Use of Open Source Softwares in Indian Libraries

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Abstract

Since last two decades, we have been witnessing a growing application of Open Source Softwares (OSSs) in Indian libraries. The present study is an attempt to find out the impact of OSSs and how they are driving the transformation of Indian libraries. The research was undertaken by studying the websites of 127 libraries which use one or the other OSS in India. The main OSSs used are: DSpace, Greenstone, NewGenLib, EPrints and Koha. The authors studied the contents of these library sites and noted how the OSSs were deployed to launch a variety of new services including Digital Archives, New Book information, Online SDI apart from marketing the libraries and providing a 24x7 access. New content made available through library sites using OSS include: Pictures, Theses, Research Papers, Book Chapters, Patents, Annual Reports, Videos/Audios, PPTs, Rare books, Institutional publications, Book Cart facility, etc. OSSs have also made library experience more interesting by facilitating self uploading/downloading of documents and user interaction online. OSSs have also been instrumental in promoting resource sharing besides serving as a tool to librarians to develop their IT skills. The paper recommends Indian librarians to explore other useful OSSs too, such as VuFind, Library Find, Calibre , PMB, Evergreen, OpenBiblio, etc. Other recommendations include development of guidelines for uploading/downloading documents, improved design for institutional repository webpages, use of standard subject headings, regular update and enriching library sites with more content.

Keywords: Open Source Software, DSpace, EPrints, Koha, Greenstone, NewGenLib, Library Transformation

1. Introduction

Although library automation began in India way back in early 1960s[1], the program was carried out as sporadic attempt in individual libraries in the beginning. It got a boost in early 1990s, when many proprietary softwares[2] such as CDS/ISIS, WINISIS, Mandarin, Libsys, Alice for Windows, e-Granthalaya, SLIM, SOUL, Maitrayee, Sanjay, Librarian, Techlib, Del-Plus, etc. emerged. In the case of proprietary software , there are some inherent constraints such as restrictions from modification, sharing, studying and redistribution or reverse engineering. The disadvantages emanate from the fact that the source code of proprietary software is not made available to users.

The Open Source Movement began in the late 80s with the launching of the GNU/Linux project by Richard Stallman. Stallman, an American software programmer is regarded within the open source community as sharing a key role in the conceptualization of freely shared source code for software development (Wikipedia[1]). The label "open source" was created and adopted by a group of people in the free software movement at a strategy session held at Palo Alto, California, in reaction to

Netscape's January 1998 announcement of a source code release for Navigator. (Wikipedia [2]). Koha was the first OSS for library automation and it was released in 1999 (Creativelibrarian, 2014). Some other OSSs used in libraries are: NewGenLib, Evergreen and Openbiblio (for automation), DSpace , EPrints, Greenstone, etc. (for institutional repository) [3].

1.1 Definition of OSS

"Open source refers to a computer program in which the source code is available to the general public for use and/or modification from its original design. Open source code is typically created as a collaborative effort in which programmers improve upon the code and share the changes within the community. Open source sprouted in the technological community as a response to proprietary software owned by corporations" (Wikipedia[3]).

Another definition of OSS says, "OSS is a software that can be freely used, changed, and shared (in modified or unmodified form) by anyone. OSS is made by many people, and distributed under licenses that comply with the Open Source Definition" (Open Source Initiative).

Lochhaas and Moore (2010) define, "OSS is software that provides access to the source code, meaning that users are free to see how the product is made. Additionally, users have the right to modify the product (change the code) to their liking, experiment with different versions, and give away or resell the new product with the guarantee that they must also provide their source code, and so on. Modifying the product and redistribution are the two main components of OSS".

Bridge (2014) states, "OSS is free software than you can use in your business. It is free because the developers of the software have chosen to make the source code publicly available for the good of the community and publish their software with an open source license, meaning that other developers can see how it works and add to it".

The above definitions highlight three distinct features of OSS: firstly, it is created as a collaborative effort, secondly, it can be freely used for the good of the community, and thirdly, it can be modified, improved and re-distributed with source code for the user community freely. The purpose of OSS is to promote IT applications for everyone and also to see how it works in different situations and widen the applications by collaborative efforts. OSS has several distinct advantages such as user participation, collaboration, user friendliness, up-to-dateness in contrast to proprietary softwares, which, otherwise, can be used by only those who can afford and they present several restrictions.

Some of the popular OSS used in libraries are: DSpace, EPrints, Fedora, Greenstone Digital Library (GSDL), CDSware, Arno, MyCore, Koha, OpenOffice.Org,

2. Objectives of the Study

Objectives of the study are to:

(i) Find out which are the prominent OSSs used in Indian libraries;

(ii) Know the applications for which the OSSs are used;

(iii) Determine how effectively the OSSs have been used in Indian libraries and the features which have been implemented by the libraries;

(iv) Find out the range of information content which are made available through OSS; and

(v) Ascertain the value addition the OSS have made and how they have transformed the Indian libraries.

3. Methodology

3.1 List of Libraries

For the study, an exhaustive list of libraries which are using OSSs is required. For this purpose, the following methods were used :

(i) List of universities and autonomous colleges was obtained from the website of University Grants Commission and we visited their library websites in order to find out whether they use any OSSs for any library related work such as automation, institutional repository, digital library, etc.

