



Smart Libraries™

Formerly Library Systems Newsletter™

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Smarter Libraries Through Technology

New Technology Platforms for Public Libraries Emerge in Scandinavia

In recent weeks, important milestones have been reached in the development and deployment of new technology systems for public libraries by Scandinavian companies. Although not currently available to libraries in North America, these two projects provide an opportunity to observe the impact of new platforms built anew with current technology components and architectures in a sector mostly dominated by integrated library system (ILS) products based on older architectures.

In the academic and research library sector, the new genre of library services platforms emerged in the late 2010s as an entirely new approach for the management and fulfillment of electronic and print collections. Ex Libris Alma and OCLC WorldShare Management Services have seen widespread adoption, steadily displacing legacy ILS products oriented primarily to manage print resources. The FOLIO initiative is advancing toward an open source library services platform based on the microservices architecture, which is expected to be ready for deployment in 2018.

Public libraries, in contrast, have mostly continued to rely on ILSs that have followed an evolutionary path. SirsiDynix has modernized both its Symphony and Horizon ILS products through the development of its BLUEcloud platform, which provides web-based interfaces and new areas of functionality.

BLUEcloud itself, however, is not positioned as an independent platform apart from a library's implementation of Horizon or Symphony. Innovative has consistently followed an evolutionary strategy with its ILS products, as seen in the progression from INNOPAC to Millennium to Sierra. Its Polaris product has been enhanced with web-based interfaces while retaining its core technical infrastructure. The company is developing a new multi-tenant technology platform to complement its core products. The Library Corporation's Library•Solution and CARL•X products have seen steady advancement but are both based on well-established architectures. The Spydus platform from Civica has evolved and incrementally reengineered with each new version, leading up to the current Spydus 10 that fully integrates print and digital resource management and discovery. One notable exception, Apollo from Biblionix, introduced in 2006, was developed as an ILS for small to mid-sized public libraries based on a multi-tenant web-based platform.

The reliance of public libraries on evolved products has been a reasonable strategy to meet their core automation needs. Public libraries continue to manage collections comprised mostly of print materials. They appreciate the mature functionality that remains available in these evolved products and that would take some time to mature in newly-built platforms. The transaction loads of public libraries associated with their circulation activity has been well supported by the server-oriented architecture of the incumbent products. Even the busiest of academic libraries do not approach the number of annual loan transactions carried out in a typical public library. Multi-tenant

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cloud-based platforms can theoretically support these loads, but the incumbent generation of products has an established track record. While public libraries are increasingly shifting to vendor-hosted server-based systems, there has been a bit more skepticism regarding true cloud-based platforms.

Two initiatives have been underway in Scandinavia to develop new platforms for public libraries based on multi-tenant cloud platforms: Axiell Quria and Cicero developed by Systematic.

Quria has been previously featured in *Smart Libraries Newsletter* (July 2016) as a new product in development by Axiell, a major technology provider for libraries, archives, and museums. The company is based in Sweden and its legacy ILS products are used primarily by libraries in Sweden, Finland, the United Kingdom, and Denmark. Quria has been developed as a new library services platform intended to align with the current realities of public libraries increasingly involved in providing access to materials in digital form in addition to their traditional print lending services. By creating a design to address digital services as the primary emphasis but layering functionality for traditional lending, Axiell hopes to provide a product that will help libraries meet the current needs and future expectations of their clientele as the proportions of e-book lending increases over time.

As of September 2017, the Drammen Public Library in Norway became the first library to move to Quria as their production system. Along with Quria, the library has implemented Axiell's Arena portal as the basis for its website and online catalog. With this initial implementation complete in Norway, Quria is positioned to enter as a new competitor in the public library technology industry.

Another new product, branded as Cicero, has been developed by Systematic for the public and school libraries in Denmark. This project has previously been covered in *Smart Libraries Newsletter* using its Danish name Fælles Biblioteks-System, which means "shared library system." In January 2014,

Dantek A/S, the Aarhus-based provider of the BiblioMatik automation system for school libraries, was engaged by KOM-BIT, a non-profit procurement organization, to commence the development of a new automation system to be shared by the public and school libraries. The initiative was based on an opt-in participation model. In August 2014, Dantek was acquired by Systematic, a large IT services company, bringing substantially more development capacity toward the completion of this ambitious project.

Cicero was developed entirely anew, apart from the code base of Dantek's BiblioMatik or other existing systems. The data model is based on a single bibliographic database shared by participating libraries. The technology infrastructure was developed as a multi-tenant platform.

