Smart Libraries Newsletter

News and Analysis in Library Technology Developments

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Smarter Libraries through Technology

Engagement Technologies for Public Libraries

By Marshall Breeding

The priorities of public libraries increasingly diverge from other kinds of libraries. Public libraries serve diverse communities including individuals of all ages, economic scenarios, ethnicities, and educational levels. Academic libraries address a narrower audience defined as the faculty, students, and staff members of a higher educational institution. Though some academic libraries may also be open to the general public, their collections and services are shaped according to their primary constituents.

More than ever, each category of library requires distinctive technologies. Previous times saw much more common ground in technology requirements. The business processes for acquisition, cataloging, and lending of materials were quite similar back when all types of libraries collected mostly print or other physical materials. During that period, libraries of all sorts could use the same supporting technologies, especially integrated library systems, quite successfully. During the past two decades, each type of library have followed different trajectories. Academic libraries have shifted priorities toward electronic access to scholarly articles with a smaller remnant of print. Public libraries thrive on the lending of physical materials, supplemented by increasing interest in downloadable ebooks and audiobooks. The business and technology tools required by these two types of libraries has never been more different. These differences can be seen in the transitions each has made in the products used to manage their collections. Publics have mostly held on to the model of the integrated library system. Academic libraries are adopting library services platforms, which are better able to manage complex multi-format collections dominated by electronic content.

The requirements for technologies supporting patron services diverge even more than those relating to collection management. Academic libraries invest in discovery services to provide access to their collections, with special emphasis on article-level indexing of scholarly journals. They also work to provide access to materials of interest to academic courses through products that integrate with institutional learning management systems.

Public libraries are working through a different progression of technologies for their patron-oriented services. The online catalog component of the ILS has long been the mainstay for providing access to public library collections. In the past decade or so, public libraries have implemented discovery interfaces to complement or replace their online catalogs. Products such as Encore from Innovative, Enterprise from SirsiDynix, or the open source VuFind have stepped in to provide a more modern interface offering relevancy ranked results, navigation facets, and enhanced displays with cover art, item summaries, and other content. Once considered "next-generation library catalogs," these discovery interfaces struggle today to keep pace with modern expectations. BiblioCommons introduced its BiblioCore discovery interface more recently, raising the bar of expectations for public library discovery.

Discovery represents only one layer of services that public libraries need to fulfill the expectations of their patrons. A suite of additional components fills other needs, either as separate products or packaged as integrated suites. Public libraries are interested in tools to help them manage their events and programs, showcase featured resources, deliver interactive research

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services, and to help manage their entire web presence. Many want help in managing their outreach and marketing efforts. Public libraries increasingly want to be able to promote their programs, collections, and other services using modern marketing methodologies. Although many business-to-business marketing tools are available, libraries may prefer specialized products more aligned with their community focus.

Heightened interest in these areas is driving a new cycle of technology in the public library sector. The last year or so has seen the launch of many new offerings. BiblioCommons has built out is product suite to address web content management (BiblioWeb), events (BiblioEvents), and automated marketing (BiblioEmail). SirsiDynix launched its Community Engagement Platform. Since 2017 Patron Point has offered its marketing automation solution specifically designed for public libraries.

This issue of *Smart Libraries Newsletter* features the new Vega platform launched by Innovative Interfaces. Now that Innovative is settling in under its new ownership arrangement under ProQuest, Vega represents its major product initiative to strengthen its position in public libraries. While beginning with the delivery of a new discovery environment, additional components of Vega are anticipated to address a broad range of patron-oriented services to support public libraries.

Innovative Interfaces Introduces Vega

Innovative Interfaces, following its acquisition by ProQuest, has begun to articulate and execute new product strategies to strengthen its position in the industry. The company aims to move forward following a period of under-investment in product development, as seen in recent years. Polaris and Sierra will continue as strategic ILS products, complemented by new patron-facing interfaces and services.

Libraries of all types use Innovative's products. Polaris is used mostly by public libraries, and its PowerPAC patron interface has steadily evolved. Sierra has been implemented by academic libraries serving higher educational institutions, by public libraries, and by some law, medical, or other special libraries. As the requirements of each library segment have become more distinctive, Innovative faces the need to refine its product strategies. For public libraries, the company has launched a development initiative, branded as Vega, to create a suite of new patron services. For its academic customers, Innovative has integrated the Summon discovery service with Encore and will begin offering electronic resource management components from ProQuest.

