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Smoke Gets in Your Eyes: Trials and Triumphs of Implementing the ExLibris Primo Discovery Tool in a Small Regional Consortium

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SMOKE GETS IN YOUR EYES: TRIALS AND TRIUMPHS OF IMPLEMENTING THE EX LIBRIS PRIMO DISCOVERY SERVICE IN A SMALL REGIONAL CONSORTIUM

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Abstract

This paper offers a case study of the NC-PALS consortium's selection and implementation of Ex Libris's Primo Central discovery service with the purpose of highlighting considerations, challenges, and concerns presented by our experiences which may help to inform planning and implementation of this or similar discovery services in small- and medium-sized libraries or consortia. As this study shows, instead of a "plug and play" solution, we have found Primo to take nearly as much time to implement as an entirely new ILS, with a number of interoperability and functionality issues remaining unresolved at the time of writing. Following a review of the literature on user behaviors and web-scale discovery services, this study offers a detailed description of NC-PALS's experiences selecting and implementing Primo, giving attention to trials and triumphs along the way, and identifying ongoing challenges which may hold significance for future implementations. This study calls into question the readiness of the discovery service marketplace to support robust interoperability between competing vendors' ILS, discovery, and content delivery services, especially for small- and medium-sized libraries or consortia with small library staffs and limited local technology support or who are opting for cloud-hosted ILS and discovery implementations.

Keywords: cloud; consortia; delivery; discovery; implementation; interoperability; selection

Keyword Phrases: Ex Libris Primo; discovery service selection; discovery service implementation; discovery services in consortia; discovery service / ILS integration and interoperability; cloud services

Introduction

Interest in web-scale discovery services has exploded within the academic library community, and for good reason. These services promise to streamline the process of accessing libraries' diverse and often distributed print and electronic collections through an integrated, intuitive search experience similar to users' preferred online tools (e.g., Google and Amazon). While early adoption of these systems largely has been concentrated among larger research institutions, smaller libraries and consortia have begun to explore this service model as a response to the challenge of changing user search preferences.

During the 2010-2011 academic year, the North Carolina - Piedmont Automated Library System, Inc. (NC-PALS) embarked on a joint project to implement its first discovery service, Ex Libris's Primo Central. The NC-PALS consortium initiated this project to address several challenges faced by its patrons and staff when navigating what Connaway and Dickey (2010) call the "discovery-to-delivery process" (29). Begun in the 1960s as a larger, informal consortium of colleges and universities in the Piedmont-Triad region of North Carolina, NC-PALS currently is comprised of Bennett College, Greensboro College, and Guilford College in Greensboro, NC, and Salem College and Academy in Winston-Salem, NC. NC-PALS shares a cloud-hosted integrated library system (ILS) as well as a reciprocal borrowing arrangement that allows patrons to request books for hold and delivery among consortium libraries. The primary activity of the consortium is the administration of its shared ILS (SirsiDynix Symphony), which is supported by a systems librarian and the staff of the consortium's partner institutions.

This paper offers a case study of the NC-PALS consortium's selection and implementation of the Primo Central discovery service with the purpose of highlighting

considerations, challenges, and concerns presented by our experiences which may help to inform planning and implementation of this or similar discovery services in small- and medium-sized libraries or consortia. As this study shows, while selection of Primo was relatively uncomplicated, implementation has proven somewhat more challenging. These challenges derive from how Primo supports the particulars of the consortium's ILS deployment and local cataloging practices, as well as from market forces that have complicated the interoperability of resources and services provided by vendors who compete in the ILS, discovery, or content and metadata marketplaces. Instead of a "plug and play" solution, we have found Primo to take nearly as much time to implement as an entirely new ILS, with a number of interoperability and functionality issues remaining unresolved at the time of writing.

Following a review of the literature on user behaviors and web-scale discovery services, this study offers a detailed description of NC-PALS's experiences selecting and implementing Primo, giving attention to trials and triumphs along the way, and identifying ongoing challenges which may hold significance for future implementations. While we remain enthusiastic about the promise of discovery services to streamline the discovery-to-delivery process for our patrons, NC-PALS's experiences point to ongoing growing pains within this emerging market, especially as vendors continue to develop their products to address the needs of an increasingly diverse clientele. As the smoke clears, the NC-PALS consortium—and the library community at large—will determine whether our early hopes for these services are achieved.

Literature Review

Any review of the recent literature on next-generation library catalogs and centrally-indexed web-scale discovery services reveals nearly universal enthusiasm for these technologies' enhanced ability to respond to emerging researcher behaviors and expectations, and to increase the relevance of library resources and services for users. This has been especially true among academic libraries, whose significant resource and personnel outlays demand justification in the face of ongoing funding challenges (Heath 2009) and changing attitudes about the purpose and value of academic libraries (Guthrie and Housewright 2011; Parry 2009). Among the most dire predictions for the future of higher education—academic libraries included—is James Dunderstadt's (2002) suggestion that new information and communications technologies hold the potential to precipitate "the end of the university, an institution that has existed for a millennium" (21). If traditional colleges and universities are at risk of obsolescence, then presumably their libraries are at even greater risk.

Several recent user studies give credence to the claim that academic libraries are losing their hold on the attention and patronage of their users when it comes to resource discovery and delivery. Connaway and Dickey's (2010) meta-analysis of twelve OCLC, RIN, and JICS user behavior studies, all published since 2005, recapitulates what academic librarians know through daily interaction with students and faculty: when it comes to discovery, users value speed and convenience in simple search contexts similar to Google or Amazon absent the granularity presented by traditional library research tools (4 and passim). These preferences have dramatic consequences for library resource use. DeRosa et al. (2006) reports that, despite high awareness of library electronic resources (2-3), eighty-nine percent of college students' information searches begin with an online search engine while only two percent begin with the library website (1-7, see also 1-10). On the other hand, when it comes to delivery, users expect

seamless access to resources absent additional steps or barriers between finding and using a particular item. Connaway and Dickey (2010) stress the centrality of a seamless "discovery-to-delivery process" to researcher satisfaction:

> The results of these studies indicate that discovery is no longer the major issue – access is the biggest issue. Retrieving large results lists does not intimidate or frustrate users (they may be accustomed to this because of search engines, such as Google). The biggest frustration is not being able to access the materials/resources because of proprietary information that requires subscriptions, logins, passwords, etc. (29)

