lending or prospective collection development arouse different responses. Some may argue for a shared ILS; others may prefer not to move in that direction. This is why it is very important to put in place processes for decision-making around direction, prioritization, and investment. And, of course, for similar reasons to those stated here, we do not expect that everybody will agree with all of our recommendations!

4. **Agency and support.** A consolidated initiative of significance would require consolidated management. This could be organized in various ways—through a mix of dedicated or loaned staff, and relying on working group and expert participation. A center of excellence model might also be tried, where one institution manages an activity on behalf of the group. This will require thinking about the balance between dedicated staff and borrowed staff or working groups, what approach works well in particular circumstances, and other considerations. It also requires thinking about how much decision-making authority to vest with the executive office, what accountability mechanisms should be in place, and so on.

We believe that the BTAA can make a large and exemplary impact around the management of its collective collection and create benefits for current and future users. This will require stronger coordination, which will, in turn, lead to a stickier BTAA partnership.

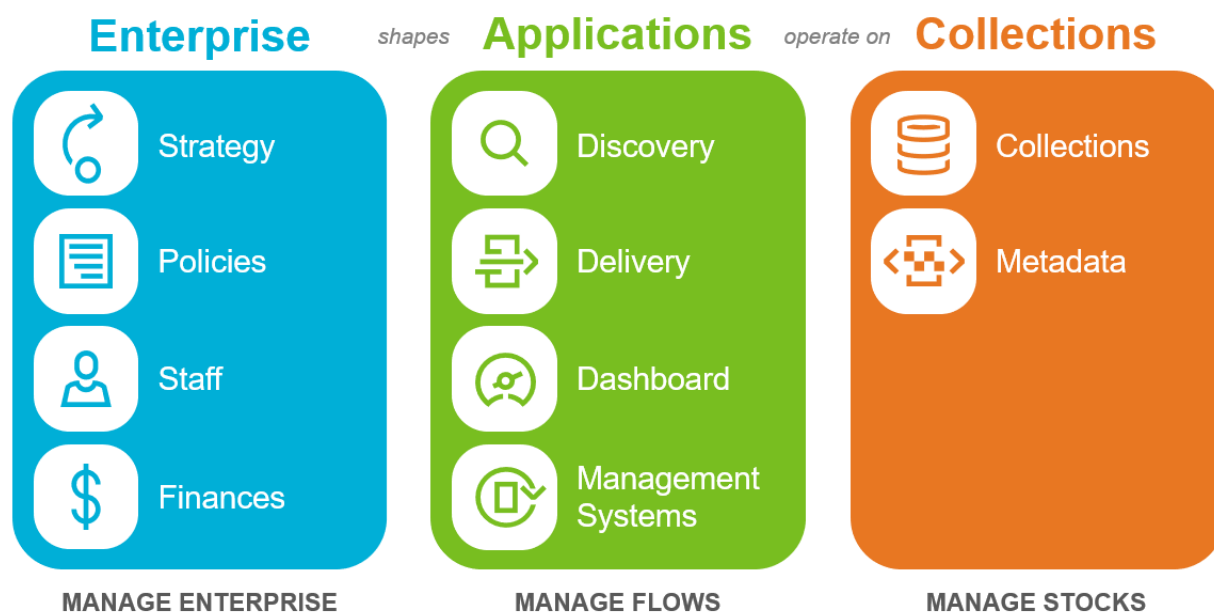
6.1 Summary recommendations organized by stack: Enterprise, Applications, Collections

This section presents recommendations organized by the Enterprise, Applications, and Collections stacks. Two related aspects of systemwide optimization through stronger coordination can be highlighted.

1. **Greater coordination across shared activities.** At present, each area (e.g., digitization, resource sharing, prospective collection development) tends to be managed independently rather than in concert or at least in mutually aware ways. Improved systemwide awareness would facilitate a more holistic approach. Can greater intelligence about resource sharing flows, for example, influence collection development practice or the development of additional print repositories?
2. **Greater coordination across libraries.** Currently, BTAA collaboration around collections is generally secondary to institutional planning. Stronger planning at the network level would facilitate a more shared approach and alignment of institutional behaviors.

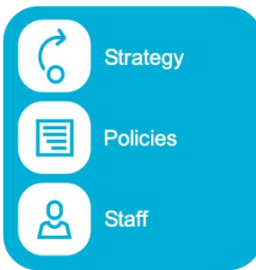
There is some overlap of recommendations, as related aspects turn up under different headings.

Recommendations: organized by stack



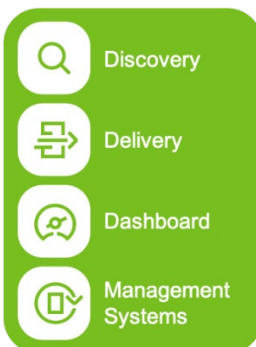
<p>Commit to manage, build, and share a collective collection representing more than a fifth of the North American print book collection.</p> <p>Create momentum through explicit commitments to a collective collection strategy, process and policies, and a group-wide awareness program.</p>	<p>Improve network fulfillment within the BTAA network and across adjacent networks.</p> <p>Integrate resource sharing into collection development processes.</p> <p>Explore a generalized broker architecture and network-level data components (holdings, policies, etc.).</p>	<p>Create stronger systemwide awareness through consolidated metadata management and aggregated usage data.</p> <p>More strongly coordinate collections for optimal distribution.</p> <ul style="list-style-type: none"> • Commit to the preservation of the BTAA collective collection as a strategic asset. • Develop network-level prospective collection coordination capacity. • Extend the pool of digital surrogates available.
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Enterprise: make explicit commitments



- **Agree upon a shared BTAA strategy**
 - Agree on priority areas.
 - Encourage buy-in, create incentives for participation.
 - Develop an awareness program, with provostial support, for campus communities.
- **Establish common work processes** for decision making, resource allocation, and review.
- **Centrally coordinate policy frameworks:** Greater uniformity of policies around resource sharing and shared print would improve services.
- **Strengthen the executive function;** give it more agency, process, and accountability.
 - Expedite decision making.
 - Increase centripetal force and “stickiness” of BTAA partnership.
- **Adopt a holistic approach** to planning collective collections that encompasses resource sharing, collection development, shared print, and metadata management.

Applications: improve network fulfillment



- Consolidate and simplify **policy frameworks** across the BTAA to harmonize service expectations and provide greater predictability.
- Provide **unified discovery** of BTAA collections with a shared index, group catalog, or other mechanism.
- Improve horizontal integration of the multiple, vertically integrated discovery and Delivery applications across the BTAA and adjacent networks. Contribute to the development of a **generalized broker architecture** to manage across services and network-level data components (holdings, policies, etc.).
- Explore **dashboard services** or applications to provide systemwide awareness/strategic intelligence for managing the BTAA collective collection (based on aggregated metadata and transaction data).

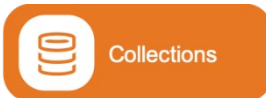
Collections: improve systemwide awareness, optimize distribution

Create stronger systemwide awareness



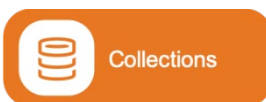
- Ensure all **holdings** are registered in WorldCat.
- Consolidate BTAA systemwide **shared print commitments** in WorldCat and duplicate elsewhere.
- Adopt emerging **digitization conventions** to flag digitized copies.
- Ensure **ILL policies** are up to date in WorldCat policies directory.
- Explore a **BTAA shared index, group catalog**, or other appropriate view of collective collection holdings.
- Explore consolidating **transaction data** across the network.

Optimize distribution of collective inventory



Prospective collection coordination

- Convene an expert group to **prioritize network level pilots**, e.g.:
 - Co-invest in one or more **open-access** offerings that might positively affect scholarly communication.
 - Consolidate the purchase, cataloging, distribution, and preservation of **e-books**.
 - Coordinate collecting special collections and distinctive materials, to improve aggregate coverage and reduce unnecessary competition or unhelpful overlap.
 - Western European acquisitions—print and/or digital—could be profiled collectively across the BTAA. **Area Studies** selection, acquisition, cataloging, and preservation could be addressed by some or all the BTAA universities, taking into account related efforts by CRL and other national repositories.
 - Create a unified profile for book, journal, data, etc., resources in one or several **core curriculum areas** (e.g., math, astronomy, psychology, art history, classics).
- Explore a pilot project to leverage ILL data to inform group-wide acquisitions.
- Create **strategic partnerships** with adjacent networks (HathiTrust, CARLI, Ivy Plus, OhioLINK, PALCI, etc.) to accelerate progress in this area.