Vega: New Technology for Public Libraries

The integrated library system continues to be reasonably effective for managing the collections and operations of public libraries, unlike academic libraries which have required a more fundamental change in technology. But even if the ILS performs well for the acquisition, processing, and circulation of materials, public libraries increasingly demand dramatically better interfaces for their patron services and more sophisticated technologies to support their outreach and marketing initiatives. Many public libraries see improving patron services and engagement as an existential priority needed to maintain and advance their position in their communities. They need to deliver their services in ways that will be appreciated in this time when current social networks, ecommerce destinations, and consumer media outlets set a high bar for personalized services. Libraries need to move beyond outdated interfaces and simplistic patron features. Other library technology vendors, especially BiblioCommons, have already moved into this space, and are making inroads into the customer base of the ILS vendors. For Innovative, these are some of the factors that drive its ambitious effort to develop a new set of advanced patron services.

With the launch of the Vega platform, Innovative deploys a new set of patron services for public libraries using Sierra or Polaris. This new multi-tenant platform is based on modern technology architecture and components. It provides a foundation for a suite of applications and services in tune with current needs for modern interfaces, personalization, and outreach.

The Vega product will be built out incrementally. The current phase focuses on a core discovery interface that meets and exceeds the features and user experience available through other options.

Successor to Inspire

In the waning years of the company's previous ownership, Innovative had begun the development of a new discovery environment branded as Inspire Discovery. This product was based on a modern technology platform and was designed mostly for academic libraries. The development initiative

was announced in April 2019. Several development partners and early implementation sites were announced up through November 2019.

Inspire Discovery was featured in the May 2019 issue of *Smart Libraries Newsletter*.

Once Innovative was acquired by ProQuest, the ongoing development and marketing of Inspire was halted. The discontinuation of Inspire did not violate the stated commitments of Ex Libris and ProQuest to not withdraw products in production use upon which libraries depend. Some libraries, including Hillsdale College and Cairn University, had implemented an early version of Inspire Discovery, but none had fully migrated from their incumbent discovery products.

Although Innovative did not take Inspire forward as a product for academic libraries, it was able to leverage some of its components into a new suite of products for public libraries. Vega, for example, includes the Context Engine to deliver search results and recommendations. Some of the ideas of the Context Engine were carried forward from Inspire, reworked and optimized for public libraries. The technical development for Inspire generally informed the development of Vega, enabling a faster launch of the product relative to starting completely from scratch.

Vega Discover also provides a forward migration path for Encore. Originally introduced in 2006, Encore has steadily evolved as a discovery interface and continues to be used widely by public and academic libraries using Sierra. Based on aging technologies, Encore cannot be further extended or developed to meet Innovative's vision for public library services. Innovative continues to provide support for libraries currently using Encore but does not market it for new sales.

Vega Technology

Vega was developed as a modern suite of cloud-based services implemented though software-as-a-service. It follows patterns of software development for current-day projects, not tied to legacy architectures. It is deployed through Amazon Web Services and a technology stack based on industry-standard components able scale to meet the performance demands of a global customer base and to support rapid product development.

Aaron Terrell, Innovative's vice president of engineering, describes the general technical design of Vega:

> Vega's architecture implements a tiered microservice architecture with separation between user interfaces (UI) and business logic. Web applications are designed to be responsive, with user testing and accessibility sourced requirements incorporated into designs. Data access is controlled by APIs across Vega's multiple services. Each service has a dedicated database. An API gateway unifies the programmatic interface to Vega, with authentication and authorization controls implemented at the gateway and within services. Vega has tight integrations with the supported underlying ILS systems (Polaris and Sierra), emphasizing strong interoperability without tight coupling where possible. This allows the ILS to maintain authority on system objects while Vega focuses on new and rich experiences.

Though Vega itself has been built as a modern multi-tenant platform, it interfaces with ILS implementations based on legacy architectures. Libraries do not need to migrate away from their Polaris or Sierra ILS to take advantage of Vega's modern patron services. This bifurcated model of modern platforms overlaying local legacy systems has multiple precedents in the library technology arena. For example, the SirsiDynix BLUEcloud suite operates with Symphony and Horizon, and the suite of products from BiblioCommons has been layered on top of most major ILS products.

