Proceedings of the IATUL Conferences   2014 IATUL Proceedings

Jun 3rd, 12:00 AM

What Would be the Future of the Integrated Library Systems?

Xiaohua (Cindy) Li
Sacred Heart University, lix@sacredheart.edu

WHAT WOULD BE THE FUTURE OF THE INTEGRATED LIBRARY SYSTEMS?

Li, Xiaohua
Sacred Heart University
Connecticut, U.S.A
lix@sacredheart.edu

Abstract

Since the advent of Integrated Library Systems (ILSs) in 1970s, they have gone from being innovative to stagnant. In recent years, the rapid advancement of web technologies and the exponential growth of electronic resources and digital contents have increasingly exposed the weakness of traditional ILSs. The lack of flexibility, interoperability, and efficiency makes the ILSs hardly meet the needs of both internal and external library users. Meanwhile Content Management Systems (CMS) such as Drupal and open source ILSs have gotten much attention due to their technological and economic advantages, and cloud computing has allowed libraries to focus on bigger pictures. Facing the unprecedented challenges, major ILS vendors are pressed to develop the next generation ILS; nonetheless, the concrete ideas of the future ILSs are still being investigated. The paper will reference the developmental history of ILSs to discuss the limitations of the current ILSs, the unavoidable transformation these systems are facing, and some aspects or features that the next-generation ILSs are expected to contain.

Keywords

Integrated Library Systems (ILSs), SaaS (Software as a Service), OSS ILS (Open Source Software ILS), Cloud Computing, Content Management Systems (CMS), next-generation ILS

Topics

Information systems
Information architecture

Developmental History of ILSs

Libraries have had a long history of organizing information and making information available to the targeted users. As early as 3rd Century BC, the Royal Library of Alexandria was said to contain such library's key departments as Acquisition and Cataloging to request and organize the bibliographic information.

From late 1780s to 1930s, card catalog started to emerge and gradually dominated the way that library print materials were organized. By 1960s, the card catalog became an essential way for libraries to organize the information.

Nevertheless, libraries have never stopped exploring more effective ways to improve users' information seeking experience. During 1960, the library world benefited from the advance of computer technologies, which resulted in the creation of MARC (Machine Readable Cataloging) standards by the Library of Congress. The computerized program dramatically increased the efficiency of libraries. Automating the library routine activities became the buzzwords of the time.

As the computerization penetrated the library world deeper, early 1970s witnessed the advent of the library automation system, known as Integrated Library System, a digital representation of card cataloging (Nelson, 2012). The initial automation system was basically used to handle circulation activities and it was able to reduce incidents of missing books and handle overdue.

In the next two decades ILS functionality grew alongside computer technology. The ILS was able to process the tasks of not only circulation but also acquisition, cataloging and serials. In the late 1990s, the popularity of the Internet led to the development of Online Public Access Catalogs (OPAC). The OPACS allowed users to search a library's holdings, view their own patron records, and put books on hold. As the 21st century began, library automation systems had greatly improved library productivities.

At the beginning of 21st century, the library world took notes of the augmentation of automation business. Marshall Breeding wrote that "In 2001, the library automation market expanded significantly (17%) and the trend continues." Companies such as Sirsy, Innovation Interface Inc. (III), EOS gained momentum by acquiring large shares from smaller automation shareholders. The merge and acquisition of automation vendors pushed the improved system complexities and the ever-intense competition resulted in high levels of systems functionalities.

With years proceeding, the automation became a global business due to the saturation of ILS business in North America. Meanwhile, OPACs become more versatile. Features such as book jacket images, and other supplement information related the book are made available.

Current Status Quo & Impacts on the ILSs

Several decades have elapsed since major developments of library automation systems, during which technology has drastically changed every part of people's lives, of course, not without impacting libraries. Since 2000s, due to the fast growth of web technology, and emerge of web 2.0, digital contents have started to take the spotlight of the information world. Lots of resources have been digitized and made available online and more information has originated as born digital. The Adobe's PDF format and Open eBook Publication Structure (OEBPS), together with web technology CSS and XML make the information published in digital formats accessible. As a result, publishers and information aggregators have steadily enlarged the number of electronic publications.