Collections

Digital resources: Focus on extending the pool of shareable digital surrogates

- Partner with HathiTrust on a **controlled digital lending** pilot (cf. Internet Archive).
- Create BTAA-wide **digitization priorities** for further conversion of print resources.
- Explore better **characterization of digital items** ("digitized" status indicator) in line with emerging approaches.

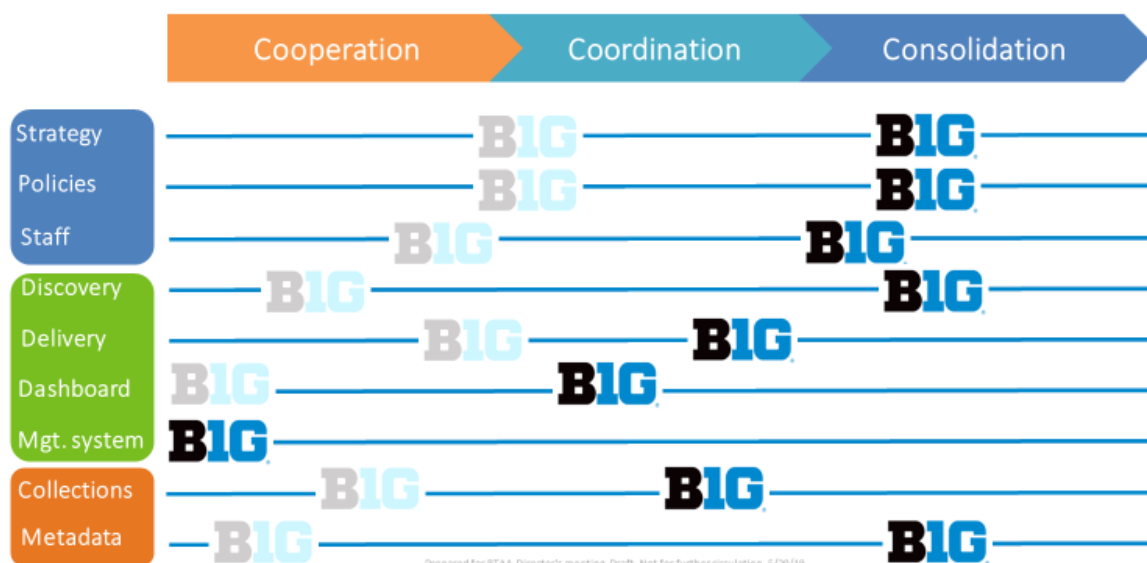


Collections

Stewardship of the scholarly record: coordinate for preservation and access (shared print)

- Prioritize long-term **preservation** of the BTAA print book collection as a **distinctive asset**.
- Explore extending the BTAA-SPR network to include a repository that can operate as a **logistically optimized hub** (similar to ReCAP).
- **Manage duplication** in the context of an optimal collective collection of core titles.
- Commit to metadata management practices that improve systemwide awareness (**consolidate shared print commitments**).
- Create **strategic partnerships** with adjacent networks (HathiTrust, CARLI, Ivy Plus, OhioLINK, PALCI, etc.) to accelerate progress in this area.

BTAA Ecosystem: 2024?

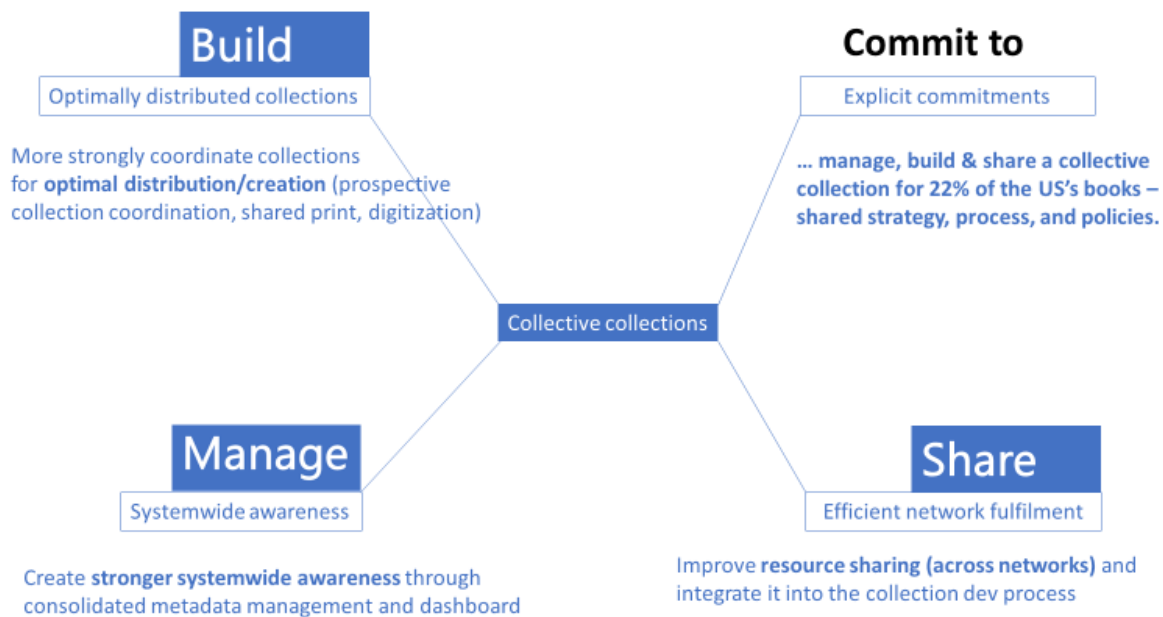


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6.2 Summary recommendations organized by the four attributes of a collective collection

In this section we re-present the recommendations organized by the attributes of a more consciously coordinated collective collection and propose some high-level staging of implementation.

Again, we lay out a high-level framework within which decisions need to be taken about priorities, staging, investment, and so on.



44

6.2.1 Possible staging

Staging will depend on strategic choices taken by the BTAA libraries, but in the usual way will be influenced by opportunity and changing needs. Some direction is suggested here.

Some structure around process will need to be decided.

- **Decide** whether to commit to manage/build/share a more coordinated collective collection within BTAA. If yes
- **Develop** a BTAA collective collections strategy based on recommendations here – with a holistic view of collections.
- **Segment** task (the threefold division in the table below makes sense) and decide priorities. Consider balance of executive/working group effort and oversight.
- **Agree** processes for decision making/commitment. Working groups should not be specialists only.

Improve resource sharing (across networks) and integrate it into the collection dev process <ul style="list-style-type: none"> • Service ecosystem • Policy framework • Usage data for decision making 	More strongly coordinate collections for optimal distribution/creation . <ul style="list-style-type: none"> • Prospective coll. Dev • Stewardship of the scholarly record – shared print • Digitization 	Create stronger systemwide awareness through consolidated metadata management and collection of usage data <ul style="list-style-type: none"> • Shared index or equivalent • Retention commitments • Digitization indicators • Usage data for decision making
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Finally, we suggest some relative priority, again acknowledging the discretionary nature of any such list, and the importance of shared BTAA strategy to provide the appropriate filter.

Manage

- **Optimize an ecosystem—not individual systems.**
- Make commitments explicit through strategy, process, and policies. [\[immediate\]](#)
- Improve systemwide awareness through consolidated management of metadata, usage data, and policies. [\[medium term\]](#)
- Implement Dashboard functionality to support decisions (requires aggregated usage data). [\[longer term\]](#)

Build

- Develop network-level prospective collection coordination capabilities. [\[longer term\]](#)
- Strongly coordinate and extend network-level shared print capabilities. [\[medium term\]](#)
- Extend the pool of digital surrogates available. [\[medium term\]](#)

Share

- Improve resource sharing (fulfillment) and integrate it into the collection dev process. [\[medium term\]](#)
- Focus on a generalized broker architecture and network level data components (holdings, policies, etc.). Acknowledge multi-network environment. [\[immediate\]](#)

Appendix 1: Draft Library Service Framework

Overview:

A service framework provides an abstract representation of core business functions in an enterprise or industry. While reference models for a small subset of library operations have been developed, we lack a generic framework to support service planning for collective collections.

Here we present a high-level view of a potential service framework for collective collections and explore its application to service ecosystems as they are configured locally and in consortial settings.

