

INTEGRATED LIBRARY SYSTEMS: SELECTION AND IMPLEMENTATION ISSUES

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Avtomatlaşdırılmış kitabxana-informasiya sistemlərinin seçimi və tətbiqi məsələləri

Xülasə: Məqalədə müxtəlif avtomatlaşdırılmış kitabxana-informasiya sistemlərinin yaranma tarixinə qısa nəzər salınmaqla onların bir sıra müasir növlərinin xarakteristikası verilmiş, müasir kitabxanaşünaslıq təcrübəsində informasiya texnologiyalarının və program vasitələrinin seçimi və tətbiqi məsələləri işıqlandırılmışdır. Təcrübə kimi ADA Universiteti Kitabxanasında hal-hazırda tətbiq olunan Millennium avtomatlaşdırılmış kitabxana-informasiya sisteminin iş prinsipi və funksional imkanları xarakterizə olunmuşdur.

Интегрированные библиотечно-информационные системы: вопросы выбора и внедрения

Резюме: В статье рассматривается краткая история формирования различных интегрированных библиотечных систем, дается характеристика некоторых из их современных типов, а также освещаются вопросы выбора и внедрения информационных технологий и программных средств в современной библиотечной практике. Тематическое исследование основано на принципе работы и функциональных возможностях системы Millennium ILS, которая в настоящее время внедряется в Библиотеке Университета АДА.

Açar sözlər: informasiya texnologiyaları, avtomatlaşdırılmış kitabxana-informasiya sistemləri, informasiya texnologiyaları, program təminatı, sistem modulları, bibliografik yazı, nüsxə qeydi, sifariş qeydi, onlayn ümumaçiq kataloq, kəşf platformu, axtarış mühərriki, istifadəçi hesabı, elektron resursların idarə edilməsi, kitabxana fondu.

Ключевые слова: информационные технологии, интегрированные библиотечно-информационные системы, программное обеспечение, системные модули, библиографическая запись, предметный запись, запись заказа, общедоступный онлайн-каталог (OPAC), платформа обнаружения, поисковая система, учетная запись пользователя, управление электронными ресурсами, библиотечный фонд.

Keywords: information technology, integrated library systems, software, system modules, bibliographic record, item record, order record, online public access catalog (OPAC), discovery platform, search engine, patron account, electronic resource management, library collection.

Introduction

Modern libraries and other information institutions are gaining more importance in the age of technological innovations that our current century with its high technologies is characterized with, and the daily life of people cannot be imagined without information and various technological tools to retrieve that information.

The history of libraries can be traced back five thousand years, and ancient libraries can be categorized into four groups: government, religious, commercial, and private or family libraries. (Grover, Greer, & Agada, 2010)

From very beginning of libraries, the control of collections has been the main goal of librarians. As collections grew in size and scope, so too did the number of institutions that were maintaining their own library collections. Needing to provide better access to this growing number of books on diverse subjects, a system had to be devised to supplement the printed inventory lists of the library's contents. Though different systems and categories were invented (i.e. 1605, Francis Bacon) to arrange the collections of early libraries, there still remained the need for a standard system of classification that could be readily adapted by many libraries to promote uniformity and efficiency. (Jost, 2016)

Different classification systems were created and developed throughout the history of the science and librarianship overall, which can be characterized as the novelties for the times when they were initiated, and are still implemented in modern libraries. The systems, such as Dewey Decimal System (created by Melvil Dewey (1851-1931)), Universal Decimal Classification, and Library of Congress (LC) Classification System are widespread examples.

