INSTITUTIONAL REPOSITORY USING DSPACE IN NORTH EASTERN HILL UNIVERSITY

A Dissertation submitted in partial fulfillment of the requirements for the Degree of Master of Philosophy in Library & Information Science

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MZU Registration No. 35 of 2010-11
M.Phil. Regn. No. & Date: MZU/MPhil/30 0f 26.5.2010
Examination Roll No: MPLIS-09/05

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2010

DECLARATION

I hereby declare that the dissertation entitled **"Institutional Repository Using D-Space in North-Eastern Hill University"** submitted by me has not previously formed the basis for the award of any Degree or Diploma or other similar title of this or to any other University or examining body.

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CERTIFICATE

This is to certify that the dissertation entitled, "**Institutional Repository Using D-Space in North-Eastern Hill University**", submitted by the candidate, Ms. Nirmali Chakraborty, M.L.I.Sc., for the M.Phil Degree, is a bonafied record of the research work done by her under my supervision during her period of study at the University for the degree, and that it has not previously formed the basis for the award of any degree, diploma, associateship, or any other similar title, and that it is an independent work done by her.

It is recommended that this dissertation be placed before examiners for the award of the Master of Philosophy.

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ACKNOWLEDGEMENT

Writing a dissertation is an enormous task, and would not be possible without help and support of so many people. Numerous individuals have aided me in this journey, and I would like to take this opportunity to thank them all. I started the MLIS program in Gauhati University, Department of Library & Information and graduated in December 2006. To all my MLIS colleagues and friends, thank you for your friendship and support.

Over the one year of my M.Phil study, I have received advice and assistance, encouragement and support from many people and organisations. I am indebted to them and wish to gratefully acknowledge and express deep appreciation to them for assisting me in completing the study. I am grateful to everyone who was generous with their time and energy to participate in my endeavour.

Firstly, I wish to express my deep gratitude and special thanks to my supervisor and mentor, Assistant Professor **Dr. R. K. Ngurtinkhuma** for providing a very high standard of supervision, guidance, patience, encouragement and care. I can say that my study would have been impossible without his assistance in this way.

Secondly, I wish to express my sincere thanks and gratitude to **Prof. A. S. Chandel,** Library Digitization, Visiting Fellow and Chairman, NEHU Central Library for his enormous support and fruitful advices regarding my study. It is only because of his kind favour that I got the opportunity to learn about institutional repository in the practical field.

I also wish to express my sincere thanks and gratitude to all the faculties and research scholars of various departments of North-Eastern Hill University, as well as to the senior library professionals of NEHU Central Library who took time out of their busy schedules to answer my surveys and provided me with required primary data. Without these eminent people it would have been impossible to complete the study.

My respect and sincere thanks goes to my teachers Assistant Professor **Dr. R. N. Mishra and Dr. S. Ravi Kumar**, Department of Library & Information Science, Mizoram University. Since the beginning of my research they have provided me with great help, encouragement and support as well as expert comment and advice regarding research instruments and fieldwork.

.

I would also like thank **Dr. Moses M Naga, Associate Professor,** Department of Library and Information Science, North-Eastern Hill University, for his advice and valuable comments on my study.

At the organisational level, I would like to express my thanks, appreciation and gratitude to Mizoram University for kindly giving financial assistance to carrying out my research work. I also wish to express my sincere thanks and gratitude to the whole family of Department of Library and Information Science, Mizoram University for their kind co-operation.

Last but not the least I thank my family members for their love and support throughout my life.

Place: Aizawl, Mizoram
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ABBREVIATIONS

ALIS	Annals of Library and Information Studies
API	Application Programming Interface
APSL	Apple Public Source License
ARPANET	Advance Research Projects Agency Networks
BIBLIOQUEST	Bibliography-on-Request
BSD	Berkeley Software Distribution
BVAAP	Bharatiya Vaigyanik evam Audyogik Anusandhan Patrika
CAS	Curent Awareness Service
CDRI	Central Drug Research Institute
CDRI	Central Drug Research Institute
CD-ROM	Compact Disc, read-only-memory
CGI	Common Gateway Interface
CIMAP	Central Institute of Medicinal and Aromatic Plants

CMFRI	Central Marine Fisheries Research Institute
CPN	Comprehensive Perl Archive Network
CSI	Catalysis Society of India
CSIR	Council of Scientific and Industrial Research
CSS	Cascading Style Sheetss
CUSAT	Cochin University of Science and Technology
CVS	Citation Verification Service
DBSS	Database Search Service
DDS	Document Delivery Service
DESY	Deutsches Electronen-Synchrotron
DOM	Document Object Model
DRM	Digital Rights Management
DRTC	Documentation Research and Training Centre
DSIR	Department of Scientific & Industrial Research
DU	Delhi University
EPFL	Ecole Polytechnique Federale de Lausanne
ETD	Electronic Theses and Dissertations
FAQ	Frequently Asked Question
FDL	Free Documentation License
FNAL	Fermi National Accelerator Laboratory
FOSS	Free and Open Source Software
GLI	Global Links Initiative
GPL	GNU Public License
GSDL	Greenstone Digital Library software
GUI	Graphical User Interface
HKUST	Hong Kong University of Science and Technology
HP	Hewlett-Packard
HTML	Hyper Text Mark-up Language
HTTP	Hyper Text Transfer Protocol
IARI	Indian Agricultural Research Institute
IBS	Icfai Business School

IBS	Icfai Business School
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IGIDR	Indira Gandhi Institute of Development Research
IGNOU	Indira Gandhi National Open Universities
IIA	Indian Institute of Astrophysics
IIA	Indian Institute of Astrophysics
IIAP	Indian Institute of Astrophysics
IIMK	Indian Institute of Management Kozhikode
IIMK	Indian Institute of Management Kozhikode
IIS	Internet Information Server
IISc	Indian Institute of Science
IIT	Indian Institute of Technology
IIT	Indian Institute of Technology
IJBB	Indian Journal of Biochemistry and Biophysics
IJBT	Indian Journal of Biotechnology
IJC-A	Indian Journal of Chemistry, Sec A
IJC-B	Indian Journal of Chemistry, Sec B
IJCT	Indian Journal of Chemical Technology
IJEB	Indian Journal of Experimental Biology
IJFTR	Indian Journal of Fibre & Textile Research
IJMS	Indian Journal of Marine Sciences
IJPAP	Indian Journal of Pure and Applied Physics
IJRSP	Indian Journal of Radio and Space Physics
IJTK	Indian Journal of Traditional Knowledge
ILS	Integrated Library System
IMMT	Institute of Minerals and Materials Technology
INFLIBNET	Information and Library Network
IR	Institutional Repository
IR	Institutional Repository
ISI	Indian Statistical Institute
ISIR	Journal of Scientific and Industrial Research

J2RE	Java 2 Runtime Environment
JIPR	[Journal of Intellectual Property Rights](#)
JMS	Java Message Service
JSP	JavaServer Pages
KOS	Knowledge Organization Systems
LGPL	Limited GNU Public License
MARC	[Machine-Readable](#) [Cataloging](#)
MDI	Management Development Institute
METS	Metadata Encoding and Transmission Standard
MIT	Massachusetts Institute of Technology
MKU	Madurai Kamaraj University
MPL	Mozilla Public License
NAAC	National Assessment and Accreditation Council
NAL	National Aerospace Laboratories
NCCR	National Centre for Catalysis Research
NCL	National Chemical Laboratory
NCL	National Chemical Laboratory
NCL	National Chemical Laboratory
NIC	National Informatics Centere
NII	National Institute of Immunology
NIO	National Institute of Oceanography
NISCAIR	National Institute of Science Communication and Information Resources
NITR	National Institute of Technology Rourkela
NITR	National Institute of Technology Rourkela
NML	National Metallurgical Laboratory
NPL	Netscape Public License
NSDL	National Science Digital Library
NTU	National Taiwan University
OAI	Open Access Initiative
OAI-PMH	Open Access Initiative Protocol for Metadata Harvesting

OCLC	Online Computer Library Centre
ODF	Open Document Format
OOo	OpenOffice.org
ORDBMS	Object-Relational Database Management System
OSI	Open Source Initiative
OSS	Open Source Software
PDF	Portable Document File
PHP	Hypertext Preprocessor
PIHEAD	Promotion of Indian Higher Education Abroad
PPT	Power Point
RDF	Resource Description Framework
ROAR	Registry of Open Access Repository
RSS	Really Simple Syndication
SDI	Selective Dissemination of Information
SLAC	National Accelerator Laboratory, Stanford University
SQL	Structured Query Language
SVNIT	Sardar Vallabhbhai National Institute of Technology
TIFP	Technology Information Facilitation Programme
UGC	University Grant Commission
UGC	University Grant Commission
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPE	University with Potential for Excellent
XML	Extensible Mark-up Language
XSLT	Extensible Stylesheet Language Transformations

CHAPTER-1
INTRODUCTION

1.1 Introduction

The library is the heart of all the scholarly output of an academic Institution. Scientific research needs a library as well as its laboratories, while for humanistic research; the library is both the library and laboratory in one place. The importance of libraries are better realized when the information stored in different forms in the libraries are properly arranged for its users.

