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Integrated Library System: Selection and Design

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Abstract

The wide use of computer and communicating systems in the recent past facilitated the design and development of 'integrated library (information) systems'. Dr Ralph Halsted Parker, pioneer in library mechanization coined the term `Library Information Systems (LIS)' around 1968, envisioned LIS as not only 'automating' existing library procedures, such as circulation, cataloguing, etc., but also providing access to materials held electronically even by other libraries and information centers across the globe. Currently, the systems librarians have been endeavouring to develop 'Integrated Library Systems' (ILS), by creating the technologic landscape for supporting and enhancing end-user access to digitally recorded document surrogates and content. Analysing and designing an LIS aims at enhancing patron satisfaction by providing just-in-time access to appropriate information. Survey findings across North America and Europe reveal that the rationale for migrating from one system to another is for increased functionality of library's information system for the benefit of end-user, sidelining the cost issues. This article describes system selection processes and procedures, and other planning and decision-making issues and factors associated with the design and development of an ILS.

1. INTRODUCTION

Induction of computing systems in libraries and information systems has enhanced the efficiency of various library operations for more than 65 years. In the recent past, library information systems (LIS) have been developed into 'integrated library (information) systems', with the ubiquitous nature of computer and communicating systems.

It was Dr Ralph Halsted Parker, pioneer in library mechanization coined the term `Library Information Systems' around 1968, while developing a graduate level class in the Masters Degree Programme at the University of Missouri entitled 'Library Information Systems.' He envisioned LIS as not only 'automating' existing library procedures, such as circulation, cataloguing, etc., but also providing access to materials held electronically even by other libraries and information centers across the globe. By then, the NLM (National Library of Medicine) was experimenting the online database MEDLINE. While selecting the three words to coin LIS, he envisaged both the current and future applications of technology within libraries; which is still appropriate in describing the contemporary technological applications in the library's information system. Currently, the systems librarians have been endeavouring to develop an ILS by creating the technologic landscape for supporting and enhancing end-user access to digitally recorded document surrogates and content.

2. LIBRARY PROCESSES AND SERVICES

In selecting and installing an ILS, the librarian or decision maker has to get acquaintance with various library operations and functions, which need the support of the

technology. Generally, the library procedures and services encompass 'housekeeping operations', 'public services,' and/or administrative planning and decision-making.

2.1 Housekeeping Activities

Housekeeping activities include: acquisition, cataloguing and classification, inventory control, circulation control, serials control, inter library loan (ILL), etc. Among these, circulation systems solutions can be considered as the first technological applications that led to the library systems.

2.2 Public Services

Public services encompass providing access to the collection held by the local library and other libraries, as well as e-resources available on the world wide web (WWW). Initially, online public access catalogue (OPAC) intended to provide access to the union catalogues of an institutional library system, however, OPACs now extended end-user's access to the collection around the world. Even online databases are made available directly to the users with appropriate links and information through library consortia.

Libraries need to offer all these services collectively through an integrated system, and not as independent information systems with different operating systems and user interfaces, since end users want to access all these heterogeneous data via a single interface, without having to know the structure of each information system or the different retrieval methods used by the systems. For which, they need to render web-based information content, which differs with earlier discussed web-enabled services, viz. online catalogues and online databases, in which web is an access and delivery tool, not a conduit for content. Since WWW holds enormous information content, libraries and information centres in the quest to satisfy users' needs, need to organise the Internet resources through HTML links, distinguishing the licensed, library owned, and freely available, both full-text and abstracts. Even the digitalized library collections are to be made available via the Web, which needs to be authenticated with user PIN, for information access and retrieval.

2.3 Administrative Planning and Decision Making

Technical services are significant to the librarians and other information professionals, whereas, public services are for the end-users. However, administrative planning and decision making play a vital role in selecting and designing an LIS. Management is responsible for drafting service goals for the libraries, which include analysing and designing the LIS, for not only enhancing patron satisfaction by providing just-in-time access to appropriate information, but also keeping pace with the technological innovations.