Among Connaway and Dickey's included studies, a report commissioned by the Research Information Network (2006) suggests that most researchers no longer "draw a hard and fast distinction between 'means' and 'ends,' between discovery services and what is being discovered" (6). We have all heard students say, "I found it on Google," as if Google were the original publisher of whatever "it" is. This collapse of expectations with regard to the means and ends of discovery and delivery—where users "expect the two activities to be one" (Tallent 2010, 4)—finds its origins in the very online search tools that researchers have come to prefer, regardless of generational cohort (Connaway 2008) or academic status (Guthrie and Housewright 2011). As the bulk of recent user studies suggest, the horse is out of the barn in terms of user preferences, and momentum is on the side of the furtherance of this collapse. "If in the past, searching for information occurred primarily in the scholarly domain and users' information retrieval behavior affected how they searched for non-scholarly information," Sadeh (2007) argues, "the researchers of today arrive at institutions of higher education already accustomed to the Internet environment and derive their expectations from it" (254; see also Timpson and Sansom 2011, 264).

If user expectations for the discovery-to-delivery process now largely derive from prior experience of the Internet, then what exactly do these expectations look like in terms of preferred interface features and behavior? A number of recent studies attempt to answer this question with relatively consistent results. Sadeh (2008) offers that users prefer "familiar," easy-to-learn, easy-to-access query interfaces similar to Google which return relevant results in varied formats without requiring "precision searching" (8-10). Moreover, users "value a system's ability to deliver electronically any type of material" (9). Through a series of usability studies of OCLC's WorldCat.org end-user interface, Calhoun et al. (2009) provide direct evidence for several of Sadeh's suggested user preferences, including simple keyword searching, search results that are relevant (and "relevance must be obvious"), immediate delivery, and facets to help "refine searches, [and] navigate, browse and manage large results sets" (11-12). Key among these findings is the importance of relevance ranking and faceted browsing to user satisfaction.

These findings are further corroborated by a number of institutional usability studies (Becher and Schmidt 2011; Ballard 2010; Ballard 2011; Gross and Sheridan 2011; Martin 2010; Olson 2007; Tam, Cox, and Bussey 2009; Williams and Foster 2011). In a recent review of usability studies investigating faceted browsing, Fagan (2010) shows that, while many studies suffer from significant methodological limitations, the majority corroborate users' preference for, and increased satisfaction with, accurate relevance ranking and faceting for organizing and managing search results (62-63).

As Notess (2011) suggests, "For the local user, the promise of discovery is compelling—only one search query can bring up everything available from the library. Although nothing is truly comprehensive, for many libraries the discovery search gets closer than anything else they have tried" (46). Notess's observation plays out in a number of impact studies that show the

variable but generally positive effect of web-scale discovery services on users' engagement with library resources. For example, Way (2010) reports that implementation of Serial Solution's Summon at Grand Valley State University has affected dramatic increases in electronic full text use. Deardorf and Nance (2009) report significant increases in ILL requests at the University of Washington after implementation of OCLC's WorldCat Local (see also Ward, Mofjeld, and Shaddle 2008), and Greiner (2011) reports increases in full text downloads, ILL requests, and consortial borrowing among Willamette University, Reed College, and Portland Community College after implementation of the same product. Although "the newness of discovery tools has not given researchers much time to study how they have affected collection use" (Greiner 2011, 211), existing studies are encouraging, giving credence to librarians' enthusiasm.

In the six years since North Carolina State University Libraries layered the Endeca search engine onto their traditional Unicorn OPAC (Antelman and Pace 2006), the marketplace has become flooded with early contenders to the web-scale discovery market. Products currently include EBSCO's EBSCO Discovery Service (EDS), Ex Libris's Primo, Innovative Interface's Encore, OCLC's WorldCat Local, Serial Solution's AquaBrowser and Summon, and SirsiDynix's Enterprise (Breeding 2011b, 28). While a number of recent studies attempt to provide functional descriptions of, and comparisons among, these products (Breeding 2007; Rowe 2011; Stevenson et al. 2009; Yang and Hoffman 2010; Yang and Wagner 2010), each comes with a significant caveat—the discovery marketplace currently is evolving so quickly that any published description and/or comparison of products, features, and functionality risks immediate obsolescence (see, for example, Vaughn 2011a, 10). Given the current pace of development, the goal of any near-term case study should be to identify generic challenges,

themes, and recommendations that will continue to impact selection and implementation of web-scale discovery services regardless of ongoing product enhancements.

With regard to selection, a handful of resources are now available which provide relatively consistent recommendations. Cai, Dou, and Jiang (2011) identify six "evaluation priorities" for web-scale discovery services, including architecture framework [*sic*], depth of integration with the ILS, resource coverage, metadata quality, user interface, and additional criteria such as back office management, interoperability with existing systems and content, and vendor support (348-52). In their discussion of architecture framework, the authors differentiate between "cloud-based" and "hybrid" implementations, suggesting that libraries should carefully weigh potential drawbacks to cloud-only implementation, including "risk of losing control of local data and sensitive information […], service quality relying on external network, and limited control over user interface, etc." (348). Added to this list should be interoperability with the library's other cloud-based services (e.g., third-party cloud-hosted ILSs), as well as vendors' willingness to provide access and data portability across these services.

Similarly, Luther and Kelly (2011) identify four "leading factors" for consideration:

- **Content**, including "scope and depth of content being indexed," "richness (and consistency of metadata," "frequency of content updates," and "ease of incorporating local content,"
- **Search**, including "simplicity of the interface," "quality of results, including relevance ranking," "ability to customize search and relevance settings," and "ease of incorporation into existing institutional access tools,"
- **Fit**, including "ease of implementation," "compatibility with existing software and content," "responsiveness of the vendor and alignment of priorities regarding future developments," and "overall customer support," and
- **Cost**. (67)

Vaughn (2011b) sets out the majority of these considerations in the form of questions for libraries and vendors to consider prior to service selection (54-59). Taken together with the currently sparse reports of libraries' implementation experiences—of which consortia appear entirely absent (Lewis 2008; Hauser 2009; Ho, Kelley, and Garrison 2009)—evidence and experience point to the centrality of Luther and Kelley's leading factors of content, search, and fit when evaluating and selecting a web-scale discovery service.

