Smart Libraries Newsletter

News and Analysis in Library Technology Developments

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Smarter Libraries through Technology

Consolidation in the Library Materials Management Sector

By Marshall Breeding

The commercial realm of materials management incorporates a broad array of technologies that assist libraries with their physical collections and spaces. The traditional core products in this sector enable self-service borrowing of library materials, anti-theft or security technologies, and automated materials handling, which includes automated returns, conveyers, and sorting machinery. This technology sector increasingly diverges into new areas that expand libraries' engagement with users within their physical facilities and creating bridges to digital content and services.

This business sector is distinct from the group of organizations that offer integrated library systems, library services platforms, discovery services, and related products. None of these companies offers its own ILS or has preferential arrangements with those products. Materials management products are implemented in libraries independently of the ILS installed. There seems to be a common strategy of neutrality relative to the ILS products used so that there are not limitations in what libraries may implement their self-check, AMH, or other products.

The business neutrality between materials management vendors and ILS vendors has technical implications. The ecosystem is supported through the reliance on reliable and pragmatic interoperability protocols, given the inherent requirement for these types of products to work together regardless of the specific vendors involved. SIP2 (Standard Interchange Protocol) serves as the core interoperability protocol, though some implementations may be based on other APIs. SIP2 has been universally implemented across these products. Libraries should be careful to tunnel the communications among these systems and products via encrypted streams because they often include data related to patron circulation transactions.

Many libraries, especially those with high-volume circulation, find automated material handling and self-service equipment to be indispensable. Such automation enables libraries to focus the efforts of their workers on more meaningful service activities, rather than routing and repetitive tasks. Libraries often implement these automation systems when launching new facility or during a renovation. They also may phase them in when upgrading technology infrastructure. For libraries, the costs in these technologies include purchase or lease of equipment and annual fees for support, service, and software upgrades. For many libraries, these investments result in increased productivity and efficiency. In libraries with especially high volumes of circulation, managing operations without some level of automated material handling would be challenging and costly.

Self-service check-outs and returns have become especially common in busy public and academic libraries. Patrons often appreciate the convenience of self-service, avoiding lines and quickly dispatching their business. Library workers can focus their energies on assisting uses with their reading or information interests or other service interactions. Face-to-face interactions continue for those that prefer not to use self-service options, to resolve exceptions or problems, and for the many other services and programs the library offers. Self-service and automated material handling were proven to be especially important during

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the COVID-19 pandemic, avoiding the need for personal contact and to reduce exposure through materials.

A number of companies have emerged to develop and support products in response to the widespread interest in self-service and automated materials handling. Often characterized as the library RFID industry, the materials identification technology does not necessarily define the sector. Though RFID has become well established as a technology for the identification and security of library items, barcodes and electromagnetic strips continue to be viable and are preferred by many libraries. Rather, the common factors around equipment and technologies define this business sector. A variety of technologies help libraries efficiently manage their physical collection materials, enrich the use of their facilities, and smoothly interact with the core integrated library system or other relevant business applications.

Many of the products in this sector rely on specialized hardware. Automated material handling installations include industrial machinery such as conveyer belts, sensors, controllers, and other robotic components. Unlike other areas of library technology based primarily on software that operates on commodity computing infrastructure, the materials management sector is based on hardware and machinery that must be designed, manufactured, and integrated. The companies participating in this sector either operate their own manufacturing facilities or contract with third party manufacturers. Some companies may manufacture equipment for multiple industries, leveraging that capacity for specialized products for libraries. The library AMH sector is characterized by high manufacturing costs with relatively narrow profit margins.