Although a large scale of adopting e-contents initially did not occur in the library world, the size of electronic resources for lots of libraries does amass rapidly. It is estimated that libraries experienced 60% growth in e-book collections between 2005 and 2008 (Wikepedia, 2014), which means library collections are no longer print-dominated. As the digital contents tilt the balance of library collections, the weakness of ILSs becomes more evident.

While libraries spend a large portion of their collection budget on licensed electronic resources, and apparently the digital resources demand more efforts to maintain, the library automation systems have not been able to keep up with the changes. Designed primarily to manage print collections, the OPACs lack the capability of offering more than titles of e-resources. Although the 856 field of MARC record serves as a mend to such disadvantage, the ILS's nature of managing print-dominant

contents is not changed. In addition, the system is not able to handle the subscriptions of electronic resources albeit the library's electronic collections grow steadily.

Such circumstances inevitably led to the development of various non-automation add-on products addressing the needs of libraries' specific tasks. Electronic Resource Management (ERM) is software that assists libraries with procurement and tracking the licenses of electronic contents. In 2004, III, partnering with several universities, developed its ERM, which works with its automation system, Millennium to manage e-resource metadata; 360 Resource Manager of Serials Solution is a similar product that enables libraries to handle their electronic subscription and licenses. The attempt to increase the interoperability among library systems and allow users to search and access subscribed resources across the platform have resulted in the advent of federated search products such as Metlib by Ex Libris, and Central Search by Serials Solutions. These products employed a search engine mechanism called metadata harvesting that enables users to search multiple resources simultaneously via a single interface. The metadata harvesting naturally pushed the development of Link Resolver. The software offers users the functionality of getting the desired resource by clicking an offered link via OpenURL, a URL standard that "provides an infrastructure for context-sensitive ling among the electronic resources to which libraries subscribe" (Breeding, 2009). SFX, initiated in 1999 was the first link resolver licensed by Ex Libris. Since then more similar products such as Article Linker from Serials Solutions, EBSCO Customlinks from EBSCO and WebBreidge from III started to appear as competitors on the market.

Yet these are only a few add-ons out of a stack of software and no single product in sight is able to incorporate all the functionalities that help libraries manage their resources and workflow. The absence of integration imposes challenges to both library staff and users: libraries find themselves constantly "integrating multiple diverse systems rather than implementing a single package" (Breeding, 2005) regardless the labor inefficiency and data duplication; users, on the other hand, become more and more frustrated by the difficult level of accessing library resources.

Were these the only obstacles that the ILSs are facing, the automation business might still be able to enjoy their distinctive status in the library world. Unfortunately, the social, technological and economic impacts on the ILSs are far overreaching. The fundamental change of users' roles online, the rapid evolution of web technology and economic concerns made the library automation systems even more undesirable.

Since late 20th and early 21st Century, web technology has undergone swift advancement. The concept of web 2.0 has swept the online world. The essence of Web 2.0 is to emphasize users' online experience, encouraging them to interact and contribute rather than passively retrieve information. The rise of social networking sites such as blog, Facebook, and Twitter makes the web as an open space for people to share and exchange information and ideas. Content Management Systems (CMS) like Drupal and Wordpress make web publishing easy and fun. Google, the most popular search engine attracts countless users because its simple interface harnessed by vast computing power sets an industry standard for information providers to follow.

Influenced by Web 2.0, Library 2.0, coined from Web 2.0, started to surface in 2005. With the same ideology, Library 2.0 promotes user-centered services. Libraries set up various service points to inspire users to connect and interact with libraries both physically and virtually. Nonetheless, the library OPAC's evolution remains stagnant. Overshadowed by the information sharing capacity of the social networks, simple interface of Google and power of CMS, OPACs' one-way communication, complex presentation and antiquated searching mechanism are pullbacks to Library 2.0. As users are no longer content with their traditional roles in the information seeking

process, libraries are losing ground. That accounts the reason that when LibraryThing, a social cataloging site appeared, it received the acclaim from the online users instantly. The feature of engaging users to participate in an activity monopolized by the libraries in the past has excited many users to "post and tag their personal, and sometimes public, collections for the public to see. Small libraries have started using LibraryThing as an alternative OPAC." (Kenny, 2003)

Apart from the capability of participation, users expect to be served better thanks to the available technology. The prosperity of Drupal, a popular CMS is not a surprise. Integrating Web 2.0 technologies such as RSS feeds and taxonomy, Drupal has provided a fresh way for users to publish information online. The flexibility of the system grants users the full control over the data in the backend system and the information presented in the frontend. Compared to CMSs, the ILS is far less competitive as the data in these automation systems are almost inaccessible, and the interface is rigid. III's ILS, Millennium has gotten substantial criticism because the Millennium users are hardly able to access their own data; most of the current OPACs offer limited power for users to customize.