Of course, as the marketplace continues to evolve, librarians are becoming more aware of the economic and technological hurdles that remain before web-scale discovery services represent a mature search and delivery model, thoroughly implemented across the spectrum of public and private, large and small, and independent and consortial academic library systems. For example, Breeding (2011a) raises the issue of delivering effective relevance rankings in discovery systems where keyword and clickthrough data is shallower than for online search engines like Google, preferences for results may differ from institution to institution, and where centralized indexes must accommodate direct access to a wider array of formats as well as proprietary and open-source materials. Notess (2011) comments:

> Relevance is extremely difficult to do well. It takes a tremendous amount of evaluation and reengineering of results. The hundreds of relevance factors that Google uses to attempt to deliver relevant results on a majority of its searches are constantly being re-examined and changed in an ongoing effort to achieve better results […] Do our library vendors have that kind of engineering capabilities? Too often I find top results turning out to be book reviews, very brief articles, or only tangentially relevant. (47; see also Quint 2010 on indexing quality)

In a similar vein, several authors have raised the issue of metadata quality and content access (Breeding 2011b; Tonkery 2011; Quint 2010). For example, in a recent review of the ILS and discovery marketplaces, Breeding (2011b) discusses the increasing unwillingness of vendors to

cooperate in providing content for centralized discovery indexes. "Each of these vendors," Breeding explains,

> enters [negotiations] with competitive concerns that hinder and help their ability to gather content into their indexes. Serials Solutions, for example, as part of the ProQuest family, benefits from ProQuest's position as a publisher and its ability to form partnerships in the broader content community as it builds the Summon index. EBSCO likewise can extend the vast content within its bevy of EBSCOhost products with third-party content. Ex Libris, not itself a content provider, builds its Primo Central index from a more neutral vantage point, though that has not insulated it entirely from competitive obstacles.
>
> Competition can impede these cooperative arrangements. Since the discovery products of Serials Solutions and EBSCO directly compete, they do not help populate each other's index. EBSCO recently withdrew from an agreement to provide EBSCOhost content to Ex Libris for Primo Central. More comprehensive central indexes will ultimately depend on a more tedious strategy of accumulating content from primary sources rather than depending on aggregators. (26-27)

What Breeding does not say here—but is implied by this statement—is that vendors are now in complex multimarket competition with each other, be it for exclusive content rights, ILS contracts, discovery services contracts, or any combination of the three. This emerging market situation renders naïve the assumption that "content providers are willing to share their metadata and full-text indexes, in order to generate more traffic to their web site and make their resources more discoverable" (Cai, Dou, and Jiang 2011, 350). It also suggests that vendors who claim to be neutral within one market may still face competitive action from vendors with competitive concerns in other markets. As this study shows, such actions are not only limited to vendors' access to metadata, but may also interfere with local implementations.

Selection Process

During spring of 2010, the NC-PALS consortium began the process of selecting a discovery service product. In so doing, the consortium faced two main factors: 1) limitations with a 1990's era OPAC, especially with regard to relevancy rankings, treatment of ebooks and other electronic resources, and a counter-intuitive search interface, and 2) the increased complexity of teaching users how to navigate among hundreds of disparate subscription databases and open-access resources. As suggested in the literature review, both anecdotal evidence and the recent literature pointed to the increasing importance of meeting users' expectations for information-seeking. Observers of library user behavior have concluded that users want to control their information-seeking in a non-mediated fashion (Matthews 2011). The feeling among the consortium's librarians who conduct instruction was that our users—faculty and students alike—did not feel that they had control over their search experience, and so were turning to non-library resources more often.

Guided by the need to meet these challenges, the NC-PALS consortium surveyed the discovery service market. In May 2010, vendors from Ex Libris, Serials Solutions, and EBSCO presented the current releases of their discovery products (Primo, Summon, and EBSCO Discovery Services, respectively) to the North Carolina Independent Colleges and Universities' Library Purchasing Committee. Following this meeting, the directors of the NC-PALS consortium's partner libraries identified the most important elements of a discovery service for the consortium.

The ability to handle the NC-PALS consortium's shared ILS was the biggest consideration in the selection of a discovery service. Each institution utilizes unique location codes in the consortium's SirsiDynix Symphony database to separate print holdings. However, there is significant overlap among libraries, particularly in print journal holdings. The

consortium also has a reciprocal borrowing arrangement by which patrons may request books at another consortium library to be put on hold and delivered to their home institution. Therefore, the NC-PALS libraries required a discovery service that supports faceted searching of both local holdings and the holdings of partner libraries. In addition, each library's electronic resource holdings are sufficiently unique to require a unique search interface for each library.

The ability of the discovery service to maintain each library's unique identity with separate institutional branding and customized facets—especially for local collections like Guilford College's Quaker Collection—also surfaced as an important consideration. Search elements such as relevance ranking and interface were considered, with all of the discovery service products under consideration offering a significant improvement to the consortium's existing user interfaces. At the time of selection, however, the differences between the various vendor offerings in this regard appeared negligible.

Vendor support was a high priority in our selection process. While all of the implementations we considered were cloud-hosted, Ex Libris offered a support package specifically geared towards small institutions with limited local technology support. This package included a special implementation period with a case manager who would walk us through the implementation process. In addition, with the selection of the SFX link resolver, Ex Libris offered coordination between the SFX and Primo products. Financial considerations also were a factor, as the NC-PALS consortium operates with little cushion for new products. In the past, the consortium's only expenses were related to contracting and maintenance of the ILS, so addition of a discovery service entailed a new line item to be financed entirely through the identification of savings and higher partnership dues.

Without question, these considerations identified Luther and Kelly's (2011) "fitness"—or ease of implementation, customer service, and compatibility with existing systems—as the most important selection factor for the NC-PALS consortium. Two products came to the forefront, OCLC's WorldCat Local and Ex Libris's Primo Central. While both products met the majority of our needs, Ex Libris offered more assistance with implementation, addressing one of our key factors of limited local technology support. Ex Libris also provided references to previous consortial implementations, as well as another SirsiDynix site, Vanderbilt University, as a resource for configuring Primo with our ILS. It also became clear that including special collections would be easier with Primo because records for these items existed in our ILS but had not been contributed to OCLC. Full access to our special collections in WorldCat Local would have required a retrospective reclamation process by each of the partner libraries to get these records included in OCLC.