Beyond the hardware factor, software represents a key ingredient. Software not only controls the operation of the equipment, it also interfaces with the circulation management functions of the ILS for configuration and control by library staff. Data collection and analytics not only document system volume and performance but can also inform operational strategies. Self-service products include patron-facing interfaces, representing a critical point of user experience and engagement, standing in the place of direct interactions with library workers. Opportunities for innovation emerge more from the software and interface components of these products than the industrial hardware. The Intelligent Material Management System from Lyngsoe Systems is one example. It overlays the basic routing features built-into the ILS with more sophisticated workflows for floating collections that optimize the deployment of materials and balance the use of collection spaces and storage facilities. The interfaces presented on self-service stations represent another important focus of innovation. The user experience must be friendly and efficient, enriched visually with cover art. It must proactively promote the brand of the library and increase engagement through personalized recommendations for print and digital materials. The interface presented by a self-service kiosk may be an even more critical point of user interaction within the library than its online catalog or discovery service.

Other threads of innovation can be seen in the development of products and concepts that leverage the technologies of self-service, RFID, and system interfaces. Examples include bundles of technologies to support unstaffed facilities that extend library services to areas not served by existing branches. Other products, such as smart shelves, advance the capabilities of RFID technologies to automate the manipulation and tracking of materials' status.

This sector is generally oriented toward tangible materials and spaces but is also able to build connections into the ever-growing involvement of libraries in digital content. Some of these organizations are also involved in digital collections. Bibliotheca, for example, offers the cloudLibrary platform, one of the most popular services for library e-books and audiobooks after Overdrive.

Consolidation prevails through the library materials management sector with patterns similar to the library technology industry. Continual rounds of mergers and acquisitions have resulted in two large, consolidated businesses, though many smaller companies continue to flourish in different geographic regions and addressing specialized product areas. The two large businesses, bibliotheca and Lyngsoe Systems both are owned by private equity firms and comprise of antecedent companies acquired from companies in diverse global regions. While bibliotheca is the larger of the two, Lyngsoe Systems' recent acquisition of P.V. Supa makes it a closer competitor. The companies have distinct product portfolios. Lyngsoe Systems specializes more in the large-scale automated material handling arena, and bibliotheca has interesting diversification in the digital platform arena with cloudLibrary. Between these two large businesses and assorted smaller companies, this sector continues to see vigorous competition.

The library materials management arena includes many other smaller companies, most of which operate with a single geographic area. Tech Logic, a wholly owned subsidiary of The Library Corporation ranks as a small competitor in this sector. It operates primarily in the United States, with some installations in Australia. Founded in 1997, Tech Logic was acquired by The Library Corporation in 2005. Although Tech Logic shares ownership with The Library Corporation, its products work with any integrated library system.

Invengo ranks as another major company in the library materials management arena. A global company based in

China, it focuses mostly on libraries in Asia and Australia, though it also has customers in the United States and Europe. In 2014 Invengo acquired FE Technologies, which serves as its primary business unit for library-oriented products.

Both bibliotheca and Lyngsoe Systems are based in Scandinavia. It is not surprising because libraries in this region have been early and enthusiastic adopters of RFID, self-service, and automated materials handling and are generally well funded. Table 1 shows some points of comparison. Public data is not available that would objectively compare the scale of the two companies in terms of revenue, employees, or libraries served.

This issue of *Smart Libraries Newsletter* features Lyngsoe Systems and its recent acquisition of P.V. Supa, including the background of both companies and their previous acquisitions. The acquisitions related to rival bibliotheca were covered in the December 2015, July 2011, and December 2007 issues.

Table 1. Comparing bibliotheca and Lyngsoe Systems

	bibliotheca	Lyngsoe Systems
Ownership	One Equity Partners	majority ownership by CataCap
Acquisitions	3M Library Systems, Checkpoint, Bibliotheca RFID, Integrated Technology Group, Trion AG, Aturis, Cordura	FKI Logistics, Codeco, P.V. Supa, 2CQR
Primary HQ	Rotkreuz, Switzerland	Aars, Denmark
Sectors served	Libraries	Libraries, postal services, manufacturing, healthcare, airports
Global Employees	400	210

Lyngsoe Systems Acquires P.V. Supa

The business sector providing automated technologies for physical library materials continues to consolidate. Lyngsoe Systems, one of the major players in this space has acquired P.V. Supa, one of its competitors. P.V. Supa had acquired 2CQR in 2017. Even as it expands, Lyngsoe Systems remains smaller than bibliotheca, the largest global business in this sector.