Introduction

Service frameworks and domain-specific reference models are used in a variety of industries to support strategic planning and service development. The primary objective of a service framework is to provide a high-level description of the core business functions in a given enterprise, so that diverse stakeholders (administrators, developers, external service providers) have a shared understanding of key service components and their dependencies. Service frameworks are commonly used in software development, where isolating discrete components or modules in a larger application is essential to scoping design requirements and developing unit tests (does the component function as it should?) and integration tests (do the components inter-operate as intended?). However, the utility of these heuristics is not restricted to software engineering. The supply chain sector, for instance, uses a domain-specific reference model (SCOR) to standardize planning and performance management, while the global banking industry has developed a framework (BIAN) that aims to standardize core banking services, in order to accelerate technological innovation and foster inter-bank operations, such as digital payment systems.¹

In the library domain, the Open Archival Information System (OAIS) reference model provides a shared framework for digital preservation services.² Abstract service frameworks have also been developed to support library service planning in consortium settings. For example, the California Digital Library, which provides shared services to libraries in the University of California system, has developed a microservices framework for digital curation that supports a modular suite of discrete service components, enabling campus partners to customize service bundles based on local need.³ The general utility of a library service framework was explored at some length by a DLF Service Framework Group, which highlighted its

¹ An overview of the SCOR framework is provided here: <http://www.apics.org/apics-for-business/frameworks/scor>. The BIAN framework is outlined here: <https://www.bian.org/>

² <https://www.oclc.org/research/publications/library/2000/lavoie-oais.html>

³ Starr, Joan, Perry Willett, Lisa Federer, Claudia Horning, and Mary Linn Bergstrom. 2012. "A Collaborative Framework for Data Management Services: The Experience of the University of California." *Journal of eScience Librarianship* 1(2): e1014. <http://dx.doi.org/10.7191/jeslib.2012.1014>

particular value in creating a shared view of emerging service requirements that are distinctive to the library community:

*A service framework for libraries allows [key stakeholders] to organize and express a consistent view of library services, that will, in turn, support the development of library systems that are flexible and responsive to the emerging needs of changing research and learning environments.*⁴

Service frameworks are especially valuable during periods of enterprise-wide change or disruption. BIAN was established to facilitate the retail banking sector's transition to digital services. SCOR was a response to disruption (specifically, the rapid globalization of supply chains) in the logistics industry.⁵ OAS enabled libraries to transition archival preservation activities from the print to the digital environment. It's our view that an abstract service framework can assist libraries in the transition from institution-scale to network-scale operations—including the move toward managing collective collections.

Library Stacks

Service frameworks decompose monolithic enterprises (e.g., logistics, digital preservation, banking) into a small number of core business functions. Thus, the SCOR framework identifies six fundamental business processes in supply chain management: Plan, Source, Make, Deliver, Return, and Enable. The University of California's Digital Curation microservices framework supports five main data management functions: Plan, Collect, Share, Manage, and Publish. BIAN distills the complex banking industry into seven main business areas with 36 discrete business domains. Each domain is supported by a "stack" of related services and infrastructure that represent distinctive enterprise assets.

Broadly speaking, the academic library is supported by three functional stacks (Figure 1):

Enterprise: intangible assets, such as a strategic plan and associated rules (i.e., policies) and tangible resources, including financial assets and personnel.

Applications: patron-facing and management services supported by technology such as an Integrated Library System (ILS), discovery layer, or inter-library loan management system. These applications support three core library service functions: discovery of library resources, delivery/fulfillment, and inventory management.

Collections: physical inventory, digital surrogates, and licensed electronic content, and the metadata describing these resources.

⁴ Brian Lavoie, Geneva Henry and Lorcan Dempsey. 2006. "A Service Framework for Libraries" *D-Lib Magazine* July/August 2006, Volume 12 Number 7/8 <http://www.dlib.org/dlib/july06/lavoie/07lavoie.html>. We note that Krisellen Maloney, Vice President for Information Services, University Librarian & Distinguished Professor, Rutgers University, was a key contributor to the DLF Service Framework Group and is a sponsor of the joint OCLC/BTAA white paper on Operationalizing the Collective Collection.

⁵ The SCOR framework is explored as a potential tool for analyzing and assessing library workflows in John Wang. 2017. *Supply Chain Management for Collection Services of Academic Libraries: Solving Operational Challenges and Enhancing User Productivity*. Chandos Publishing.

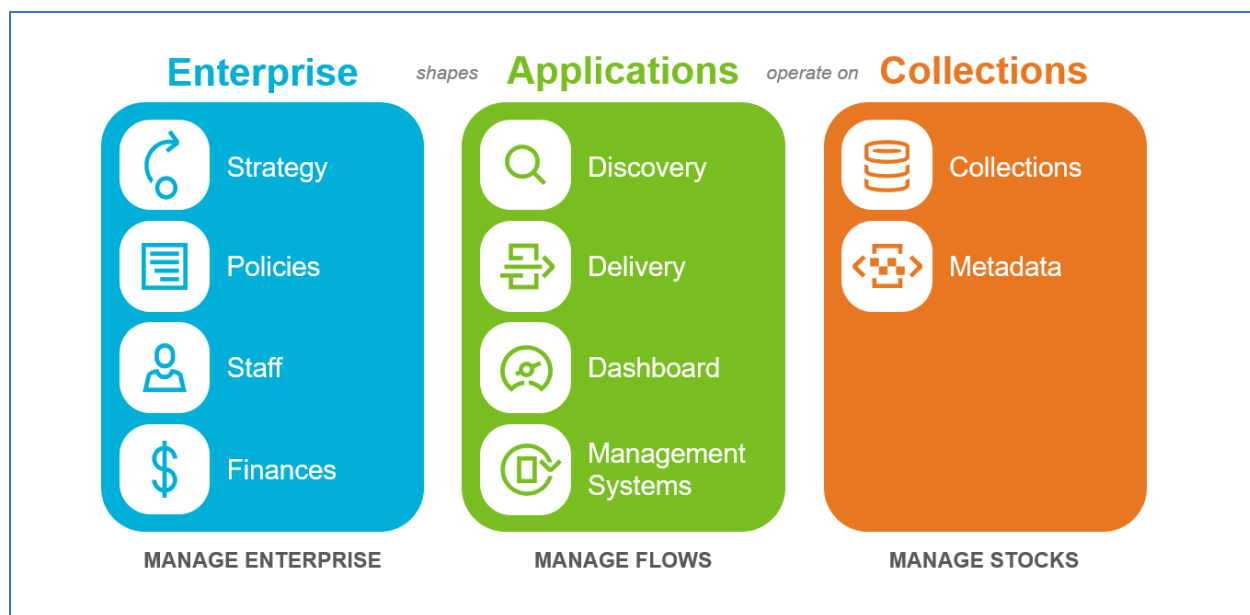


Figure 1: Library Service Framework: Functional Stacks

The Enterprise stack supports enterprise management; the Applications stack supports application management (i.e., successful service integration); the Collections stack supports ongoing management and optimization of owned, licensed, and shared holdings. While the composition of each stack may vary from one institution to the next, every academic library needs support in each of these three areas. Local choices about the composition and integration of these service stacks will impact the library's ability to "right scale" core operations, i.e., its relative position on a spectrum between institutional autonomy and enterprise consolidation.

In our view, the Enterprise stack does not typically receive the attention it deserves in discussions of shared library futures. Technology alone is insufficient to create scalable library services, as these inevitably require some coordination of underlying policy frameworks, resourcing decisions, staff workflows, and so on. And while there is increased discussion, especially in the context of shared print programs, of collection sharing, more attention should be paid to the importance of coordinating metadata flows. The potential advantages of consolidating other kinds of library collections (e.g., research data, open access content) also deserve consideration. In short, maximizing the efficiency and impact of network-level service requires that some attention be paid to each of the Enterprise, Applications, and Collections stacks.

We can use this high-level framework of functional stacks to explore the relationship between local implementation choices and strategic objectives. In a consortial context, shared objectives (such as creating economies of scale in metadata management, maximizing efficiency in resource sharing, rationalizing and expanding the scope of a collective collection) come with coordination costs. The configuration of Enterprise, Application, and Collection stacks will influence those costs. It is more difficult to optimize performance across a network of autonomous nodes than in a wholly consolidated system. Creating a seamless user experience across a consortium with different ILS and discovery layers is more challenging than unifying discovery in a group on a common platform. Streamlining workflows across a

group is more difficult when local policies conflict with consortial guidelines. Optimizing the logistics of inter-lending is harder when inventory is widely distributed.

Figure 2 suggests how component-level choices in the three stacks influence coordination capacity. Most academic libraries rely on a configuration that is optimized for local efficiency while enabling some ad hoc cooperation. Many seek a level of inter-institutional coordination that requires a different configuration of Enterprise, Application, and Collection stacks. While the potential benefits of “deep collaboration” are often invoked, few are prepared to accept the tradeoffs of full consolidation of library strategy, systems, and inventory.







