



Smart Libraries™

Formerly Library Systems Newsletter™

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Smarter Libraries Through Technology

Technologies to Improve Management of Physical Resources

By Marshall Breeding

Although it's easy to view libraries as increasingly involved with digital and electronic resources, we cannot neglect the reality that public libraries continue to thrive on providing print materials to their communities. The Pew Research Center's "Book Reading 2016" shows that while the trends for e-book reading are increasing and print decreasing, the rates of change are quite modest. Print continues as the preferred reading format by large margins. The dominance of print likewise can be seen in public libraries. The number of book loans continues to hold strong for most public libraries. Although the patterns are uneven, some have seen the number of book loan transactions increase, or at least hold steady (see pewinternet.org/2016/09/01/book-reading-2016/).

Public libraries serving large cities or urban areas can circulate tens of millions of books each year. Toronto Public Library reported over 32 million circulation transactions in 2016. The three library systems serving New York City (NYPL, Brooklyn, and Queens) loaned over 64 million items in 2014. Among the members of the Urban Library Council, 30 report annual circulation transactions exceeding 10 million.

These libraries necessarily seek ever more efficient ways to manage their high-volume circulation operations. With tight budgets and expectations to provide high quality, prompt service, they benefit from any available technology to help them achieve optimal service.

Self-service checkouts and returns have become commonplace. A variety of vendors produce self-service kiosks for libraries to help patrons easily check out their selected materials, pay fines or fees, return items, and other activities that would otherwise be performed at a service desk. Self-service has the potential to help patrons avoid lines and conduct their loans with more privacy. Libraries benefit from self-service through reduced personnel assigned to service desks, enabling them to focus on other activities or reallocate budgets. Library workers often appreciate the shift from performing repetitive tasks at the service desk to being able to help patrons with other types of questions or activities.

When libraries rely on self-service, those kiosks then represent the face of the library to many of their patrons. How well they work can impact perceptions of the library, so it's essential for them to offer smooth interfaces with the least possible points of frustration. The public accepts—often expects—to conduct many of their daily tasks through self-service, but the stakes for libraries are high to deliver a nice experience that positively reinforces the image of the library. Some have implemented features that go beyond the basic transaction of checking out an item, such as making recommendations for future reading, promoting library programs, or offering e-book downloads. Over the years in which I have been following self-service products for libraries, the improvements have been remarkable, progressing from very plain screens with basic features to quite advanced interfaces with ever better usability that emphasizes the brand of the local library and promotes its services.

Whether materials are borrowed via a self-check kiosk or service desk, they still require considerable effort by the library to get them back to the shelf to be read by the next patron.

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Dealing with the high volume of returned items represents a major challenge for busy public libraries. Several types of products have been created for libraries to assist them with this aspect of their operations. This genre of automated material handling includes several types of products, especially in the form of automated returns and sorters. The size and complexity varies, but most can accept an item as it is returned by the patron, scan its identifying number, send a transaction to the circulation module of the integrated library system (ILS) to check it in, handle exceptions, and then perform some level of sorting to expedite its return to the shelf. Some of these automated sorters may have just a few bins, which organize materials into exception categories or general shelving locations. Such equipment can help smaller library systems or individual branches save considerable time and labor.

A few of the largest municipal library systems have implemented very large-scale centralized sorting operations. Libraries with tens of millions of returns need the fastest and most efficient technology available. Patrons of these large multi-branch library systems appreciate the convenience of requesting items from any branch, or returning materials to any convenient location, which is often different than the one from which it was borrowed. This convenience for the patrons translates into quite an operational burden for the library. A high volume of inter-library transfers usually means that the library needs to establish some type of centralized sorting and logistics operation.

Some libraries have implemented highly automated centralized sorting operations to handle their high volume of returns and routing of materials among their branches. BookOps, serving the New York Public Library, the Brooklyn Public Library, and the King County Library System, established centralized automated sorting and distribution operations that showcase the equipment and technologies available.

BookOps established its sorting center in 2010, sharing a 145,000-square-foot facility with its other technical services operations. Considered the largest sorter for library materials, the equipment at BookOps can sort 12,000 items per hour to manage an overall volume of 8 million items annually. A high-capacity sorter manufactured by Lyngsoe rapidly scans items once it is placed on the conveyer and ejects them into the proper bins. The personnel operating the sorter unloads items received in bins onto the conveyer belt and lets the sorter do its work. Bins of materials can then be transported to the receiving branch via delivery vans that make regular rounds among the branches. This facility has resulted in materials being returned to the shelves much faster and with fewer errors than the previous manual sorting operation.