Vega Discover

Vega Discover is the initial application in Innovative's strategy to provide immediate relief to libraries needing to replace outdated patron interfaces. Vega Discover completely replaces the classic online catalog associated with the library's ILS, and it will be followed by a suite of additional services. Any remaining gaps in functionality will close as Vega development continues.

Innovative positions Vega Discover as its strategic patron interface for public libraries. It provides a modern replacement for its other patron facing interfaces including the classic online catalogs of Sierra (WebPAC Pro), Polaris (PowerPAC), or Encore.

Vega Discover provides a modern approach for finding and exploring the library's physical and digital resources. It delivers a clean and easily understood interface and embodies modern web design concepts such as responsive layout, supporting devices of all sizes, and adherence to accessibility standards.

A key aspect of its simple presentation can be seen in its concept of "roll-ups," consolidating multiple representations into a title, avoiding the cluttered and confusing results when each version is listed separately. Public libraries offer any given work in multiple formats and editions. A popular title, for example, will be available in hard bound, paperback, or large format print, as ebooks, or as audiobooks. This consolidated approach enables a patron to view a title of interest, and then

select among the available formats and editions.

Digital content, especially ebooks and audiobooks, have become a growing part of public library lending services. Any discovery environment for public libraries must integrate well with the major library-oriented digital platforms. Patrons expect to check-out digital titles as easily as print. Vega Discover supports selection, check-out, and downloading of ebooks from OverDrive and audiobooks from Hoopla.

The underlying data models of Vega bring together multiple types of data to drive patron experience. These data components include:

- MARC bibliographic records, transformed into BIBFRAME linked data format,
- library holdings data mined from the library's ILS,
- global name and subject authority records, and
- bibliographic enrichment resources such as Syndetics Unbound, Content Café, or EBSCO NoveList.

This component of the Vega platform leverages these integrated data sources to drive search, enrich the presentation of materials, and enable exploration of related resources. It powers such features as related search recommendations, concept cards, and author pages.

The textual data encoded in MARC records represents only the skeleton of what is needed for search and presentation in a modern interface. Public libraries usually subscribe to additional services for enriched content that can be layered on top of the basic MARC record data. Vega draws enriched content from Syndetics Unbound from ProQuest and Content Café from Baker & Taylor for the presentation of cover art, author images, and biography summaries.

In addition to the Context Engine, which optimizes use of library resources, the vision of Vega also includes a community management engine to drive personalization and communications with library patrons. The community-oriented capabilities in the forthcoming applications of the Vega platform are geared especially to patron engagement.

Vega Discover integrates with the patron management module of the ILS, enabling patrons to view account details, make updates, and adjust their privacy settings.

Features planned or in development include such capabilities for patrons as:

- opting to save their reading history through an optional setting that is disabled by default.
- paying fines directly in Vega.
- placing holds on items on order, but not yet available.
- saving previous search terms.

Integration with Polaris is underway, including MARC record ingest and all patron functions.

Vega Connect: Platform Interoperability

Vega Connect is a key part of the technical infrastructure for this new platform. It houses data stores as well as software to support the new Vega applications and manage interoperability with the library's ILS, whether Sierra or Polaris. Its connectivity layer harvests data as needed to populate indexes and uses APIs for dynamic interactions between the ILS and discovery layer. Vega Connect also manages the interactions among the applications residing on the platform. The Context Engine, patron messaging, and other functionality reside within Vega Connect.

Current Status and Implementations

The initial version of the Vega platform, including Vega Discover and Vega Connect, has been completed for libraries using Sierra. Interoperability with Polaris is nearing completion and will be generally available in March or April 2021. Support for consortia using INN-Reach is also underway.

To date, 17 libraries have purchased Vega. New York Public Library and the Miami-Dade County Public Library System are working with Innovative as development partners for Vega.

Vega Discover has been implemented by early adopter libraries, with live previews available to their patrons. These libraries include the MIdPointe Library System in Ohio, the Ferguson Library in Connecticut, and the Jefferson County Library System in Alabama.

Time Line

- Jan 2020: ProQuest acquires Innovative Interfaces.
- Aug 2020: Vega Development begins.
- Dec 2020: Vega Discover available in General Release for Sierra.
- Apr 2021: Vega Discover available in General Release for Polaris.