The acquisition of P.V. Supa expands the geographic reach of Lyngsoe Systems, brings a substantial set of new customers, and adds new products to its portfolio. Lyngsoe Systems has acquired the entire P.V. Supa Group, including its operating companies in Finland (P.V. Supa Oy), the United States (P.V. Supa, Inc.), and the United Kingdom (2CQR). Lyngsoe Systems was especially known for its large-scale sorting systems. It now gains a variety of mid-range and smaller sorting products, as well as self-service and related products to fill out its portfolio to meet the full spectrum of library requirements. PV Supa's manufacturing facility in Finland will extend and complement the facility that Lyngsoe Systems operates in Denmark.

Cory McCoy, President of Lyngsoe Systems library business in the United States, stated, "The acquisition brings together two complementary companies. Each has distinctive product offerings with little overlap in distributor networks. As the two organizations begin to integrate, the key focus will be on strengthening communication and service for customers involved." (telephone interview, Jan 13, 2021).

Lyngsoe Systems

Denmark-based Lyngsoe Systems offers logistics, RFID, inventory management, and other related products and services spanning many business sectors. The company reports that its products are used in 3,700 locations in 60 countries. In addition to its library products, Lyngsoe Systems provides logistics solutions for airlines and airports, postal services, healthcare, manufacturing, and customs. The company was originally founded in 1952 and has continually expanded to provide products for additional areas of automation and logistics. Library products represent about 50 percent of the revenue for Lyngsoe Systems and is its largest business division.

According to its 2019 financial report, Lyngsoe Systems has a workforce of 135 FTE employees and annual revenue of 230,000,000 DKK (about US$38 million). These figures represent its Scandinavian operations. Globally, Lyngsoe currently employs 163, which does not include the 47 employed by P.V. Supa at the time of the acquisition.

Lyngsoe Systems entered the library market in August 2009 through the acquisition of Library Solutions business of FKI Logistex. This business was previously part of Crisplant A/S and Intelligrated, Inc. FKI Logistics developed, manufactured, and marketed a variety of RFID and automated material handling products, which were sold in Scandinavia

and the United States. Crisplant and Intelligrated acquired FKI Logistics in 2009, subsequently selling the library solutions business to Lyngsoe Systems, while retaining its other products. Crisplant A/S was acquired by Beumer Group in 2009, and the combined company became Beumer Group A/S in 2016.

In November 2009 Lyngsoe Systems made a follow-on acquisition in the library RFID and AMH sector through the purchase of the assets of Codeco, a company based in Denmark that developed self-service equipment and related products for libraries. Founded in 1987 to develop products for industrial automation, Codeco shifted its exclusive focus to library products in 1989. Its library products were primarily sold in Denmark, though it had a presence in Sweden, the United States, and some European countries. Codeco closed its operating company in Sweden in 2007.

Investment by CataCap

In March of 2014, private equity firm CataCap acquired a 76 percent ownership stake in Lyngsoe Systems through a major investment. CataCap is based in Denmark and has an overall investment capacity of over 7 billion DKK. The terms of the investment in Lyngsoe Systems were not publicly disclosed.

The leadership of Lyngsoe Systems follows the usual structure for large, consolidated businesses, including a board of directors representing the interests of its owners and investors, global executives responsible for the overall business strategies, and division level managers that guide activities within each major business unit. CataCap's majority ownership in Lyngsoe Systems brought changes in executive leadership. Villads Thomsen has served as the company's chief executive officer since December 2014. Joergen Bardenfleth is the chairman of the board of directors, with Rasmus Lokvig, representing CataCap, as the deputy chairman. Henrik Kjeldgaard serves as the library systems business unit director. Cory McCoy serves as the president of Lyngsoe Systems US operations. McCoy was previously a general manager for FKI Logistex and joined Lyngsoe Systems when that company was acquired by Lyngsoe Systems in September 2009.