The King County Library System was the first to create a centralized automated sorting center, which came online in 2005. This facility located in its Preston facility not only includes a high-speed Lyngsoe sorter, but also makes use of a computer-driven crane to efficiently move bins of material through the system. This crane relieves personnel of much of the manual work in moving heavy bins of materials and organizes their workflow for efficient induction onto the sorter and staging for the delivery vans. The Preston facility includes a set of racks with storage locations for 2,600 bins. The racks are used for staging materials coming in and out of the sorting operation and to house a collection of lesser used materials that can be requested for fulfillment to patrons at any branch. This facility has a similar capacity of sorting 12,000 items per hour.

Showcasing their respective capabilities, King County Library System and BookOps have an annual contest for the most items sorted in an hour. The two facilities apparently have quite similar capacities, reflected that in the annual contest held since 2010, neither has won two years in a row.

Other large libraries have established centralized sorting centers. The Toronto Public Library, Hennepin County Public Library, Seattle Public Library, and the Free Library of Pennsylvania each make use of high-performance sorting systems to automate the returns of materials. Each has a different configuration. The Seattle Public Library, for example, has an impressive automated material handling system, which not only checks in the materials and sorts them, but also places them on book trucks ready to be reshelved. The Hennepin County Public Library has an automated sorter in its technical services unit to enable processing staff to conveniently place completed items on the conveyer for sorting and delivery to the designated branch.

One of the key questions related to self-service and automated materials handling relates to the technology used to identify library materials. Barcodes have been used since the earliest days of library automation. Radio-frequency identification (RFID) technologies offer a higher-tech approach and have been increasingly adopted by libraries. Both technologies continue to coexist in libraries and can support self-service and automated material handling.

In the library context, both RFID and barcodes provide a fast and accurate way to read the unique identification number of an item. Barcodes require a light beam to scan the item; RFID technology does not require physical contact, but activates and reads the numbers of items in close proximity. While barcodes have to be scanned individually, most RFID equipment can scan multiple items simultaneously. RFID tags can

also perform double duty for theft control, using a security bit that sounds an exit gate alarm if not turned off when checked out. Libraries using barcodes usually use electromagnetic strips planted inside the books, which can be demagnetized to clear security gates.

RFID requires complete deployment throughout the branches of a system to gain optimal advantage in multi-branch facilities with high volume of inter-library transfers. Some library systems will phase in a subset of branches as a pilot project or as a longer-term implementation strategy. During this period, handling items can be complicated as materials flow among branches using RFID and those still using barcodes.

To gain a better understanding of the relative capabilities of RFID technologies versus barcodes, I recently conducted a mini-study to gather information regarding adoption patterns. The study aimed to gather data to see which libraries have implemented RFID versus barcodes and to see if observations can be made relative to how either approach supports self-service and automated material handling. I am not aware of systematic data available describing the implementation of RFID in libraries. The libraries.org database that I maintain records the automation and discovery systems implemented by libraries. Although fields are provided for identification technologies, self-service, and automated material handling products, these have not been especially well populated.

For this new study, I opted to focus on the members of the Urban Libraries Council (ULC). This group of libraries includes those serving larger populations and are more likely to have the volumes of circulation activity of their print collections to warrant the investment in technologies such as RFID and automated material handling systems. Each library was asked to answer five basic questions:

- Does your library use RFID tags, barcodes, or a combination to identify collection items?
- How many branches use RFID (and total branches)?
- Does your library offer self-service circulation?
- About what percent of loan transactions are conducted by self-service?
- Does your library use automated sorting equipment for returned items?

A total of 93 ULC members responded to the survey. Of these, 59 reported using RFID, with 43 of these also using barcodes; 34 rely only on barcodes.

It was interesting to note that the busiest tier of libraries tends to rely on barcodes rather than RFID. Of the five libraries with total circulation transaction above 20 million,

four use barcodes and one uses RFID (Toronto Public Library). The high capacity sorting operations of both BookOps and King County Library System rely entirely on barcodes. High-speeds laser can read barcodes at very high rates. For operations such as these, the limiting factor can be the speed in which the ILS is able to respond to a Standard Interchange Protocol (SIP) request for the status and destination of the item. Toronto Public Library's use of RFID tags for its large-scale sorting center confirms the viability of either technology.

RFID technologies are deployed in higher proportions among the libraries below this top tier. Deployment costs can be a bit more modest in these libraries. Many of these libraries that are still using barcodes reported plans to phase in RFID technologies.