In 1902, the LC began selling copies of its printed catalog cards to other libraries, saving individual libraries the expense of having to catalog materials already owned by LC. (Lerner, 2009) This was one of the first steps in terms of library automation, even though it involved printed materials and was well before modern technology entered the picture. The idea of library cooperation and resource sharing were slowly becoming one of the cornerstones of how libraries operated. (Jost, 2016)

Later, the invention and development of computers and computing systems made libraries take advantage of this new technology to help them manage their growing collections and meet the increased requirements of society. During this process one of the most expensive sources of labor costs for most libraries was the cataloging operation, in which each item had to be described, both physically and intellectually, before it could be added to the collection. With the advent of automated library systems, it became possible for libraries to share their catalog records directly with each other and the development of automated systems for the sharing of bibliographic records resulted in the development of bibliographic utilities, an important milestone in the library automation world. The most famous bibliographic utility is OCLC-Ohio College Library Center (currently interpreted as Online Computer Library System), established in 1967, which was followed by the Research Libraries Information Network (RLIN) and the Western Library

Network (WLN). The establishment of these bibliographic utilities would not have been possible without the development of bibliographic record standards, as each library would need to adhere to a common standard for sharing records. Pioneered by the LC in 1961, the Machine Readable Cataloging (MARC) format was developed and quickly became the standard for not only most American libraries, but also for other libraries sharing the bibliographic records on a global scale.

Following the automation of the cataloging operation and the continued growth of the computer industry, other aspects of the library operations became targets for automation.

Starting with the technical services operations, the Northwestern Online Total Integrated System (NOTIS) was developed by Northwestern University in 1968 as the first integrated library system. This system was one of the first to link circulation functions and technical services functions in one unified system, followed by the development of an online public access catalog (OPAC) in 1985. (Jost, 2016) The OPAC of the late 1980s became the face of the library, albeit in a non-graphical user interface; yet it was quite functional and a huge leap beyond the paper card catalog. The advent of the OPAC led libraries into the next phase of West and Lyman's procession, innovation. This phase witnessed significant experimentation, which involved the integration of the core library modules and the OPAC. This heralded the emergence of the ILS. (Kinner & Rigda, 2009)

With the advent of NOTIS and similar systems, a library could purchase software for its operations from an independent vendor. This led to the development of an automation marketplace of many vendors, offering a variety of integrated and stand-alone systems to the library world.

The most widespread and famous integrated library systems currently offered in the global automation marketplace are: Mandarin, ResourceMate, Alexandria, Koha ILS, L4U, Millennium, Destiny Library Manager, Aleph, Bibliotheca, Libdata and other systems. (Mammadova, May 5, 2016)

The ability to automate library functions with an integrated library system is only possible when the library has data stored in an electronic format that can be utilized by the system. Many libraries made the transition from a paper-based storage system to electronic records upon the purchase of a new system, necessitating new workflows and procedures. A complete understanding of the record types used in modern libraries and examples of typical workflows is critical to anyone wanting to be familiar with the development of integrated systems.

Types of Integrated Library Systems

It is important to be knowledgeable about the different types of architecture available so that you can select the right system for your library and narrow the choice of vendors offering the type of system you want. It is also vital to understand that technology is never static. The following definitions will help you communicate with vendors when discussing and researching their products:

Turnkey – the ILS software and the patron and bibliographic data are stored on the server and communicate via the network with the client workstations

located within the library at the circulation desk, reference desk, public-access catalogs, and so forth.

Stand-alone installation – describes systems in which the hardware and software are purchased separately and the system administrator or library staff installs the client-server software him/herself. This type of installations can be on a single computer workstation in a very small library or on a local area network (LAN)/wide area network (WAN) in a client-server architecture.

Hosted system – in this type of integrated library system, the vendor hosts the library's ILS software, bibliographic records, patron records, and sometimes the library's website on its server farms. The vendor's technical support department troubleshoots any software problems and installs all updates at its location. A dependable, high-speed Internet connection is required so that the staff workstations and public-access catalogs can communicate with the vendor's servers.

Software-as-a-service (SaaS) – SaaS, specialized form of which is “cloud computing”, refers to a subscription service for web-based software. Library pays an initial fee for the ILS software along with an annual or monthly subscription fee to the vendor. The vendor uses the Internet to deliver software functionality instead of installing software on the library's hardware. Staff accesses the modules – circulation, reports, cataloging, and the like – via a web browser. The bibliographic and patron data are stored on the vendor's servers.