(ii) We obtained the list of important institutions of the country by visiting the websites of Council for Scientific and Industrial Research, Indian Council for Agricultural Research, Indian Council for Medical Research, Indian Council for Horticultural Research, Indian Council for Social Science Research, Indian Institutes of Technology and Indian Institutes of Management. Besides, we visited the websites of different ministries and the institutions coming under them.

(iii) Visits were made to the websites of all public library systems in the country and we checked for the OSSs software used by them.

(iv) Visited websites of over 100 top schools of the country through Google search in order to check the OSSs software used by them.

(v) Obtained a list of Institutional Repositories (IR) in India from Registry of Open Access Repositories (ROAR) (http://roar.eprints.org/). ROAR provides the list of various OSSs and the institutions using them worldwide.

(vi) Obtained the list of Indian users from the websites of the following OSSs: Greenstone, Koha, DSpace, EPrints and recorded the URLs.

In all, we visited websites of over 1000 institutional sites which included schools, colleges, research institutions, public libraries, government departments, public sector undertakings and corporates. Libraries using any one or more OSS are given in the Annexure 1. Table 1 & 2 give an analysis of libraries using OSSs.

Table 1. Number of Libraries using OSSs

Type of library	No. of libraries
University and college libraries	85
Research libraries	31
Public libraries	3
Others	8
Total	127

After listing various library websites, we studied the features of the OSSs used by them and noted how they have helped in transforming the libraries. We also noticed that several libraries were not using OSS though they were listed in ROAR (http://roar.eprints.org/). These libraries were not included in the study.

4. Limitations of the Study

(i) We collected the data from the websites of the libraries. In many libraries, the names of the OSSs in use were mentioned, though the link was not provided. And, in some cases,

the links were not opening. As a result, we could not get a feel of the features and applications of the OSSs in some libraries and this has been indicated in the Annexure 1.

(ii) In some institutions, the OPACs or IR have been provided on Intranet and is not open to public. In such cases too, we could not experience the features and applications of the OSSs.

(iii) In some of the libraries, the access is provided on User Name/Password basis. In such cases too, we could not experience the features and applications of the OSSs.

(iv) The repository, Anvesan, put up by IIT Kharagpur was left out since it was non-English.

(v) Leaving the above four kinds of libraries, a break-up of OSSs and the libraries using them is given in the following Table 2.

Table 2 : OSSs used in Indian libraries

Name of OSS	Number of librares
D Space	83
Eprints	25
Greenstone	2
Koha	22
NewGenLib	5
Total applications	137*

* Note : Though the actual number of library websites are 127, ten of them use two OSSs each and therefore, the total number of applications become 137.

5. Analysis of Data

By using the OSSs, the libraries of India have been able to provide a huge amount of additional information for the benefit of users which was not possible before the application of OSS. The new content made available is described in the following paragraphs.

(i) Ph.D, M Phil & Masters' theses – full access

Fourteen (14) digital libraries provide full access to the theses through their portals. They are: Saurashtra University, GGS Indraprastha University, M S University, IIT Roorkee, Institute of Mathematical Sciences, NIT Rourkela, Raman Research Institute, Indian Institute of Astrophysics, Institute for Social and Economic Change, Bangalore, CUSAT, Cochin, Shodhganga, Inflibnet (Over 8800 full text theses from 133 universities of India), KLE University, Belgaum, Librarian's Digital Library (DRTC), Bangalore and SRM University, Chennai.

(ii) Ph.D, M Phil and Masters' theses– access through login/password/Intranet

Twenty (20) digital libraries provide partial access to the theses through their portals. While some of them provide only the abstracts, some others provide full text access through user name/password. And in a few cases, copy is sent on request. Details are given below: University of Mysore (only the list of theses), Indian Institute of Science, Christ University, Bangalore , IGIDR (Abstracts only), BITS Pilani, Institute of Himalayan Biosphere Technology, Palampur, National Metallurgical Laboratory, Jamshedpur (Masters theses), NAL, Bangalore, CMFRI, Kochi, IIHR, Bangalore (Abstracts only), Bose Institute, Kolkata (Full access to summaries provided on internet), University of Kashmir (Abstracts only), Indian Institute of Chemical Biology, Kolkata (Abstracts only), Madras Diabetes Research Foundation, Chennai (Request a copy), Explorations – Open Access Repository of Indian

Theses – maintained by CSIR (Over 600 theses submitted to Indian universities – mostly abstracts though very few full texts also are available) CFTRI, Mysore (Most of them are on UN/PW though a few are accessible full text), ICRISAT, Hyderabad (Most of them are on UN/PW though a few are accessible full text), Krishikosh, National Agricultural Research System (Most of them are on UN/PW though a few are accessible full text), NEHU, Assam (Abstracts and bibliography only) and Aryabhata Institute of Observational Sciences, Nainital (UN/PW basis).

