Development Of Koha Library Management System: The UTM Library Experience

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Abstract. A library management system that can support the task of the library is cost effective, with inter module integration providing easy access to users is always a choice of any organisation. The capability of a system is integral in supporting effective and systematic learning in line with the advent of future technology. The transition from commercial system to open source KOHA is seen as factors of technology transfer, cost reduction, source code enhancement, big data analysis, innovative culture and less dependency on vendors to strengthen the implementation. This article is the recollection of UTM Library experience in developing its own open source KOHA system by librarian. Implementation of early planning, how data analysis was carried out, infrastructure development, suitable design complementing mapping and migration, implementation of real system and challenges as well as new knowledge gained along the period are documented. Transformation in librarian work culture and viewpoint in the capability and direction of the library is obtained with the development of the system.
Keywords: KOHA, Open Source, Library Management System

1   Introduction

Integrated Library Management System (LMS) has been used by UTM Library since 1991 - Dynix Automated Library, which was then upgraded in 2001 to - ADVANCE ILS and in 2010 - SirsiDynix Symphony, with the system applied being commercial paid system (proprietary system) until now. LMS is the pulse of the library system in ensuring efficient and effective services aligned with information needs to support learning, teaching, research and publication processes in UTM. LMS has been fully utilized in UTMJB Library (Sultanah Zanariah Library and Raja Zarith Sofiah Library), 13 Faculty Libraries, UTMKL Library, Menara Razak Library and MJIIT Library. LMS is implemented right from the process of library material

procurement, cataloguing and classification, search of library collection, borrowing and returning, holding and renewal as well as other relevant services for library patrons' convenience. The main modules of the system are Acquisition, Catalogue, Circulation, Serial Control, Reports, OPAC, InterLibrary Loan (ILL), Offline, Requests, Configuration and Utility. LMS also communicates with the Library Self-Service Borrowing/Returning System through the Standard Interchange Protocol version 2.0 or SIP2 to ensure borrower and material information are updated on the user record in the LMS, allowing user to renew the loan if necessary via the self-service facility.
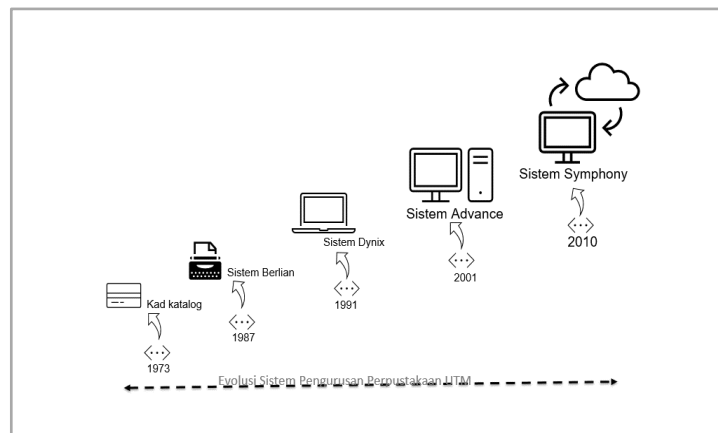

Fig. 1. History of UTM library system.

2   Open Source Software Alternative

The Library has to look into other alternatives to ensure uninterrupted services to users. Budget allocation reduction for system maintenance beginning 2014 impacted the performance of the library system due to the increase of maintenance cost each year. Hence, the Library has taken initiatives to research several library management systems especially open source system (OSS) to transition from proprietary software to open source software. This move is to ensure sustainability of efficient and effective library services and saving in the system maintenance budget for a long period of time. The purpose of this implementation is also to increase ICT skills and knowledge among librarians in the Automation Division (AD) specifically as well as UTM Librarian in general with regards to open source system adaptable at UTM Library. Apart from that, it would ensure constant provision of efficient, smooth and reliable user services by UTM Library. The Library's readiness to form professional teams in implementing open-source software for the library's main systems other than LMS namely Document Management System (DMS), Library Service System (LSS) and UTM Institutional Repository (UTM-IR) e-Prints is essential in the future.