Open-source software (OOS) systems – are software in which a program's source code is available for individuals to use, copy, modify, and redistribute. This is opposed to closed software in which the program's source code is not publicly available. Examples of well-known open-source software are the Firefox web browser, Linux operating system, Koha, and Evergreen integrated library systems. (Webber & Peters, 2010)

Most ILSs are commercial, off-the-shelf software systems that can vary dramatically in functionality from system to system. For example, some packages are more suitable for large institutions while others are more suitable for smaller ones. To mitigate risks in productivity or transaction loss and to minimize system and implementation costs, a library needs to determine the best “fitness-of-use” system. Such a determination is the outcome of a careful selection process. Although there is no commonly accepted technique, method, or tool for this process, all selection processes share common key steps suggested in the literature. They are the following as applied to library-systems selection: define stakeholder requirements, search for products, create a short list of most promising candidates based on a set of “must-have” requirements, evaluate the candidates on the short list, and analyze the evaluation data to make a selection. In addition, if the server option was chosen instead of the cloud option, selected hardware needs to satisfy system requirements for the final configuration. (Yeh & Walter, 2016)

Components of Library Operations

Although each library will be different and may have a unique organizational structure, the basic outlines of standard library services can usually be found in

every organization. They are traditionally split between technical services and public services (often now called collection resources/management and access services), but have many of the same characteristics across the library spectrum.

The early generations of automated library systems (ALS) were not designed to be interactive or even user friendly. They ran on main frames accessed via “dumb” terminals and were, for the most part, managed by information technology staff rather than library staff. These systems covered the core modules used by library staff: acquisitions, cataloging, circulation, and serials. They were more efficient than the paper systems libraries had been using for generations. (Kinner & Rigda, 2009)

Main components of library operations embrace:

- **Technical services:** In this area, the traditional subunits are cataloging (often called metadata), acquisitions, serials, binding, and processing. Most units in technical services (cataloging, acquisitions, and serials) usually deal with print, electronic, and other types of formats that the library collects, while the binding and processing is mainly devoted to print resources. In some libraries, the electronic resources may be split into their own unit (often called database support).
- **Public services:** This is the area that includes subunits such as circulation, interlibrary loan (often called resource sharing), and the online catalog or discovery layer. Circulation is a function that is often tied into the technical services workflow, as it is primarily dealing with the print resources. The resource sharing function also deals with the print resources for the most part and is a natural partner with the circulation functions.
- **Library records:** The fundamental mission of libraries is to preserve and make available library collections in multiple formats. To accomplish this task, libraries have developed a set of records (bibliographic record, order record, patron record, item record, checkin record etc.) to help them with their tasks, which encompass the types of information that a patron would need to retrieve the requested material. (Jost, 2016)

The typical workflow and functionality of both Voyager and Millennium, the widely used IL systems in academic libraries, are built on a *modular* structure. Major function modules, called *client modules*, include Systems Administration, Cataloging, Acquisitions, Serials, Circulation, and Statistics and Reports. Additionally, the traditional ILS provides an OPAC interface for library patrons to access library materials and manage their accounts. Millennium has an ERMS module built in as a component of their ILS while Ex Libris has developed an independent ERMS as an add-on to Voyager. The Systems Administration module is used to add system users and to set up locations, patron types, material types, and other library policies. The Cataloging module supports the functions of cataloging resources, managing the authority files, tagging and categorizing content, and importing and exporting bibliographic records. The sophistication of the Cataloging module depends primarily on the ILS. The Acquisitions module

helps in the tracking of purchases and acquisition of materials for a library by facilitating ordering, invoicing, and data exchange with serial, book, and media vendors through *electronic data interchange* (EDI). The Circulation module is used to set up rules for circulating materials and for tracking those materials, allowing the library to add patrons, issue borrowing cards, and form loan rules. It also automates the placing of holds, interlibrary loan (ILL), and course reserves. Self-checkout functionality can be integrated as well. The Serials module is essentially a cataloging module for serials. Libraries are often dependent on the Serials module to help them track and check-in serials. The Statistics and Reports module is used to generate reports such as circulation statistics, age of collection, collection development, and other customized statistical reports. A typical traditional ILS comprises a relational database, software to interact with that database, and two graphical user interfaces—one for patrons and one for staff. It usually separates software functions into discrete modules, each of them integrated with a unified interface. (Fu & Fitzgerald, 2013)