Self-service seems well supported in libraries using either technology. All but five of the responding libraries reported offering self-service loans. Libraries are not able to effectively reallocate service desk personnel unless they achieve relatively high rates of self-service. Those using RFID reported significantly higher portions of overall circulation transactions performed through self-service. Of the 17 reporting over 90 percent self-service, only 2 use barcodes exclusively. Yet many libraries using barcodes achieve high percentages of self-service. Those reporting lower rates usually noted that self-service was offered only in some facilities or not positioned as the preferred option. More libraries using RFID reported implementation of some type of automated material handling in their branches.

This initial study confirms that efficient operations for the circulation of physical materials can be accomplished with either barcode or RFID technologies. While it is a misconception that RFID must be used for these activities, this limited study indicates it as an effective enabling technology. At the highest end of automated material processing, barcodes seem able to perform well and with lower costs.

Going forward, I plan to increase my efforts in gathering data on these technologies. Future updates to library entries in libraries.org will include these data elements. I encourage libraries to either update their entries or to send me information regarding the use of these technologies. Since public libraries will inevitably continue to see vigorous levels of circulation for their physical materials, I hope to be able to provide as much information as possible regarding the technologies best able to support this aspect of their work.

People in the News

EBSCO Industries has named **David Walker** as its new Chief Executive Officer. Walker previously held the position of Chief Financial Officer and Vice President. He joined EBSCO in 2000 as general manager of Military Service Company, was named Vice President for Acquisitions in 2000, and was promoted to Chief Financial Officer in 2010. **Tim Collins**, Chief Executive Officer of EBSCO Industries since July 2014 will remain with the company as President and Chief Executive Officer of EBSCO Information Services. Collins co-founded Popular Magazine Review in 1983, which was acquired by EBSCO in 1986 to form EBSCO Publishing. In 2013, EBSCO Information Services and EBSCO Publishing were merged into EBSCO Information Services, with Collins at the helm. Although EBSCO Information Services stands as one of the largest companies held by EBSCO Industries and the best known to libraries, the company owns a variety of other companies in other business sectors. EBSCO Industries employs over 5,000 personnel across these companies, earns annual revenue over \$2.7 billion, and is one of the largest private companies in the United States.

Ann Melaerts has joined Axiell as Vice President and Business Area Director for Axiell Public Libraries. Melaerts comes to Axiell from INFOR, where she served as General Manager Library Division and VP Independent Business. At Axiell, her responsibilities will include sales for its public library products, especially *Quria*, the company's newly launched library services platform for public libraries and its *Arena* discovery portal.

Melaerts came to INFOR from Geac, which was acquired by Golden Gate Capitol in 2006 and merged initially into Extensity and then into INFOR. From 1992-1999, Melaerts held positions for ODIS, which developed the *Vubis* family of ILSs that subsequently was acquired by Geac.

Justin Duewel-Zahniser has rejoined The Library Corporation (TLC) as its Chief Technology Officer and will be based in the company's headquarters in Inwood, WV. In this position, he will be responsible for ongoing enhancement of the company's *Library•Solution* ILS. Duewel-Zahniser held a variety of positions at TLC from 2003-2006 including project manager and software instructor. In the interim, he has held positions in product management for companies offering cloud-based products.

TLC has also promoted **Mike Willis** to Business Development Manager. Willis joined TLC in 2004 and has held a succession of roles from support and sales representative to senior project manager. In this new role, Willis' responsibilities will include expanding the customer base of the company's TLC. *SmartTECH* line of products.

Hamish McDonald has joined Yewno as its Channel Manager for APAC. McDonald, who previously served as Director of Sales, Asia Pacific for *Innovative Interfaces*, will work out of Auckland, New Zealand to oversee the company's expansion in to the region. Prior to his tenure at *Innovative*, McDonald managed the *eLGAR* consortium of public libraries in Auckland.

Smart Libraries Q&A

Each issue, **Marshall Breeding** responds to questions submitted by readers. Have a question that you want answered? Email it to **Samantha Imburgia**, Associate Editor for ALA TechSource, at simburgia@ala.org.

What trends are you noticing with resource management and discovery systems? Are more libraries mixing and matching products from different vendors or utilizing the discovery system provided by their ILS vendor?

Resource management and discovery represent two of the major components of a library's technical infrastructure.

Resource management systems, such as ILSs and library services platforms, provide functionality to enable library personnel to acquire and manage library collections. Discovery services enable library users to find and gain access to library collections. Although a library will also have other technology components in its environment, these two components provide the foundation for much of the library's core activities.

This bicameral infrastructure takes different forms: the discovery and management components can be bundled together or they can be implemented separately. Several different factors may impact the choices libraries make regarding their strategies for deploying these components.