When talking about the social and technological impacts, we cannot ignore the financial disadvantage that ILSs are facing. The economic downturn of 2008 had not spared libraries. Many libraries have experienced the declining budget and spending cuts. Before the "great recession", although most libraries were hardly auspicious in funding, they were able to increase staffs by about 15%, the funding for the positions was increased by 22% and the collection especially serials and e-Books went up 23%. Since 2008, the budgetary constraints have forced libraries to cut resource acquisition and even lose staff positions. In contrast, the tendency of increasing non-print resources from many libraries continues on the rise. Facing the flat or decreased budget and reduced staff but increasing heterogeneous collection, libraries need more than ever the assistance of technology to effectively manage the workflow. Nevertheless, a striking shortcoming of proprietary library software is the high price. Since digital content continues to grow, libraries have to spend on technology to accommodate this growth. What puts commercial automation system vendors on the hot seat is the development of Open Source (OS) ILS. These OSILSs have given libraries alternatives not to rely on the proprietary systems. So far major OSILSs such as Evergreen and Koha both have a solid user base. Users not only benefit from the low cost but also the flexibility of customizing the system based on their needs and, more importantly, the collaborative efforts from the library community reflect the library service philosophy: benefit the community.

Literature Reviews

The noticeable issues with traditional ILSs have generated substantial concerns and discussions from library professionals and ILS vendors. "This (ILS) once unchallenged identity of libraries faces mounting pressure from outside Web forces. Libraries must work with vendors to build systems to integrate with new and reliable technologies, with features that are attractive to library users." (Wang, 2000)

Marshall Breeding, a library business expert, has published large quantity of studies regarding the current situation of automation systems, the developmental trend and anticipation of future systems. In his 7 annual reports "Automation Marketplace" since 2002, Marshall shared his observation and analysis of the positions that ILSs play in libraries. In 2005, Marshall pointed out that the ILSs are facing following challenges: 1. Integration issues and the barriers to integration; 2. Lack of functionalities that support the mission of libraries; 3. Inflexibility to cope with the future changes. Marshall suggested "…the key to progress in library automation systems involves improving technology infrastructure and reshaping the functionality to match today's real-world libraries, then

adding enough flexibility to accommodate future changes, which seem likely to unfold more rapidly than ever before."

Andrew Pace from OCLC emphasized, "Stagnation of ILS development has become obstacles to the library's services…Libraries require a sea-change—a dramatic departure from the status quo of library automation, solutions that will scale like typical Web solutions, technologies that will ensure our future." (Pace, 2009) Another library expert and researcher, Roy Tennant wrote in his personal blog "most integrated library systems, as they are currently configured and used, should be removed from public view." The reasons are most of the systems contain incomplete information due to their inflexibility of dealing with library holdings. The interface is not user-friendly. He even vehemently claims that "the OPAC is dead" as these systems become "thoroughly anachronistic" and have lost their vitality. Others such as Kristin Antelman and Stephen Abram have expressed their concerns to the current situation of ILSs and their predictions of the future systems.

Besides quantified studies and researches from library professionals, library automation systems vendors are also active in the conversation. Back to 2003, the Library Journal (LJ) held a Round Table discussion focusing on such aspects as services, web, integrated vs. integrating and Meta Searching. A group of executives from ILS businesses acknowledged the competitiveness of Google and Amazon in terms of services and simplicity. In 2011, LJ held another discussion during the ALA Midwinter conference, at which ten top figures of ILS providers were back to the table. They listed the challenges the ILS industries were facing:

- growing amount of digital contents
- streamlining workflows
- competition from open source
- public interest in libraries
- integration of all services
- software as service - cloud computing

They agreed that public dissatisfaction to the current ILSs pushed them to reposition their roles and the available applications they place on the markets only serve as temporary solution. With the technology in hand, they were optimistic that they would be able to develop cost-effective new systems built on service-oriented architecture. They admitted that in order for them to stay in the business, it is essential not to ignore but address the concerns of users.