Implementation and Installation

Successful implementation requires strong leadership by executives who understand, support, and champion the project. When this involvement is trickled down through organizational hierarchy, it leads to an organizational commitment, which is required for implementation success for complex projects. Since library-system implementation is a complex project that (if done correctly) will transform the entire library and reposition it for better efficiency, strong leadership is critical as well. (Yeh & Walter, 2016)

When considering which integrated library system to purchase, it is vitally important to look at what added features each ILS will support. The term “added features” is used for equipment and software that is outside of the standard modules of circulation, catalog, reports, and the online public-access catalog (OPAC). The examples of added features are:

- Online acquisitions module;
- Serials management module;
- Interlibrary loan management;
- Automated notification system;
- Federated searching tools;
- RFID and self-checkout;
- Public computer reservation and print management;
- E-commerce

“Added features” are modules or functions that are requested and purchased in the contract as additions to the basic system offered by the ILS vendor. For example, an online acquisitions module would be an add-on if it were priced separately from the basic package. A vendor may charge \$15,000 for the basic system and another \$1,400 for the online acquisitions module. (Webber & Peters, 2010)

When it comes to ILS implementation and installation process, it includes

numerous procedures and components indicated below:

- Network installation and upgrades;
- Electrical wiring and cable installation;
- Peripherals;
- Add-ons;
- Retrospective conversion;
- Managing existing barcodes in the collection;
- Circulation rules;
- Implementation meetings with staff;
- Marketing a new ILS to patrons;
- Plan to thank funders;
- Planning the appearance of the library's website;
- Installation of hardware and ILS software;
- Staff training sessions;
- Migration of data;
- Going live;
- Final payment to the vendor;
- A new level of service. (Webber & Peters, 2010)

Following is an example of information vendors may request regarding circulation rules:

- Patron types (faculty, student, adult, child, or interlibrary loan);
- Checkout time frame by collection and/or patron type. For example, nonfiction books circulate for 14 days but DVDs circulate for seven days. Interlibrary loans have a 30-day checkout;
- Fine amount imposed, if any, by collection and/or patron type. For example, students pay overdue fines but faculty do not;
- Grace periods, if any, before fines are imposed;
- Charges for replacement library cards;
- Card expiration time frame. For academic libraries, cards may expire at the end of every semester, while public libraries may expire every year or two;
- Expiration time period for holds/reserves;
- The number of overdue and bill notices issued;
- The interval between overdue notices and bill notices.

Most of the larger ILS vendors will assign a project manager to work with you through the implementation phase. The software and maintenance fees are higher for these companies but customers receive guidance during the installation and migration process. ILS project management includes steps, such as: setting project goals, defining the project, planning-deciding on team members and resources, planning-reviewing the technology, planning-writing procedures, planning-developing schedules, implementation and adjustment, and project evaluation. (Jost, 2016)

Staff Competency and Training

Another initial step in the installation process is preparing staff and patrons

for change. It is necessary to hold an initial staff meeting and inform all the staff about generalities concerning the overall project, including:

- ✓ The approximate time frame;
- ✓ What hardware and software will be installed at their workstations
- ✓ What new and improved features will benefit staff
- ✓ What new and improved features will benefit customers
- ✓ Acknowledge any outside funders for the project, such as grants or gifts
- ✓ What major changes the staff might experience
- ✓ Proposed training schedule
- ✓ Proposed date for going live (Webber & Peters, 2010)

And one of the most important aspects of any systems projects is finding the person who will be main architect of the project. To mitigate this burden on existing staff, it is advisable (if possible) for the library to hire a dedicated person to manage an automation project. Although there are many titles for this set of job duties, the most common one is “systems librarian”, although these job duties may also be included in the job description of an “emerging technologies librarian” or “electronic resources librarian”.