Library Products and Services

In the library sector the company provides RFID-based automated material handling equipment, including high-performance centralized sorters used in some of the busiest public libraries. The central sorting facilities supporting the King County Library System and BookOps, which processes materials for the New York Public Library and the Brooklyn Public

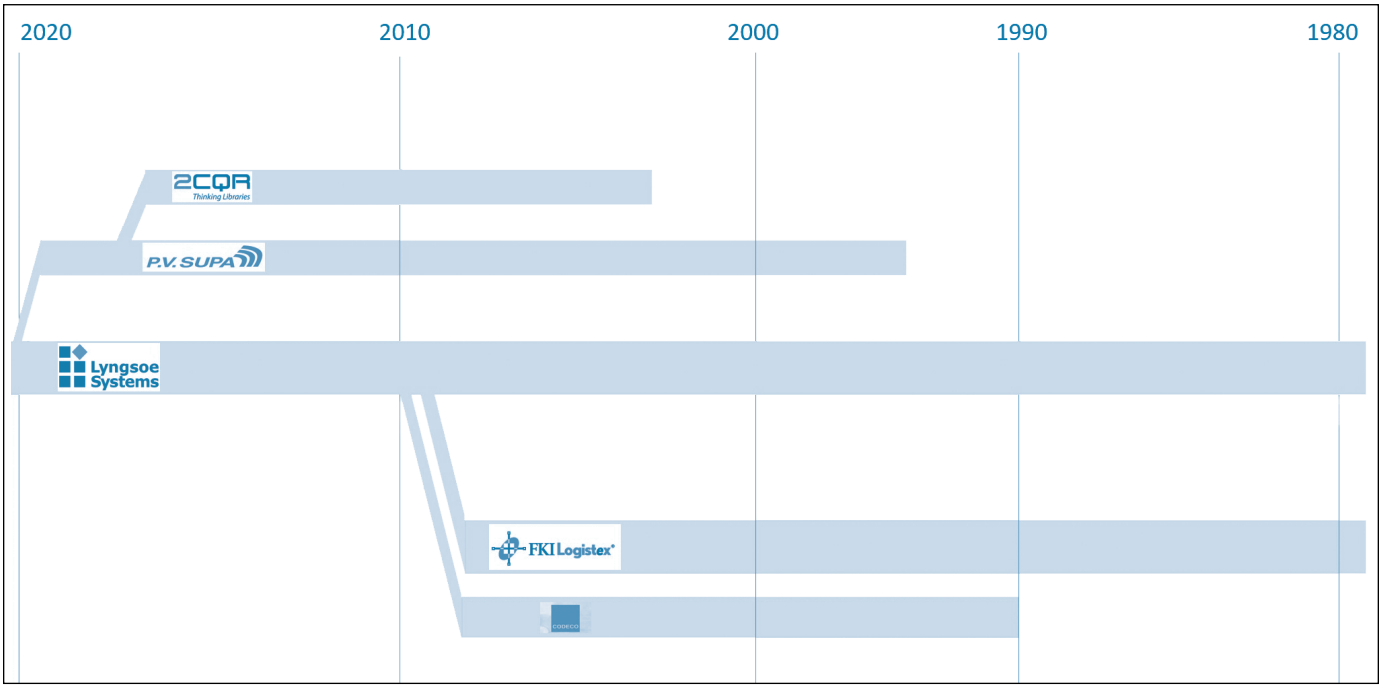

Figure 1. Lyngsoe Systems: Mergers and Acquisitions

Library, are based on equipment and software from Lyngsoe Systems. (See *Smart Libraries Newsletter* December 2015, "Enhanced Self-service and Automated Materials Handling.") The use of centralized sorting facilities has been a growing trend among large multibranch public library systems. Many of the recent implementations have been based on equipment from Lyngsoe Systems.