In order to keep track whether the set goals are met or not, the requisite data can be derived from the various subsystems designed to provide information services that support processes within the library. Library administrators and/or policy and decision makers make use of the byproduct of the various applications under technical and public services, which reveal patron usage, collection usage, valuation of specific services and so forth. The data gathered from the subsystems of the LIS aid the administrators in analysing and improving the system and its services for the optimal benefit of the end user. Further, management can ensure to install or upgrade infrastructure in support of the LIS. The infrastructure includes hardware, software, cabling with sufficient bandwidth that ought to support the varying information needs of divergent users.

3. SYSTEM SELECTION

Selection of a system and its installation generally, involves the following steps:

(a) Identifying library's needs;

(b) Documenting the library's needs;

(c) Evaluating alternatives;

(d) Preparing written agreements; and

(e) Implementation.

3.1 Identify Library's Needs

In India, several academic and research institutions have automated (either partially or fully) their libraries and information centers. Many are still to adapt ILS. These libraries need to assess and identify their libraries' needs (users' information needs) for upgrading (moving from one system to another), or migrating from manual to automated system.

Survey findings of North America and Europe reveal that the primary reason for migrating from one system to another is for increased functionality. And other reasons include the scalability issues, problems with the vendor i.e., lack of after-sales support. Surprisingly, cost issues were given the least importance for migrating to a new system.

Library's current operations should be analysed to identify needs of the user community it serves, and ways in which improvements might be made, for which five general issues need to be considered, viz. time, costs, control, service, and communication.

Another beneficial activity that a library must pursue is to identify the systems that the peer libraries installed for their purpose and functioning. For this, concerned staff or systems librarian should visit other libraries to get acquaintance with the pros and cons. Their visits may give a comprehensive idea about how to migrate from manual to automated system or what all the new levels of service one can introduce with the adaptation.

3.2 Document the Library's Needs

Analysis of user needs and consequent library needs should be documented, so as to list the priorities for installing new LIS. The list of the needs should be organised into different functional areas, depicting significant features and functions that library needs to integrate. Rather than listing extensively, this document should focus on 10 to 15 functions that will really make productive impact on staff activities, alongside, improving the level of information services to a greater extent.

Along with library functions and other information activities, it should also enlighten the hardware, software requirements, stating the minimum requirement in terms of system reliability, response times for different types of transactions, etc.

3.3 Evaluate Alternatives

Once the library's needs are determined, the next step is considering several alternatives and evaluating these, for choosing the best alternative that meets the challenges and needs.

The available options are:

- Stand-alone or in-house system;
- Shared system; and
- ASP service.

3.3.1 Stand-alone

A stand-alone system is owned and maintained exclusively, by an individual library for its functioning. It is the best system purchased from a preferred LIS vendor that meets the specific needs of a library. The library itself needs to exercise absolute control over operating the system, after installation and training of the staff. For which, the library should have the necessary budget, as upfront capital costs are involved.

3.3.2 Shared System

Shared system means sharing an LIS with already existing, or creating a consortium as a co-operative and sharing venture. Consortia are primarily set up with an economic motive of reducing and sharing the costs, both installation and maintenance. Deciding to join the existing system, rather creating a new co-operative association may be a wise decision. However, the selected system may not best meet the library's needs (as the library's needs vary according to their user community) and the library does not exercise absolute control over the system parameters.

3.3.3 ASP Service

ASP stands for 'Application Service Provider', which is relatively new alternative under which a library rents access to a service i.e., access to LIS. ASP is a

third-party entity that manages and distributes software-based services and solutions to customers across a wide area network from a central data centre.

By utilising this alternative, a library can:

- Transfer the total ownership responsibility to a vendor, who has to design, implement, and host the services tailored to meet its user needs;
- Reduce the total cost of ownership considerably by 25% or more;
- Start using the ASP service in days rather than months, as in earlier options;
- Eliminate the need to recruit, train, and retain 'technology savvy' staff;
- Avoid the tasks of performing routine system maintenance, and data backups;
- Transfer the responsibility for installing, upgrading, and maintaining operating system, database, and application software on the central server;
- Eliminate up-front capital expenditure for library automation; and
- Retain ownership of its own data.