KOHA System

The word KOHA originates from New Zealand Maori which means gift, donation or contribution. KOHA is an integrated library system widely used by academic, public, specialized and school libraries. The modules in the system are integrated to enable seamless implementation of workflow. It began development in 1999 at New Zealand by Katipo Communication Ltd for Horowhenua library and was put to work in 2000. KOHA system incorporates features that support cataloguing and search standard MARC and Z39.50. In 2014, KOHA system had been used by 1,136 public libraries with over 15 million items and 1.8 million active users in Turkey alone. The support for the system is broad and spans multiple languages namely English, French, Chinese, Arabic and a few others. The installation would require expertise in Linux Server, Apache, MySQL, Perl, Root in the server and requires understanding of the command line. KOHA carries capabilities at par with other library systems such as international bibliographic record and catalogue standards MARC21, UNIMARC, Copy Cataloguing and Z39.50. KOHA system also integrates catalogue module, OPAC, circulation, patron, and procurement among others.

KOHA Features

- ❖ Convenient for arrangement of circulation policy, better patron data management, web navigation and access permission to broader staff account.
- ❖ The relation between main and sub main patron is easy to achieve to determine access and make copies.
- ❖ Service feature to establish library clubs and external communities such as book club, and reading club which are easily manageable.
- ❖ Services for book holding, including reservation and activation of request through patron's account on OPAC. Staff have access to view and manage the request easily.
- ❖ Tracking improvement on tag 001 and 035 which enables updating of old record to the latest version.
- ❖ Execution of return/undo button by cluster to the import process with a single click, instead of one-by-one removal.
- ❖ Wider and variety of SIP2 configuration from vendors such as ITG, 3M, EnvisionWare, Talking Tech, Overdrive, TechLogic, and Librarica. KOHA can also complement EzProxy as dual authentication to access online database.
- ❖ Utilization of OPAC interface, staff, management arrangement, borrowing-returning and all other requirement through web-based access.

3   Development Plan of Library System

Early preparation towards the implementation of open source LMS began with the approval by the Library's Top Management allowing librarians from Automation Division to attend KOHA Workshop organised by Hamzah Sendut Library of Universiti Sains Malaysia on 25-26 August 2016. AD officers led by Information Technology Manager of PRZS managed to install KOHA version 16.05.02.00 on LINUX server for testing purposes of the system and comparison between functions of KOHA

system and the existing Sirsi Dynix Symphony library system. To ensure the smooth running of each phase and process found in the system development cycle, Library and CICT collaboration through the Steering Committee (JKP) has been established in assisting and realizing efforts to implement the KOHA system in UTM Library. The need to identify attributes in the current system especially Files & Fields for each module needs to be done in detail to ensure data mapping, data conversion and migration from the current system to KOHA system can be done seamlessly. The migration process is done by ensuring the issue of record loss is minimal before the implementation of the KOHA system. Careful planning and testing of records during data mapping and conversion should be done. In the early stages of implementation, guidance and support from outside vendors who specialize in the KOHA system is much needed, in line with the knowledge transfer process from vendors to librarians to ensure that the Library has a competent system administrator and implementation team in the KOHA system.

UTM Library KOHA Implementation Planning Schedule

KOHA planning at UTM Library is to completely replace the old library system with the latest KOHA open source system. The implementation of the development will look at the technical architecture and capabilities of the server resources as well as the librarians' expertise in the latest KOHA application. Understanding of training as well as distribution by modules is emphasized on the librarians involved. This comprises the work process of each module such as catalogue, procurement, circulation, serial, OPAC, KOHA administrator management and many more. A simple Gantt chart of KOHA implementation according to the system development cycle has been drawn up as shown in the diagram below. A kick-off meeting with the technical division of the university's IT management was carried out at the beginning of the year to ensure the planning received support and information from them. The process of data cleaning and policy setting to item types, material status, circulation fines, patron types, attribute levels, authorities, fields and tables as well as other requirements need to be refined. At the same time, data cleaning and data record consistency in the LMS needs to be viewed and updated for the purpose of record data migration.