Of course, given the ongoing pace of development in the discovery marketplace, the NC-PALS partner libraries confronted an element of risk when selecting any of the available products. While the SirsiDynix's Enterprise discovery service was considered, it was determined that this product needed further development to be a serious contender. Certainly, a tighter integration between the current SirsiDynix ILS and a SirsiDynix discovery tool would have been ideal, but instead a focus on closer integration with the link resolver was chosen. The NC-PALS partner libraries chose to migrate to Ex Libris's SFX link resolver, which promised tighter integration with the subscription databases and other full-text resources. Because Ex Libris does not directly compete in the content/metadata marketplace, they marketed the "content neutrality" of their products as a benefit to full-text delivery. This trade-off proved significant during the implementation phase.

To date, many implementation issues have progressed well, such as pricing, support, customization of facets and search features, and branding for the partner libraries. However, as the following discussion shows, scope and depth of coverage of Primo's centrally-indexed database (Primo Central), and interoperability with other vendors' cloud-hosted products, might have been higher on our list of deciding factors. As suggested by Breeding (2010b) in the literature review, relevant coverage and delivery of EBSCO-owned metadata and full-text content has been a factor. Also, integrating Primo's real-time resource availability features and support for ILS user authentication has proven challenging, thus mitigating the utility of Primo as an OPAC replacement and for supporting the consortium's reciprocal borrowing arrangement. A guide such as Vaughan's (2011b) "Questions to Consider" would have been very useful at the time of selection—one risk of being on the leading edge.

Implementation

SFX Implementation

The first step in the NC-PALS partner libraries' implementation process was to ensure interoperability between the Primo software and each institution's OpenURL link resolver. Prior to adopting Primo, the NC-PALS partner libraries each subscribed to W. T. Cox's Journal Finder for link resolution. However, other libraries that had paired their SirsiDynix ILS with Primo recommended migrating to Ex Libris's own link resolver, SFX. While Journal Finder technically is compatible with Primo, underlying interoperability issues appeared more easily addressed by migrating to SFX, as well as Ex Libris promised better support with this move. The process of SFX implementation was scheduled to take about 31 days but took more than twice as long for all four institutions to have SFX up and running. This was due to the fact that

all four institutions have unique journal and electronic resource collections. Guilford College was the first institution to go live with SFX, completing the implementation process in about 45 days. Implementation took approximately another 30 days for the other three institutions.

An SFX implementation team was formed consisting of the NC-PALS systems librarian, Guilford College's library director and technical services librarian, and the reference librarian at Bennett College. Team members' roles initially were defined along the following functions—project manager, systems back-end, technical services, and user interface. The consortium intentionally kept this team small with the expectation that members would pass information along to the other institutions as their turn for implementation came up. However, in hindsight, a representative was needed from each institution from the beginning. Many questions regarding configuration and customization were institution-specific and each library would have benefited from following the progress of the others. As this became clear, weekly phone conferences with our Ex Libris implementation manager came to involve one or more representatives from each school.

One early obstacle to overcome during SFX implementation was ambiguity surrounding the vocabulary used by Ex Libris to refer to "targets" and "select lists." A "target" is the name used by Ex Libris to refer to an aggregator database indexed in SFX, which may be activated or deactivated within a particular institution's implementation. While this scheme sounds simple enough, considerable confusion arose when Ex Libris referred to a "target" by one name, the vendor by another, and the institution by yet another. Given this ambiguity, it often was unclear what resources would appear available for an institution by activating or deactivating a particular target in SFX. Moreover, while communicating with vendors regarding specific package names and contents helped to clarify which targets should be activated, at other times the target name

used by Ex Libris and the library would be the same but the actual contents would differ. For example, Guilford College has a subscription to EBSCO's Electronic Journals Service (EJS). When the target for that package was activated, all 10,000+ titles that SFX associates with this target appeared available. Guilford College only had access to a small subset of these titles. It was only after further discussion with Ex Libris that we realized SFX defines targets as comprehensive vendor packages whereas the library may only subscribe to specific content within a package. Therefore, Guilford had to identify and submit its specific EBSCO Electronic Journal holdings as a select list.

A "select list" is Ex Libris' term for a list of specific titles to which a library has access within a defined target or which are represented by item records within the ILS (usually print holdings). If only certain titles are owned or subscribed to within a target then these are loaded individually by ISSN. However, Ex Libris returned some of these titles as problematic, usually because an older title had no ISSN assigned. It took numerous exchanges with the SFX implementation manager and vendors to identify and reconcile these resources.

Each institution also opted to make their print journal holdings available within SFX. For titles with ISSNs, generally these were quickly loaded. Older journal titles with no ISSNs proved more challenging. For example, many titles in Guilford College's Quaker Journals special collection do not have ISSNs. A select list of these titles was sent to the SFX implementation manager who generated unique system ID numbers for Guilford's technical services librarian to add to each title's ILS record. At first, SFX would not link directly to the requested journal title in the OPAC, but instead produced multiple results. To correct this, the SFX implementation manager provided the NC-PALS systems librarian with the variables expected by the Ex Libris software and the NC-PALS systems librarian crafted the required URL

to link to only the desired journal title in the OPAC (see additional discussion regarding URL structures below).

Of course, not all electronic resources to which the consortium's partner libraries subscribed could be activated, loaded into, or otherwise delivered via SFX, including certain newspaper collections, poetry collections, aggregator packages of streaming music, digital art collections, ebook collections, and reference resources. Oddly, while targets existed for certain reference and ebook collections, included titles were not searchable within SFX because ebooks rely on ISBNs, not ISSNs. While some schools activated these targets and prepared select lists to be loaded into SFX, it remained unclear why this should be done until certain implementation challenges arose with Primo later on.