Teachers and researchers at academic institutions gather and interpret data, advocate new ideas, and extend human knowledge. This works sometimes shared with other scholars and researchers as working papers, technical reports and other forms of prepublication works. These prepublications are often difficult to find out and even more difficult for librarians to collect systematically, manage and preserve. But the use of internet and other digital technologies have changed the scenario. A variety of web-based systems are becoming available for accepting deposition of these literatures. These systems make the research output of an institution easier to discover as well as manage and preserve. They also make it possible to share information globally through compliance with a standard metadata harvesting protocol.

Institutional Repository can help institutions in developing their own resource base and subsequently new areas of resource sharing with other institutions under the open archive initiatives. It is a valuable vehicle to disseminate research articles of an individual to the worldwide as well as to expose the institution through electronic devices.

In the age of information, the traditional library concept has been changed, and digital library and electronic library concepts are being popularized. Now a day, libraries are not only the store house of printed documents but also the hub of digital information. With the development and application of Information and Communication Technology, the service and the collections of the libraries are globalized. The prime objective of libraries is to keep their clientele up-to-date in their areas of interest. It can be in any format, e.g. preparing bibliographies of the latest literature published in their area of research in a broad way or simply providing them with the information published in the newspapers, websites, personal blogs etc. on the subject of their interest. Due to information explosion, dwindling budget of the library, space problem, high information demand and increasing fees of journals have forced the libraries to seek other ways; by which we can collect, store and disseminate information among the users. To solve these types of problems, the concept of institutional repository is started among the academic institution in India. Now the academic institutions have started to build their own repositories.

1.2   Meaning and Definition of Institutional Repository

An Institutional Repository (IR) is a web-based database of the scholarly output of an institution, owned and maintained at either departmental or institutional level. It is a digital repository of the research out put of an institution. Institutional repositories are one of the most promising developments that utilize new web technologies to offer a viable and sustainable alternative to the current model of scholarly publishing. According to Clifford A. Lynch (2003)

"A university-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate as well as organizational; access or distribution."

In Wikipedia institutional repository is defined as-

"an online locus for collecting, preserving and disseminating in digital form, the intellectual output of an institution, particularly a research institution".

Crow (2002) presents a working definition of Open Access Institutional Repository namely

"a digital archive of the intellectual product created by the faculty, research staff, and students of an institution and accessible to end users both within and outside of the institution, with few if any barriers to access."

In the words of Jones (2006),

"An institutional repository will be defined as: an organized collection of digital objects, pertaining to a particular research or educational organization."

Johnson (2002) identifies an IR as:

"scholarly; cumulative and perpetual; and open and interoperable."

According to Drake (2004),

"Repositories in universities act as marketing tool to communicate capabilities and quality by showcasing faculty and student research, public service projects, and other activities and collections." (Cited by Shindhe, 2008)

In the words of Hayes (2005),

"Repositories help faculties to self-archive their own material, act as a central archive for their work, representing a CV that provides a complete list of their research over the years and being open access it increases the dissemination and impact of work. Repositories will help the faculties to enhance their visibility and academic accolade."

Ware (2004) adds OAI (Open Access Initiative)-compliance in his IR definition:

"An institutional repository (IR) is defined to be a web-based database (repository) of scholarly material which is institutionally defined (as opposed to a subject-based repository); cumulative and perpetual (a collection of record); open and interoperable (e.g. using OAI-compliant software); and thus collects, stores and disseminates (is part of the process of scholarly communication). In addition, most would include long-term preservation of digital materials as a key function of IRs.

Thus an institutional repository is a digital repository of the research output of an institution that captures, preserves and provides access to the digital

products of a community. It is the exhibition of an institution to the world where institution displays its valuable research programs, projects and initiatives to the world. Some Institutional repositories focus on particular subject domains or documents like a research articles, before (preprints) & after (post prints) undergoing peer review, and digital versions of thesis, dissertations etc, but it may also include other digital assets generated by normal academic life, such as administrative documents, course notes, or learning objects, examination question papers etc.

1.3 Need & Importance of Institutional Repository

There are a number of reasons for building an institutional repository. Institutional repositories are a new but important area within the educational Landscape. It is a practical, cost effective and statistic means for academic institutions for built partnership with their faculty to advocate scholarly communications. Institutional repository provides tools that help faculty, students and researchers to disseminate their work to audiences inside as well as outside the institution. Institutional repository may serve as a complement to traditional forms of publication or as an alternative. It enables information seekers to find faculty and student work more easily by organizing and indexing it, making it more visible to colleagues, fund providers and employers. Even it facilitates long-term preservation through centralized planning, support and funding. Demonstrate the significance and relevance of the institutes total research activities. An Institutional repository concentrates the intellectual product created by their

students, researchers, faculty members to demonstrate its scientific, social and financial value.

Institutional Repository provides a central archive of the works of the scholars. It increases the dissemination and impact of their research. It also acts as a full profile of the scholars. Institutional repository increases visibility and prestige of the institution. Moreover it helps in marketing of the institute for attracting funding authorities, potential new faculties as well as students. Institutional repositories are the communicators of the world research. It assures long term preservation of the assets of normal academic life.

1.4 Objectives of an Institutional Repository

The main objectives for having an institutional repository are-

- To create global visibility for an institution's scholarly research;

- To collect contents in a single location;

- to provide access to institutional research outputs by self archiving it;

- to store and preserve institutional digital assets including pre published or otherwise easily lost(grey) literature (e.g. theses or technical reports).

1.5 Core Features of Institutional Repository

Despites of all ambiguities regarding the definition of institutional repository, all institutional repositories posses some common features. The core features of institutional repository pointed out by Gibbon (2004) can be discussed as follows-

1.5.1 Digital content- The prime feature of an institutional repository is that the content of a repository is totally in digital form. Different types of digital contents such as text, audio, video, images, learning objects, multi-media contents, datasets etc can be uploaded in an institutional repository. The materials may be born digital or a printed one that has been digitized such as scanned images.

1.5.2 Community-driven & focused- The second common feature of an institutional repository is that it is community driven and community focused. The community of users not only determines what should be deposited into the repository, but they are individually responsible for making the deposits. Here the members of the community also are the authors and copyright owners of the content.

1.5.3 Institutionally supported- An institutional repository cannot exist without the support of an institution. It is not so simple or cheap to undertake an institutional repository. A successful IR requires co-operation among various units across an institution, which can be achieved most easily with top-down institutional support. Moreover an institutional repository needs continuing monetary support for maintenance and updateness of the contents.

1.5.4 Durable & permanent- The fourth core feature of an institutional repository is durability and permanence. It is well known that the content of an institutional repository is persistent and permanent. When a digital file is uploaded into a repository, the author can expect that the document will preserve there for the long future.

1.5.5 Accessible content- The content of an institutional repository is open to the entire world. With some exceptions, the content of a repository can be accessed by more than just the content's owners because; the material within an IR is intended to be shared. The material deposited in to an institutional repository is scholarly in nature and prepared for public dissemination.

1.6 Core Functions of Institutional Repository

All institutional repositories have some prime functions. Gibbons (2004) identifies six core functions of an institutional repository as: materials submission, metadata application, access control, discovery support, distribution and preservation. Even if a repository may afford for many more functions, these six are vital, and a system lacking any of these cannot adequately carry an institutional repository.

1.6.1 Material submission - Material submission is the first core functionality of all institutional repository systems. Most of the IR systems contain some means by which an author or proxy can submit content to the system. Many times material submission is accomplished through a Web-based form, which process is simplified so that anyone, with little or no training, can make a submission. An institutional repository system also may have the option of appointing several editors with task such as assuring quality of the content, judging the appropriateness of the document's inclusion to a particular collection and enhancing metadata. The material submission process might include added features such as automatic document conversion e.g. Word to PDF or e-mail alert services etc.