Libraries that follow the bundled route, can expect the resource management system and discovery service to be tightly integrated, with the vendor taking full responsibility for their technical interactions. Even though the products may be also offered as separable components, when purchased together, the technical integration can be expected to work with little intervention.

Acquiring discovery and management systems separately enables the library to choose the product that works best for its staff to perform their work and to select the discovery service that provides optimal access to their collections. In some cases, the library may go through separate selection processes for each of these components and select both from the same vendor, but many will instead want a mixed environment.

Public Library Discovery Trends

Most public libraries opt to use the online catalog or discovery service from the vendor of their ILS. The patron-facing products created by the ILS vendors have steadily evolved and have gained the features needed to provide access to public library collections. The pairings within each vendor's product family include:

- SirsiDynix: Enterprise with Symphony or Horizon
- Innovative: Encore with Sierra or Millennium; PowerPAC with Polaris
- The Library Corporation: LS2 PAC with Library•Solution

The online catalog module cannot easily be separated for many of the ILSs serving small to mid-sized public libraries. Also, these smaller libraries lack the resources to integrate multiple products. Some of the products where few, if any examples, use third-party catalog or discovery services include Biblionix Apollo, Auto-Graphics Verso, and Book Systems Atrium.

Almost all public libraries using the open source Evergreen ILS use its built-in web-based catalog, with the notable exception of King County Library System, which uses BiblioCore. Almost all libraries using Koha rely on its online catalog.

A smaller portion of public libraries have implemented discovery interfaces other than the one provided with their ILS. This arrangement comes with the need to populate and continually update the index of the discovery interface with bibliographic records managed by the ILS. Dynamic mechanisms also need to be implemented to enable patron services to be managed by the discovery interface and to provide

real-time shelf status of materials. These mechanisms have become well established, but it does add a layer of complexity to the library's technical infrastructure compared to using the catalog provided by the ILS vendor.

Among larger public libraries, BiblioCommons stands out as the company with a track record of displacing the online catalog of the ILS. Their BiblioCore discovery interface provides full search and retrieval capabilities, assumes control of all patron services, and incorporates many features drawn from the realm of social networks.

About 75 public libraries in the United States have implemented BiblioCore. Some of the larger ones include Boston Public Library (with Polaris), Columbus Metropolitan Library (Polaris), Hennepin County Library (Horizon), Charlotte Mecklenburg Library (Horizon), Seattle Public Library (Horizon), King County Library System (Evergreen), and San Francisco Public Library (Sierra). Some libraries have moved away from BiblioCore to the discovery interface from their ILS vendor, including New York Public Library, Brooklyn Public Library, and the CLEVNET Library Consortium.

The VuFind open source discovery interface has also been adopted by many public libraries to replace their native ILS catalog. A customized discovery environment called Pike based on VuFind was developed by the Marmot Library Network in Colorado to use in tandem with their Sierra ILS, as well as others in Colorado including the libraries participating in the AspenCat catalog (LibLime Koha), and the Rangeview Library District (Horizon); libraries beyond Colorado using Pike include the Arlington County Public Library (Sierra), Anne Arundel County Library (Symphony), Nashville Public Library (Carl.X), Santa Fe Public Library (Sierra), and the Wake County Public Library (Horizon). Many other public libraries have implemented VuFind apart from the Pike customizations.

A discovery interface called AquaBrowser was commonly used in public libraries from about 2005 through 2012. It has since fallen out of favor with only one library system in the United States remaining.

Table 1 provides data from the libraries.org directory of libraries in Library Technology Guides to illustrate these trends. The table includes counts of some of the combination of ILSs and discovery products. To better reflect the overall impact of the trends, it supplies both counts of the library organizations as well as the total number of branches represented in each scenario. Separate columns describe the ILS Discovery products, such as Enterprise or Encore. The "Native Catalog" columns represent the built-in ILS online catalog modules.

Most public libraries opt to use the online catalog or discovery service from the vendor of their ILS.

Table 1: Discovery Trends—Public Libraries in the United States

	Installations		Native Catalog		ILS Discovery		VuFind		BiblioCommons	
	Libs	Bran	Libs	Bran	Libs	Bran	Libs	Bran	Libs	Bran
Horizon	265	892	174	513	77	207	3	29	8	133
Symphony	1604	3611	2276	940	1073	610	29	97	17	147
Sierra	1054	2313	587	1099	851	340	92	159	32	196
Polaris	1118	2504	1078	2258			0	0	9	177
Millennium	139	353	126	266	10	31	0	0	2	50
Library•Solution	517	1064	517	1064			0	0	0	0