To be successful as a systems librarian, there are definite qualities that a library should seek in any candidate for this job position:

1. Flexibility and balance
2. Sound judgment
3. Curiosity and risk taking
4. Follow-through and persistence
5. Time management
6. Resource management
7. Firmness and cooperativeness
8. Nonjudgmental approach
9. Skepticism
10. Technical realism
11. Analytical, methodical serendipity
12. Perspective switching
13. Fire in the belly
14. Resiliency
15. Technical aptitude (Wilson, 1998)

Systems librarian may also play various roles in a library, such as designer, planner, implementer, consultant, technology representative, facilitator, and etc.

Since the next-generation ILS is implemented through the cloud-computing model, there is no requirement for local staff to perform the functions traditionally defined as “systems” staff activities, such as server and storage administration, backup and recovery administration, and server-side network administration. In general, as shown in **Table 1**, local systems staff could be freed from the burdensome responsibility of administering the traditional ILS because of the software architecture of the next-generation ILS. (Fu & Fitzgerald, 2013)

One of the most important methods for fostering involvement will be staff

training. How this important part of the project is conducted will be a key component of a successful project outcome.

There are two general types of staff training that will probably be part of the library project:

Vendor training – has many advantages. Vendor training is often done on-site (which is the preferred method as it is the most effective learning style), but for large installations, it may be done via web conferences. There are some caveats that the library should be on the lookout for as it begins any training program supplied by the vendor:

- Trainers who are not prepared or knowledgeable;
- Trainers who do not tailor their training to the specific site but rely on a generic script;
- Trainers who are reluctant to answer questions or fail to follow up with answers after the sessions are complete;
- Trainers who are not professional trainers but are either technical people or sales staff used for training purposes.

Any responsible vendor should be willing to work with the library to ensure that the training they provide will meet the specific needs of the library organization.

| Systems Librarian Responsibilities | Workload Percentage | Traditional ILS | Next-gen ILS |
|---|----------------------------|------------------------|---------------------|
| Managing ILS Applications, including modules and the OPAC | 10 | X | |
| Managing associated products such as discovery systems, ERMs, link resolver, etc. | 10 | X | |
| Day-to-day operations including management maintenance, troubleshooting, and user support | 10 | X | X |
| Server maintenance, database maintenance and backup | 10 | X | |
| Customizations and integrations | 5 | X | X |
| Configurations | 5 | X | X |
| Upgrades and enhancements | 5 | X | |
| Patches or other fixes | 5 | X | |
| Design and coordination of statistical and managerial reports | 5 | X | X |
| Overall staff training | 5 | X | X |
| Primary representative and contact to the designated library system vendors | 5 | X | X |
| Keeping abreast of developments in library technologies to maintain current awareness of information tools | 5 | X | X |
| Engaging in scholarly pursuit and other professional activities | 10 | X | X |
| Serving on various teams and committees | 5 | X | X |
| Reference and instruction | 5 | X | X |
| Total | 100 | 100% | 60% |

Table 1. Systems librarian responsibilities comparison for traditional ILS and next-generation ILS.

In-house training – most libraries need to do their own training in order to supplement the vendor training. It is realistic to expect that additional training will be required for many aspects of the system and specific documentation prepared to support local practices. There are several steps and general guidelines to set up an effective in-house training program:

- Select local staff as trainers who are good at training;
- Create documentation in advance of any class sessions and provide copies to all participants;
- Leave time during each presentation for questions and comments;
- If at all possible, do the training in a space (like a computer lab) where each participant can either have their own computer or share one with their colleague;
- If the library is using any presentation software (like PowerPoint), make the slides available to each participant so that they may review them on their own at a later time;
- Use current examples from library materials to illustrate staff workflows. (Jost, 2016)

Another important stakeholder group that cannot be forgotten is the patrons who will be using the discovery layer of the new system. *Patron training* efforts could be done through community meetings, handouts, posters, online videos, social media, or any other communication methods commonly employed by the library to reach patrons.

Case Study

There are numerous academic and public libraries in Azerbaijan that use different integrated library systems on various software platforms. The popular examples of them are: Innovative Interfaces (Sierra, Millennium ILS), ExLibris (Alma, Alephino ILS), Follet (Destiny ILS), OCLC (Worldshare ILS), and etc. (Mammadov, April 15, 2016)

Being the first library in Azerbaijan to implement modern and world-scale integrated library system - Millennium ILS, ADA University Library has made a long distance in becoming methodical center for other republican libraries in the field of library automation and integration processes. It is the best example for librarians and library professionals to follow and learn from.