Once initial SFX configuration was complete for the partner libraries, testing proved relatively straightforward and led to further customization and improvements. After seeing everything in action, the partner libraries elected to turn off SFX's 'direct linking' feature, which is designed to take users directly to the first available full text result rather than manually selecting a full text source where multiple options exist. While the 'direct linking' feature initially seemed like an effective time-saver, it did not always provide accurate results. Sometimes a user would be taken to the correct title but the full text source did not have the needed coverage dates. Given the variability of coverage dates among databases and subscription levels, this feature seemed more of a liability than a benefit. Additionally, in the instance that SFX could not produce a successful link to a full text record or produced a link to an incorrect record, the user would be left without further delivery options. It seemed more effective to let the user select his or her full text source from the start instead of having to redo the search or abandon SFX entirely if it could not produce a successful link. Unfortunately, SFX

does not support both direct linking and a database menu option, which would seem appropriate in a discovery context where users might want to choose between faster or more comprehensive delivery options.

Primo Implementation

Following SFX implementation, the NC-PALS consortium's contract with Ex Libris included an implementation period and access to a Primo project manager to perform initial configuration and customization of the Primo software. This period was to be followed by transition to Ex Libris's ongoing Primo support service, Total Care. In light of the experience with the SFX implementation, it was decided that at least one staff member from each library should be represented throughout the Primo implementation process. Pursuant to this, the Primo implementation team consisted of three library directors, two reference and instructional librarians, a technical services librarian, the consortium's systems librarian, and the Primo project manager.

Implementation of Primo began with a conference call with the Primo project manager to review the product's features and functionality, the implementation process, and Ex Libris's implementation timeline. Each institution was given a customized URL pointing to a unique instance of the Primo interface to be customized by the library. To facilitate this process, each institution was provided with functional feedback and customization forms to determine search features, functionality, branding, and nomenclature for their interface. Customization included page branding with header and footer logo images, menu changes; top-level search scopes; search facets; and item record details. Branding was a customization feature that each institution pursued separately, including developing unique names for their interfaces. Guilford College

chose “Amigos;” Salem College, “Sleuth;” Greensboro College, “Launch!;” and Bennett College, “Find It!”

As the Primo project manager worked on applying feedback from the libraries’ forms, implementation team members got their first chance to test the functionality of each library’s interface. In addition to verifying the appearance of each interface, team members tested the functionality of basic and advanced searches, search scopes, and the quality of results. Team members worked with library staff and students at each institution to perform a variety of searches, and noted questions or problematic results such as when a known article or book title was not found. The results of these tests were submitted to the Primo project manager and were the subject of weekly conference calls.

While Ex Libris staff worked on troubleshooting erroneous results identified during initial testing, members of the implementation team turned their attention to configuring and mapping facets for their libraries. Each library submitted requests to reorganize or rename facets according to their users’ search behaviors and expectations. In addition to customizing facet nomenclature, each library was able to separately specify the order and grouping of facets that appear under Primo’s “Show Only” and “Refine My Results” headings for their library. In addition to format type, facet options included topic (i.e., LC subject heading), author/creator, publication date, language, journal title, and item location. Ex Libris further supported creation of custom facets if ILS holdings data supported it.

Once configured, facets could be selected or deselected within the same list of search results, allowing users to manipulate results in various ways. Primo’s locations facet promised to be particularly useful for the consortium as it allows users to filter results by the holdings of each

library. [see Fig. 1] As mentioned above, this feature was crucial during the selection process pursuant to supporting the consortium's reciprocal borrowing arrangement. Also, relevance ranking had been a major problem with the consortium's OPAC, but here Primo delivered. In a simple search of the phrase "Harlem Renaissance," the first item in Primo's result list was a book titled *Harlem Renaissance*, with similar results following. When narrowing this search to just articles with the format type facet, book reviews did dominate the top of the results list; however, when a second phrase was added to the search (i.e., "Langston Hughes"), more relevant articles appeared on the first page of results. [see Fig. 2]

Primo's scopes, however, did not work as well. Unlike facets, which are applied to a results list after the search is performed, scopes define what portions of a library's print and electronic resources are to be included among the results prior to submission of the search. An example of a scope is "Everything," which might include all available consortial and library-specific resources among the search results. While Ex Libris supported customization of scopes for each of the libraries, specific scope parameters were never made clear and, for at least two libraries, their custom scopes appeared to behave erratically. In the case of Bennett College, Ex Libris was unable to correct these erratic behaviors. Bennett College eventually abandoned custom scopes altogether for a single default search of their entire collection, including all consortial holdings. For most of the partner libraries, keeping scopes as simple as possible and using faceted browsing to narrow results became the default.

Despite the troubles with customizing search scopes, much of the initial Primo configuration appeared to run smoothly. However, as the partner libraries dug more deeply into Primo's interoperability with its shared ILS and each library's subscription databases, additional challenges cropped up. For example, accessing ebooks in Primo proved somewhat of a

challenge. Greensboro College, for example, owned 59,438 Netlibrary (now EBSCO) titles at the time of SFX implementation. Other partner libraries owned more, some less. For some libraries, these ebooks comprised a large percentage of their total monographic holdings. Because MARC records for these titles had been loaded into the NC-PALS ILS, it was thought that they would be accessible like any other book in the collection. However, this approach proved problematic because only one item record had been loaded into the ILS for each ebook title, so that there was no way to break out which school owned the title in Primo using the locations facet. In other words, if one library owned an ebook title, the record showed up in the locations facet for each of the partner libraries regardless of whether any other library actually owned a copy. The second problem with this approach was that ebook titles were not distinguishable from print titles in the ILS, and therefore could not be differentiated as such with Primo's facets. In order to resolve this challenge, each library was required to load a select list of ebook titles into SFX so that Primo could parse a custom ebook facet that only contained the titles held by each institution.

More critically, despite the success of the locations facet to sort items by library of ownership, patrons were unable to place transfer requests for items held by other consortial libraries via the Primo interface. This service, which is central to the consortium's reciprocal borrowing arrangement, has been available to users for years through a "request" link beside each catalog record in the NC-PALS OPAC. To use this feature, users must log into their personal library accounts using the particular authentication scheme for their home library. However, Primo proved unable either to identify or track the home library of a requestor, and therefore was unable to direct him or her to the appropriate authentication scheme for requesting an item. Workarounds directing patrons to a consortium-wide login page caused item details to

be lost and therefore unable to be passed to the appropriate hold request fields in the ILS. To date, this problem remains unresolved. Obviously, this limitation of Primo to support authentication and data transfer in the shared ILS implementation does not meet the goal of simple and seamless delivery of resources.