		COOPERATION STACK	COORDINATION STACK	CONSOLIDATION STACK
Enterprise management	 Rules	Library directors	Committees	Consortium leadership
	 Resources	Local functional units, budgets	Consortium working groups, program fees	Centralized staffing, budgets
Application service management	 Discovery	Lookups to local databases	APIs	Shared index
	 Delivery	Local ILS/LSP, IMS	Interoperable LSP + middleware	Shared LSP, IMS
	 Dashboard	ILS report module	Aggregated data, ETL data warehouse	Real-time analytics, ML/AI approaches
Collections management	 Collections	Local stores	Group stores	Logistically optimized hubs
	 Metadata	Local data stores	APIs	Union catalogue

Figure 2 Library Service Framework: Implementation Choices

Individual libraries will source and configure Enterprise, Application, and Collections stacks according to local need. In the Applications stack especially, vertical integration is needed to maximize operational efficiency. Some libraries will source discovery, delivery, and dashboard components from a single vendor; others will prefer to mix and match “best of breed” components from different vendors. Large research libraries may invest significant time and money in customizing the integration of various components with special add-ons, modules, macros, and so forth. Whatever the benefits to local service provision, this kind of customization typically results in a brittle systems architecture with limited scalability. Cooperation becomes more challenging and coordination costs increase.

In a consortium setting, there will be multiple institution-scale stacks: a variety of governance bodies, different local policy frameworks, diverse systems in place, and mostly autonomous collections management, as illustrated in Figure 3. Additionally, there will be a group-scale stack that provides some level of coordination. This could include a robust and well-resourced Enterprise stack, some elements from the Applications stack (e.g., shared discovery environment, consortial fulfillment service, shared ILS), some consolidated inventory, a shared central index, or others. Strong horizontal integration is needed to

achieve optimal network-scale efficiency. Local fulfillment will need to interface with shared collections; a shared central index will need to be synchronized with the local metadata stores, etc.

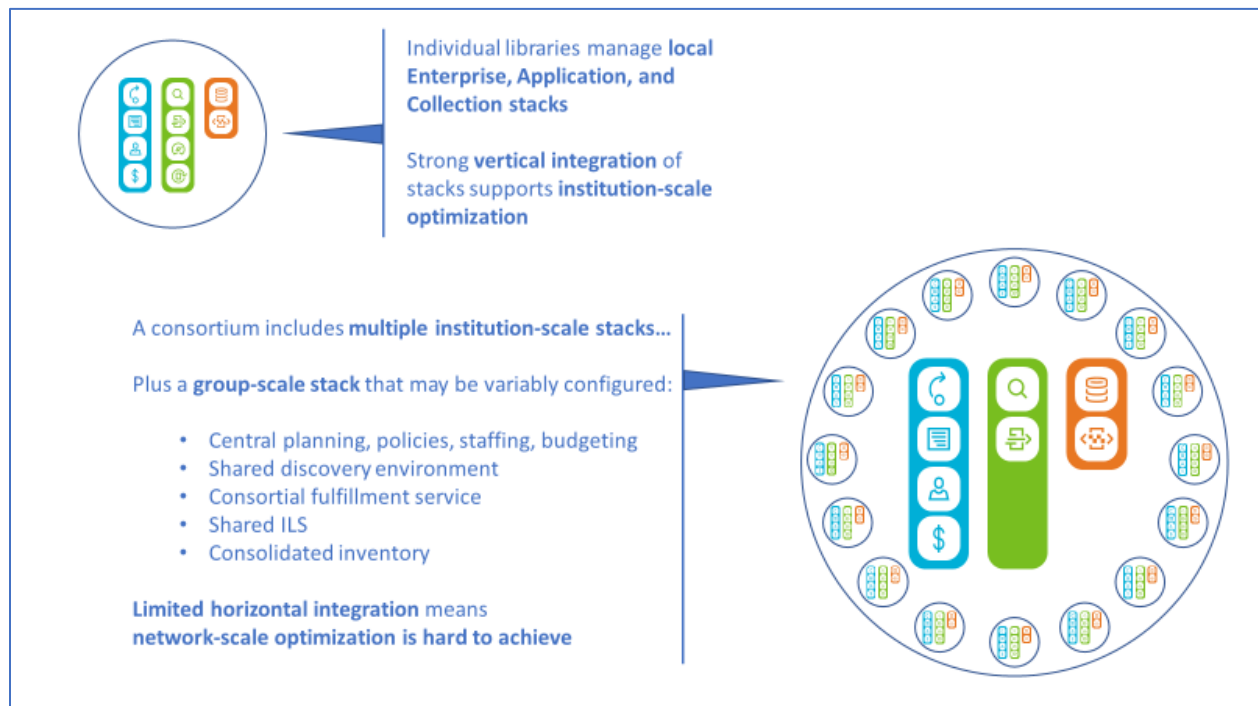


Figure 3: Stack Configuration: Local, Consortia

Coordination capacity varies in different consortial contexts (see Figure 4). This is a matter of choice, but also of circumstance: a consortium that serves a diverse mix of institution types will find it more difficult to harmonize circulation policies, acquisitions profiles, retention commitments, etc. Libraries that participate in consortia with stronger coordination capacity—clear strategic priorities, robust and reliable resource sharing, more shared services—may transfer a larger share of back-office functions and even some core operations (such as metadata management, content acquisitions, preservation) to the consortium, and reallocate resources to support locally distinctive services.

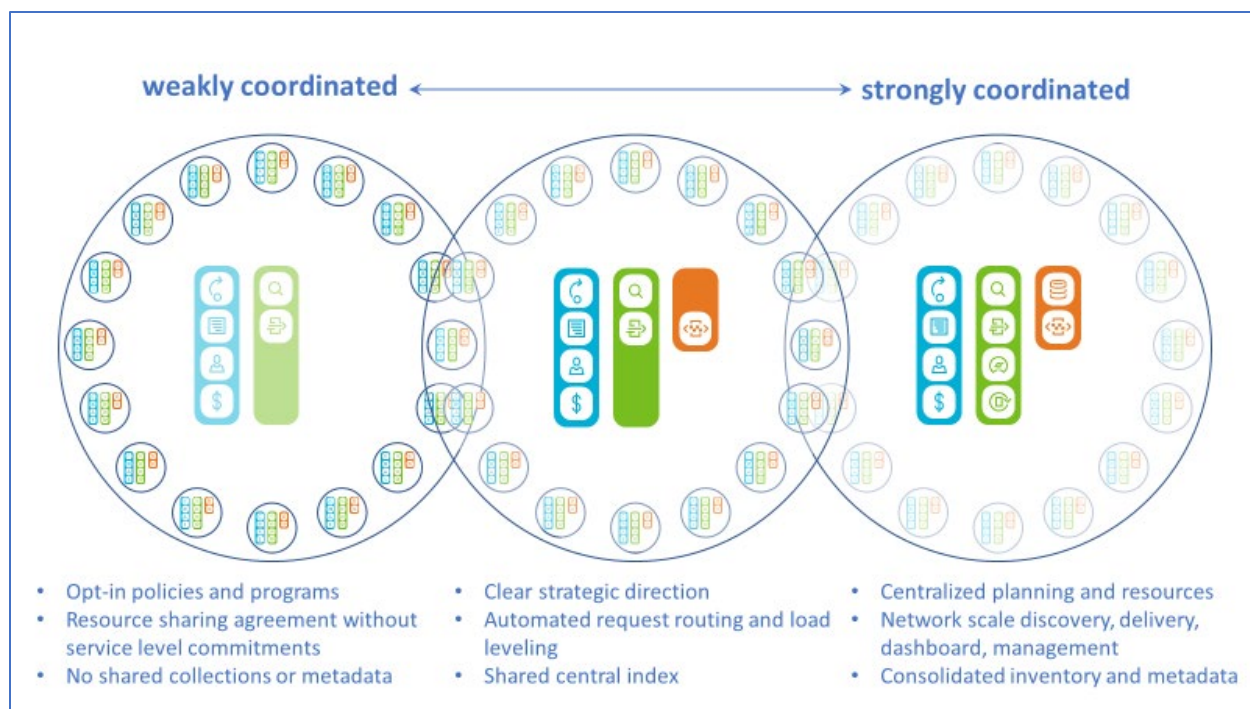


Figure 4 Consortium Coordination

Strategic choices: stack configuration

Local decisions regarding the composition and sourcing of individual service components will be informed, tacitly or explicitly, by the library's strategic direction. A university library that prioritizes autonomy, optimizes services for local efficiency and impact, and engages in opportunistic collaboration will tolerate high coordination costs because they are rarely incurred. Accordingly, they will customize the configuration of functional service stacks, and develop specialized workflows and extensions to 'out of the box' solutions. A library that relies on consortial partnerships for collections access and other shared services (content licensing, staff development, etc.) will need to manage coordination costs more deliberately. To maximize consortium impact, they may harmonize local policies and service configurations with partners, or advocate for greater interoperability between different vendor platforms. Finally, a library that seeks to reduce the costs of core operations through collaborative sourcing may opt for wholesale consolidation of some infrastructure and services. This will reduce or eliminate coordination costs, and also concentrates risk by increasing reliance on a single provider or platform.