(iii) Articles, Conference papers and Book Chapters by Faculty and students

Forty six (46) digital libraries provide partial access to articles, conference papers and book chapters authored by the faculty, staff and students of the parent institution. While some of them provide only the abstracts, some others provide access through user name/password. And in a few cases, copy is sent on request. Details are given below. GGS Indraprastha University, Christ University, Bangalore (access on UN/PW), IGIDR , BITS Pilani, M S University, Baroda, IIT Bombay, IIT Roorkee, IISc, Bangalore, IIM Kozhikode, IHBT, Palampur, NISCAIR, NML, Jamshedpur, NPL, Delhi (Some have full access, while the others are on UN/PW) , IIAS, Shimla, Institute of Mathematical Sciences, Madras, Indian Institute of Astrophysics, Bangalore, NIT Rourkela, NAL, Bangalore, CMFRI, Kochi, , IIHR, Bangalore (Abstracts only), Raman Research Institute, Bangalore, Bose Institute, Kolkata (Password protected), S N Bose Institute, Kolkata, NIO, Goa (Most of them have full access; for the remaining, Request a copy arrangement is provided.), GGS IP University, Delhi, IUCAA, Pune, VPM College, Thane, University of Kashmir, Indian Institute of Spice Research, Calicut, NISCAIR National Science Digital Library, ATREE, New Delhi , Indian Institute of Chemical Biology, Kolkata (UN/PW basis), Madras Diabetes Research Foundation, Chennai (Articles and conference papers are on Request a copy; Book chapters on full access), Indian Academy of Sciences, Bangalore (Papers contributed by Fellows of IAS), NIC Open Med (Full text of papers relating to Medical and allied sciences mostly of Indian origin), CFTRI, Mysore, ICRISAT, Hyderabad, Institute for Social and Economic Change, Bangalore (including all books and papers of Prof V K R V Rao, the Founder Director), National Agricultural Research System (Most of them are on UN/PW though a few are accessible full text), NEHU, Assam, CUSAT, Cochin, National Center for Antarctica and Ocean Research, KLE University, Belgaum, Librarian's Digital Library (DRTC), Urban Aspirations in Global Cities (Abstracts only), SRM University and Aryabhata Institute of Observational Sciences, Nainital.

(iv) Lecture Notes

Nine (9) digital libraries have uploaded lecture notes relating to the parent institution. These are available in full text. These libraries are**:** GGS Indraprastha University, Gokhale Institute of Politics & Economics, Pune, BITS Pilani, IIT Roorkee, IISc, Bangalore, IIM Kozhikode, IIAS, Shimla, VPM College, Thane and T. John Institute of Technology, Bangalore

(v) Lectures by visiting faculty

Six (6) digital libraries have uploaded transcripts of lectures delivered by visiting scientists, experts and academics held in their parent institution. They are available in full text. These libraries are: IIT Bombay, IIAS, Shimla, Raman Research Institute, Bangalore, VPM College, Thane, NISCAIR National Science

Digital Library, CUSAT, Cochin (Lectures by visiting Nobel laureates).

(vi) Videos

11 digital libraries have uploaded videos of lectures and other events held in the institute. These libraries are : BITS Pilani, NML, Jamshedpur, CMFRI, Kochi, Raman Research Institute, Bangalore, Indian Institute of Astrophysics, Bangalore, IUCAA, Pune , VPM College, Thane (including lectures by visiting experts, NPTL), CUSAT, Cochin (Lectures by visiting Nobel laureates), Osmania University Library and T. John Institute of Technology, Bangalore.

(vii) Audios

Raman Research Institute, Bangalore has made available audios relating to Astronomy and Physics, Science and Gandhian lectures.

(viii) Case Studies

IIM Kozhikode has made available full texts of case studies contributed by the faculty of the Institute.

(ix) Book Reviews

IIM Kozhikode has made available book reviews contributed by the faculty in various journals.

(x) Question Papers and Syllabi

Seven (7) digital libraries have made available old question papers on their portals. These are: Jadhavpur University, Christ University, Bangalore (access on UN/PW), BITS Pilani, VPM College, Thane, NEHU, Assam, T. John Institute of Technology, Bangalore and SRM University, Chennai.

(xi) Institute Publications Archives

Twenty nine (29) digital libraries have made available archives of their institute publications. They are: IGIDR (project reports of the Institute), Gokhale Institute of Politics & Economics, Pune (Annual Reports, Working Papers, Newsletters, Institute Journal), BITS Pilani (Annual Reports, Research@BITS), IIT Bombay (Technical reports), IIT Roorkee, IISc, Bangalore (Technical reports, Conference proceedings), IHBT, Palampur (Technical reports, Monographs), NISCAIR (papers published in all the NISCAIR journals including back volumes), NML, Jamshedpur (Annual Reports, Conference Proceedings), IIAS, Shimla (Annual reports, monographs), NAL, Bangalore (Technical reports), CMFRI, Kochi (Technical reports, monographs), IIHR, Bangalore (Newsletters), Raman Research Institute, Bangalore (Annual Reports), Indian Institute of Astrophysics, Bangalore (Technical reports, Annual Reports starting from 1899), Bose Institute, Kolkata (Newsletters, Annual Reports, Scientific Reports), NIO, Goa (Scientific Reports) IUCAA, Pune (Academic Calendar), Indian Institute of Spice Research, Calicut (Annual Reports, Scientific Reports, Souvenirs, Proceedings of Meetings (UN/PW basis) , NISCAIR National Science Digital Library (CSIR Golden Jubilee publication, e-books by NISCAIR scientists etc.), ATREE, New Delhi (Monographs), ICRISAT, Hyderabad (Newsletters, Scientific Reports), Institute for Social and Economic Change, Bangalore (Annual reports, monographs, reports, Working papers for Government of India meetings), Krishikosh - National Agricultural Research System (Annual Reports, Scientific reports and Newsletters), NEHU, Assam (Annual Reports), National Center for Antarctica and Ocean Research, Goa (Scientific Reports), KLE University, Belgaum (Journal of Scientific Society), Urban Aspirations in Global Cities (Reports – abstracts only), Aryabhata Institute of Observational Sciences, Nainital (Academic Reports).