Similarly, as implementation proceeded, the Primo implementation team participated in an online discussion concerning user authentication, during which Ex Libris requested ongoing access to each institution's authentication directory (typically an LDAP server) in order to verify user credentials. By allowing Ex libris direct access to each institution's authentication directory, patrons using Primo would be able to access full text resources without further authentication, as well as utilize Primo's "personalized" features such as its e-shelf for saving search results. However, permitting Ex Libris direct access to mission-critical servers and protected student information created concerns for IT systems administrators at each school. Because of this, different authentication schemes had to be worked out for each institution. The relative smoothness of this implementation differed for each school, ranging from seamless to challenging, underscoring the importance of close coordination with IT stakeholders as early as possible during this process.

Unfortunately, user authentication in Primo has remained an issue for the partner libraries, affecting variability in the quality and completeness of search results for users. As mentioned in the literature review, tensions have arisen among vendors over sharing metadata for inclusion in competitors' centrally-indexed discovery services (Breeding 2011b). As a result, EBSCO content originally believed to be accessible in the Primo Central index was not. The libraries enabled targets in SFX and Primo for open source databases such as CrossRef and Directory of Open Access Journals (DOAJ) with the hope of locating and delivering their

subscribed EBSCO content, but this proved ineffective. Moreover, while Ex Libris and EBSCO appear to have reached an agreement that allows Primo to utilize application programming interfaces (APIs) to access EBSCO metadata, use of these APIs is contingent on users being authenticated in Primo. As a result, delivery of licensed content differs vastly for authenticated and unauthenticated users at each institution, resulting in search results that often fail to include subscribed resources altogether, produce invalid full text links, or produce links to the wrong content. To date, this problem remains unresolved.

Additional Configuration Challenges and Interoperability of Cloud-Hosted Services

Beyond the basic challenges with functionality outlined above, there were enough unique aspects to the NC-PALS consortium's ILS and discovery layer implementations to create new challenges for SirsiDynix, Ex Libris, and the NC-PALS systems librarian. For example, as previously mentioned, the technical aspects of including each library's print holdings in SFX involved providing Ex Libris with a URL structure that would allow SFX to link to item records in the consortium's OPAC. NC-PALS uses Web2, a legacy OPAC solution from SirsiDynix, the structure of whose item-level URLs was not readily available from other SirsiDynix libraries using Primo. Through trial and error, the systems librarian was able to identify a URL structure that met SFX's needs; however, this process lacked direct support either from SirsiDynix or Ex Libris.

Similarly, the systems librarian performed edits to the NC-PALS OPAC to allow linking from print journal records to their corresponding records in SFX. These edits involved embedding Web2 macros into the OPAC to call the MARC 022 field, format the metadata

according to SFX's supported URL structure, and produce links to the correct records in SFX. This process took quite a bit of trial and error, and again, because SFX and Primo were paired with another vendor's ILS, there was no vendor support to ensure interoperability between these products.

A more significant challenge was that the acquisition of SFX and Primo coincided with the consortium's move to SirsiDynix's cloud-hosted server solution for ILS implementations, SirsiDynix Cloud. In the spring of 2010, the NC-PALS local ILS servers were fast approaching their end of life and had already experienced a major crash. Moving to SirsiDynix Cloud freed NC-PALS from purchasing new ILS servers, enabling the consortium to commit additional funds to Ex Libris's cloud-hosted implementation of Primo. However, working with two vendor-hosted products created significant configuration challenges because each vendor limited the systems librarian's access to their servers. The systems librarian had to work with an intermediary from each vendor to affect changes on their servers. Moreover, because each vendor had no access to the other's servers, the systems librarian had to serve as an intermediary between the two vendors.

Exacerbating this situation was the lack of documentation on how to integrate Primo with SirsiDynix's ILS. Ex Libris directed the systems librarian to contact Vanderbilt University, who previously had implemented Primo with their SirsiDynix ILS. The need to involve a third-party in this process created some concern since the systems librarian would not be dealing directly with the vendors regarding system configurations for interoperability while at the same time working with intermediaries to implement and test configuration changes on their servers. Moreover, Vanderbilt's scenario differed notably from NC-PALS's in that Vanderbilt hosted both of their ILS and Primo implementations on local servers, and therefore had direct

access to system settings. Despite these challenges, the systems librarian at Vanderbilt was extremely helpful in providing the consortium with the necessary scripts and documentation, and went to great lengths in aiding the NC-PALS's systems librarian with its unique implementation.

In order for Primo to harvest item records from the SirsiDynix Symphony ILS, catalog MARC records must be translated into extensible markup language (XML). This is accomplished using multiple scripts to extract MARC records from the Symphony ILS and translate then into XML for ingestion into Primo Central. The first step in this harvesting process is to output ILS authority and MARC records using SirsiDynix API calls to the ILS database. The second step is to combine and translate these records into XML for ingestion into Primo Central. The initial harvest of NC-PALS's item records required extracting all of the ILS's authority records and then performing a catalog dump of the MARC records. These records were then transferred to the consortium's ILS test server, where a Perl script combined the authority records with the appropriate MARC records and translated these into XML. The extraction of authority and MARC records is performed on the ILS's production server where the live data resides while translation of this data into XML is performed on the test server. This procedure has the benefit of taking the resource-intensive XML translation process off of the production server and placing it on the less-utilized test server. Later on, the consortium's adoption of this procedure alleviated some of the SirsiDynix Cloud engineering team's concerns about allowing third parties access to their hosted servers.

The ongoing harvesting process is similar to the initial data harvest in that both processes use similar scripts. Ongoing harvesting involves running multiple scripts on an hourly and daily basis against real-time ILS updates. Throughout the day, an hourly script makes continuous calls to the ILS and provides availability information to Primo based upon the location changes of

item records. Three daily scripts run once a day after the ILS production server has run through its daily maintenance process and is updated with all of the day's changes. This is scheduled to run overnight when system use is low. The first daily script extracts added or updated authority records, the second extracts catalog keys (ckeys) for any items that have been deleted, and the final script extracts any added or modified MARC records.