Cicero is the basis of a national shared platform for public and school libraries, with libraries in 97 out of the 98 counties in Denmark participating. The libraries in Hjørring are the only ones that have not yet agreed to participate. The implementation of this shared library system has been mostly completed, with final migrations taking place in October 2017. It supports about 1,500 public libraries and learning centers for schools throughout Denmark. In aggregate, these libraries conduct over 50 million loan transactions annually.

Systematic will also market Cicero outside of Denmark. The Central Library of Greenland has signed a contract for the product; libraries in Sweden and Germany have also licensed the product with upcoming implementations.

For more information on Cicero, see: <https://systematic.com/library-learning/loesninger/by-name/cicero/library-management-system/>.

Libraries in Scandinavia have long been on the forefront of innovation. They have been early adopters of RFID technologies, for example, which is used in almost all libraries in the region. It will be interesting to observe whether these ILSs developed in Scandinavia will have an impact on the library technology industry outside this region.

Lucidea Acquires Eloquent Systems

In a move that further consolidates the technology sector for special libraries and archives, Lucidea has acquired Eloquent Systems. Eloquent specializes in providing digital asset management products for archives, libraries, and museums. The company is based in Vancouver, Canada and will operate as a wholly owned subsidiary of Lucidea.

Eloquent Systems was founded by Merv Richter in 1975 and was one of the longest standing companies in the library

automation industry owned by its founder. Richter worked for IBM for eight years before launching the company in 1975 under the name Easy Data. The company developed software for microcomputers, which were just then gaining use for business applications. The company developed several products, including an ILS that was implemented in many corporate libraries. Easy Data was acquired by Sydney Development Corporation in 1982. Richter continued as the president of the

subsidiary operating his former company and as a director of Sydney Development Corporation. Richter resigned from Sydney in 1985 and launched Eloquent Systems, Inc. in 1987 to carry forward his business activities.

Eloquent Systems developed products to help archives, libraries, and related organizations manage physical and digital assets. The original product GENCAT (for General Catalog) was a flexible record management system based on a MultiValue Database, one of the several descendants of the Pick operating system. The current generation of the company's technology, the WebGENCAT platform, is based on the jBase, an implementation of the MultiValue database, with an application layer developed in C and with a communications layer implemented as a Java servlet in Apache Tomcat. WebGENCAT underlies each of the company's products: Eloquent Archives, Eloquent Library, Eloquent Museum, and Eloquent Records. Each product has been customized to meet the needs of its target organization type.

Following the sale of Eloquent to Lucidea, Richter has retired from the profession.

Lucidea, privately owned by Ron Aspe, ranks as the largest competitor offering technology solutions to special libraries and information centers. The company has expanded over the last decade through a series of business acquisitions. The company traces its initial history through SydneyPLUS International, which was rebranded as Lucidea as it made a series of acquisitions and wanted a neutral identity to house its multiple brands.

SydneyPLUS International shares some common threads of its early history with Eloquent Systems. Sydney Development Corporation acquired Easy Data, and its software became the basis of the ILS initially offered by Sydney Development Corporation and later by SydneyPLUS after its separation from its original parent company. The SydneyPLUS software was substantially reengineered over its product history, culminating in the current SydneyEnterprise platform. Eloquent developed the webGENCAT platform independently from the original Easy Data product. It is notable, however, that these two companies that overlapped in the 1970s have now come together in Lucidea.

The following chronology describes the business history of Lucidea and related companies:

- 1975: Easy Data, Inc. is founded by Merv Richter in Vancouver, Canada.
- 1978: Sydney Development Corporation is founded in Vancouver, Canada.
- 1982: Sydney Development Corporation acquires Easy Data with Merv Richter continuing as president.
- 1985: Merv Richter exits Sydney Development Corporation.

- 1987: Merv Richter relaunches Eloquent Systems, Inc. as a private business.
- 1989: International Library Systems is founded by Ron Aspe.
- 1989: International Library Systems acquires rights to Sydney Library System.
- 2000: International Library Systems rebrands to SydneyPLUS International.
- 2008: SydneyPLUS acquires SV Technology and its LawPort Product.
- 2008: SydneyPLUS acquires Cuadra Associates.
- 2010: SydneyPLUS acquires Questor Systems.
- 2010: SydneyPLUS acquires LookUp Precision from Advanced Productivity Software.
- 2011: SydneyPLUS acquires special library products from Inmagic.
- 2012: SydneyPLUS acquires Presto product from Inmagic.
- 2013: SydneyPLUS rebrands to Lucidea.
- 2017: Lucidea acquires Eloquent Software, Inc. from Merv Richter.