(xii) Pictures

Eleven (11) digital libraries have made available pictures relating to the institute such as events, VIP visits, buildings, campus, personalities, etc. They are: Gokhale Institute of Politics & Economics, Pune, BITS Pilani, NAL, Bangalore, CMFRI, Kochi, Raman Research Institute, Bangalore, Indian Institute of Astrophysics, Bangalore, Bose Institute, Kolkata, VPM College, Thane, Human Rights Law Network Digital Library, Librarian's Digital Library (DRTC) and Aryabhata Institute of Observational Sciences, Nainital .

(xiii) Book Jackets

Sixteen (16) libraries have provided the pictures of book jackets on their webOPAC. They are: Goa University Library, University of Mysore, G B Pant University, JNCASR, Chitkara, Azim Premji, Delhi Public Library, T N Ambedkar Law University, NAL, Bangalore, JNCASR, Bangalore, Bose Institute, Kolkata, Gogte Institute of Technology, Belgaum, Institute of Financial Management Research, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Chennai, CUSAT, Cochin and Central University, Kerala.

(xiv) Digitization of Old and Rare Books

Thirteen (13) digital libraries have provided digitized version of old and rare books. These are: Gokhale Institute of Politics & Economics, Pune, M S University, Baroda, IIT Roorkee, IIAS, Shimla (old and out of print journals such as Harijan Bandhu), Indian Institute of Astrophysics, Bangalore, (Annual reports from 1899), Bose Institute, Kolkata (Original books of J C Bose, Transactions of Bose Institute etc.). VPM College, Thane (Including old manuscripts), Institute for Social and Economic Change, Bangalore (Prof V K R V Rao's publications) , Krishikosh - National Agricultural Research System, NEHU, Assam (Theses, book chapters), Osmania University Library, Human Rights Law Network Digital Library (Scanned copy of Acts) and West Bengal Public Library Network (10854 digitized versions of old and rare books).

(xv) E-books

Four (4) libraries have provided access to e-books. They are: IISc, Bangalore (on UN/PW basis), VPM College, Thane, NISCAIR National Science Digital Library and T. John Institute of Technology, Bangalore.

(xvi) Patents

Six (6) digital libraries have provided access to the patents obtained by the scientists of the institutes. They are: IISc, Bangalore, IHBT, Palampur, NML, Jamshedpur, NAL, Bangalore, CMFRI, Kochi and Raman Research Institute, Bangalore.

(xvii) New Arrival list

Four (4) libraries have provided new arrival lists through OPAC using the automation software, Koha. They are : Chitkara University, Delhi Public Library , Tamil Nadu Veterinary and Animal Sciences University, Chennai and CUSAT, Cochin.

(xviii) Self Uploading/Downloading of research contributions through IR

In all universities having IR, there is a provision for self uploading and downloading of research papers. While downloading in most of the cases is available to everyone, in a few cases, it is confined to the authorized users. Uploading is only restricted to the authorized users.

(xix) Books Cart Facility

Twelve (12) libraries have provided book cart facility for selecting books from the OPAC using the automation software, Koha. They are: Goa University Library, University of Mysore, G B Pant University, Chitkara, Azim Premji, Delhi Public Library , T N Ambedkar Law University, JNCASR, Bangalore, Gogte Institute of Technology, Belgaum, Institute of Financial Management Research, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Chennai, CUSAT, Cochin and Central University, Kerala.

(xx) WebOPAC

Thirteen (13) libraries have provided a webOPAC using Koha. They are: Goa University Library, University of Mysore, G B Pant University, JNCASR, Chitkara, Azim Premji, Delhi Public Library, T N Ambedkar Law University, Bangalore, Gogte Institute of Technology, Belgaum, Institute of Financial Management Research, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Chennai, CUSAT, Cochin and Central University, Kerala,

(xxi) PPTs

Ten (10) libraries have provided PPTs of lectures and articles contributed by the scientists of their institution. They are: NIT Rourkela, NAL, Bangalore, Raman Research Institute, Bangalore, IUCAA, Pune , VPM College, Thane, NISCAIR National Science Digital Library, CFTRI, Mysore , CUSAT, Cochin , Librarian's Digital Library (DRTC) and T. John Institute of Technology, Bangalore .

(xxii) Press Clippings

Four (4) libraries have provided press clippings relating to their institution. They are: Indian Institute of Astrophysics, Bangalore, Bose Institute, Kolkata , IUCAA, Pune and Human Rights Law Network Digital Library

(xxiii) Others

Book purchase suggestions using Koha (G B Pant, NML, Jamshedpur), Presentations Browse by Author and Title (JNSCSR), eGyankosh study materials – based on UN/PW (IGNOU), Featured scientist - Profiles of prominent scientists (ICRISAT, Hyderabad), Data sources relating to Karnataka and Government of India, such as Statistical Abstracts, Economic Surveys, etc (Institute for Social and Economic Change, Bangalore), Academic Council Meeting, Assam Human Rights Law Network Digital Library Posters (NEHU), Debates in Indian Rajya Sabha since 1952(Parliament of India, Rajya Sabha Debates), Urban Aspirations in Global Cities - Ongoing research projects and brochures (Aryabhata Institute of Observational Sciences, Nainital).