New Developments of ILSs

The unavoidable change of information world and higher expectation of library users impel the library ILS vendors to pay attention to what is happening to the industry and the consequence if they fail to keep up with the change. The appearance of some next-generation ILSs reflects the ILS providers' adaptation to the change.

So far the paradigm of the new ILS development that echoes the ideas of next-generation ILS contains two layers: a web-based automation system that fully supports the library operation and a discovery service that replaces the traditional OPAC. Some highly desirable features listed below are being implemented in these developments.

Integration and Interoperability: Trying to address the integration issues caused by multiple systems that manage library resources and workflows, next-generation ILSs render web-based systems, which make various information systems interoperable via metadata. For instance, Ex Libris' Alman has the ability to "consolidate disparate systems"

(http://www.exlibrisgroup.com/category/AlmaOverview) and provide the functionality of metadata sharing in a highly secure environment. III's Sierra has abandoned its old modular model and integrated all the functions in a web-based application. Largely employing API (Application Programming Interface), Sierra makes resource sharing more efficient to reach the goal of interoperability. Other products such as OCLC's WorldShare Management (WSM), Serials Solution' Summon, Open Source Kuali OLE (Open Library Environment) and Intota share the similar features and functionalities.

Open Architectures and Scalability: Under the influence of data globalization, data accessibility and system scalability are important features incorporated in the next generation systems. III used to be criticized for having their data in a black box, but its new ILS, Sierra is built on OS applications, which permits users to even query its database. The open architecture makes Sierra more scalable: its Service-Oriented Architecture (SOA) model allows user to make sensible decision based on their capability and affordability. Kuali OLE serves as a fully functioning system, which, apart from its capability of managing library and non-library efforts, can serve different size of libraries and accommodate individual needs by integrating and interoperating with other systems.

User-centered Design: The next-generation ILSs have adopted some striking features, if not all, from Google and Amazon. Summa is an OS-powered search engine developed by librarians, and IT people of Denmark State and University Library Denmark. Its goal is to ease users' resource discovery process. Summa offers "integrated search and sort by relevance" across different data sources. It employs the Google's suggestion techniques that help users find the relevant search terms. As matter of a fact, most available next-generation discovery service applications have incorporated such features as relevancy ranking, facet filtering, and resource type grouping. Another major change these new systems bear is the interface design. Most interfaces of these products imitate Google's simplicity, offering a single search box.

Cloud Computing: With diverse resources coexisting in the l ILSs and the demand of managing various information systems increasing, libraries need more than ever the technological savvy personnel who have the knowledge of both hardware and software. Luckily Cloud Computing has alleviated much burden of libraries. Due to the available high-capacity networks, low cost hardware and storage space and service-oriented architecture, most of ILSs vendors offer cloud-based service that allow libraries to take advantage of Software as a Service (SaaS). SaaS not only helps libraries reduce the cost of ownership of the technology infrastructure but also enables libraries to concentrate on user services without worrying about the limitations caused by short of skillful personnel. So far most next-generation products such as Alma, Sierra, EDS (EBSCO Discovery Service) and WSM offer cloud-based services.

Summary

With more than 30-year developmental history, Integrated Library Systems have reached the tipping point that the collision between the traditional ILSs and library users' best interests is bound to happen. The advance of technology, the economic impact and the change occurred to the library collections mandate an efficient ILS that is capable of handling library workflows and provides users the state-of-the-art web presentation and searching capacity, but such system may not necessarily require big upfront investment of both personnel and technology.

Although there are some products on the market that contain better functionalities and services, and these products are attempting to address the weakness that traditional ILSs possess, there is much space for these systems to ameliorate: the next-generation ILSs are unable to provide

"seamless and unified Interface across all service offerings (Breeding, 2012) "; most discovery services can hardly offer comprehensive resources at one entry point; a CMS-like ILS would be advantageous as it would give users the leverage to control their data and web presentation. Nonetheless, the forward thinking that the next-generation ILSs represent forecasts a promising future of the ILSs. What the automation vendors or developers need is to further push the envelope and think out of the box.

Nelson predicted, "Over the next few years, enterprise & cloud level content management systems will replace traditional integrated library systems," and for ILS vendors, "the real competition is not other ILS vendors, it's CMS and innovative mash-ups." Nelson also predicted, "if we continue with the status quo, it (ILS) has no future."