The acquisition of Eloquent by Lucidea expands its presence in the special libraries arena. Its existing products are especially oriented to corporate and legal libraries though they are also used in other types of organizations. In its recent phase of business, Eloquent had focused more on providing digital asset management products for archives. The sale of Eloquent to Lucidea represents an exit of Richter's ownership of the business that he built and sustained for over 40 years. Lucidea is well positioned to sustain Eloquent's products and provide ongoing support to its customers.

Impact on the Competitive Landscape

This move further consolidates the special library technology arena. Although Lucidea gains an incremental stage of growth, its position is not unchallenged by other competitors.

- SirsiDynix continues its active role in this sector with the EOS.Web product it acquired in 2013. Special libraries represent a relatively small portion of SirsiDynix's overall business, with its flagship Symphony, Horizon, and BLUEcloud products more widely implemented by public and academic libraries.
- Soutron Global, in partnership with UK-based Soutron Limited, was established more recently but continues to see a growing market share in special libraries.
- Softlink continues as a major competitor in the special libraries sector with its Liberty ILS, which is primarily in Australia and other international regions.

The category of information centers formerly known as special libraries have seen substantial change in recent decades. Few of the organizations they serve operate traditional libraries with physical books and serials. Rather they manage mostly electronic collections or digital assets. Their collections may include subscriptions to electronic information and internally published business, scientific, and technical reports. The professionals employed, often with training as librarians, provide services beyond managing collections. They help identify resources and provide analysis for researchers and executives.

Developing and supporting technology products for the information centers or libraries outside the public, academic, and school markets continues to be a challenging business sector. Consolidation of large corporations, law firms, and hospitals has significantly reduced the potential customers of these companies. Many have eliminated their physical libraries and information centers. Those remaining often face challenges of

serving large global organizations with limited personnel and resources.

These factors have taken their toll on the special library technology sector, which at one time included dozens of successful companies and many distributors or consulting firms providing implementation and customization services. These conditions have led to consolidation of the technology providers serving the special library sector as the key business strategy. To date, the consolidation has been seen more at the corporate level than with the incumbent products. Lucidea, for example, continues to support the products of all the companies it has acquired.

There is less homogeneity in the functional requirements in this sector compared to public, academic, or school libraries. These differences make it less likely that any given product will emerge to dominate in this sector. The current state of this sector—characterized by consolidated companies and fragmented products—seems likely to persist.

Axiell Acquires ATP Automation

Axiell continues to expand its portfolio of products through business acquisitions. The company's latest move involves the acquisition of ATP Automation Ltd Oy, a small company based in Finland that supplies self-service and automated material handling equipment to public libraries. The company was

founded in 2006. Over 70 libraries in Finland have implemented its products as well as a small number of organizations outside the library sector. ATP Automation previously worked with Axiell as a partner in library implementations prior to its acquisition. The four staff members of the company will join Axiell.

People in the News

Kathryn Harnish has joined Innovative Interfaces as its new Senior Vice President of Product Strategy. She takes the role vacated by Leif E. Pedersen, who recently left the company. Harnish comes to Innovative with substantial industry experience. At ProQuest, she was Director of Product Development

for Library Services Platforms, providing leadership for the development of Intota. She was director of Unified Resource Management Product Management for Ex Libris during the early development period of Alma. Harnish also held positions at OCLC and Endeavor Information Systems.

Open Source Developments

The development community for the open source Evergreen ILS has released Evergreen 3.0. Used primarily by consortia of public libraries, Evergreen has been continuously enhanced since its first release in 2006. This release includes a new web-based

staff interface. Previous versions of the staff client of Evergreen based on XULRunner, a user interface framework based on Mozilla, needed to be installed on each computer using the system. Work on a fully web-based staff client has been underway

for four years, culminating with its full implementation in this release. Evergreen 3.0 also includes many other enhancements, including faster search performance and additional integration with e-book lending platforms such as OverDrive and RBdigital (originally OneClick Digital). Evergreen has been implemented by over 1,500 public libraries in the United States and Canada.

Villanova University announced that version 4.1 of the open source VuFind discovery interface has been released. This

version includes new features mostly oriented to developers to expand its capabilities for integrating with content resources and ILS systems. VuFind has been under continuous development since 2007 and has been implemented by thousands of libraries worldwide. Villanova University continues to serve as the lead institution for its development, supplemented by contributors affiliated with many other institutions globally.

OCLC Further Enhances CONTENTdm

OCLC has enhanced its CONTENTdm digital asset management system to expand its support of the International Image Interoperability Framework (IIIF). IIIF, initially proposed in 2011, has gained broad support among digital archive communities for its ability to provide interoperability among collections even when they are based on different image repository platforms. Support of IIIF in CONTENTdm, the most widely implemented digital asset management systems used by libraries, substantially expands the body of materials available within this interoperability framework.