6. Observations

(i) It has been observed that in most of the IR, there are no standard guidelines for self uploading of documents. This affects the quality of the repository. For instance, in some repositories, only the abstract of the article is given while in others, the full text is given for all articles. In a few cases, provision for 'Request the document' has been given. Similarly in the case of Ph.D theses, no standard practice has been noticed. For instance, in some cases, only the abstracts are given while in others, full text thesis is available. In some, 'Access is based on request' and in others, it is based on User Name/Password. Besides, in a few cases, articles and other documents

have been uploaded though the parent institution does not have the copyright .

(ii) In some institutions the access to documents has been made universal, while in a large number of others, access is confined to the members of the institution, thus limiting the benefits of open access technology. In a few cases, the institutional repository is available only on intranet.

(iii) Most of the IR have not provided precise subject headings, in the absence of which, retrieval efficiency is reduced.

(iv) In most of the cases, the IR have been a part of library website. In fact, the IR showcases the contribution of all faculty and students of the parent organization and not merely from library staff. Therefore, the IR link may be given directly from the Institute's homepage itself which will also attract more attention and usage.

(v) Though there are over 13 OSSs (OSS) [3] for library applications, we find that the main ones used in Indian libraries are: Greenstone, DSpace, E-Prints, Koha and NewGenLib.

(vi) Most of the IR give a 'look alike' feel and they have a sort of stereotype design though the IR softwares have provided features to customize and improve the designs. No efforts have been made to make them attractive by giving them a distinct identity in tune with the parent organization's brand image. In comparison to this, many libraries have provided web based customized OPACs using the open source automation softwares.

7. Conclusions

(i) Transformation of libraries

Indian libraries have witnessed a major transformation since last two decades and this continues to grow steadily. There has been a huge increase in the contents made available in our libraries besides improving the mode of access provided to the users in an unprecedented scale. Growth of information and contents is more through the digitized media. The new contents made available through IR are: digitized books, pictures, archives of institutions, Institute publications, theses and dissertations, videos and audios, tutorials, news clippings, etc. We presume that though the change is driven by several factors, the impact of OSS is significant in the absence of which the libraries would have found it difficult to use the proprietary software which are prohibitively expensive. The OSSs are not only easily accessible, but also have more features and are updated regularly. Further, the users are encouraged to use, improve upon and make it available for a wider community. By making available a large amount of additional resources with user friendly access, libraries have been successful in promoting resource-sharing concept.

(ii) Libraries beyond boundaries

What we notice during the transformation is the concept of libraries beyond the four walls and the accessibility round the clock and throughout the year. Though the users still visit the library either to borrow books or browse through the new titles, the need of visiting the library regularly in order to keep oneself updated is not imperative since a vast amount of resources have been made avail-

able at the click of the mouse. Even facilities such as renewal/reservations, information about new arrivals, knowing the status of books, etc. are possible now by using the OPAC.

(iii) Enabling users to participate

New tools such as IR enable users to participate in library activities by directly uploading of their works such as articles, thesis, lecture notes, ppts, pictures, reports, etc. Book cart facility on the webOPAC enables users to select the books of their interest and serves as a selection list for future borrowing. Such participatory privileges make the library experience interesting and enjoyable.

(iv) Sharpening the IT skills of library staff

One spin off of the OSS is the interest it has created among the library professionals to explore new areas by using technology, which otherwise, would have been difficult had they relied only on proprietary software. For instance, library staff in most of our institutions have become aware of the basics of building digital libraries by using OSS. Library staff have begun exploring the possibility of improving services by introducing OSS.

(v) Promoting resource sharing

IR and webOPACs are great tools in promoting resource-sharing. Users come to know what is available in other libraries and the new tools facilitate document delivery from other libraries.

(vi) Promoting the use of rare information materials

By making available the rare materials such as pictures, manuscripts, annual reports, biographies, out-of-print books, etc., libraries are able to promote the use of rare materials, which, otherwise would have remained un-utilized, though safe in the respective library shelves.

(vii) Advertising tool

OSS serve as great tools for advertising library resources. From webOPAC to IR, digital libraries to photo-archives or from scanned books to e-books, the OSS serve as tools for advertising the library resources which can be done without much investment.

(viii) Providing precise and selective information

While on the one hand the information has been growing in exponential proportion, the new tools like Atom, RSS, etc. help the libraries to provide information selectively and precisely and promptly. What's more, these tools can be self operated by the users themselves.

6. Recommendations

(i) The main OSS used by Indian libraries are: Greenstone, E-Prints, DSpace, NewGenLib and Koha. Libraries may explore the use of other softwares too such as VuFind (for improving the web interface), Library Find (for indexing special collections), Calibre (for ebooks management), PMB (integrated library management system), Evergreen (integrated library management system and OpenBiblio (Integrated library management system), etc.