1.6.2 Metadata application - Metadata is descriptive information such as title, author, citation information, subject keywords, etc. It is important for access and preservation that a good metadata record be created for every submission. These records can be distributed to other libraries and research centers to add to their catalogs and facilitate retrieval and dissemination via search engines such as Google. The system itself adds administrative metadata, including date and time of deposit and identity of depositor. The system also may provide for the role of a metadata expert, such as a library cataloguer, who can enrich the metadata by adding subject terms and name authority control. Therefore it is said that the richer the metadata, the more accessible content is.

1.6.3 Access control – Access control refers to digital rights management (DRM). It is another core function of an institutional repository. An IR system must have controlled accessed to the content. This access may be accomplished by integrating an organization's authentication or identity management system with the institutional repository. Generally institutional repository systems rely on logins and password distribution by system administrators. Even if all the content of an institutional repository is open to all for world wide access, the system must still ensure that only authorized people can add, delete, approve and edit content.

1.6.4 Discovery support – Institutional repository systems commonly rely on third-party search engine, such as Lucene from the Apache Software Foundation. A system also can support discovery through browsing, which provides an

overview of the type, breadth, and relationship of the content contained within the repository.

1.6.5 Distribution – The distribution function of an institutional repository is closely intertwined with access control and discovery mechanism. Once an authorized user locates the desired content, the IR system must then have a mechanism by which a copy of the digital file can be provided or displayed to the user. Depending on the type of file, the system may require that users first download the document onto their computer, and then open it using software on the computer, such as Microsoft Excel. Some types of files can be displayed directly through the internet browser using plug-ins, such as Adobe Reader.

1.6.6 Preservation - The research material and scholarly publications of the faculties and research centers are knowledge intensive and needs to be preserved. Institutional repository stores and makes accessible the educational, research and associated assets of an institution. As such, preservation is an important function of an institutional repository. Preservation identifies both long- and short-term preservation policies of an IR. Preservation includes everything ranging from format conversions to content back-ups.

1.7 Core Services of Institutional Repository

Most prominent Institutional repository establishments reveal that following core services should form an integral part of a typical institutional repository –

- Deposit and withdrawal services;

- Access control and rights management;

- Administrative services;

- metadata services;

- User support and feedback mechanisms;

- Storage space, file naming or name resolution services;

- Search engine, preservation and migration.

1.8 Staffing for an IR

A successful institutional repository can be established only through team work. Therefore, manpower is one of the important elements of an institutional repository. It is important that IR management should work collaboratively with university members, including research students, academic staff, IT professional and senior management, to ensure the success of an institutional repository. Outsourcing is also one of the solutions in this regard.

In addition to the technical staff necessary to set up the repository and update supporting web pages, the institutional repository should be sufficiently resourced with trained staff in the areas of-

- checking intellectual property rights;

- collection and identification of bibliographic data;

- metadata creation;

- peer review;

- scanning of the printed pages;

- user education and training;

- advocacy.

1.9 Core Issues Related to IR

Following are some of the core issues of an institutional repository-

1.9.1 Administrative Issues

An institutional repository cannot stand without the support from the authority. The perceptions and attitudes of administrators towards an institutional repository are critical for gaining support. Even a repository is implemented and managed entirely as a library initiative. IR efforts require to gain faculty awareness and administration willingness to reallocate resources and provide additional funding.

The rational for universities and colleges implementing institutional repositories rests on two interrelated propositions: one that supports a broad, pan institutional effort and another that offers direct and immediate benefits to each institution that implements a repository.

1.9.2 Cultural Issue- Cultural rather than technological factors limit the use and development of institutional repositories (Hubbard, 2003; Ware, 2004). Some writers suggest that ingrained behaviours, inertia, indifference and resistance to change hamper the adoption of the working practices needed to support the institutional repository initiative (Hubbard, 2003; Ware, 2004).

1.9.3 Technological Issues- A major technological consideration for all of the institutional repositories is selecting an appropriate software platform. Open

source or proprietary? Which open source: which proprietary? It is seen that open source software demands a high level of in-house technological support, which is not always available in a library setting. Proprietary solutions have therefore been preferred in some cases. Ofcourse, this has not always been the case, with open source also several successful institutional repositories are established.

Other aspects of technology that generated comment included the importance of interoperability (both between repository systems and with other systems), the critical importance of common standards, the quality of data input, the costs and quality of metadata to ensure discoverability, the capacity to scale the system to accommodate growing needs, questions of storage management (online, offline, data replication), ensuring a robust and reliable environment, and the need for middleware, especially relating to security and authentication.

1.9.4 Collection Development Issues – In an institutional repository, content is limited to only the output of one institution, which distinguishes institutional repositories from other collection. Lynch suggests that repositories need to be understood and developed as a new form of scholarly publishing, and he has called for libraries to use them to "digitally capture and preserve many of the events of campus life – symposia, performances, lectures" (Lynch, 2003).

Libraries and archives of course have long experience with developing and managing content, and many of the skills applied to print and other forms of digital collections will be transferable to the institutional repository environment. For libraries developing institutional repositories, the issue of content should be

foremost. They are, after all, simply another form of collection, which should be subject to established levels of decision making with regard to collecting priorities, and the same level of management with regard to associated matters, such as access and preservation. So familiar are these tasks that they should be able to be smoothly incorporated into the current collection management programs of libraries and the associated policy decisions can be recorded within the framework of existing collection development policy documents subject-based predecessors. Nixon noted that the "Library has a number of distinct roles beyond its technical provision and maintenance". These roles were -

1. encouraging members of the University to deposit material into the e-Prints archives;

2. providing advice to members of the University about copyright and journal embargo policies for material which they would like to deposit in the archive;

3. converting material to a suitable format such as HTML (Hyper Text Marcup Language) or PDF (Portable Document File) for import into the archive;

4. depositing material directly on behalf of members of the University who do not, or

cannot self-archive their material; and

5. reviewing the metadata of content which has been self-archived to maintain the quality of the record (Nixon, 2002).

Henty (2007) in his study found that the entire interviewed repository administrators agreed that there is a need for a strong policy framework to define the role of the repository service and the scope of the collection. In practice, few

universities have a written policy, but all recognise the need to have one, especially if they have leapt into providing a repository service without thinking through the collecting implications. The need for a policy framework parallels the traditional practice of university libraries and archives in having a collection development policy, agreed by the user community and in line with the aims and objectives of the university. Some now find themselves having to refuse some categories of material: difficult to do without a policy that has been accepted by the wider university community.

There is another issues related to collection management of IR, that what material to be kept for the longer term and what then to discard. If not discarded, material may be relegated to secondary storage, available only on request and possibly after some delay.

1.9.5 Copyright Issues- Open source, open library and open access including institutional repositories have direct conflict with copyrights of the publishers and authors on their intellectual output. If every information and resource is going to be freely and openly available as open source irrespective of their copyrights, it may raise many issues. Some publishers do however permit open access to authors either at the stage of post-prints or preprints. However, policies of the publishers may differ. As a matter of fact authors of the papers have the first copyright on his work. Publishers logically should not enjoy the same right as of author even if the copyright is transferred (Chandel, 2008). By doing little editing work, publishers or editors should not own the responsibility of intellectual

contribution. However, in the prevailing situation authors who have already transferred copyrights to the publishers merely for the sake of publication request the publisher to get back the rights to post the publications on his own website or in institutional repository of parent institution. However, some publishers have liberal attitude of granting these rights as a standard procedure to the authors and their institutions which is a very encouraging development.

Libraries and academic institutions can influence publishers to adjust their present copyright policies with regard to the reuse of published articles. The expectation is that there will be many institutional repositories, most of which will have specialized collections and will be internet worked together in a way loosely resembling today's Internet. Most institutional repository project planners are aware there are intellectual property issues that must be resolved in order to successfully deploy their libraries. Some proposals for institutional repository projects express intent to resolve intellectual property issues as part of the overall plan for the library. Therefore, Copyright Act needs some amendments for the growth and development of institutional repositories (Chandel, 2008).

1.10 Challenges of Institutional Repository

There are some common challenges that each and every institutional repository has to face as such-

- Absence of a well defined institutional policy;
- Lack of IR expertise in India;
- Insufficient funds for Information Technology (IT) Infrastructure and manpower;

- Apathy of authors towards time consuming and lengthy deposition procedure;

- Ignorance of users in the absence of appropriate literacy program;

- Publisher's rigid attitude towards copyright policy;

- Customization of open source software is a bottle neck;

- Diversity of content and the language used in the full texts;

- Relying on unproven methods for long term digital preservation.