Due to the timing of the consortium's move to SirsiDynix Cloud, the NC-PALS's systems librarian began work on technical tasks for Primo implementation on the NC-PALS local servers. The rationale for this was that SirsiDynix had marketed its cloud service to be effectively identical to owning one's own servers. It was assumed that, if the consortium could support interoperability with Primo on its own local ILS servers, then SirsiDynix would be obliged to support interoperability on the cloud. Also, because it was necessary to edit Vanderbilt's scripts to reflect NC-PALS's server and ILS configurations, this process was easier to accomplish on a local server so that real-time editing could be performed during initial configuration.

Initially, implementation of these scripts was slowed because the systems librarian did not have prior experience with the mechanics of downloading and installing Perl modules from the Comprehensive Perl Archive Network (CPAN). The scripts provided by Vanderbilt relied heavily on Perl, and downloading these modules was required to convert ILS authority and MARC records data into XML for ingestion into Primo Central. Because SirsiDynix Symphony uses its own Perl library with an older Perl installation to accomplish many functions, the systems librarian required additional time to configure these updated Perl modules on the consortium's local test server. The need to move forward with testing prompted the systems librarian to request help from Vanderbilt with initial translation of the consortium's records.

Graciously, Vanderbilt's systems librarian set up an FTP connection for the consortium to send data files to their servers, where properly-functioning Perl scripts were able to translate NC-PALS's records for ingestion into Primo. This stopgap measure allowed NC-PALS to begin testing Primo's search interface, but initially without real-time item record updates or availability information.

During this initial implementation period, the systems librarian simultaneously was working with the SirsiDynix Cloud management team to prepare for moving the consortium's ILS from its local servers to SirsiDynix's cloud-hosted servers. Early in this process, the SirsiDynix Cloud management team raised concerns about resource load and security issues related to supporting Primo interoperability. The systems librarian addressed these concerns over the course of several meetings with SirsiDynix executives, both in person and over the phone. The resolution was that SirsiDynix required the consortium to make an additional purchase of a "zoned" server environment. In Storage Area Networks (SANs), a zone essentially is a container used to isolate services so that they do not interfere with one another. The consortium's purchase of this zoned environment allowed NC-PALS to administer its own crontab with which to automate its hourly and daily scripts and satisfied SirsiDynix that any third-party activity would be contained within NC-PALS's ILS implementation. However, this additional expense was unanticipated and unwelcome given the consortium's expectations of the SirsiDynix Cloud product. Given SirsiDynix's prior claims about the similarity of SirsiDynix Cloud to owning one's own servers, this scenario leads the consortium to question whether the customer is paying for competitive strains among ILS and discovery service vendors.

Fortunately, once NC-PAL's zoned server environment was in place, the SirsiDynix Cloud engineering team was receptive to requests to configure NC-PALS's server instances to

properly support and run the consortium's updated Perl modules and customized scripts. The engineering team played an active role in finalizing this implementation. Despite these hurdles and the time they added to the consortium's Primo implementation, once NC-PALS had successfully migrated to SirsiDynix Cloud under this zoned implementation, the majority of our concerns with ILS data harvesting were put to rest.

As NC-PALS has moved forward with Primo, however, some new technical issues related to ILS/discovery interoperability have arisen. One major issue derives from the resource-intensive process of updating item availability. Not surprisingly, the hourly scripts that provide availability statements to Primo create an abundance of XML files which can grow exponentially the more times an item circulates during the course of an hour. In short, this is because the hourly scripts output the entire MARC record and convert it to XML for every time the location of an item changes, creating a cascade of data for items that frequently circulate. High-use items like reserves and laptops create a particular problem in this regard.

The NC-PALS systems librarian had hoped to address this issue by using web services to provide real-time availability for items that were queried rather than having the hourly scripts output and translate all location changes in the database. However, a mutually agreeable solution with Ex Libris has yet to be determined in this regard. As long as real-time availability does not work to the partner libraries' satisfaction, utility of Primo as an OPAC replacement is out of the question.

Conclusion

For the small library or consortium with limited funding to host local servers or employ the team of staff needed to support them, a hosted discovery service that offers a greater degree

of support to guide the customer through the implementation process is the only practical choice. Yet even with this level of support, implementing a discovery service has proved to entail a major investment in human resources that likely will continue for the foreseeable future. In this quickly evolving marketplace where the interoperability of products and integration of vendor resources is still on very shaky ground, this endeavor is not for the faint of heart. At one time, talk in the field suggested that, with the discovery layer, an institution might review its discovery service provider every 3-5 years in order to keep up with the latest offerings. Nimbleness of interoperability has a long way to go before such a strategy will be possible for the typical small- to medium-sized academic library or consortium.

Indeed, the NC-PALS consortium's experiences call into question the readiness of the discovery service marketplace to support robust interoperability between competing vendors' ILS, discovery, and content delivery services for smaller institutions with limited local technology support or who are opting for cloud-hosted ILS and discovery implementations. With that said, initial feedback from library users is very much in keeping with the enthusiasm expressed in the literature for discovery services. For the typical user, searching is faster and more convenient, and returns can be sliced, diced, and delivered in ways that never were possible with the consortium's ILS and legacy OPAC alone. This result has made the effort of implementing a discovery service worth it for the NC-PALS consortium. The lesson here may be that, when you live on the cutting edge, you will bleed—but hopefully for a good purpose.

Figure 1: Customized Facets in Primo.