Figure 5 suggests how a cooperation, coordination, or consolidation strategy might inform local and group decisions about the configuration of the functional stacks. In a cooperation-oriented strategy, selection and optimization of components is intended to retain maximum autonomy, and interoperability is favored as an approach. A coordination-minded strategy will focus on optimizing transactions within and between networks, potentially surrendering some local control. A consolidation strategy will leverage shared infrastructure (e.g., a shared ILS, a central index, physically consolidated inventory) to maximize systemwide efficiency.

	COOPERATION	COORDINATION	CONSOLIDATION
Enterprise management	Efficiently managing a node on the network	Efficiently managing transactions across the network	Maximizing impact, efficiencies of scale with shared infrastructure
Applications management	Autonomy with high coordination costs	Purposeful management of coordination costs	Minimize coordination costs; concentrate risk
Collections management			

Figure 5 Strategic Choices: Configuring Library Service Stacks

In practice, most academic libraries rely on an infrastructure and service stack designed for institution-scale operations that supports some boot-strapped cooperation, exemplified by *post hoc* collection-sharing (ILL) partnerships. Many institutions aspire to a service configuration that enables greater operational and strategic coordination with consortium partners, while retaining some measure of institutional autonomy. Consortial implementations of shared “discovery to delivery” solutions such as INN-Reach (e.g., OhioLINK, MeLCat), OCLC D2D (e.g., UBBorrow) or Autographics SHAREit (e.g., SRCS in Indiana, RAILS in Illinois) reflect growing interest in inter-institutional coordination of library operations. A small but growing number of academic libraries are opting for full consolidation of discovery, delivery, and inventory management functions in consortial implementations of a single Integrated Library System such as ALMA from Ex-Libris (e.g., Orbis Cascade Alliance) or OCLC’s WMS (e.g., PALNI).

The primary benefits and tradeoffs of cooperation, coordination, and consolidation may be summarized as follows:

Cooperation maximizes institutional autonomy but requires many “stack-to-stack” interactions, which increase coordination costs.

Coordination can reduce the costs of stack-to-stack interactions with a mix of shared infrastructure and interoperability but may result in a proliferation of overlapping and even duplicative partnerships that require costly human mediation.

Consolidation provides the greatest efficiency and may increase innovation capacity and overall impact but is hard to achieve. Library organizational structures are typically optimized for institution scale operations; shifting to centralized services and staffing can be disruptive and may create an unwelcome distraction within the university it serves. And, while contractual service-level agreements can reduce overall risk, consolidation inevitably concentrates risk.

Our discussion paper *Operationalizing the BIG Collective Collection* proposes a series of recommendations for increasing the efficiency and impact of collection-sharing activity within the BTAA. The service framework outlined above is used to organize these recommendations.

It is not our intent to propose a fully elaborated service framework for operationalizing collective collections here. Instead, we outline a general framework that can support community discussion about shared service needs so that gaps in existing organizational and technological infrastructure can be more easily identified and addressed. On a local level, library directors can use the framework to evaluate the alignment of existing Enterprise, Applications, and Collections stacks with the library's strategic direction. Within a consortium, the framework can be used to assess the mix of functional stacks in member libraries and how it constrains or enables group-scale operations. Institutional choices—such as ILS implementation, descriptive cataloging practices, prioritization of certain inter-lending networks, participation in shared collections storage, and so on—affect the efficiency and impact of group-scale activities. Thus, a decision to prioritize fulfillment through a state-wide network such as OhioLINK or I-Share will reduce the overall efficiency of UBorrow. Likewise, opting to aggregate item-level holdings and retention data in multiple metadata stores (e.g., PAPR, HathiTrust, OCLC) increases overall coordination costs.

In the figures below, we use the service framework to describe three different approaches to organizing library operations in a consortial context. The first (Figure 6) describes a loosely coordinated ecosystem, in which group-scale strategy and operations are subordinate to institution-scale operations. Core library functions rely on local Enterprise, Applications, and Collections stacks, which interoperate more or less well with group-scale infrastructure.

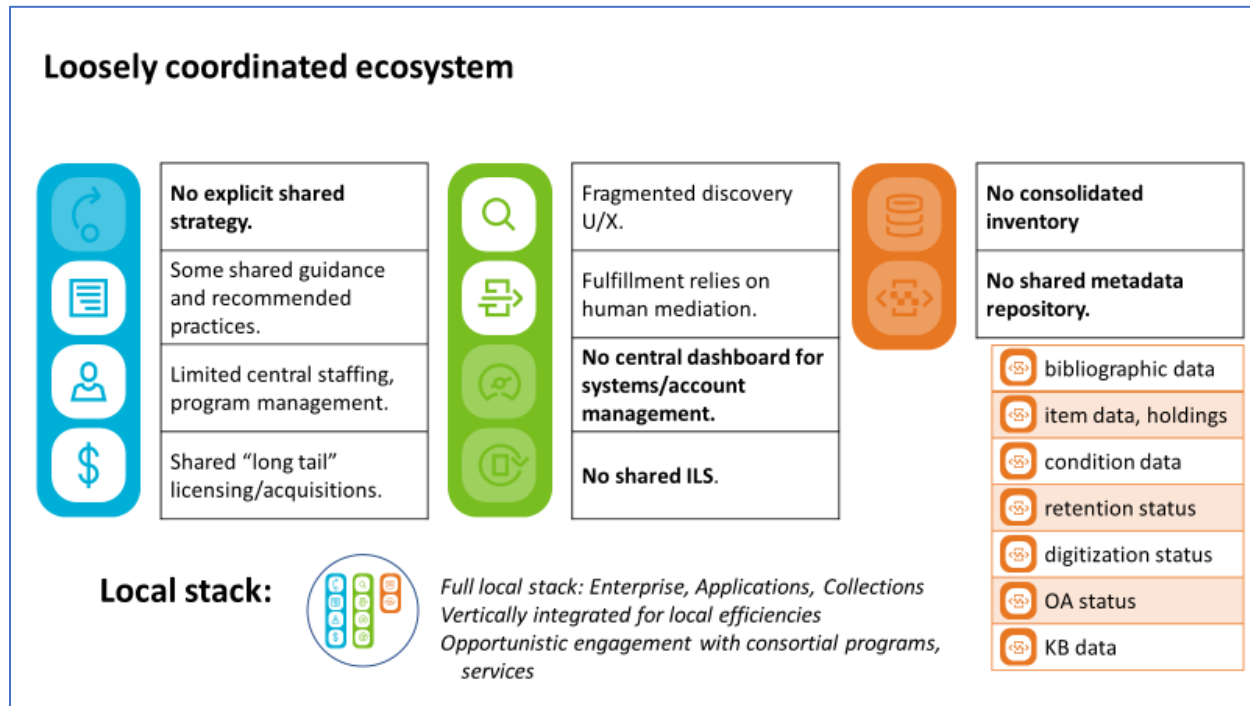


Figure 6 Stack Configuration: Loosely Coordinated Ecosystem

Figure 7 describes an ecosystem in which local and group operations are more purposefully coordinated. Reliance on the local stack is diminished and shared services move into the foreground. Figure 8 imagines an ecosystem where core operations are managed as group-scale activity and local stacks are tailored around distinctive university needs.