1.11 Statement of the Problem

Institutional repositories have recently become major players in the Open Access movement. Libraries across the world are clamoring to launch their IRs. But it is seen that many libraries are facing the challenges in developing and managing institutional repositories. Moreover, institutional repository efforts require considerable financial, personnel, technological investment. For this reason, it would be helpful if academic institutions could learn from one another, sharing their experiences, building models, and formulating best practices. Moreover, the use of Open Source Software is difficult to install and manage. As such, the level of technical knowledge needed to maintain this software can also stood as an obstacle in this path. Besides that, less documentation and very rapid updateness has also created a problem of using open source software for the library professionals.

Therefore, one feels impelled to investigate in to this phenomenon specifically related to the institutional repositories using DSpace software. DSpace Open Source Software is observed as a solution in the era of global

meltdown in the context of institutional repository because, many libraries experience with the use of commercial software that is slow to evolve and expensive.

NEHU Central Library has started its institutional repository as UPE (University with Potential for Excellence) project approved by University Grant Commission. The proposed study is to explore the problems faced by the institution as well as to find out its prospects to create and store scholarly works of its staff and scholars.

1.12 Objectives of the Study

The objectives of the proposed research within the scope of study are:

- To study the impact of IR on the Academic Fraternities.

- To find out different issues associated with IR.

- To identify the practical problems faced by the institution for the improvement of an IR.

1.13   Significance of the Study

With the advent of technologies in library and information centers, the notion of library has been changing drastically which gives high value to the library services in providing information resources to its users. The technologies have also increased the use and access of information in various activities that have resulted advancement of knowledge in education and research. At this juncture, many libraries and information centers are developing to cope up with

the latest technologies for providing and uploading their resources to give best services to the users. The advancement of technology have also resulted the need of institutional repositories that have been carried out by means of some technological devices to upload information to the users. There are various institutions and organizations that have carried out the activities of IRs which give great value and recognition to the institution and the professionals as well. While organizing IR there have been some problems that affect its accessibilities and development which is done by some software. Experiences gained through this study can be implemented in the creation of Institutional Repository in Mizoram University.

1.14 Scope of the Study

The scope of the study is limited to the Institutional Repository of the Central Library of North-Eastern Hill University (NEHU). The NEHU central library was started with a collection of 600 books in 1973. Now it is a premier university library of the North-Eastern Region of India with a collection of over 2.3 lakhs volumes of books and bound periodicals. The library is also supplemented by enormous information resources available through the UGC-INFONET Consortium and the links to global information resources and services provided on its webpage.

The NEHU Central Library has launched a major effort to provide the best services through internal re-organisation, optimisation of available resources and

launching of innovative services. The Institutional Repository of NEHU is one of these services. NEHU Central Library has already started its institutional repository and the project is still going on. The strength of its collection is increasing day by day.

1.15   Methodology

A total number of more than 300 faculties and almost 150 research scholars of North Eastern Hill University are the total population of the study. Therefore the scholar has adopted a stratified sampling technique to obtain representative samples constituting teachers and research scholars as the sample constitute a heterogeneous group. The scholar has divided the total population into several sub population groups which are individually homogenous and scholar has also selected the items from each stratum to constitute a sample.

For the survey of the primary data the scholar has adopted the following methodologies-

1.15.1 Interview Method

The scholar had a personal interaction with the administrator and the other concerned staff of the institutional repository under study, through which the scholar has able to understand the practical situation for developing a repository. For this interview a schedule was prepared in advanced.

1.15.2 Questionnaire Method

Two structured questionnaires were prepared which were distributed among the faculties and research scholars under the study to find out the impact of the

particular repository on the academic fraternity. During the survey, 150 questionnaires were administered to randomly selected faculties and 25 were to research scholars. Out of which 110 faculties and 11 research scholars had responded and returned the 3-paged questionnaires. This represents a 69.14% response rate, are analysed by using Microsoft Office Excell.

1.16   Review of Literature

The scholars had generated enormous data on institutional repositories using open source software. These works have provided us the first hand information about the institutional repositories. Some of the literature that have discussed about the subject have been reviewed as below:

In the paper of **Carol Jean Godby (2004)** and others propos a model for metadata crosswalks that associates three pieces of information: the crosswalk, the source metadata standard, and the target metadata standard, each of which may have a machine-readable encoding and human-readable description. The crosswalks are encoded as Metadata Encoding and Transmission Standard (METS) records that are made available to a repository for processing by search engines, OAI harvesters, and custom-designed Web services. The METS object brings together all of the information required to access and interpret crosswalks and represents a significant improvement over previously available formats. But it raises questions about how best to describe these complex objects and exposes gaps that must eventually be filled in by the digital library community

Catherine Jones (2007), in her book, 'Institutional Repository: Content and Culture in an Open Access Environment' concentrates on the policy and cultural aspects of implementing IR. The first five chapters of this book deal with the external environment and organizational influences on changing information access behaviours, explaining some of the reasons that IR come in to being. The sixth chapter looks at three successful implementations, two based in United Kingdom and one in New Zealand. These case studies consider various aspects of implementation project.

In this article, **Ferreira, M, Rordrigues, E and Baptista, A. A. (2008)** tackle the ubiquitous problems of slow adoption and low deposit rates often seen in recently created institutional repositories. The article begins with a brief description of the implementation process of RepositoriUM, the institutional repository of the University of Minho, and moves on to thoroughly describe the set of activities included in a strategic plan specially designed to undertake the previously outlined problems. Among those activities are the development of an adequate promotional plan, development of value-added services for authors, engagement in the international community and definition of a self-archiving mandate policy. The article also provides some figures on the results of the strategic plan and explores future initiatives being devised to further increase the adoption of the repository.

G H S Naidu and Prabhat Singh Rajput (2008) give a comprehensive idea about metadata describing definition, need and categories. The different type of metadata and their functions are also discussed here. Metadata harvester provides

indexes or harvests metadata, from different open archives and open access journals. The study attempts to know Open Access Initiative Protocol for Metadata Harvesting (OAI-PMH) and available harvesting services in India.

G, Wrenn and others (2009) discusses the process of setting up and managing a digital repository: hardware and software selection; customizations; gaining campus support; developing collections; accepting submissions; and planning for the future, including participation in a system-wide effort to create a shared repository in their article on 'Institutional Repository on a Shoestring'.

Jean-Gabriel Bankier, Connie Foster and Glen Wiley (2009) describes in their article 'Institutional Repositories—Strategies for the Present and Future', institutional repositories as the tools to support, disseminate, and showcase the scholarly communications and intellectual life of an institution. A successful repository requires planning and a defined focus, as well as an attractive name and design.

Julie Mondoux and Ali Shiri. (2009) stress the activities of IR in their literature entitled 'Institutional Repositories in Canadian Post-Secondary Institutions', which examines and provides an insight into Canadian post-secondary institutional repositories (IRs) with respect to user interface features and knowledge organization systems (KOS) used. Here a directory of 27 IRs in Canada is created. Incorporation of KOS in institutional repository is evaluated.

Juli Thakuria (2008) in her paper deals with open source institutional repository software specially DSpace. After defining the terms, it discusses implementation of DSpace as an institutional repository. DSpace has developed a model that

allows users to use the system submit and use content, and administrators can organize and configure the system. In order to be more usable to different types of users, the software provides a configurable submission and workflow process that can be fit to any organization's information needs.

Kuang-hua Chen and Jieh Hsiang (2009) in their article 'The Unique Approach to Institutional Repository Practice of National Taiwan University', explores the practical and unique approach to construct an institutional repository (IR) at the National Taiwan University (NTU). With comparison to other IR systems, it is found that a content-rich system with the much friendlier user interface like NTUR could be constructed in an effective way.

In this paper **Ki-Tat Lam and Diana L.H. Chan (2007)** tried to document Hong Kong University of Science and Technology's (HKUST's) experiences in developing its Institutional Repository and to highlight its programming developments in full-text linking and indexing, and cross institutional searching. The paper reveals what and why some policy issues should be adopted, including paper versioning, authority control, and withdrawal of items. It notes what proactive approaches should be adopted to harvest research output. It also shows how programming work can be done to provide usage data, facilitate searching and publicize the repository so that scholarly output can be more accessible to the research community.