The use of agile methodology system development is depicted in the diagram below. The selection of each staff member in the field of librarianship is reviewed and refined. It is not only for short-term plans but for long-term needs of expertise. Technical requirements are again detailed through a complete schedule forwarded to top management. This thorough planning includes risk analysis, cost requirements, technical capabilities, daily actions, immediate changes and more. An understanding of this agile methodology is required with theoretical and practical training to the development of small-scale systems first successfully implemented.
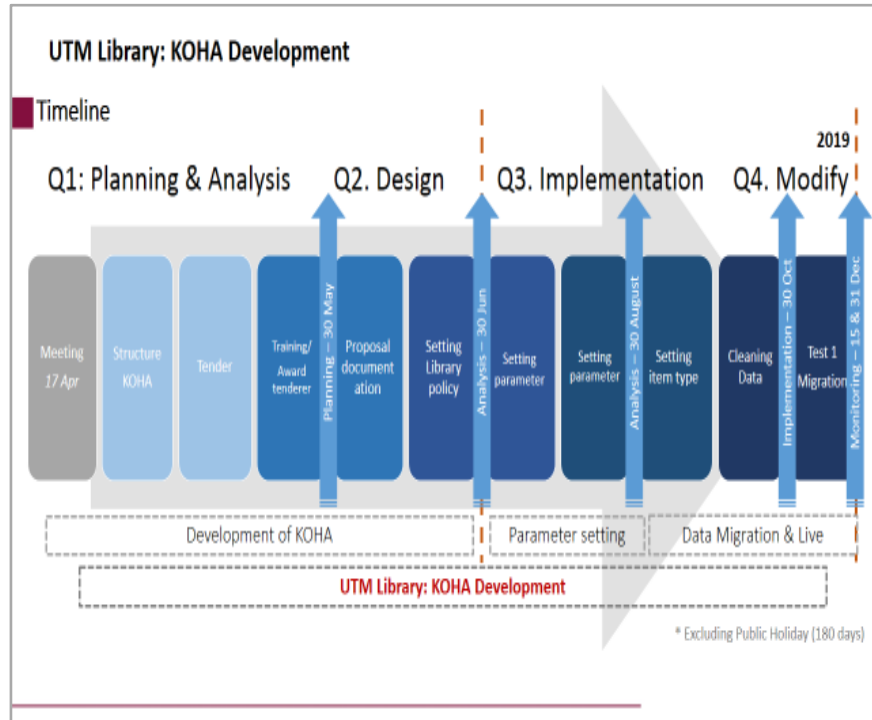
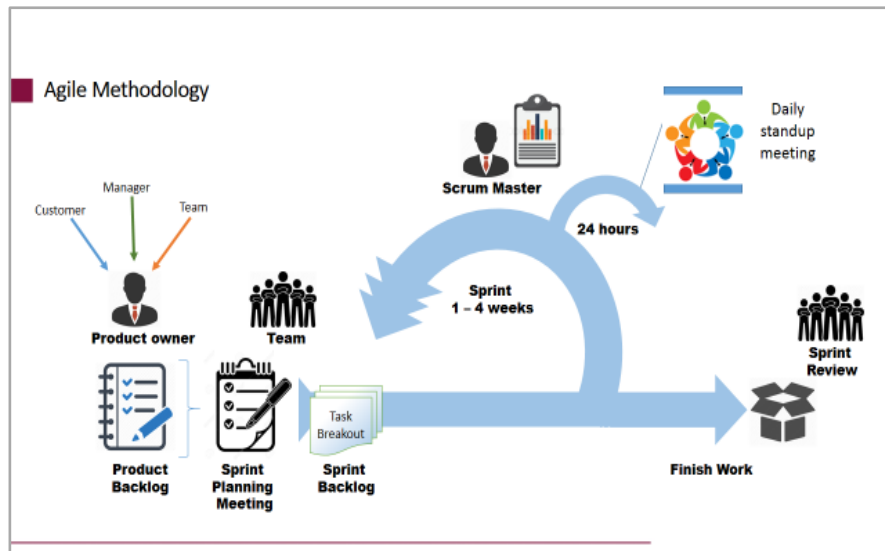Fig. 2. KOHA system development planning chart.

Fig. 3. Agile Methodology KOHA System Development.