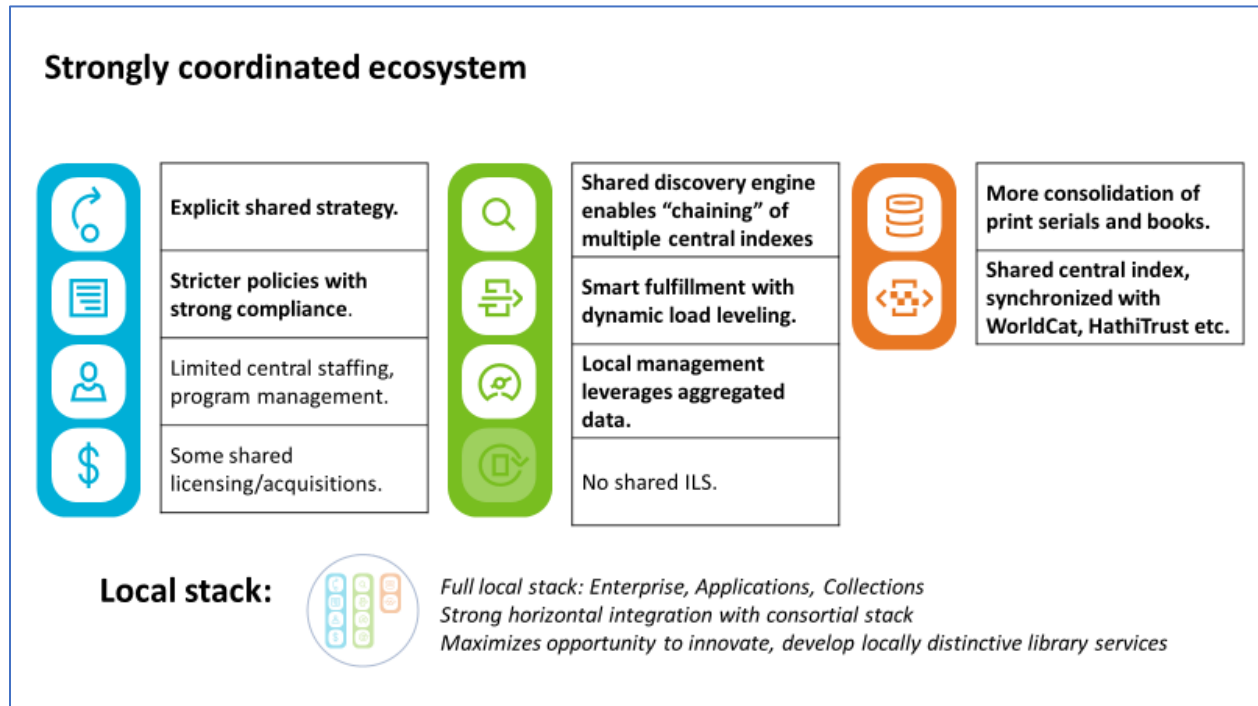


Figure 7 Stack Configuration: Strongly Coordinated Ecosystem

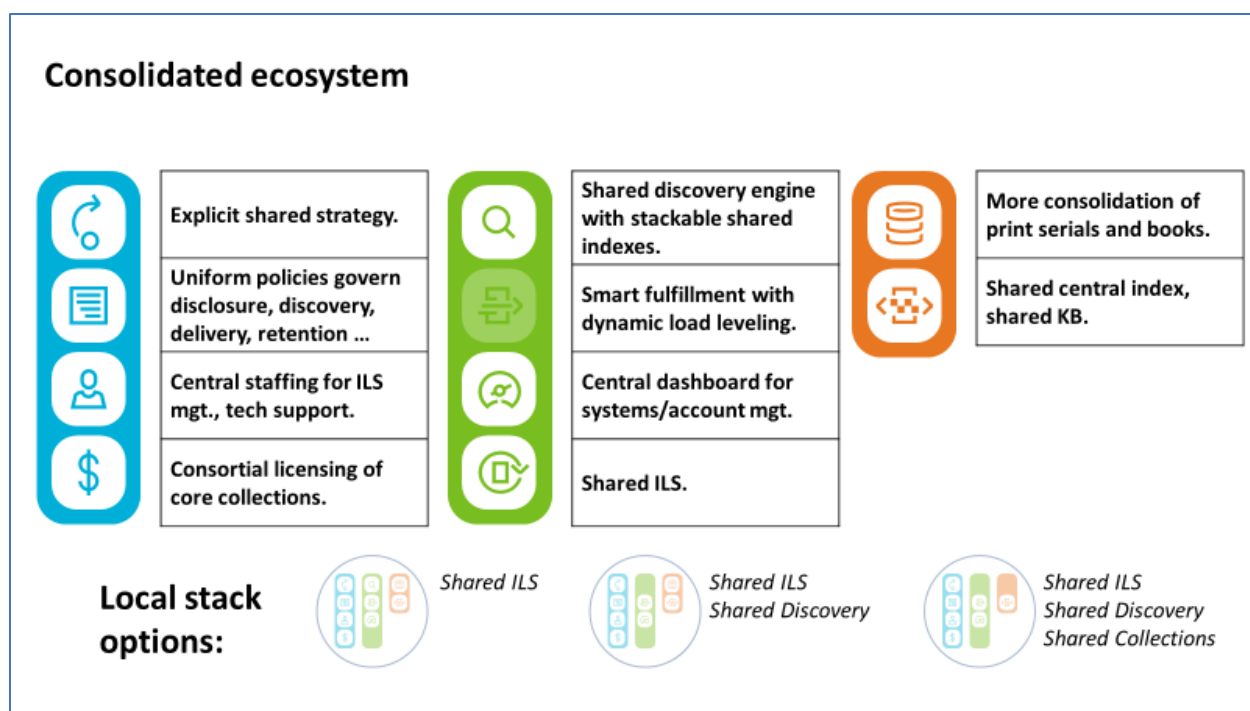


Figure 8 Stack Configuration: Strongly Coordinated Ecosystem

Business Functions

Service frameworks are designed to clarify core business functions, so that system developers can provide solutions that align with business processes and workflows. In principle, the business requirements of any domain can be decomposed into discrete *processes* and *functions*. The business *functions* of a domain can then be used to design and develop modular services that may be combined in different ways to support business needs in various settings.

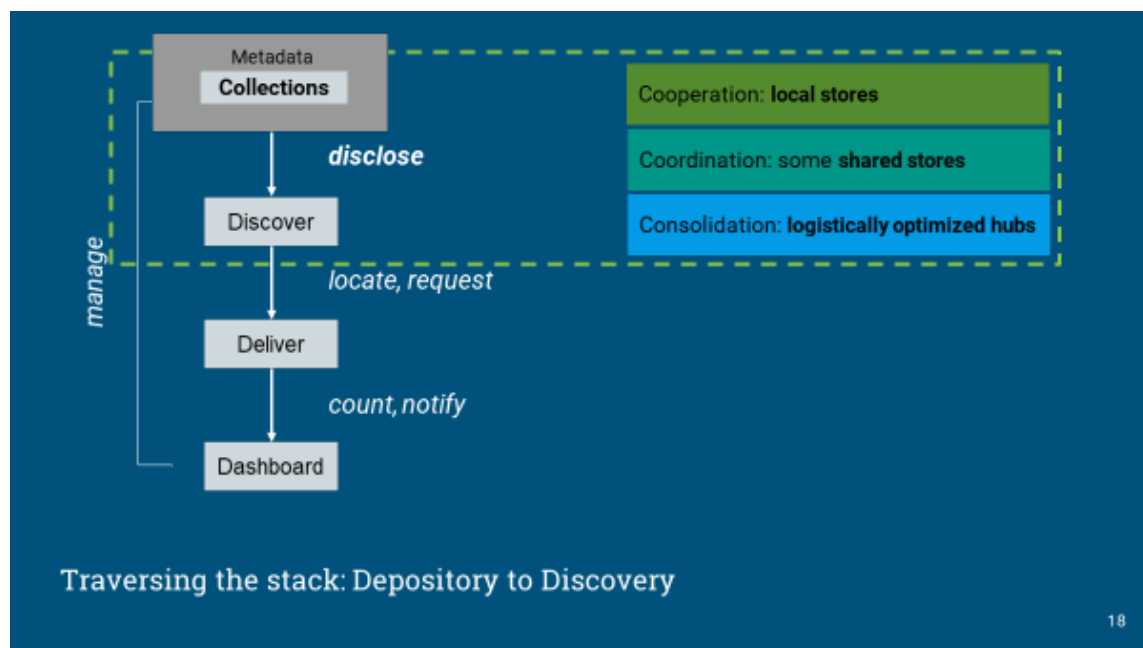
Discover, locate, request, and deliver are examples of core library business functions.⁶ The services that support these functions differ in the print and digital environment, but the underlying functions are the same and recognizing this has been important to enabling libraries (and system vendors) to manage the transition from print to digital discovery and delivery.

In the following images, we demonstrate how our stacks framework can be used to explore the relationship between discrete business functions and the processes and workflows they support. We do not include all the relevant functions here, just a few illustrative examples. This process mapping can be useful to understanding what may be required to achieve functional integration across the stacks. Workflows in the collections stack include accessioning content as well as withdrawing item (for transfer or de-accessioning), and appraisal of items (for selection, for preservation action, etc.). These operations impact workflows in metadata management, including disclosing and maintaining holdings in local and group catalogs. These metadata functions and processes support resource discovery and delivery. The data produced across all these operations are needed to monitor (and improve) system performance.