M.N. Jadhav, and N.J.Bamane, (2006) mention that the Central Library, Indian Institute of Technology of Bombay digitized bibliographic details and abstracts of Ph. D. theses from 1964-1999 and have been merged with data of Masters Dissertations from 1999 and Doctorate theses from 2000 and are made available at

http://www.library.iitb.ac.in/~mnj/gsdl/cgi-bin/library. In order to develop digital repository, DSpace has been chosen to provide enhanced Open Archive Initiative (OAI) support and metadata harvesting of Electronic Theses and Dissertation and other electronic scholarly publications.

Mary Piorun (2008) in her article on 'Digitizing Dissertations for an Institutional Repository: A Process and Cost Analysis'**,** describes the Lamar Soutter Library's process and costs associated with digitizing 300 doctoral dissertations for a newly implemented institutional repository at the University of Massachusetts Medical School. Here, 320 dissertations were digitized and added to the repository for a cost of $23,562, or $0.28 per page. Seventy-four percent of the authors who were contacted (n5282) granted permission to digitize their dissertations. Processing time per title was 170 minutes, for a total processing time of 906 hours.

Mohammad Nazim and Maya Devi (2008) in their article on 'Open Access Journals and Institutional Repositories: Practical Need and Present Trends in India', mentions the present trends of IRs in India. The paper disclosed that among the top 25 open access publishing countries, India ranks 12th for the over all number of journals but drops to 18th for journals with online content. However, its position in the list of open access journal is $5^{th.}$ At present India ranks 12th in the list of countries with registered interoperable archive in the Registry of Open Access Repository (ROAR).

Philip M. Davis and Matthew J. L. Connolly (2007) reports on an evaluative study of Cornell's DSpace institutional repository in their literature on 'Institutional Repositories Evaluating the Reasons for Non-use of Cornell University's Installation of DSpace'. Here it is mentioned that Cornell's DSpace is

largely under populated and underused by its faculty. Many of its collections are empty, and most collections contain few items.

R. Crow (2002), in his work 'The Case for Institutional Repositories' examines IRs from various complementary perspectives, describing their potential role and exploring their impact on major stakeholders in the scholarly communication process.

R.Jones, T.Andrew and J.MacColl. (2006) stressed the concept of IR in their book 'The Institutional Repository'. The first three chapters of this book deal with the general conception of IR and the technologies and technicalities related to it. The fourth, fifth and sixth chapters highlight on administration, advocacy and intellectual property whereas the seventh chapter describes a case study of the Edinburgh Research Archive.

However, these works some how lacks an analytical and practical approaches. Therefore, proposed research work intends to make an in-depth study of not only the institutional repositories using DSpace software but also its problems and prospects that arises for its development.

1.17 Dissertation Overviews

Chapter 1 served as an introduction to the study, a foundational explanation for the importance of Institutional Repository for the present knowledge era. The chapter also discusses about the core features, functions, issues of institutional repository etc. This chapter also served with theoretical background of the study and it concluded with the statement of the problem, the objectives of research, significance of the study and the methodology of the study.

Chapter 2 is study about the overall study of the institutional repositories of India. An attempt has been made in this chapter to review the trends of institutional repositories in India.

Chapter 3 provides an overview of Open Source Software. Here different open source digital library software like DSpace, Eprints, Greenstone, Fedora, Envenio, Opus are elaborately discussed.

Chapter 4 displays a brief overview of North-Eastern Hill University with special reference to its Institutional Repository.

Chapter 5 presents the analysis and findings of the study. The researcher employed quantitative methods to have fact findings within the scope of study. The quantitative data were obtained from faculties and research scholars of various departments and the library professional of the Central Library of North-Eastern Hill University.

Chapter 6 includes findings and conclusion of the research study and some suggestions are also given for improvement of the institutional repository of North-Eastern Hill University.

1.18 Summary

There is now a growing call for academic and research institutions to establish institutional repositories where their scholars and researchers are required or mandated to deposit or archive their research output. The development of institutional repository services can often be related to the open access movement, which seeks to make valued research outputs openly available by encouraging academics to place their publications into repositories, enhancing

their availability and bypassing the high cost of journal subscriptions. However, many universities have extended the functionality of their repository services for other purposes, such as giving scholars the opportunity to develop their own research portfolio, providing a means of improving research reporting, establishing an electronic publishing service, or giving access to collections of images or other research outputs. The potential for development seems endless in this field.

At the same time, university research increasingly involves the use, generation, manipulation, sharing and analysis of digital resources. The importance of what is generally called "e-Research" on the national agenda shows the need for improved data management and sustainability practices to support research over the longer term. This raises questions of the relationship between the repository and e-Research and provides challenges to repository managers to broaden their thinking still further to help meet these needs.

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CHAPTER-2
INSTITUTIONAL REPOSITORIES OF INDIA

2.1 Introduction

Now a day, it is a trend of institutional repositories all around. Many of the institutions have their repositories which they have built on various open source software. The saddest part of this is that various institutes had created their

institutional repositories for testing or trial purpose only and could not maintain later. Some of them are closed and are not being updated regularly.

In India also institutional repositories are developing rapidly. Open source software, especially DSpace, is increasingly being used for the creation of digital repositories. Centres with expertise on DSpace, Greenstone and Eprints have evolved in India and these centres are spearheading institutional repository activities in India with regular training programmes that are developing human resources in the area.

The Indian Institute of Science was the first in the country to set up an interoperable institutional archive (eprints@IISc). The archive now has more than 8000 records, with over 70% being full text. Presently, there are 58 institutional repositories in India which are listed in the Registry of Open Access Repositories (Accessed on 29/11/2010). Unfortunately out of the 58 institutional archives, only 42 are accessible and functional at the time of writing this dissertation. It is seen that India is in the 2nd position in Asia after Japan. So, India is competing with other developed countries across the world regarding this matter. It is leading towards open access movement among the developing countries since last decade by establishing a number of open access repositories, embracing free and open source software (FOSS). The Indian information professionals experiment with the open source software such as Greenstone, DSpace and EPrints for establishing institutional repository (IR) in a local library. If an IR is successfully implemented in the local library setup, it then scales up to the institution-wide application through campus-wide network or intranet. Likely, it turns open to the wider

audience with the implementation of open access institutional repository, when the authority of institution convinced. With the availability of the dedicated information infrastructure combined with 24X7 broadband connectivity and national educational grid, some national institutions and universities implemented institutional repositories for wide dissemination of scholarly literature emanated from the respective institutions. Some institutional repositories in India are specially established to diffuse intellectual outputs of the country in the form of electronic theses. Vidyanidhi and ETD@IISc, Shodh Ganga are some of the examples of such kind. Other institutional repositories provide all kind of scholarly materials such as research papers, conference papers, presentations, photographs, along with e-theses. The OpenMED and Librarians' Digital Library are examples of such kind.

There is a notable development of open access repositories since 2004 after the Budapest Open Access Initiative and Berlin declaration. Presently there are 68 open access repositories in India; out of them 11 are listed among the top 800 repositories of the world repositories. The OpenMED@NIC of National Informatics Centre, India is at 118th position, and the Indian Institute of Technology, Delhi is at 800th place. ePrints@IISc of Indian Institute of Science is on the rank of 161 having highest number of records (30066). (Raja, 2010)

2.2 Institutional Repositories of India

Following is the list of institutional repositories from India which are currently active on the Internet-

Allama Iqbal Library Digital Collection (http://www.kashmiruniversity.net/)

It is an institutional repository of University of Kashmir developed on Greenstone. The repository provides full access to the institutional output in the form of journals, research articles and other papers. It was hosted on 5th of March, 2009.

Delhi College of Engineering, Repository (http://202.141.12.109:8080/dspace/)

It is an institutional repository of Delhi College of Engineering with a collection of faculty publication, students' research theses, project etc. It is running on DSpace software and hosted on 9th of May, 2007.

DKR@CDRI (http://dkr.cdri.res.in:8080/dspace)

DKR@CDRI is the digital knowledge repository of Central Drug Research Institute (CDRI), Lucknow running on DSpace. It was hosted on 14th of November, 2007. DKR@CDRI strives to collect, preserve and disseminate different institutional publications such as journal articles, conference proceeding articles, technical reports, thesis, dissertations, etc. Users can search, browse and access publications of CDRI from this collection

DRS@nio (*drs.nio.org/*)

It is a digital repository service of National Institute of Oceanography, India. DRS@nio tries to collect, preserve and disseminate different institutional

publications (journal articles, conference proceeding articles, Technical reports, thesis, dissertations, etc). Users can search, browse and access publications of National Institute of Oceanography from this collection. In its collection more than 1491 documents are   available.