(ii) There has to be adequate guidelines such as type of materials, format, size of documents, copyright clearance aspects etc and these are to be put up by the coordinators of IR in order to maintain standards in uploading and downloading of documents. Besides, the coordinator has to insist on the compliance of

guidelines before the document goes live on the repository. In case the repository contains good quality and information rich materials, it can serve as a valuable resource (in contrast to a dumping ground).

(iii) IRs need to provide sufficient and precise subject headings using standard schemes such as LCSH, Sears' list, MeSH, etc. and this will facilitate and enhance the retrieval capabilities.

(iv) The OSS have a great potential. However, many libraries are yet to exploit their capabilities fully as we observed that in many cases, bare minimal content has been provided such as pictures, annual reports, question papers, etc. A large amount of other resources which are copyright owned by the institution, such as faculty articles, theses, dissertations, etc. can be made available on the IRs.

(v) In a large number of repositories, contents are not uploaded regularly. Regular updating has to be ensured.

(vi) The IR link may be given directly from the Institute's homepage itself which will not only showcase the total contribution of the parent institution, but also will enable more attention and usage.

(vii) The design of IR and library OPACs needs to be improved and made attractive and user friendly. This will facilitate better use and more traffic to the site.

Notes

1. According to a Ph.D dissertation of Mr. Surkyakant K. Kamdarne (2012) available in Inflibnet's Shodhganga, (http://shodhganga.inflibnet.ac.in/bitstream/10603/5661/9/09_chapter%204.pdf), erstwhile INSDOC was the leader in early experiments with computerization in 1964 and it used computers for Union Catalogue of Scientific Serials. Later, computers were used for generating author and subject indexes of Indian Science Abstract in 1965. In 1967, the INSDOC brought out the 'Roster of Indian Scientific and Technical Translators' with the help of computers. In 1978, INSDOC initiated SDI service as a NISSAT project with Chemical Abstracts and INSPEC data-bases, with the use of CAN/SDI software of IIT, Madras. In 1970s, many libraries ventured in preparing computerized databases.

2. According to Wikipedia, Proprietary software or closed source software is computer software licensed under exclusive legal right of the copyright holder with the intent that the licensee is given the right to use the software only under certain conditions, and restricted from other uses, such as modification, sharing, studying, redistribution, or reverse engineering. Usually the source code of proprietary software is not made available (Source : Wikipedia (2014)," Proprietary software". available at: http://en.wikipedia.org/wiki/Proprietary_software#Limitations) (Accessed on 10 January 2014).

3. URLs of some OSSs for library applications are given below:

OpenBiblio : http://obiblio.sourceforge.net/ . Accessed on 21.1.2014.

Evergreen: **evergreen**-ils.org/. Accessed on 21.1.2014.

Koha: http://www.koha.org/ . Accessed on 21.1.2014.

DSpace : www.**dspace**.org/. Accessed on 21.1.2014.

Greenstone: http://www.greenstone.org/. Accessed on 21.1.2014.

ePrints: http://www.verussolutions.biz/web/. Accessed on 21.1.2014.

NewGenLib : http://www.verussolutions.biz/web/. Accessed on 21.1.2014.

SOPAC: http://thesocialopac.net/ . Accessed on 3.2.2014.

PMB:http://www.sigb.net/ndex.php?lvl=cmspage& pageid=2&id_logiciel=18. Accessed on 3.2.2014.

Collection Workflow Integration System https://scout.wisc.edu/cwis. Accessed on 3.2.2014

Library Find : http://www.libraryfind.org/ . Accessed on 3.2.2014

Calibre : http://calibre-ebook.com/ . Accessed on 3.2.2014

VuFind : http://vufind.org/. Accessed on 3.2.2014

References

1. BRIDGE, Rachael. **O**SS: advantages and disadvantages. 2014. available at : http://www.entrepreneurhandbook.co.uk/open-source-software/. (accessed on 10 January 2014).

2. Creativelibrarian. OSS for libraries. 2014. available at: http://creativelibrarian.com/library-oss/ . (accessed on 21 January 2014).

3. LOCHHAAS, Sherry and MOORE, Melissa. OSS libraries. 2010. available at: http://ir.uiowa.edu/bsides/17/. (accessed on 8 January 2014).

4. Open Source Initiative. 2013. available at: http://opensource.org/. (accessed on 20 November 2013).

5. Wikipedia[1]. Open source movement. 2014. Available at: http://en.wikipedia.org/wiki/Open-source_movement. (accessed on 10 January 2014).

6. Wikipedia[2]. 2014. Op.cit.

7. Wikipedia[3]. Open source. 2013. Available at: http://en.wikipedia.org/wiki/Open_source. (accessed on 20 November 2013).