3.3.4 Process to Evaluate Alternatives

To evaluate each of the available alternatives, one has to prepare a cost analysis statement, comparing each alternative with one another. Finally, all the possible cost components for each of the major alternatives should be tabulated. Both the initial costs (purchase and installation), and ongoing maintenance charges should also be determined for each option. Determining the total five-year costs means first year costs plus the maintenance cost over the five years, which is imperative, since one vendor may offer with low initial pricing but high ongoing maintenance charges or vice versa. The cost components to be considered for cost analysis are:

(a) Consultant, if any;

(b) Client hardware – new and/or upgrade;

(c) Server hardware – new and/or upgrade;

(d) Operating system software;

(e) Library application software;

(f) Third party software (e.g. Oracle, MS SQL Server licenses);

(g) Security software;

(h) ASP service;

(i) Cabling and telecommunications;

(j) Databases conversion;

(k) External databases and systems;

(l) Training; and

(m) System manager and computer support staff.

This cost analysis essentially, aids in sharing the actual costs incurred with funding decision makers, library committees, and other funding agencies.

3.3.5 Factors for Choosing an LIS

According to Peggy Johnson5, a more recent survey identified the top ten factors for choosing an LIS:

(a) Ease of use by patrons;

(b) Availability of application modules and subsystems;

(c) Completeness of modules and subsystems;

(d) Cost of system;

(e) Cost of hardware;

(f) Need for local programming staff;

(g) Service reputation of vendor;

(h) Ease of use by staff;

(i) Comparable installed site; and

(j) Previous experience with the vendor.

In addition, a library can have access to other sources, such as review literature, and published articles about library automation products in professional journals. These may provide significant information regarding the vendors, their products, and customers. Moreover, the library staff may visit the nearby libraries, to get reliable information from their peers, and to get their doubts clarified, regarding a particular information system they want to install.

3.4 Preparing Written Agreements

Once the selected automated system and the corresponding vendor get the approval of the library authorities, then the negotiations with the vendor about the terms and conditions, embracing the purchase of the product is to be commenced. Now-a-days, for the systems that cost more, vendors are willing to negotiate a Purchase Agreement and a Maintenance Agreement, however, certain vendors still adhere to their Standard Agreement. Nevertheless, in negotiating the cost of the system, the interest and objectives of the library should be served better; and it must be a fair advantage to the library. The library should have a clear understanding of what it expects of a system in terms of reliability, response times, scalability, and software functionality. The agreement should provide a framework for malfunctioning of the system, future conflicts, misunderstandings, or disagreements, if arise.

The System Purchase Agreement and Maintenance Agreement should address the following points:

Deliverables: Precisely, what is to be delivered to the library should be specified. It should encompass the hardware (if part of the agreement), software modules, training of the staff, and so forth.

Pricing: The agreement should address issues relating to pricing policy of the vendor i.e., system purchase price, and ongoing maintenance charges in detail to avoid disagreement after purchasing the system.

Payment Schedule: The number of progressive payments is to be specified. Normally, libraries opt for three such payments: while signing the contract; installation period; and acceptance of the system. Though, the vendors wish to get maximum amount as soon as possible, libraries need to delay huge sum, until the system gets final acceptance, which involves some negotiation.

Delivery and Installation: Even the delivery schedules for various components of a system should be stated precisely, to control the delays.

Training and Documentation: Staff training is significant for the efficacy of the system to be used. The agreement should state the amount of training to be provided, and user manuals to be supplied. Such documentation should be in machine-readable form, so that the library staff can incorporate necessary changes.

Acceptance Tests: If acceptance tests are part of the agreement, library staff should perform software functional acceptance test - the software should be compared with the vendor's brochure or written proposal; system reliability test – whether the system meets the stated reliability performance standard; response time acceptance test – staff should follow a script to perform prescribed transactions at stated intervals of time (e.g. discharging an item every 10 seconds with a maximum response of three seconds).