DSpace at Bangalore Management Academy (http://bma.ac.in:8080/dspace)

This institutional repository is developed by Bangalore Management Academy on DSpace software. It was hosted on 5th September of 2008. It includes teaching and learning objects produced by the members of the institute. Presently, it possesses more than 825 items.

DSpace at GGS Indraprastha University

(http://dspace.ipu.ernet.in:8080/dspace/)

This is an institutional repository of Guru Gobind Singh Indraprastha University, Delhi based on DSpace software. It was hosted on 24th of September, 2007.

DSpace at Icfai Business School (IBS), Ahmedabad (http://202.131.96.59:8080/dspace)

It is an institutional repository created by Icfai Business School (IBS), Ahmedabad on DSpace. It was hosted on 9th of June, 2006. The repository includes Faculty and Research staff Articles, Conference papers etc.

DSpace at National Chemical Laboratory, Pune (*dspace.ncl.res.in/dspace/*)

National Chemical Laboratory, Pune has Open Access to its research and other scientific documents through the digital library built on DSpace software. More than 357 documents of scientific nature are hosted on it.

DSpace at NCRA (http://ncralib.ncra.tifr.res.in:8080/dspace/)

It is an institutional repository of Indian Institute of Technology, Bombay (IITB) on DSpace. This institutional repository providing access to the research output of the National Centre for Radio Astrophysics (NCRA). Some items are only available to the registered users. It was hosted on 19th of March, 2009.

DSpace at Sarai (http://archive.sarai.net/dspace/)

DSpace at Sarai is the repository of Sarai Multimedia Digital Archive. Its Initial holdings are everyday archive on Cinematographic and Media Practices, Contemporary Social Movements of Urban Life. The strength of this archive is represented by Print and Electronic Media, Audio, Visual and Audio Visual. Anyone can enrich this archive through their contributions in this particular area.

DSpace at University of Hyderabad (http://digilib.uohyd.ernet.in/dspace)

This is a repository of research publications of faculties and students of University of Hyderabad. The repository was created using DSpace software and hosted on 30th October, 2008.

Dspace@IIA (http://prints.iiap.res.in/)

It is an institutional repository of Indian Institute of Astrophysics (IIA) developed on DSpace software. It was hosted on 11November, 2004.

Dspace@iimk (http://dspace.iimk.ac.in/)

It is a scholarly archiving facility for the Indian Institute of Management Kozhikode (IIMK) community, using the DSpace software. This service enables the Institute community to archive their preprints, post prints and other scholarly

publications. In keeping with the objectives of the Open Access movement, it facilitates the researchers of the institute in self-archiving and long-term preservation of their scholarly publications, provide world wide access to these publications and improve impact of their research. While dspace@iimk can be accessed by anybody, submission of documents to this archive is limited to the IIMK research community. Currently more than 607 documents are there covering various subject areas. It was hosted on 29th December, 2005.

DSpace@IITB (http://dspace.library.iitb.ac.in/jspui/)

DSpace@IITB is a research produced at Indian Institute of Technology, Bombay running on DSpace. Here it presents a selection of best research of IITB community including full-text of book chapters, conference/proceeding papers, technical reports, journal pre-prints & post-prints, working papers, Patents and others like annual reports etc. Presently it is having more than 1659 records. It was hosted on 25th April 2010.

DSpace@IITD (http://eprint.iitd.ac.in/dspace/)

It is a digital repository of Indian Institute of Technology Delhi, for submission of research and Electronic Theses and Dissertations [ETD]. It contains around 2200 documents.

DSpace@INFLIBNET (http://dspace.inflibnet.ac.in/)

It includes the University Grants Commission (UGC) funded major/minor Research Project. The database contained full-text of the project report submitted to the University Grants Commission in Science, Humanities, Engineering & Technology, Medicine and Agriculture. This full-text database is maintained by

Information and Library Network (INFLIBNET) Centre and the copy of the project reports were received by INFLIBNET Centre from the project investigators in electronic form. The INFLIBNET Centre is happy to include in the UGC Funded Major /Minor Research Project database for the academic user community of this country. The

Project database provides maximum options for retrieving the desired project report from the database. Efforts were made to provide maximum information about the project report in the first instance. It was also tried provide maximum fields for searching from the database and included most important fields. It was hosted on 4th of May, 2006.

DSpace@MDI (http://dspace.mdi.ac.in/dspace)

It has created by Management Development Institute, Gurgaon using DSpace software. It was hosted on 6th October, 2006.

DSpace@NITR (http://dspace.nitrkl.ac.in/dspace/)

DSpace@NITR of National Institute of Technology (NITR), Rourkela collects preserves and disseminates the intellectual output of National Institute of Technology to the global audience. Presently, it archives journal articles, pre-prints and conference papers authored by NITR researchers. Documents in this archive are now indexed by OAIster where users can access several millions of open access scholarly documents of other academic institutions around the globe. Presently the repository possesses more than 1260 documents in its archive. It was hosted on 18th May, 2005.

DSpice at Indian Institute Spice Research (http://220.227.138.214:8080/dspace/index.jsp)

It is the collection of scholarly publications from Indian Institute of Spices Research, Kozhikode (Calicut). Here members from [Indian Institute of Spices Research](...) can submit their research papers after getting registration. It is running on DSpace software and hosted on 17th June 2010.

DU Eprint Archive (http://eprints.du.ac.in/)

It is the repository of the scholarly output of Delhi University (DU), hosted on 14th October, 2005. For the creation of the repository EPrints Software was used.

Dyuthi at CUSAT (http://dyuthi.cusat.ac.in/dspace/)

It is a digital repository of Cochin University of Science and Technology (CUSAT) on DSpace. This repository is funded by Department of Scientific & Industrial Research (DSIR), Under Technology Information Facilitation Programme (TIFP), Ministry of Science & Technology, Government of India. Dyuthi archieves the intellectual output of the scientific community of the CUSAT faculty, research scholars and scientists. This service enables the cusat community to archieve the preprints, postprints, theses, conference proceedings, teaching and learning materials and other scholarly publications. It was hosted on 8th of July, 2008.

eGyanKosh (*www.egyankosh.ac.in/*)

eGyanKosh- a National Digital Repository to store, index, preserve, distribute and share the digital learning resources developed by the Open and Distance Learning Institutions in the country. Items in eGyanKosh are protected by copyright, with all rights reserved by Indira Gandhi National Open Universities (IGNOU). To access the items in repository, registration is required. But registration is free for all. Currently it is containing around 30,000 documents.

ePrints@Catalysis (http://203.199.213.48/)

ePrints@Catalysis repository collects preserves and disseminates in digital format the research output created by the National Centre for Catalysis Research (NCCR) and also other catalysis research publications from India on behalf of the Catalysis Society of India (CSI). It enables the Catalysis community to deposit their preprints, postprints and other scholarly publications using a web interface, and organizes these publications for easy retrieval. While eprints@Catalysis can be accessed by anybody, submission of documents to this repository is limited to the catalysis research community of NCCR, India.

Eprints@CMFRI (http://eprints.cmfri.org.in/)

Eprints@CMFRI is the Open Access research outputs repository of Central Marine Fisheries Research Institute (CMFRI), Cochin developed on EPrints software. It consists of research outputs of CMFRI as such, journal papers, conference papers, reports, theses, patents etc. CMFRI scientists who do research on fisheries and related areas can self achieve their articles in the repository. Interested users can freely download and use documents as most of

them are directly accessible and full-text downloadable. 'Request Copy' forms can be used for documents to which direct full-text download is restricted due to publisher embargo. The repository was hosted 4th March, 2010.

Eprints@IARI (http://eprints.iari.res.in/)

Eprints@IARI is an institutional repository of Indian Agricultural Research Institute, Delhi based on EPrints Software. It was hosted on 9th of November, 2009.

ePrints@IIMK (http://eprints.iimk.ac.in/)

It is a scholarship repository of Indian Institute of Management, Kozhikode on EPrints software, hosted on 4th May, 2006.

eprints@immt (http://eprints.immt.res.in/)

eprints@immt is the institutional repository of Institute of Minerals and Materials Technology (IMMT), Bhubaneswar using EPrints software and hosted on 30th May, 2009

EPrints@IIT Delhi (http://eprint.iitd.ac.in/dspace)

It is an institutional repository of Indian Institute of Technology (IIT), Delhi created on DSpace software. It was hosted on 28th of May, 2005.