Forthcoming Applications

Innovative plans an additional set of applications for the Vega platform. Forthcoming modules include:

- **Interact**: Enables the library to communicate directly to patrons through notifications and alerts. This messaging would be triggered by temporal circumstances, such as

initial registration or renewal, or generated according to areas of interest.

- **Promote**: Supports a library's marketing campaigns through the generation of messaging to selected groups of patrons. A library would take advantage of these automated marketing capabilities to promote events, highlight collections, engage in fundraising, or other activities.
- **Program**: Features an event management and room booking module with integrated patron communications and streamlined workflows for scheduling, program descriptions, and promotion.
- **Analyze**: Provides the statistics, reports, and analytics libraries need to assess the effectiveness of its programs, collections, and other services.

Competitive Environment

In the current competitive environment, public libraries have a high interest in technologies able to improve the digital experiences for patrons and to improve their ability to connect with them. The current marketplace offers multiple alternatives, ranging from add-on marketing components to comprehensive systems.

OCLC Wise takes a comprehensive approach that encompasses a full integrated library system and layers of patron engagement services, including an enriched discovery layer, integrated event management, and marketing automation. This product, established in The Netherlands, was introduced in the United States in 2018. OCLC has garnered a handful of sales in the US, drawn from sites using Symphony, Horizon, Polaris, and Sierra. Vega can be seen as a defensive measure to avoid future defections.

BiblioCommons has made much deeper inroads into public libraries in the United States and Canada for its suite of patron-facing applications. More than 45 institutions using Sierra and 22 using Polaris have implemented BiblioCore. BiblioCommons does not offer its own ILS and therefore does not represent a major threat to Polaris and Sierra. However, BiblioCore's customer base means important lost opportunities for Innovative in critical patron services, which may in the longer term weaken its competitive position.

SirsiDynix launched its Community Engagement Platform in August 2020 with a similar vision of event management, marketing automation, and analytics. SirsiDynix competes directly with Innovative in the public library sector. Vega is vital in that competitive dynamic.

Patron Point offers a marketing automation solution that operates with the library's existing ILS and discovery environment. The company has announced implementations in over 80 public libraries, reflecting strong demand for more powerful messaging and marketing technologies.

The next few years will be an important period for public library technologies. Decisions to remain with current vendors or move to other providers will increasingly be driven by front-end services more than back office automation. The turnover in this sector has been especially light in recent years. Few libraries are opting to make lateral moves between vendors with limited points of differentiation. Multiple initiatives are underway that may change the dynamics of this sector. Innovative, with the backing of ProQuest, has begun to strengthen its competitive position with its new Vega platform. Time will tell how these efforts will play out in the marketplace.

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.

How can blockchain be useful for library training?

Blockchain has attracted incredible levels of interest in recent years, especially through its association with cryptocurrencies. Headlines in recent days, for example, hype Bitcoin's ascent to a value of $50,000. Apart from cryptocurrencies, blockchain finds more mundane applications, mostly in the financial and supply chain sectors. In essence, blockchain defines a distributed model for storing data based on cryptography.

The basic idea of blockchain involves transactions or other points of data stored in lists, or blocks, encoded with a precise timestamp and a cryptographic hash. Each transaction is posted to block, following an algorithm called a Merkle tree. When a block is completed, a hash for it is generated and added to the chain, along with the hash of the preceding block in the chain. Most implementations involve distributed storage across many nodes with multiple replicates of each block rather than a centralized data store. Changes cannot be made to any transaction in the blockchain without recalculating every hash of every transaction and each block for every copy

in the distributed network. Such a change would be computationally impossible.

Every implementation of the blockchain model varies in technical details. Transactions in blockchains can be publicly visible or secured as private, depending on the cryptographic architecture of the implementation, whether permissions are applied to access transactions, how blocks stored, and many other possible variations. Blockchain as a data storage protocol needs to be understood apart from implementations, such as Bitcoin.

Bitcoin, for example, includes a computationally intensive activity called "mining" as part of the transaction verification process. Bitcoin miners can earn bits of currency by solving complex mathematical puzzles. The complexity of these puzzles requires massive computational resources, ranging from individual personal computers to large-scale data centers. A recent news article reported that the computing performing Bitcoin mining annually consumes 121 Terawatt hours, slightly below the energy consumption of the country of Norway[1]. This extreme example does not apply to blockchain implementations that do not require intensive proof-of-work tasks.