Annexure 1

Library Name	URL
Sri Venkateswara University, Tirupati	Link is not given in the website
Goa University	http://libcat.unigoa.ac.in/
Saurashtra University	http://etheses.saurashtrauniversity.edu/
Mysore University	http://libcat.mysore-univ.org/ http://dspace.vidyanidhi.org.in:8080/dspace/
Kannur University	No url link is provided
Baba Farid University of Health & Medical Sciences #	http://220.227.36.19:1029/gsdl
Tamilnadu Dr. Ambedkar Law University	http://14.139.186.69/
G.B.Pant University of Agriculture & Technology	http://202.141.116.195/
Jadavpur University	http://dspace.jdvu.ac.in
Vidya Sagar University #	http://192.168.100.7:8080/dspace
Delhi Technological University #	http://dspace.dce.edu/
Guru Gobind Singh Indraprastha Vishwavidyalaya	http://14.139.60.216:8080/jspui/
Indian School of Mines #	172.16.68.12:8080/jspui
Indian Institute of Science ##	http://etd.ncsi.iisc.ernet.in/
Christ University	http://repository.christuniversity.in/
Jawahar lal Nehru Centre for Advanced Scientific opac-Research	http://lib.jncasr.ac.in:8081/cgi-bin/koha/ detail.pl?biblionumber=7139
Gokhale Institute of Politics & Economics	http://dspace.gipe.ac.in/jspui/
IGIDR, Mumbai	http://oii.igidr.ac.in:8080/jspui/
Defence Institute of Advanced Techology, Pune	No url link is provided
Krishna Institute of Medical Sciences #	No url link is provided
SYMBIOSIS International University #	http://106.187.42.113/
TISS, MUMBAI #	http://dspace.tiss.edu/
Thapar Institute of Engineering & Technology #	http://dspace.thapar.edu:8080/dspace
BITS Pilani	http://eprints.bits-pilani.ac.in/
Dhirubhai Ambani Institute of Information and Communication Technology #	No url link is provided
Nirma University #	http://10.1.7.180:1900/dspace/
Jaypee University of Information , Solan #	http://172.16.73.104:8080/dspace/
Azim Premji University	http://library.azimpremjiuniversity.edu.in/cgi-bin/koha/opac-authorities-home.pl
Hans Mehta Library	http://14.139.121.106:8080/jspui/
Chitkara University, Punjab	http://library.chitkara.edu.in/
Shiv Nadar University, UP #	http://snu.edu.in/campus/OPAC_outsidecampus.aspx
IIT, Delhi ##	http://eprint.iitd.ac.in/dspace/, https://repository.iiitd.edu.in/jspui/
IIT, GUWATHI #	http://10.17.250.203:8080/xmlui/

IIT Kanpur #	http://172.28.64.70:8080/dspace
IIT Bombay	http://dspace.library.iitb.ac.in/jspui/
IIT , Roorkee	http://bhagirathi.iitr.ac.in/dspace/
Indian School of Mines, Dhanbad #	http://172.16.68.12:8080/jspui
IISC, Bangalore ##	http://eprints.iisc.ernet.in/13075/
IIT Jodhpur #	http://172.16.100.55:8081/newgenlibctxt/
IIT Hyderabad # # 192.168.3.199/jspui	192.168.3.200:8080/newgenlibctxt/ , http://
IIM KOZIKODE	http://dspace.iimk.ac.in/
MDI, Gurgaon #	http://dspace.mdi.ac.in/dspace
IHBT - Institute of Himalayan Bioresource Technology, Palampur	http://ihbt.csircentral.net/
NISCAIR - National Institute of Science Communication and Information Resources, New Delhi	http://nopr.niscair.res.in/
NML - National Mettalurgical Laboratory, Jamshedpur	http://eprints.nmlindia.org/
NPL - National Physical Laboratory, New Delhi	http://npl.csircentral.net/
BIMTECH, Greater Noida Opac2_0.jsp	http://210.212.115.113:8080/newgenlibctxt/
Connemara Public Library	http://connemara.tnopac.gov.in/
DAIICT, Gujarat	http://drsr.daiict.ac.in/jspui/
Delhi Public Library, Delhi	http://dpl.gov.in/
IIAS Institutional Repository	http://library.iias.ac.in/dspace
IMSc Library	http://www.imsc.res.in/xmlui
NAL - National Aerospace Laboratories, Bangalore	http://nal-ir.nal.res.in/
NIT, Rourkela	http://dspace.nitrkl.ac.in/dspace/ http://ethesis.nitrkl.ac.in/
NIT, Srinagar	No url
Central Marine Fisheries Research Institute , Kochi	http://eprints.cmfri.org.in/
IIHR, Bengaluru ##	http://www.erepo.iihr.ernet.in/
Institute of Public Enterprise Osmania University, Hyderabad #	http://175.101.1.190:8080/newgenlibctxt/
Indian Institute of Science Education and Research, Pune #	http://idl.iiserpune.ac.in:8080/jspui/
Indian Institute of Science Education and Research, Mohali # #	http://115.119.172.69/ http:// 192.168.2.35:8080/xmlui/
NISER,Bhubaneswar,	http://10.10.0.22:8080/jspui/
JNCASR Library Online Catalogue	http://lib.jncasr.ac.in:8081/
Raman Research Institute, Bangalore	http://dspace.rri.res.in/
Indian Institute Of Astrophysics Digital Repository	http://prints.iiap.res.in/
Bose Institute	http://resources.boseinst.ernet.in:8080/xmlui/
S.N Bose National Centre for Basic Sciences	http://59.160.210.74:8080/jspui/