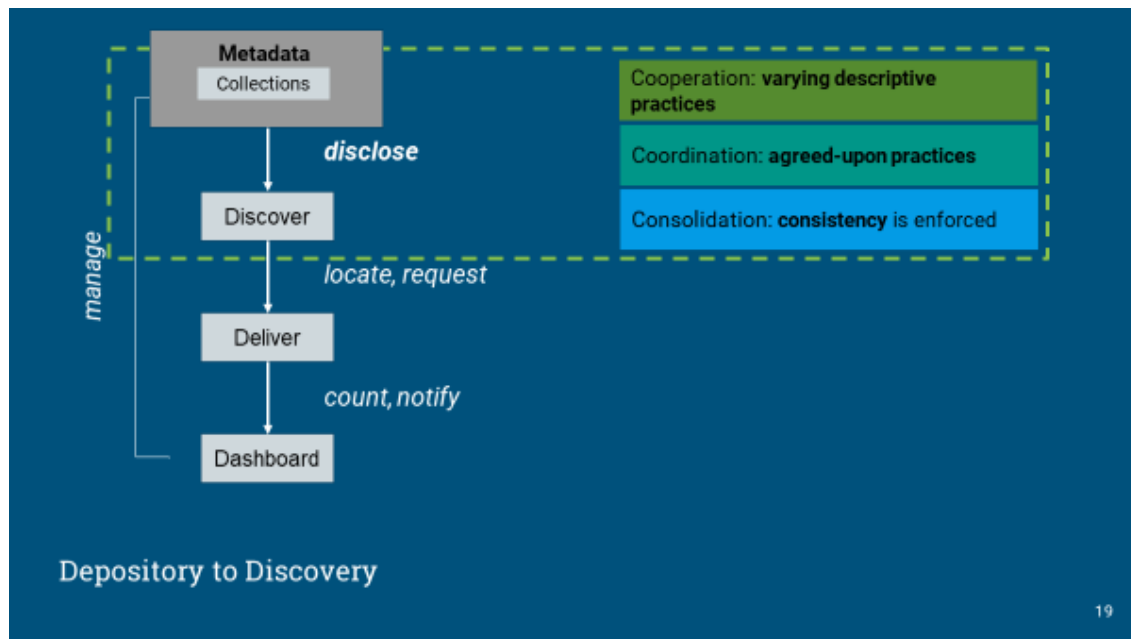
⁶ Lorcan Dempsey (2005). "Discover, Locate, ... Vertical and Horizontal Integration." Lorcan Dempsey's Weblog. November 20, 2005. <http://orweblog.oclc.org/discover-locate-vertical-and-horizontal-integration/>



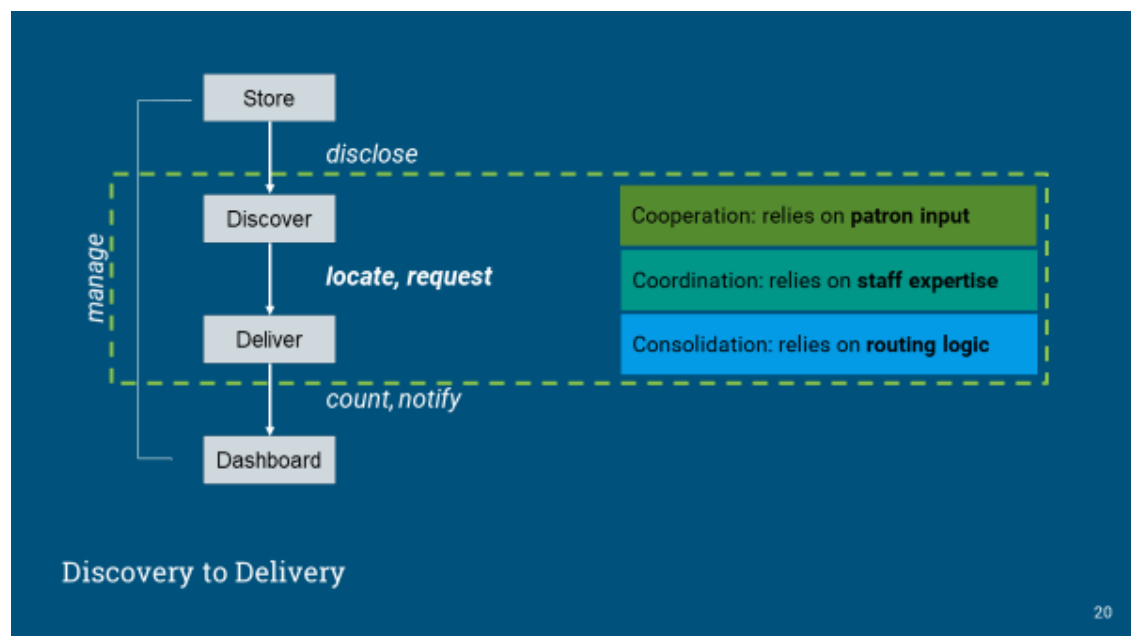
Using this framing, we can explore different approaches to integrating operations across the stack. In a loosely coordinated ecosystem, collections inventory and metadata are managed in local stores. In a more purposely coordinated ecosystem, there will be some shard stores (e.g., a shared repository, a group catalog). In a consolidated ecosystem, all the content and metadata will be aggregated in a central hub. Disclosure of these resources is necessary in any of these scenarios, because it enables the next critical process (i.e., discovery). From a service and system planning perspective, it is helpful know that disclosure is key to any of these approaches to collection management. It prompts important questions about how disclosure is implemented in different group settings. Coordinating disclosure from multiple stores will present more difficulties than disclosing from a central store, for example.



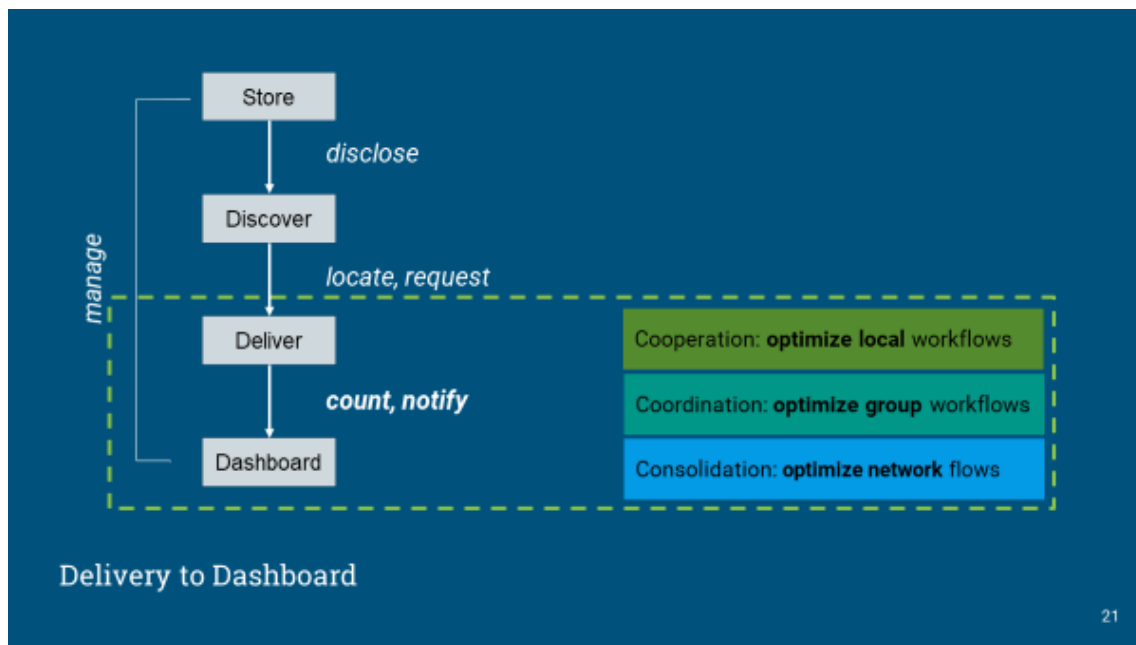
Similarly, thinking of the metadata management operations that support the disclose function, there are potential benefits to coordinating descriptive practice, or even consolidating resource description (e.g., centralizing the registration of retention commitments).



The central discover, locate, request, deliver sequence relies on specific inputs to advance from one stage to the next. In an institutional setting where a variety of fulfillment options are available (such as borrow a local copy, request a consortial copy, request an item from a commercial supplier), this process often relies on patron input. A choice must be made between different fulfillment networks. In some ecosystems, this process is supported by expert staff mediation (e.g., requests are manually routed to preferred providers, including consortial fulfillment networks). Increasingly, institutions are seeking to automate this process with programmable request routing and load leveling.