System Design and Implementation

The KOHA system has been developed according to high network security specifi-cations. The diagram below shows how UTM Library KOHA network architecture has been built to prevent inefficiency and downtime of database and search access from occurring. This architecture is also to ensure that copies of backup data in the database are always current and up to date. Access to data is also always reliable and enhanced without any long intervals. The data obtained are also consistent with the changes made at the work process application station. Data capability can always be enhanced with a backup data replication process that runs every 12 hours a day.
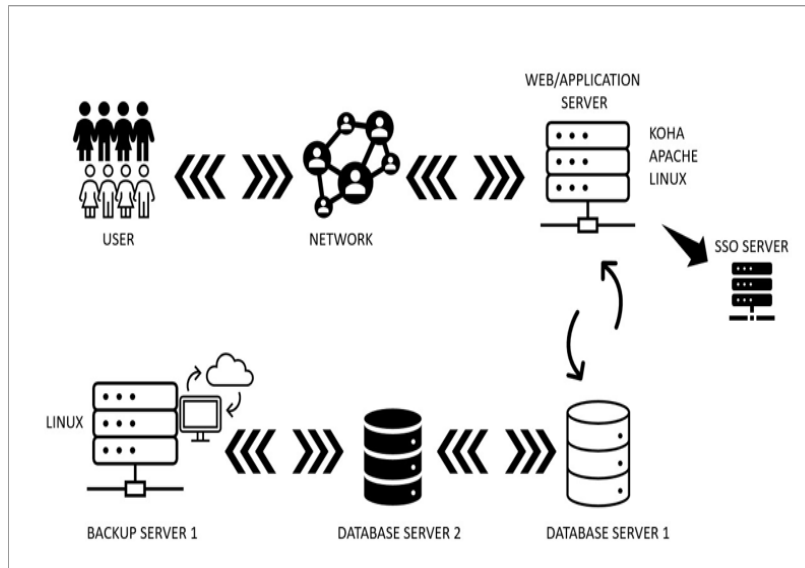

Fig. 4. UTM KOHA System Development Infrastructure.

Data Migration

UTM Library has about 500 thousand titles and almost a million bibliographic rec-ords with a wide variety of items and formats. The bibliographic data of all materials is stored in the LMS system database which is Symphony. These materials can be accessed through the workflow application where all library module management can be updated and accessed through a client base. The process of data migration from the Symphony system to the KOHA system involves several methods as follows:-

1. Examining each database and field for KOHA software
2. Identifying data collection in Symphony system software
3. Organizing and identifying all data in the Textpad editor

4. Making corrections to problematic data

5. Coordinating each field and sub field in Excel according to the require-ments of the KOHA system

6. Moving data to the MARC editor

7. Converting Textpad data to .MRC and .MRK format

8. Exporting .MRK data to KOHA software
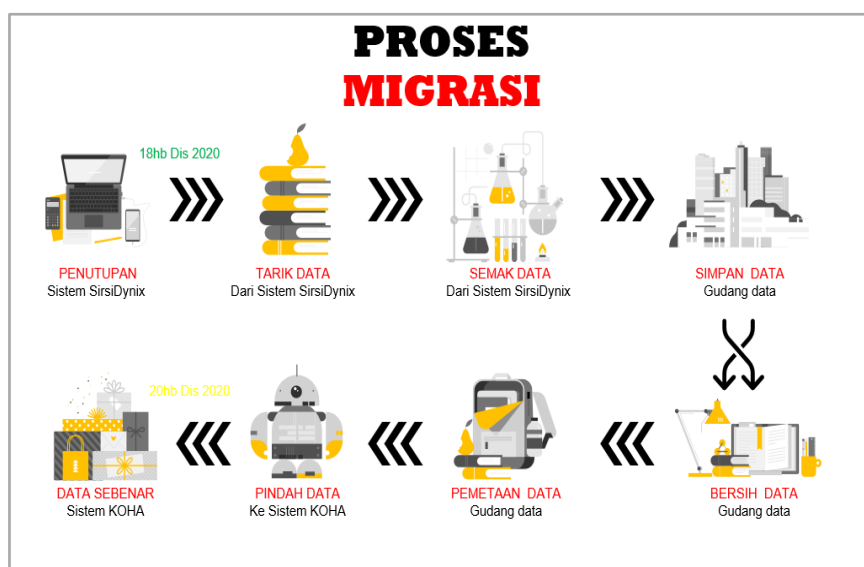
9. Viewing data consistency

Fig. 5. KOHA Migration Process Implementation

The entire bibliographic record data and metadata have been successfully trans-ferred to KOHA. The transfer of authority data namely the data of authors and subject matter was problematic at first and required time to be linked. However, the issue was successfully resolved with the coordination of source code within KOHA itself.