Academic Library Discovery Trends

Academic libraries see quite a different set of trends related to discovery. These libraries seek the best tools to provide access to their users to their multi-faceted collections, including electronic resources as well as print. These libraries are increasingly moving to library services platforms, such as Ex Libris Alma and OCLC WorldShare Management Services. These products have relatively strong ties to the discovery service offered by the same provider. Ex Libris and OCLC bundle their discovery and management products together, though libraries sometimes prefer a different combination. The default pairing of Alma with Primo and WorldShare Management Services with WorldCat Discovery Service prevail, but there are notable exceptions. Academic libraries using ILSs such as Ex Libris Voyager, SirsiDynix Symphony, or Innovative's Sierra often will use them in conjunction with one of the index-based discovery services.

Ex Libris recently has softened its position on bundling Alma only with Primo. When the company was acquired by ProQuest it committed to having Summon as a fully supported patron interface. Open source discovery interfaces, such as Blacklight and VuFind also now enjoy official support. The University of Pennsylvania will implement Alma in conjunction with the Summon index and a locally developed discovery interface. Eastern Michigan University was the first library to implement Alma with Summon as its patron interface; Maurist College has opted for the same arrangement.

EBSCO Information Services does not offer its own ILS or library services platform, but can be used with any of them. For all the management products other than Alma, EDS can function as a complete patron interface, including patron account services.

Academic libraries in recent years have generally opted for Alma or WorldShare Management Services as they seek new

resource management products, in most cases going with the default bundling option. Ex Libris recently reported Carnegie Mellon University as the thousandth library to select Alma. This has meant that EBSCO Discovery Service, one of the dominant products in this genre, has been displaced by several libraries because of this prevailing trend. Libraries, as it seems, may see that the difference in capabilities of the discovery services does not warrant breaking apart the bundled management and discovery products. The paired products come with built-in integration and avoids complications of dealing with multiple vendors for implementation and support. In some cases, however, libraries insist on using the best discovery product that meets the needs of its patrons and the resource management platform with the best features for its staff members to use for their work.

At least 60 implementations of EBSCO Discovery Service have been displaced by academic libraries that have selected Alma with the bundled Primo discovery components. Some libraries opting for Alma have retained EBSCO Discovery Service, including the University System of Georgia and the Hebrew University of Jerusalem.

A much larger number of libraries implementing WorldShare Management Services have chosen to use EBSCO Discovery Service for article-level discovery instead of WorldCat Discovery Services.

Substantial numbers of academic libraries using the ILS products from SirsiDynix and Innovative Interfaces have implemented EBSCO Discovery Service. These two companies have not developed their own article-level discovery indexes, but have instead formed partnerships with EBSCO. SirsiDynix offers its Enterprise interface with article-level discovery powered by EBSCO Discovery Service as does Innovative's Encore Duet.

Both Innovative and SirsiDynix have lost ground to Ex Libris in the academic library sector since the launch of Alma. Further erosion of their academic market share will not only

Table 2: Discovery Trends—Academic Libraries

	Total		Primo Central		Summon		EDS		WorldCat		Native Catalog	
	<i>US</i>	<i>World</i>	<i>US</i>	<i>World</i>	<i>US</i>	<i>World</i>	<i>US</i>	<i>World</i>	<i>US</i>	<i>World</i>	<i>US</i>	<i>World</i>
Alma	380	660	332	563	3	4	13	14	0	0		
WorldShare	281	317	0	0	2	5	23	24	253	284		
Voyager	255	352	40	50	27	32	47	52	7	7		
Aleph	144	446	52	52	18	10	60	73	7	9	15	201
Sierra	408	758	3	10	42	70	161	210	1	3	191	265
Symphony	370	607	8	10	25	47	101	142	5	10	231	398
Any			449	874	146	295	520	743	290	334		

weaken their position, but also has implications for EBSCO, since replacements of Symphony, Horizon, Millennium, or Sierra would likely come with Primo and mean displacements of EBSCO Discovery Service. This provides some context for EBSCO's support of FOLIO as an open source alternative to Alma. FOLIO has been designed to integrate with any discovery service. EBSCO will offer hosting and other services for FOLIO, and will naturally promote EBSCO Discovery Service.

Table 2 provides data from libraries.org to illustrate discovery trends among academic libraries. While the directory

provides strong coverage of academic libraries in the United States, it is not as comprehensive elsewhere. The numbers generally can be taken as representative of the trends, but not as definitive. Counts are provided for the number of academic libraries, not including branches both for those in the United States and globally. The statistics given for WorldCat combine WorldCat Local and WorldCat Discovery Services.

Questions or suggestions
for topics in future issues?



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