Eprints@MDRF (http://mdrf-eprints.in/)

Eprints@MDRF is the digital repository of [Madras Diabetes Research Foundation](), Chennai. It was created by using EPrints software and hosted on 24th September, 2009.

eprints@mku (http://eprints.mkuniversity.in/)

It is an institutional repository of Madurai Kamaraj University, Madurai based on EPrints software and hosted on 29th October, 2009.

Eprints@NML (http://eprints.nmlindia.org/)

The institutional repository of National Metallurgical Laboratory (NML), Jamshedpur is known as Eprints@NML, hosted on 19th September, 2009. It is running EPrints software.

ePrints@SVNIT (http://eprints.svnit.ac.in/)

ePrints@SVNIT repository collects preserves and disseminates in digital format the research output created by the Sardar Vallabhbhai National Institute of Technology (SVNIT) community. It enables the community of the institute to deposit their preprints, post-prints and other scholarly publications using a web interface, and organizes these publications for easy retrieval. While ePrints@SVNIT can be accessed by anybody, submission of documents to this repository is limited to the SVNIT community. ePrints@SVNIT repository is running on EPrints open archive software. It was hosted on 30th April, 2008.

ETD@IISc (http://etd.ncsi.iisc.ernet.in/)

This is the digital repository of theses and dissertations of Indian Institute of Science, Bangalore. Users can search, browse and access theses and dissertations from this collection. This repository has been developed by using DSpace software to capture, disseminate and preserve research theses of Indian Institute of Science. It was hosted on 8th February, 2005.

ethesis@nitr-ethesis (http://ethesis.nitrkl.ac.in/)

ethesis@nitr-ethesis is the repository of e-theses collection developed by National Institute of Technology Rourkela. Here all theses produced by students as a partial fulfillment of degree are uploaded. EPrints software is used for the development of the repository. It was hosted on 17th April, 2009.

[Indian Institute of Astrophysics Repository](http://prints.iiap.res.in/) (http://prints.iiap.res.in/)

This is the digital repository of publications of Indian Institute of Astrophysics (IIAP), Bangalore, developed to capture, disseminate and preserve research publications of IIAP. Users can search, browse and access full text of these publications from the repository. This repository also hosts papers published in Bulletin of the Astronomical Society of India. This repository is created to accommodate all publications of the institute which include the archival contents which are out of copyright in the repository for better access. Most of these contents are catalogued, classified, digitized and uploaded in the Open Access Repository with appropriate metadata. For those contents which are protected by copyright only metadata is provided. Researchers can request the Indian Institute of Astrophysics Archives for full-text of these contents. It is a collection of 5274 documents and being updated regularly.

Indian Institute of Science, Bangalore (http://eprints.iisc.ernet.in/)

The institutional repository of Indian Institute of Science, Bangalore is based on EPrints software and hosted on 5th April, 2004

Indian Statistical Institute Library, Bangalore (http://library.isibang.ac.in:8080/dspace/)

The institutional repository of Indian Statistical Institute Library, Bangalore is a publishing database on DSpace. It was hosted on 4th May 2006.

Kautilya Digital Repository of IGIDR (http://oii.igidr.ac.in:8888/dspace)

Digital repository of conference proceedings, thesis and dissertations and research articles, etc hosted at Indira Gandhi Institute of Development Research, Mumbai, India. It contains around 200 publications of the institute. It was developed by using DSpace software and hosted on 27th February, 2006.

KR@CIMAP (http://kr.cimap.res.in)

Is an institutional repository created by the Central Institute of Medicinal and Aromatic Plants, Lucknow on DSpace. It was hosted on 25th October, 2008.

Librarians' Digital Library (https://drtc.isibang.ac.in/)

It is a research cross institutional repository on DSpace. It was hosted on 17th of Junuary 2004.

Mahatma Gandhi University – Online Theses Search (http://mgutheses.org/)

Mahatma Gandhi University – Online Theses Search is the first Online Digital Library covering more than 1000 theses in Sanskrit, Malayalam, Hindi and English devoted entirely for the theses collection of a University in India. It was hosted on 29th November, 2008.

NAL-IR (http://nal-ir.nal.res.in/)

The institutional repository of National Aerospace Laboratories (NAL), Bangalore is based on EPrints software and hosted on 9th November, 2004. It is the digital archive of the research output of NAL scientists. This knowledge base

covers journal articles, conference papers, technical reports, presentations/lectures, preprints, thesis, images etc.

National Center for Antarctic Research, Goa (http://dspace.ncaor.org:8080/dspace/)

It is an institutional repository of National Center for Antarctic Research, Goa running on DSpace software. It was hosted on 13th October, 2006.

National Chemical Laboratory – Pune (http://dspace.ncl.res.in/)

It is a digital repository on DSpace hosted on 31st March, 2005.

National Institute of Oceanography, India (http://drs.nio.org/)

This repository possesses to National Institute of Oceanography (NIO), India on DSpace software. It was hosted on 6th April, 2006. Documents in this archive are now indexed by OAIster where users can access several millions of open access scholarly documents of other academic institutions around the globe. Users can search, browse and access publications of NIO from this collection. Presently it is having more than 3720 documents in its collection.

NII Repository (http://eprints.nii.res.in/p)

It is the digital repository of National Institute of Immunology (NII), based on EPrints software and hosted on 1st November, 2008.

National Science Digital Library at NISCAIR (http://nsdl.niscair.res.in/)

National Science Digital Library (NSDL) was created by National Institute of Science Communication and Information Resources by using DSpace

software and hosted on 23rd February, 2010. It aims at providing comprehensive Science & Technology information to students of science, engineering and technology. It was begun as a Tenth Five Year Plan Network Project of Council of Scientific and Industrial Research (CSIR), India. NSDL is the only one of its kind that provides curriculum based content to address the information needs of the undergraduate students of science. The content creation and development for NSDL has gone through rigorous procedures to make available quality content for the students. NSDL envisages to bring the finest contents authored by eminent teachers and validated by renowned faculty in Indian universities and colleges. Here users can freely download E-books on subject areas like agriculture, anthropology, biochemistry, botany, chemistry, geology, horticulture, industrial Chemistry, Library   Science, Mathematics, Microbiology, Pharmacy, Physics, Polymer Science, Statistics and Zoology.

NISCAIR Online Periodicals Repository (http://nopr.niscair.res.in/)

One can access full text articles from research journals published by NISCAIR. Presently full text facility is provided for the seventeen research journals viz. Indian Journal of Biochemistry and Biophysics (IJBB), Indian Journal of Chemistry, Sec A (IJC-A), Indian Journal of Chemistry, Sec B (IJC-B), Indian Journal of Pure and Applied Physics (IJPAP), Journal of Scientific and Industrial Research (JSIR), Indian Journal of Radio and Space Physics (IJRSP), Indian Journal of Chemical Technology (IJCT), Indian Journal of Chemical Technology (IJEMS), Indian Journal of Marine Sciences (IJMS), Indian Journal of Experimental Biology (IJEB), Indian Journal of Biotechnology (IJBT), Indian

[Journal of Fibre & Textile Research](#) (IJFTR), [Indian Journal of Natural Products and Resources](#) (IJNPR), [Journal of Intellectual Property Rights](#) (JIPR), [Bharatiya Vaigyanik evam Audyogik Anusandhan Patrika](#) (BVAAP), [Annals of Library and Information Studies](#) (ALIS) and [Indian Journal of Traditional Knowledge](#) (IJTK). For other journals abstracts can be accessed. Full text of these journals will be made available in due course of time. Presently the collection of this repository is more than 9500. It was hosted on 18th February, 2008.

Open Access: Agriculture Research Repository (http://www.agropedia.net/openaccess)

It is a repository under International Crop Research Institute for the Semi-Arid Tropics (ICRISAT), Kanpur hosted on 10th February, 2010. This repository is built with the intention of accumulating agriculture related research papers around the globe under one single umbrella. Content here in this repository are semantically cataloged.

[OpenMED@NIC](#) (http://openmed.nic.in/)

It is an open access archive of National Informatic Centere (NIC) developed on EPrints for Medical and Allied Sciences. The aim of OpenMED@NIC is to provide free service to academics, researchers, and students working in the area of Medical and Allied Sciences. Here authors can self-archive their scientific and technical documents. For this they need to register once in order to obtain a user ID in OpenMED@NIC system. However no registration is required for searching the archive or accessing the documents.