Overview of the International Image Interoperability Framework

IIIF enables researchers to work with multiple image collections using the same interface or tools even when each is based on a different digital asset management system. Virtual aggregate collections can be presented on a given area of interest spanning diverse image repositories. The framework would also enable a unified presentation of collections that have been separated and curated by different institutions. If multiple institutions own and have digitized different fragments for the same manuscripts, a complete presentation of the manuscript could be presented if each repository has implemented IIIF.

The framework includes multiple APIs to enable different aspects of interoperability between image repositories and viewers:

- **Image Delivery API** (current version 2.1). Implemented on a repository to respond to requests for images through a web service. The Image Delivery API makes a repository able to interoperate with clients or viewers that implement the API for requesting images. This API includes parameters to specify whether the full image or specific regions of the image should be delivered; any rotation values; if

the image should be scaled to an alternate resolution; if the image should be delivered in color, grayscale, or bitonal; and its format (JPG, TIFF, PNG, etc.).

- **Presentation API** (current version 2.1) provides a standard way to describe the structure of digital objects on a repository to enable a viewer or client to present a correct representation of those objects in its interface. The structure of the object is delivered through a manifest, formatted in JSON-LD that describes its images and metadata.
- **Search API** (current version 1.0) specifies a protocol for performing a search within a given resource for text within its annotations. It is not a general search facility for discovering the resources available with a given repository.
- **Authentication API** (current version 1.0) enables access to images in a repository that has enabled access restrictions. The API acts on the basis of existing authentication mechanisms that may be implemented on a repository and allows the user to get the credentials needed to gain access.

Institutions involved in the initial development of IIIF include Stanford University, Cornell University, and Los Alamos National Laboratory Research Library in the United States; the British Library and Bodleian Library in the United Kingdom; the National Library of France; and the National Library of Norway. The community of institutions currently involved with IIIF includes libraries, museums, and other cultural institutions managing digital image collections throughout the world.

CONTENTdm Implementation

OCLC has been phasing in support for IIIF over the last year. Support of the IIIF Image API was made available in the January 2017 release of the product. The IIIF Presentation API in CONTENTdm was included in its October 2017 release. No

specific announcements have been made regarding adding support for the Search and Authentication APIs.

The extension of CONTENTdm to support IIIF enables libraries and other organizations using the product to access their images through many different viewers and tools beyond the product's own interface. OCLC notes that over 2,500 institutions have implemented CONTENTdm to manage their image collections and that the number of images across these collections totals over 30 million. Many of the libraries contributing to the Digital Public Library of America use CONTENTdm.

Apart from the recent IIIF support, CONTENTdm offers a robust set of its self-defined APIs to enable programmatic access to resources managed within an institution's repository. These APIs can be accessed through a wrapper called dmweb-services and include functions to make requests at the application, server, collection, or item level. An additional set of utility APIs support retrieval of specific images, thumbnails, streams, or files.

CONTENTdm Background

The digital asset management system that came to be known as CONTENTdm was originally created by the Center for Information Systems Organization (CISO) at the University of Washington. The software development lab behind the project

was led by Greg Zick, who at the time was a Professor of Electrical Engineering for the university. One of the early projects of CISO involved working with the University of Washington Libraries to create a platform to manage a collection of 26,000 images related to theatre productions. The initial version of the software was launched in 1996. The success of the project led to interest outside of the university with some external implementations beginning in about 1999.

A new spin-off was launched in 2001, named DiMeMa, Inc., to commercialize the software, continue development, and provide support services. Greg Zick led the company as its president. Rather than develop its own extensive sales force, DiMeMa entered into a partnership with OCLC in June 2002 as its exclusive marketing and distribution channel for libraries. In August 2006, OCLC acquired CONTENTdm from DiMeMa, naming Zick as its new Vice President for Digital Services; in 2006, he shifted to Vice President of Global Engineering at OCLC, remaining in that role through June 2014.

CONTENTdm was originally offered as a system installed on servers housed in the local institution. In recent years, OCLC has primarily deployed new implementations of CONTENTdm as a hosted service, though the locally hosted versions continue to be supported. The implementation of IIIF reflects the ongoing efforts of OCLC to continue to develop and enhance this product.

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.

Do you think the increasing consolidation of library automation companies will be met by more independent companies entering the field? Are more mergers in the industry inevitable?

Future events in the companies that comprise the library technology industry naturally cannot be predicted with any certainty. We can, however, observe trends that have helped bring the industry into its current form and suggest possibilities for what may come about in the relatively near future.