Warranty: The agreement should specify the warranty period, during which the library need not pay a single penny for vendor's support. Warranty period varies with the vendors, which may be as short as 90 days, and as long as a year. During negotiations the issue to be resolved regarding the warranty is, 'when does the warranty period begin?' Whether it begins at the time of installation or when the library receives the system.

Termination: Terms and conditions for the termination should be specified. The conditions may arise out of the failure of the vendor: to deliver the software as scheduled; to deliver the software with accepted performance levels; and if the library wishes to install a new system.

Once the library has accepted the system, terms and conditions of the System Purchase and Maintenance Agreement, and then the system becomes operative.

3.5 Implementation Process

After having the user acceptance of the new system developed, the implementation phase begins. The conversion to the new system is made according to a plan developed in the detailed design phase. Implementation is the stage of a project during which theory is turned into practice.

During this phase, all the programs of the system are loaded onto the user's computer. After loading the system, training of the library staff starts. Training should be given to the staff to:

(a) Execute the package;

(b) Migrate the data into new LIS package;

(c) Process the data (processing details); and

(d) Retrieve the requisite records, and other reports.

During training, each staff member should be provided with his/her separate workstation, and ample time for hands-on practice. Usually, the vendor representative responsible for training assumes that the library staff attending the training are computer savvy. If the staff without technical background take part in the training, they may gain nothing from it. The quality of the training offered by the vendor shows the biggest impact on staff's functional and operating skills, ultimately, on the efficiency of the ILS. Henceforth, the staff should be apprised of the automation project from the outset, and supplied with the vendor's training modules before hand, whether it be on-site or net-based training. After the staff got trained about and adopted to the computerised system, manual working has to shift from manual to computerised working, or current library information system to new LIS. While migrating the data from an existing system into the new, library staff may seek the assistance of vendor's implementation team, so as to ensure that a field of data in the current system is moved to the appropriate data field in the new system.

Before actually implementing the new system into library operations, a test run of the system is done. It is an important phase of a successful system. After codifying the whole programs of the system, a test plan should be developed and run on a given set of test data. The output of the test run should match the expected results. Once it is ensured that the system designed is running error-free, then the library staff can feed the actual data into the system, as per the libraries and/or information centers requirements.

The following two strategies are followed for running the system:

Parallel run: In a parallel run, both the systems i.e., computerized and manual are executed in parallel, for a certain defined period. This strategy is helpful because of the following reasons:

(a) Manual results can be compared with the results of the computerised system; and

(b) Failure of the computerised system at the early stage, does not affect the working of the library, since the manual system continues to work, as it used to do.

Pilot run: In this type of run, the new system is installed in parts. Some part of the new system is installed first and executed successfully for considerable time period, say for instance, acquisition module or circulation module. When the results are found satisfactory then only other parts are implemented. This strategy builds the confidence in the library staff and the errors can be traced easily.

CONCLUSION AND SUGGESTIONS

Since the scope of information services has been widening with the integration of ICTs, it is imperative for libraries to design and develop an ILS that meets not only the present but also future demands and challenges. While designing systems and services, the primary factor to ponder over is users - their information needs and wants. Before designing a user-centered system, library staff should undertake the system study, which involves identifying the scope of the system and identification of user's requirements in a library and information centre and the limitations and problems of the present system. This study helps the systems librarian in presenting a system proposal to the library authorities for its approval and fund raising.

Additionally, the competencies of the library staff are critical in adapting a new information system or upgrading an existing system. The staff should update their functional and technical skills in order to cope with the advancements in the system. As a

systems librarian, one must continually learn new skills, new tools, and new approaches to manage and provide access to information. To be the part and parcel of library information system development process, library staff should respond to the developments in technology at a number of levels - they must keep current with what technologies are available (often from outside the traditional library sector), they must evaluate technologies, so that they can make informed decisions about using those technologies, and they must develop practical plans for implementing those technologies. Upgrading the core competencies of staff, alongside library's automation system not only enhances the professional competencies of the staff, but also thwarts the intrusion of alternative information providers into the information profession.

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