The Millennium integrated library system (ILS) offers libraries a technology architecture that is broad, stable, and includes what libraries need to meet their most pressing technology challenges.

Innovative designed the Millennium not just for libraries, but also for librarians. Millennium's modules reliably support simple, everyday library transactions while at the same time meeting the demands of the most sophisticated cataloger, circulation manager, or web librarian. Innovative has worked to make Millennium a comprehensive solution that streamlines library operations so librarians can focus on doing what they do best, being librarians. (Innovative Interfaces, 2017)

Millennium ILS, has successfully been implemented at ADA University Library since 2011, and along with automation of the library processes, it centralizes and integrates the workflow of different units under one system. The modules of the Millennium ILS include: Circulation Module, Acquisitions Module, Cataloging Module, Electronic Resource Management Module, Serials Module, Systems Administration Module etc. The workstations of each module are activated through personal librarian credentials. The system is also essential in retrieving library reports on circulation transactions and different statistics of multiple library operations. (Məmmədova, May 5, 2016)

Added features of the Millennium ILS, such as RFID technologies - self-checkout, security gates, as well as, online acquisitions, OPAC, online holds and renewals, electronic resource management allow librarians and patrons to contribute to and fully benefit from library information services of the ADA University Library respectively.

ADA University Library's work practice with Millennium ILS has been one of, if not the only basis for the emergence of the ALISA (Automated Library Information System of Azerbaijan) ILS, a complex project, which was initiated and developed to enhance the library field in Azerbaijan.

ALISA was invented by the company of "Ultra Technologies" according to the order by the Ministry of Culture and Tourism of the Republic of Azerbaijan and implemented at the numerous libraries located in Baku and regions, included into the subordination of the ministry and at the Heydar Aliyev Center in Ganja; and some of its modules were installed at the Central Library of Science of the Azerbaijan National Academy of Sciences. (Ultra Technologies, 2015)

Though the Millennium ILS meets most of the requirements of ADA University Library professionals and users, there are some features which haven't been planned and added during the planning and installation process, for example serials management module, automated notification system, interlibrary loan management, etc. And also technical capacity of the Millennium ILS hasn't been upgraded since Innovative Interfaces Inc. developed the Sierra ILS, more sophisticated version of the Millennium ILS. Because of these and other reasons ADA University Library is planning to migrate to another system – SirsiDynix Symphony, a proven and robust ILS for the next generation in library technology. It has all the robust functionality and customization capabilities, giving the librarians the tools they need to run a modern library of any type or size. With Symphony Web, the browser-based staff tool for Symphony, the library will no longer be dependent on desktops, upgrades, or installs. Symphony supports library staff from wherever they are. Symphony maintains desktop client for the library staff through the WorkFlows tool. It ensures a seamless, consistent staff experience – from acquisitions and cataloging to circulation and reporting.

The preparation of migration from the Millennium ILS to the SirsiDynix Symphony ILS is underway at ADA University Library and hopefully by the beginning of the spring semester (2017-2018 academic year) all needed installations will be set.

Conclusion

When looking back at the most recent history of library automation, it is clear that for over 100 years, librarians have been attempting to discover ways to use their current state of the art technology to expand library services. Often these technologies were not the final solutions but provided instead a stepping-stone to the adoption of solutions that took advantage of new technological developments.

Modern integrated library systems are transformation in the way library services are delivered to library users by:

- Providing new tools to make the library space (both virtual and physical) more interactive, collaborative, and driven by community needs;
- Encouraging collaborative two-way social interactions between library staff and library customers;
- Requiring user participation and feedback in the development and maintenance of library services. (Jost, 2016)

Libraries have proven to be the best examples of the procession of information technology that are in the transformational stage and will probably remain in this stage for quite some time as change is happening very quickly, not only in the library automation marketplace, but also in the needs and objectives of the library patron.

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