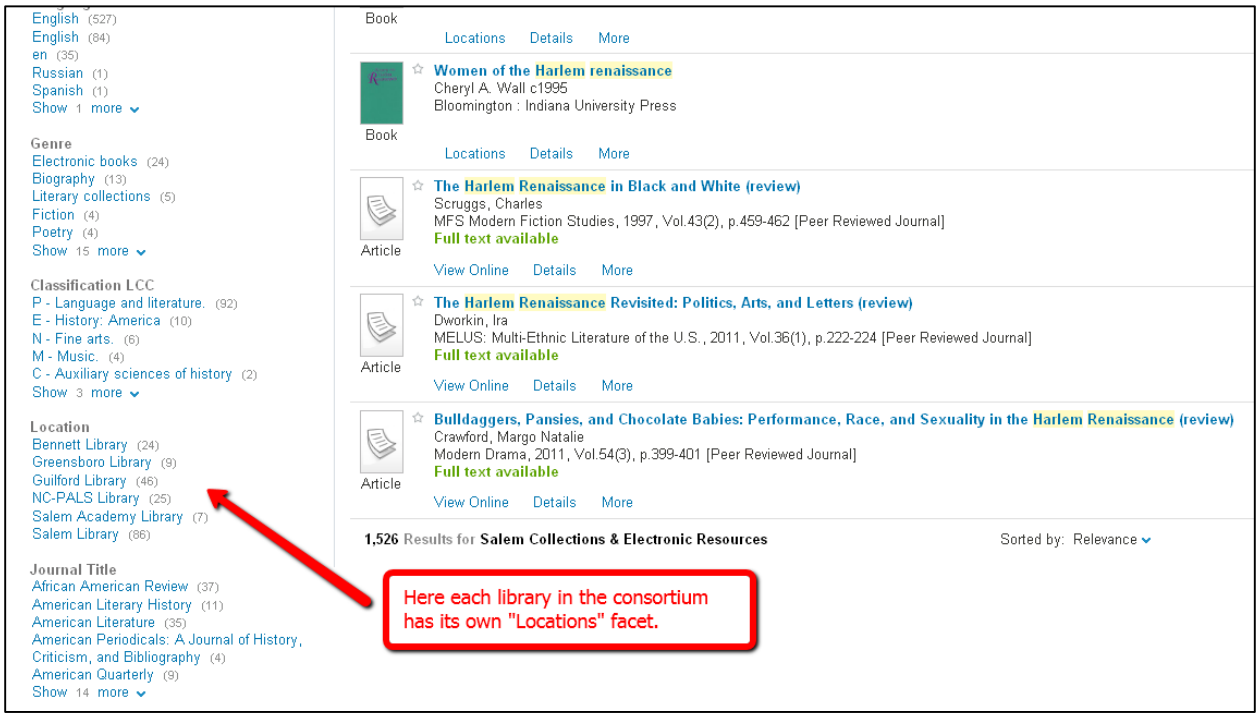
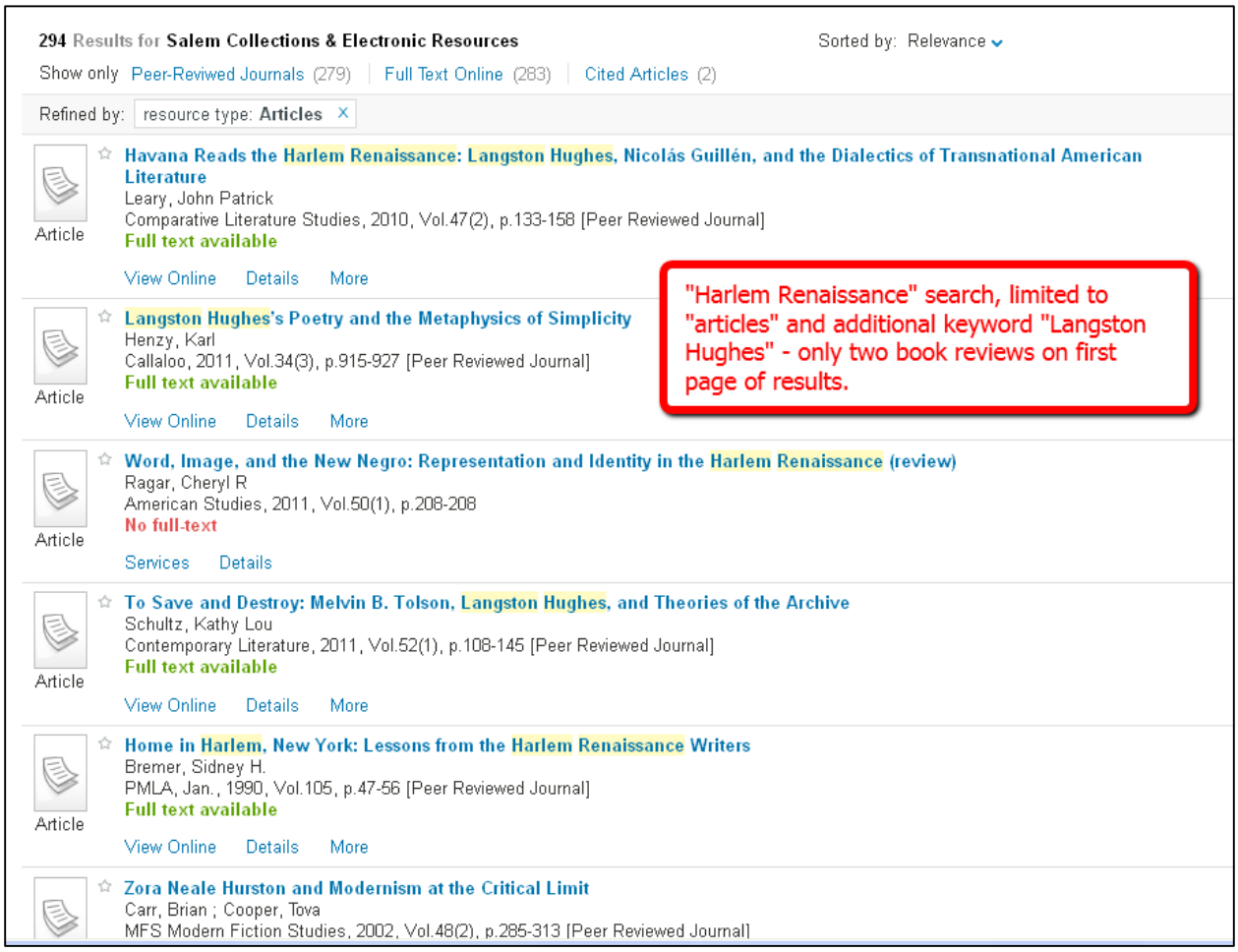


Figure 2: Example Results of Faceted Search in Primo.



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