The overarching trend that has prevailed for the last two decades or more has been a continuous series of mergers and

acquisitions of the companies involved in developing ILSs and related products. As companies strive to grow into more prosperous businesses, there has been tremendous pressure to acquire their direct competitors or be acquired. The finite economy of libraries can only sustain a limited level of revenue for these companies.

In earlier phases of the industry, dozens of companies were founded to develop, market, and support ILSs, each of which at least initially had promising prospects. These companies participated in what can be considered in retrospect to be a fragmented industry where too many competitors offered products that were not well differentiated. Even the largest of the companies had limited resources to develop and enhance products at a pace to fully meet the expectations of libraries. The number of personnel employed by each company needed to develop and market their products were quite high relative

to the number of libraries using them, resulting in limited profitability.

Consolidation brought companies together, so that even if they continued to develop and support each incumbent product, they would gain efficiencies in administrative costs, as well as in combined sales, marketing, and support units. Over time, multiple rounds of consolidation have resulted in fewer competitors, though each has more development capacity than any of the antecedent entities. Some of the ILS products of previous eras have fallen way, though it is not clear if they would have survived under their original vendors.

The latest round of business activity impacting the library technology industry has taken a new turn. The acquisition of Ex Libris by ProQuest and the launch of the FOLIO initiative both represent a new phase where the strategic technology products have come directly or indirectly within the sphere of the top tier of companies oriented to libraries. The mergers of ILS companies can be considered a horizontal consolidation among direct competitors. This horizontal consolidation has also become vertical as the large entities offering broad portfolios of products and services to libraries, initially centered on content, now take a new interest in the technology products libraries use to manage and provide access to their collections.

The current state of the library technology industry sets the stage for several different possibilities as its next phase unfolds. Even the largest of the consolidated ILS companies fall well below the capacity of the top tier companies to develop new products that help libraries meet the challenges they face. Collections continue to become more complex and expectations continue to rise for providing access in new ways, requiring management and discovery services with ever more sophisticated capabilities. Libraries also continue to be frustrated with the level of innovations that have been produced, even in this consolidated environment where companies have ample development capacity.

Now that the competitive environment has expanded to the top tier of companies, the stand-alone ILS companies may find themselves in a weaker position. Other large content-centered companies may see similar advantages to add a technology business to their portfolio. It's equally possible that none of the other large content companies will have an appetite for the idiosyncrasies associated with the ILS products.

The vertical consolidation brought about by a strategic acquisition of an ILS company into a larger entity brings a different set of implications than a merger of direct competitors. In a horizontal merger, there is considerable pressure for

the incumbent product of one company to eventually arise as dominant and for others to eventually become displaced. In the context of a strategic acquisition, the technology products become part of the product portfolio of a larger entity with greater opportunities for ongoing development and support. The direction of development may be at least partially shaped by the business interests of that larger entity.

Private equity firms own several of the companies in the library technology industry. These ownership arrangements are usually structured for limited duration. As these investments mature, it is possible that the ownership of some may shift to strategic acquisitions by top-tier companies already involved in libraries or adjacent business activities rather than to a new set of financial investors.

The demand for more innovation opens the possibility for new companies to arise in the global library technology industry. Possibilities include companies in other regions that have created products with the potential for global appeal or start-ups with a new product that is able to rapidly scale up to join the competitive arena. New start-ups may well arise to inject innovation into the industry. Even if their products strike a resonant tone to libraries, it is exceedingly difficult for a start-up to grow into a major player in the global library technology industry. A more likely outcome would be for them to become acquired and their products become integrated into the portfolio of an established company. This pattern continually plays out in all technology-oriented business sectors.

Open source software initiatives also have an impact on the library technology industry. So far, that impact has been moderate, with open source products such as Koha and Evergreen gaining a steadily growing number of implementations in libraries, often through support services from commercial entities. FOLIO, with the backing of EBSCO and the development capacity of Index Data, stands as a possible disrupting factor for the industry at large. Many libraries express concern over the ever-narrow options available to them and are willing to consider open source alternatives. Even though it comes with its own set of issues, open source can provide libraries with a sense of control in the context of a business environment viewed as offering limited choices.

The library technology industry has seen few pauses in business activity over the course of its history. It would not be realistic to expect it to hold in its current state indefinitely. Though the specifics are not predictable, some level of change is inevitable.



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November 2017 Smarter Libraries through Technology

Smart Libraries Newsletter

Marshall Breeding's expert coverage of the library automation industry.

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Production and design by the American Library Association
Production Services Unit.

Smart Libraries Newsletter is published monthly by ALA TechSource, a publishing imprint of the American Library Association.

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