Physical Research Laboratory. Ahmedabad # bin/library.cgi	http://n0lib10.lan.prl.res.in/Greenstone/cgi-
IGNOU	http://www.egyankosh.ac.in/jspui/
Catalysis Database #	http://catalysis.eprints.iitm.ac.in/
INFLIBNET #	http://ir.inflibnet.ac.in/
National Institute of Oceonography	http://drs.nio.org/drs/index.jsp
Cochin University #	http://dspace.cusat.ac.in/jspui/
Guru Gobind Singh Indraprastha University, Delhi,	http://14.139.60.216:8080/xmlui/
IUCCA	http://www.iucaa.ernet.in:8080/jspui/
University of Hyderabad #	http://digilib.uohyd.ernet.in/dspace
Vidya Prasarak Mandal	http://dspace.vpmthane.org:8080/jspui/ index.jsp
PPDU, University	http://spmlib.pdpu.ac.in:8080/xmlui/
Bangalore Management Academy #	bma.ac.in:8080/dspace
University of Kashmir#	http://dspaces.uok.edu.in/jspui/ .UiBwtn9Zh2B
SDM College Of Engineering and Technology #	http://210.212.198.149:8080/jspui
Indian Institute of Spices Research	http://220.227.138.214:8080/dspace/index.jsp
National Science Digital Library	http://nsdl.niscair.res.in/
Ashoka Trust for Research in Ecology & the Environment	http://eprints.atree.org/
CSIR: Indian Institute of Chemical Biology	http://www.eprints.iicb.res.in/
Madras Diabetes Research Foun	http://mdrf-eprints.in/
Indian Academy Sciences	http://repository.ias.ac.in/
Ministry of Earth Sciences, Government of India #	http://moeseprints.incois.gov.in/
CSIR, India	http://eprints.csirexplorations.com/
Open Med	http://openmed.nic.in/
AMPRI, Bhopal #	http://eprints.ampri.res.in/
CFTRI, CSIR	http://ir.cftri.com/
International Crops Research Inst for Semi-Arid Topics	http://oar.icrisat.org/
Institute for Social and Economic Change, Karnataka	http://203.200.22.249:8080/jspui/
IACS #	http://arxiv.iacs.res.in:8080/jspui/
National Centre for Radio Astrophysics #	http://ncralib1.ncra.tifr.res.in:8080/jspui/
NEHU Digital Library	http://dspace.nehu.ac.in/jspui/
Pandit Deendayal Petroleum University, Gandhinagar	http://spmlib.pdpu.ac.in:8080/xmlui/
Baddi Univ. of Eng. & Technology ## 8080/jspui	http://192.168.25.13/ http://192.168.25.145/
GOGTE INSTITUTE OF TECHNOLOGY	http://library.git.edu/
H.T. Parekh library	http://library.ifmr.ac.in/
IIITD &M Kancheepuram #	http://172.16.1.200/cgi-bin/koha/opac-user.pl
Tamil Nadu Veterinary & Animal Sciences University	http://14.139.186.158/
Cochin Universtiy of Science and Technology (CUSAT)	http://opac.cusat.ac.in/
(# #)	http://dyuthi.cusat.ac.in/xmlui/

Sree Narayana Guru Institute of Science and Technology (SNGIST) # #	No link is given
Central University , Kerala	http://117.211.90.250/cgi-bin/koha/opac-search.pl
Osmania University	http://oudl.osmania.ac.in/
Rajiv Gandhi University of Health Sciences, Karnataka,Bangalore #	http://119.82.96.198:8080/jspui/
Human Rights Law Network	http://109.74.198.40:8087/jspui/
NISCAIR-National Science Digital Library	http://nsdl.niscair.res.in/handle/123456789/939
Parliament of India, Official debates of Rajyasabha	http://rsdebate.nic.in/
World Health Organisation Southeast Asian Region Digital Repository #	http://repository.searo.who.int/
National Agricultural Research System-Krishikosh	http://krishikosh.egranth.ac.in:8080/
National Centre for Antarctic and Ocean Research	http://dspace.ncaor.org:8080/dspace/index.jsp
Inflibnet- Institutional –Shodhganga- Indian ETD	http://shodhganga.inflibnet.ac.in/
KLE University	http://182.48.228.18:8080/jspui/
Indian Statistical Institute DRTC, Bangalore	http://drtc.isibang.ac.in:8080/
T.John Institute of Technology	http://122.181.173.88/jspui/
Vivekananda Institute of Technology	http://118.102.236.139:81/jspui/
Urban Aspirations in Global Cities #	http://uagc.tiss.edu/jspui/
SRM University #	http://digitallibrary.srmuniv.ac.in/dspace/
Central Institute of medicinal and Aromatic Plants #	http://kr.cimap.res.in/index.jsp
Indian Institute of Petroleum	http://library.iip.res.in:8080/dspace/
Aryabhatta Research Institute of Observational Sciences	http://210.212.91.105:8080/jspui/handle/123456789/1
Anwesan @ SNLTR by CSE, IIT Kharagpur	http://anwesan.iitkgp.ernet.in:8080/jspui/
Indian Association for the Cultivation of Sciences	http://arxiv.iacs.res.in:8080/jspui/
West Bengal Public Library Network	http://dspace.wbpublibnet.gov.in:8080/jspui/
Indian Institute of Horticultural Research ##	http://www.erepo.iihr.ernet.in/
National Centre for Antarctic and Ocean Research	http://14.139.119.23:8080/dspace/index.jsp

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