While libraries need statistics describing activities, the records themselves for those transactions have a limited lifespan.

The basic model of blockchain can be implemented in many ways. Many of the characteristics of Bitcoin, for example, do not necessarily apply to other implementation scenarios.

Blockchain technology has potential benefit for some sectors through the validation of transactions without the need for manual verification or reliance on individual institutions. For cryptocurrency and financial services, blockchain enables trusted transfer of assets without the manual validation of transactions through a central authority such as a bank. It includes mechanisms for enabling transactions by anonymous entities. The blockchain network itself validates the transaction. Blockchain can enable smart contracts where terms are automatically executed without the need for a central authority. In a manufacturing and supply chain context, blockchain technology can be used to authoritatively track the source of an item and each step in distribution and transport.

This general understanding of blockchain informs its suitability to library applications. Opinions differ on whether blockchain technologies offer benefits to library applications.

A fundamental difference applies to transactional data of library operations relative to the principles of blockchain. Blockchain transactions are immutable. They cannot be altered once committed to the blockchain. The basic idea behind blockchain is create trust by making it impossible to forge or alter transactions. Investopedia states: "The goal of blockchain is to allow digital information to be recorded and distributed, but not edited."[2]

Library transactions are inherently transitory. Most categories of operational data for libraries, or at least those related to patron services, are stored only as long as needed for operational requirements. Out of concern to protect patron privacy, most libraries delete, or at least anonymize, transactions once the active lending or use activity has completed. When a patron borrows a book, for example, the library needs to be able to identify the specific individual to generate circulation notices or fines or fees for items not returned. When the item is returned, the library will either scrub the transaction from its records or remove anything that associates a specific individual with the transaction. Some variation of this process applies to online access of digital materials, interlibrary loan, reference interactions, and other services. While libraries need statistics describing activities, the records themselves for those transactions have a limited lifespan.

The deletion of transactions or the requirement to alter transactions as they transition from identifiable to non-identifiable formats seems antithetical to the basic concepts of blockchain.

Library business activities outside patron services may present theoretical opportunities for blockchain. The procurement of print and digital resources and related financial transactions resemble those in other sectors that have implemented blockchain. The diverse numbers and types of suppliers involved would complicate any implementation of blockchain for financial transactions or supply chain management. It would seem to require an industry-wide adoption of the technology, which would be impractical. The business components of library acquisitions systems and those of their suppliers were slow to implement basic interoperability protocols such as EDI, which does not bode well for the implementation of complex and computationally-intensive blockchain technologies. In the realm of business processes in the library ecosystem, it would be difficult to argue that blockchain offers substantial benefits not met by current technologies that would justify enormous investment in systems development and disruption of the current business workflows.

Library adoption of blockchain will happen or not in concert with the broader realm of consumer and business technologies. If the primary database and transactional engines used

in business broadly shift to blockchain, libraries will naturally follow along. Such a transition seems unlikely. Blockchain will probably continue as a relevant technology for a fairly limited niche in business technologies without becoming common business infrastructure.

Blockchain can have some implications for library training scenarios. In the same way that libraries provide training and instruction on other technologies, this may be a topic of interest. As Bitcoin and blockchain have become so prominent in popular culture, it is reasonable for libraries to include it in their technology literacy programming. Libraries can help clarify some of the confusion that might exist between Bitcoin and cryptocurrencies and the general characteristics of blockchain technology. Blockchain is a topic that should be in the repertoire of library technologists regardless of whether implement it themselves.

It would also be interesting to explore possibilities for using blockchain technologies in the performance of a training program. It is possible to create an experimental blockchain implementation that could be used to support learning activities and to allocate badges and rewards. Such an implementation would help investigate how blockchain technology could be implemented in ways that address the privacy issues discussed above and whether the cost and complexity exceed practical value.

Notes

1. "Bitcoin consumes 'more electricity than Argentina.'" BBC News, 2021. https://www.bbc.com/news/technology-56012952.
2. Luke Conway, "Blockchain Explained," Investopedia, 2020. https://www.investopedia.com/terms/b/blockchain.asp.

Questions or suggestions for topics in future issues?

Contact Patrick Hogan at **phogan@ala.org**

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

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