References

Breeding, M. (2002). Capturing the Migrating Customer. *Library Journal, 127(6),* 48.

Breeding, M. (2005). Gradual Evolution. *Library Journal, 130(6),* 42-47.

Breeding, M. (2005). Re-Integrating the Integrated Library System. *Computers in Libraries, 25(1),* 28-30.

Breeding, M. (2006). Reshuffling the Deck. *Library Journal. 131(6),* 40-54.

Breeding, M. (2006). Trends in Library Automation: Meeting the Challenges of New Generation of Library Users. Retrieved from http://www.docstoc.com/docs/50627249/Trends-in-Library-Automation-Meeting-the-challenges-of-a

Breeding, M. (2009). Next Generation Library Automation: Its Impact On The Serials Community. *Serials Librarian 56(1-4),* 55-64.doi:10.1080/03615260802679028

Breeding, M. (2013). Automation Marketplace 2013: The Rush to Innovate. *Library Journal. 138(6),* 32.

Casey, M. E., & Savastinuk, L. C. (2006). LIBRARY 2.0. (Cover story). *Library Journal, 131(14),* 40-42.

Collins, T. (2012). The Current Budget Environment And Its Impact On Libraries, Publishers And Vendors. *Journal Of Library Administration 52(1),* 18-35. doi:10.1080/01930826.2012.630643

Eberhart, G. M. (2006) *The Whole Library Handbook 4: Current Data, Professional Advice, and Curiosa about Libraries and Library Services*. (4th ed.) Chicago: American Library Association.

Jantz, R. C. (2001). E-Books and New Library Service Models: An Analysis of the Impact of EBook Technology on Academic Libraries *Information Technology and Libraries (ITAL), 20(2).*Retrieved from http://www.ala.org/lita/ital/20/2/jantz

Kenney, B. (2003). The Future Of Integrated Library Systems. *Library Journal 128(11)* 36.

Klein, M., & Kyrios, A. (2013). The Code4Lib Journal – VIAFbot and the Integration of Library Data on Wikipedia. Retrieved from http://journal.code4lib.org/articles/8964

Knox, E. (2011). A Confirmatory Factor Analysis Of Library Use*. In Proceedings of the 2011 iConference* (pp. 697-698). New York, NY: ACM New York. Doi: 10.1145/1940761.1940874

Lamothe, A. (2010). Electronic Book Usage Patterns as Observed at an Academic Library: Searches and Viewings. *Partnership: the Canadian Journal of Library and Information Practice and Research.5(1).*

MacLeod, R. M.(2004) *The Library of Alexandria: Centre of Learning in the Ancient World*. London: I.B. Tauris.

McGrory, M., Williams, M., Taylr, K., & Freeze, B. (2007). The impact of the Integrated

Digital Library System on the CNIB Library. *Library Trends, 55(4),* 973-993.

Nelson, W. (2012). The Future Of The Integrated Library System. Retrieved from http://www.slideshare.net/tiranloblanc/the-future-of-the-integrated-library-system

Pace, A. (2009). 21st Century Library Systems. *Journal of Library Administration, 49(6),* 641-50.

Regazzi, J. J. (2013). U.S. Academic Library Spending, Staffing And Utilization During The Great Recession 2008–2010. *Journal Of Academic Librarianship* 39(3) 217-222.

Riewe, L. (2009). Survey of open source integrated library systems. M.L.I.S. dissertation, San Jose State University, United States – California, Retrieved November 1, 2009, from Dissertations & Theses: Full Text (Publication No. AAT 1459712).

Singh, V. (2010). Comparison of technical support for open source software versus proprietary software. In *Proceedings from ASIS&T '10: The 73rd Association for Information Science & Technology Conference.* Pittsburgh, PA.

Tull, L. (2005) Electronic resources and web sites: replacing a backend database with Innovative's Electronic Resource Management. *Information Technology & Libraries. 24(4),* 163-169.

Yongming, W., & Dawes, T. A. (2012). The Next Generation Integrated Library System: A Promise Fulfilled. *Information Technology & Libraries 31(3),* 76-84.

Zhonghong, W. (2009) Integrated Library System (ILS) Challenges And Opportunities: A Survey Of U.S. Academic Libraries With Migration Projects. *Journal Of Academic Librarianship 35(3)* 207-220.