P.V. Supa

P.V. Supa brings a range of automated material handling equipment, as well as some specialized products, into the Lyngsoe Systems portfolio. The company is based in Finland. It was founded in 1996 and operates in 37 countries. At the time of acquisition, P.V. Supa employed 47 personnel.

The company's product lines include:

- **Anytime Library**, a combination of components that enable a library to remain open without on-site staffing. In addition to standard self-service stations, Anytime Library includes access keypads, security cameras, controlled door locks, security alarms, and related software. This product was developed by 2CQR.
- **Agilon**, a distinctive product for automated materials management, especially for patron pick-up of library materials. This product combines robotics, automated material handling, inventory management tracking software, and other components to provide management of thousands of library items queued for pickup by library users.
- **Smallest Branch** can provide access to library materials at remote interior locations through a vending-machine style enclosure holding up to 175 items, coupled with self-check panel.
- **Smartblock**, portable, self-contained meeting spaces that can be equipped with screens and other equipment supporting collaborative work.
- **Extensive line of Automated Materials Handling** products and modular components
- **Smart shelves for RFID return and pick-up**
- **RFID-based self-service kiosks**

In January 2019, P.V. Supa entered a strategic partnership with Nedap Library Solutions, a division of a large-scale technology based in The Netherlands and providing technology and automation products for many industries, including healthcare, retail, security management, identification systems, staffing, and light controls. Under this partnership, Nedap supplied hardware components for library products, with P.V. Suva executing integration and software development. The partnership is expected to continue as P.V. Supa becomes part of Lyngsoe Systems.

2CQR

Prior to its acquisition by Lyngsoe Systems, PV Supa had expanded its position in the library RFID and automated material handling sector through the acquisition of 2CQR (usually pronounced "two secure") in October 2017. Based in the United Kingdom, 2CQR offers a similar portfolio in the self-service and AMH but had also developed some new products such as the Anytime Library, Smallest Branch.

Chris Robb and Ram Patel founded 2CQR in May 2004. Phil Farrell was CEO of 2CQR Limited and currently serves as the managing director as it continued as an independent business unit under P.V. Supa and now within Lyngsoe Systems. Cofounder Chris Robb previously served as executive director and is now retired.

2CQR Ireland, (Spectrum Communication Ltd; previously known as Library Systems Ireland) is a separately owned Irish company and was not included in the acquisition. This company will continue to serve as a distributor as 2CQR and P.V. Supa become part of Lyngsoe Systems.

Colin Carter Leads IMMS initiative

Colin Carter, long-time exec with Innovative Interfaces, joined Lyngsoe Systems as the business director of its Intelligent Material Management System (IMMS) product within the library business unit. Carter advanced through multiple roles at Innovative Interfaces between 2005 and 2020. From 2014 he served as director for library engagement for the EMEA region. Prior to Innovative, he held sales positions for Talis and Ex Libris. Before moving to the vendor arena, Carter worked in public libraries in Edinburgh and Staffordshire.

As described in the article, IMMS provides a layer of advanced material workflows for management of floating collections, storage, and other aspects of the management of a library's physical collection.

IMMS does not replace a library's integrated library system, but provides additional services, with connectors providing the interoperability needed for synchronization. IMMS was initially developed in partnership with the public library systems in Copenhagen and Aarhus, which use the Cicero

Lyngsoe Systems' IMMS was featured in the September 2019 issue of *Smart Libraries Newsletter* (https://librarytechnology.org/document/24767).

library management system (Fælles Bibliotekssystem) as do all public and school libraries in Denmark. Although the product was designed to work with any integrated library system, many of the subsequent implementations have been in libraries using Innovative's Sierra. These include the Helsenki Public Libraries in Finland, the University of Liverpool in the United Kingdom, The Sacramento Public Library, and the public libraries in Malmö in Sweden.