Information Technology Infrastructure

In order to implement KOHA system at UTM Library, the requirement of hard-ware and software infrastructure to support the development are as follows:

Hardware
• Intel I3 Processor, RAM 4GB, Hard Disk 1 TB
• HP LaserJet Printer and Scanner
Open Source Software
• Operating System: Apache/2.4.38 (Debian)

- Library Software: Koha 19.11.02.000
- Data Export Software: MARC Editor
- Email Software: Postfix Application Software
- Database Application Software: MySQL
- Programming Language: Perl for Koha
- Web-Enabled Software: Tomcat

System Configuration

Additional computer setting and application such as:

- Networking and IP setting
- Firewall Setting
- Mail Configuration

4   Implementation and Challenges

Change of Work Culture

The development of a new system requires the involvement of all users of multiple levels, modules, activities, use of work processes and their routines. This requires a project leader to understand each continuity of work process mapping between existing library modules and integration between modules that need to be changed or converted to a process that is more in line with KOHA. This is a big challenge since not all staff or users can easily accept change. It is difficult to translate a new open system with a new work process compared to the previous system and how this new system is supported by the expertise of the librarian. System administrators need to be really adept and in touch with other KOHA development community groups to gain knowledge and solve problems. The initial implementation plan of the administrator in terms of knowledge and preparation for each module should be planned to improve the efficiency of assistance services especially technical problems.

Knowledge Transfer Program

The library needs to prepare and develop a group of internal experts among its own librarians who are able to manage technical problems and open source software applications. This is due to many issues in KOHA that are not understood by IT officers especially related to the issues of cataloguing, circulation, serial and procurement which have the classic characteristics of librarian duties. Basic skills related to KOHA needs and survival such as the use of PERL language modules, Zebra search engines, Linux base sites, MySQL databases and Apache web servers need to be learned by IT librarians. KOHA administrators also need to be exposed to basic web technologies in which KOHA uses HTML 5, CSS3, XML and Bootstrap where all of these are open source technology. Future planning for all this knowledge transfer needs must be implemented to enable the guaranteed development and maintenance of this KOHA system.

Report Data Analysis

The control over the overall data and the ability of KOHA in developing data reports is impressive. Data reports can be gathered and coordinated with development methods according to module and field options easily. The development of new reports with the stack of existing reports is very much provided through SQL code. The selection of SQL code only needs to be searched in existing online dictionary and the report will be available shortly. Various complex data can be created through a combination of fields and tables enabling the data to be sorted according to time and needs.

Cleaning of Bibliographic Data

A thorough data cleaning is essential before implementing the data migration process. This clean-up is done to enable mapping and layout of subfield tags and smooth migration process. The difficulties with large amounts of copy data require this data cleaning process to be carried out periodically and in a structured manner. Reports on all incomplete data should be provided and training to staff on data updating methods should be made properly. The number of different and varied materials also makes accurate compilation of bibliographic data crucial. Data errors in determining the type of material will cause difficult data management either physically or in a database. This cleaning process needs to be done repeatedly and in accordance with the standard methodology of scientific data cleaning.

5   Conclusion

The development of KOHA open source system is a positive experience for UTM library. Despite facing challenges in the beginning, it has brought upon many benefits to the work culture and good impact on management. In the development of a new system based on open source, there are some issues and room for change in the task at hand but it does not affect the entire main functions of the library. Confidence in the ability of IT librarians has also increased not only among staff but also outside the organization. A series of benchmarking from outside organizations wishes to share knowledge and experience on how development of open source can be implemented.

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