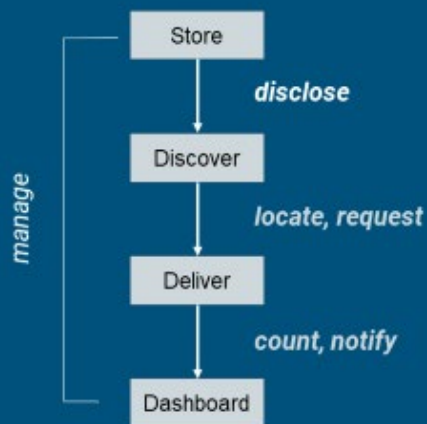


At the end of the process, when an item is delivered (and when it is returned), transaction data is collected so that item availability can be updated, accounts are reconciled, and borrowing and lending activity is registered. Individual libraries will use this data to manage institutional workflows; in a consortial setting, it can be used to adjust the rota for borrowing requests (to prioritize lenders with quicker turnaround, lower costs, etc.) or to monitor agreed upon commitments (e.g., two-day turnaround). Greater consolidation of transaction data would enable process optimization to scale even further: monitoring resource flows across multiple fulfillment networks so that logistics are improved, the movement and transfer of stock is better understood, and costs can be better managed.



This high-level framework can also be used to organize a bird's-eye view of existing infrastructure and to explore requirements for supporting core business functions in emerging organization contexts. In the images below, we note some examples of how current systems and services map to these business functions and identify some of the gaps and frictions that exist.

Cooperation



Collection = local inventory

Discovery starts with local collection with post-hoc extensions to other sources (regional collection, WorldCat)

E.g. ILS/IMS, discovery layer

Circ + post-hoc ILL

ILL requests mediated by library staff

E.g., ILLiad

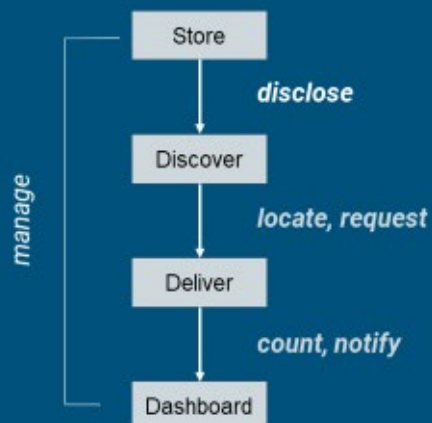
Manual analysis of local reports

Library staff monitor usage and adjust inventory, workflows as appropriate

E.g. ILS circ and OCLC ILL reports

23

Coordination



Collection = what is discoverable

Variable disclosure = limited discoverability

E.g., update WorldCat holdings

UX varies from site to site

Fulfillment relies on 'Invisible labor' of library staff

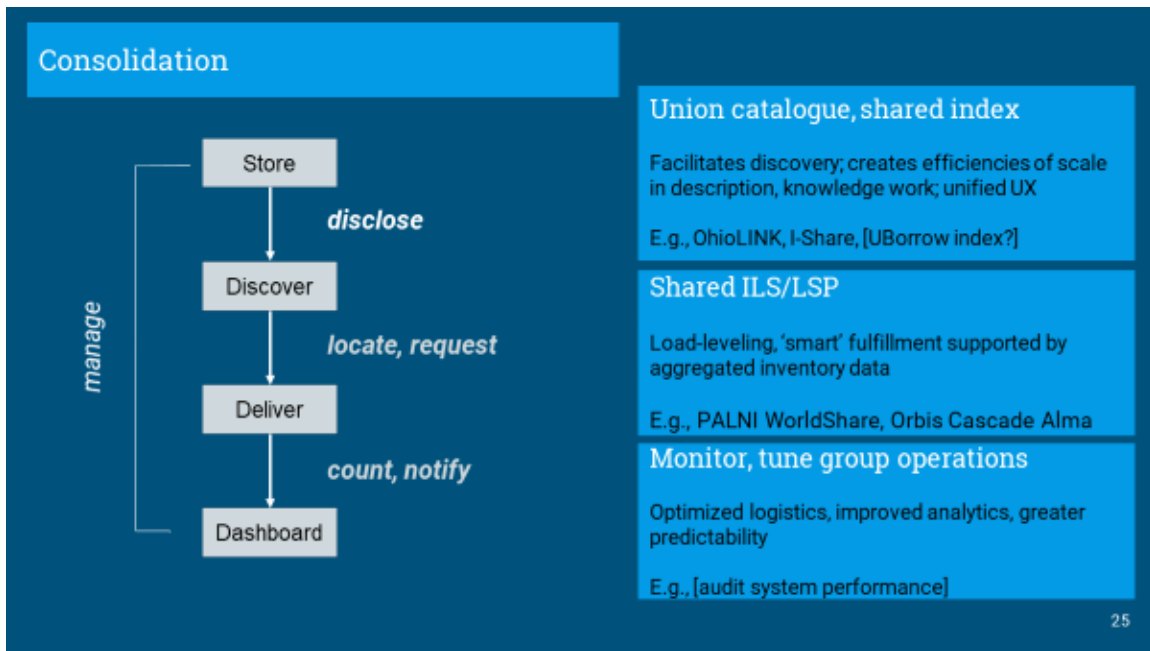
E.g., UBBorrow vs. I-Share, OhioLINK, EZB

Service level is highly variable

UBBorrow value varies from site to site

E.g., no monitoring of UBBorrow SLA

24



The work presented here could be extended to develop a more complete picture of the collective collections service landscape and identify common design patterns for key collection-sharing operations. Here, we aim only to demonstrate the service framework's utility in clarifying how institutional choices about the composition and configuration of the Enterprise, Applications, and Collections stacks can facilitate or constrain collective action. We use the framework to explore the collective collections service ecosystem in our *Operationalizing the BIG Collective Collection* discussion paper.

Appendix 2: BTAA Fulfillment Networks and Shared Print Partnerships

We polled BTAA libraries to identify the full range of collection sharing partnerships in which the libraries actively participate. The tables below present the fulfillment networks and shared print partnerships identified by BTAA library staff (as of 2018).

Table 1 BTAA Fulfillment Networks

BTAA Library	UBorrow	CRL	State network	RapidILL	OCLC SHARES	NNLM	PALCI EZ Borrow	Ivy Plus BorrowDirect	Other network 1	Other network 2	Other network 3	TOTAL
Indiana University Bloomington	X	X	Indiana Libraries	ARL		X			ALI			6
Michigan State University	X	X	MeLCat	ARL		X						5
Northwestern University	X	X	ILDS		X	X						5
Ohio State University	X	X	OhioLINK /SearchOhio		X	X						5
Pennsylvania State University	X	X			X		X					4
Purdue University	X	X	State of Indiana (SRCS)	ARL, E, I					ALI			5
Rutgers University	X	X	JerseyCat	ARL, E	X		X		NY METRO			7
University of Wisconsin	X	X	Wisconsin private & public institutions	ARL, E, I, M, Cosmo		X			Iowa State/Iowa Consortium	UW System		7
University of Chicago	X	X	ILLINET/ILDS		X	X		X				6
University of Illinois Urbana-Champaign	X	X	ILLINET/ILDS						CARLI / I-Share			4
University of Iowa	X	X	SILO		X				Two Rivers Alma Collaborative			5
University of Maryland	X	X	Maryland Interlibrary Loan Organization (MILO)	ARL, COSMO, Maryland					USMAI	MD Digital Library	CIRLA	7
University of Michigan	X	X	MeLCat	ARL, M	X							5
University of Minnesota	X	X	Minitex/Minnetonka		X	X						5
University of Nebraska	X	X	Nebraska Library Assn.	ARL, E								4

Table 2 BTAA Shared Print Partnerships

BTAA Member	BTAA Shared Print Repository	HathiTrust Shared Print Retention Partner	CARLI Last Copy Program	Iowa-Iowa State-Wisconsin Journals Retention Program	PALCI Distributed Print Archive	Minitex (MLAC)	OhioLINK Last Copy Program/Ohio Depositories	TOTAL
Indiana University Bloomington	x	x						2
Michigan State University	x							1
Northwestern University	x	x	x					3
Ohio State University	x	x					x	3
Pennsylvania State University	x				x			2
Purdue University	x							1
Rutgers University	x				x			2
University of Wisconsin	x	x		x				3
University of Chicago	x	x	x					3
University of Illinois Urbana-Champaign	x	x	x					3
University of Iowa	x	x		x				3
University of Maryland	x							1
University of Michigan	x	x						2
University of Minnesota	x	x				x		2
University of Nebraska	x							1

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