Carter's background with the integrated library systems sector in general, and with Sierra in particular, provides a good foundation for leading Lyngsoe Systems' expansion of its IMMS product.

Work is currently underway by Lyngsoe Systems to extend IMMS to work with other ILS products beyond Sierra and Cicero.

Smart Libraries Q&A

Each issue Marshall Breeding responds to questions submitted by readers. Email questions to Patrick Hogan, Managing Editor, at phogan@ala.org.

What efforts are underway within academic libraries to help learners gain digital literacy skills?

Support of digital literary skills represents an important activity of libraries of all types. A review of the scholarly literature of the library profession would reveal some specific trends and statistics. I would also suggest engaging with other front-line librarians that deal with these issues directly. I can offer only some general observations, focusing more on the perspective of technology.

Academic libraries generally consider outreach and education within their core mission. The promotion of digital literacy falls within these broader activities. Digital literacy skills can be seen in multiple contexts, including:

- Selection of resources in the digital environment. Libraries make extensive quantities of information available through their collections of electronic resources, including subscription-based content products and open access materials. Library users will naturally also encounter materials beyond these curated collections on the open web. Helping users find relevant and reliable resources within library-provided collections and beyond is a basic part of library service which librarians address with great skill. The current library discovery services and the general search services on the web, such as Google Scholar, will reveal many resources in response to almost any research context. The challenge for the technology-based services lies especially in presenting the resources suitable for each research context. Librarians will usually be well aware of the limitations and imbalanced results associated with these search services, though users may not. Within the activity of resource selection, digital literacy means looking beyond initial results of search tools and understanding what key resources may be beyond their scope or may be buried within large sets of extraneous items.
- Evaluation of digital resources has always been a critical skill, make more difficult through the increasing quantities of unreliable content. In these times, reliable sources may be characterized as "fake news," and unreliable content may be uncritically promoted. Beyond the usual guidance that librarians provide related to the evaluation of the objectivity of content, some technical factors are also important. These would include clues that help validate the source and reliability of digital items. These technical characteristics include:
  - Web site identity and validation. The url and digital certificate validate the source of an item. Popular news or scholarly articles may be shared widely on social media. It is important to refer to the original source and ensure that it is published by the organization cited and that the digital certificate of that web site confirms that identity. Any derivative copies may be accidentally or intentionally altered.
  - Digital images and video can likewise be altered. In this era "deep fakes" of image or video content can be difficult to distinguish from objective content. The source of the digital content may provide some confidence, such as its provision through organizations that carefully validate content items, such as Getty Images, and official news gathering organizations. Further, critical assessment of digital content should include viewing its metadata, such as EXIF to validate timestamps and geographic coordinates of its original capture. Online tools are available to view the metadata for

digital objects, such as exifinfo.org. Also keep in mind that this meta may also be manipulated.

- Creation and integration of digital content may also be a component of digital literacy. Beyond selection and evaluation, library users may also need help gaining skills with the tools needed to incorporate these resources into their own work. One level of assistance may involve training in the use of citation management tools to insert properly formatted references in a paper and to track resources related to the research project or areas of interest. Academic library staff may also offer teaching or support in creating and editing digital images, sound, and video. Student assignments and scholarly projects increasingly involve the production of podcasts or digital video. Many libraries operate learning labs or digital commons that make digital production resources available and provide assistance with using the hardware and software involved.

These suggestions are just a starting point for considerations related to digital literacy in an academic library. This topic is multifaceted with opportunities for much more in-depth exploration.

Notes

1. Lyngsoe Systems A/S. Annual Report 2019. https://catacap.dk/wp-content/uploads/2020/09/lyngsoe-systems-annual-report-2019.pdf.

Questions or suggestions for topics in future issues?

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