OpenMED@NIC is a subject based international archive. Its peer-reviewed documents having relevance to research in Medical and Allied Sciences including Bio-Medical, Medical Informatics, Dental, Nursing and Pharmaceutical Sciences. Peer-reviewed preprints, post-prints (refereed journal paper) and accepted theses can be deposited in this repository. In case of non-English documents, descriptive data [Author, Title, Source etc.], abstract and keywords must be in English. Submitted documents will be placed into the submission buffer and would become part of OpenMED@NIC archive on their acceptance. It was hosted on 22nd March, 2005.

Physical Research Laboratory Library (http://www.prl.res.in/~library)

It is a digital repository organized by Library & Information Services, Ahmedabad on Greenstone software. It is consists of journal articles, PhD theses and technical Reports. It was hosted on 14th of August, 2009

Prints@IISc (http://eprints.iisc.ernet.in/)

This is the open access repository of the Indian Institute of Science (IISc), Bangalore, India. The repository collects preserves and disseminates in digital format the research output created by the IISc research community. It enables the institute community to deposit their preprints, postprints and other scholarly publications using a web interface, and organizes these publications for easy retrieval. While eprints@IISc can be accessed by anybody, submission of documents to this repository is limited to the IISc research community only. Number of publications in the repository is more than 12010 and still growing.

RRI Digital Repository (http://dspace.rri.res.in/)

It is an institutional repository of Raman Research Institute Digital Repository, Bangalore on DSpace, hosted on 19th of April, 2005. This contains the research publications of the faculty and students of the Raman Research Institute. The collected papers of Chandrasekhara Venkata Raman and the historical records of the institute (Annual Reports and Newspaper Clippings) are also housed here. Presently more than 3845 documents are there in its collection.

Vidyanidhi Digital Library and E-Scholarship Portal (http://dspace.vidyanidhi.org.)

Vidyanidhi (Meaning 'Treasure of Knowledge' in Sanskrit) is India's premier Digital library initiative to facilitate the creation, archiving and accessing of doctoral theses. Vidyanidhi is an information infrastructure, a digital library, a portal of resources, tools and facilities for doctoral research in India. Vidyanidhi is envisioned to evolve as a national repository and a consortium for e-theses through participation and partnership with universities, academic institutions and other stake holders. Vidyanidhi enhances access to Indian theses and enlarges the reach and audience for Indian doctoral research works. This repository is yet to be registered.

2.2.1 List of Institutional Repositories of India running on DSpace

Sl No	Name of IR, Institution	URL	Date of Hosting	Software
1	Bangalore Management Academy,Bangalore	http://bma.ac.in:8080/dspace	5/09/2008	Dspace
2	Delhi College of Engineering	http://202.141.12.109:8080/dspace/	9/05/2007	Dspace
3	DKR@CDRI, Digital Knowledge Repository of Central Drug Research Institute	http://dkr.cdri.res.in:8080/dspace	14/11/2007	Dspace
4	DRS at National Institute of	http://drs.nio.org/drs/index.jsp	6/04/2006	Dspace

	Oceanography (CSIR), India			
5	Dspace @ INFLIBNET	http://ir.inflibnet.ac.in/	15/06/2006	Dspace
6	Dspace at Bangalore Management Academy	http://bma.ac.in:8080/dspace	5/09/2008	Dspace
7	Dspace at Guru Gobind Singh Indraprastha University, Delhi	http://dspace.ipu.ernet.in:8080/dspace/	24/09/2007	Dspace
8	Dspace at ICFAI Business School (IBS), Ahmedabad	http://202.131.96.59:8080/dspace	9/06/2006	Dspace
9	Dspace@IIA, Indian Institute of Astrophysics	http://prints.iiap.res.in/	11/11/2004	Dspace
10	Dspace@iimk, Indian Institute of Management Kozhikode	http://dspace.iimk.ac.in/	29/12/2005	Dspace
11	Dspace@IITB, IIT Bombay	http://dspace.library.iitb.ac.in/jspui/)	25/04/2010	
12	Dspace@NCRA, IIT, Bombay	http://ncralib.ncra.tifr.res.in:8080/dspace	19/03/2009	Dspace
13	Dspace@nitr, National Institute of Technology.	http://dspace.nitrkl.ac.in/dspace/	18/05/2005	Dspace
14	Dspace@University of Hyderabad, IGM Library	http://digilib.uohyd.ernet.in/dspace	30/10/2008	Dspace
15	DSpice at Indian Institute Spice Research, Kozhikode	http://220.227.138.214:8080/dspace/index.jsp	17/06/2010	Dspace
16	Dyuthi at CUSAT , Cochin University of Science & Technology	http://dyuthi.cusat.ac.in/dspace/	8/07/2008	Dspace
17	eGyankosh, IGNOU, New Delhi	http://www.egyankosh.ac.in/	Yet to registered	Dspace
18	ETD@IISc, Electronic Theses and Dissertations at Indian Institute of Science	http://etd.ncsi.iisc.ernet.in/	8/02/2005	Dspace
19	Guru Gobind Singh Indraprastha University	http://dspace.ipu.ernet.in:8080/dspace/	24/09/2007	Dspace
20	IIT, Kanpur	http://172.28.64.70:8080/dspace		Dspace
21	Indian Institute of Technology Delhi research and Electronic Submission of Theses and Dissertations	http://eprint.iitd.ac.in/dspace	28/05/2005	Dspace
22	Institute of petroleum management	http://203.77.192.116:8080/dspace/index.jsp		Dspace
23	Institutional repository at MDI,(Management Development Institute)	http://dspace.mdi.ac.in/dspace	6/10/2006	Dspace
24	ISI Library, Bangalore	http://library.isibang.ac.in:8080/dspace/	4/05/2006	Dspace
25	Kautilya Digital Repository of Indira Gandhi Institute of	http://oii.igidr.ac.in:8888/dspace	27/02/2006	Dspace

	Development Research.			
26	KR@CIMAP, Central Institute of Medicinal and Aromatic Plants	www.kr.cimap.res.in	25/10/2008	Dspace
27	Librarians' Digital Library	https://drtc.isibang.ac.in/	17/01/2004	Dspace
28	National Center for Antarctic Research , Goa	http://dspace.ncaor.org:8080/dspace/	13/10/2006	Dspace
29	National Chemical Laboratory, Pune	http://dspace.ncl.res.in/dspace/index.jsp	31/03/2005	Dspace
30	National Science Digital Library at NISCAIR	http://nsdl.niscair.res.in/	23/04/2010	Dspace
31	Niscair Online Periodicals Repository (NOPR)	url: http://nopr.niscair.res.in/	18/02/2008	Dspace
32	Raman Research Institute Digital Repository	http://dspace.rri.res.in/	19/04/2005	Dspace
33	Sarai Multimedia Digital Archive, Delhi	http://archive.sarai.net/dspace/	Yet to registred	Dspace
34	Vidyanidhi Digital Library andE-Scholarship Portal	http://dspace.vidyanidhi.org.	Yet to registred	Dspace

Table: 1 Institutional Repositories of India running on DSpace

2.2.2 List of Institutional Repositories of India running on EPrints

Sl No	Name of IR, Institution	URL	Date of Hosting	Software
1	Bangalore university	http://202.141.128.119/	Unknown	Eprints
2	CSIR Unit for Research and Development of Information Products, Pune	http://eprints.csirexplorations.com/	Unknown	Eprints
3	dspace@IIMK, Indian Institute of Management Kozhikode Scholarship Repository	http://dspace.iimk.ac.in/	29/12/2005	Eprints
4	Eprint@DU, University of Delhi	http://eprints.du.ac.in/	14/10/2005	Eprints
5	ePrints@Catalysis National Centre for Catalysis Research (NCCR)	http://203.199.213.48/		Eprints
6	Eprints@CMFRI, Central Marine Fisheries Research Institute, Cochin	http://eprints.cmfri.org.in/	4/03/2010	Eprints
7	Eprints@IARI, Indian Agricultural Research Institute	http://eprints.iari.res.in/	9/11/2009	Eprints
8	ePrints@IIMK, Indian Institute of Management Kozhikode Scholarship	http://eprints.iimk.ac.in/	4/05/2006	Eprints

	Repository			
9	ePrints@IISc, National Centre for Science Information (NCSI),Indian Institute of Science, Bengaluru	http://eprints.iisc.ernet.in/	5/04/2004	Eprints
10	Eprints@MDRF, Dr. Mohan's Diabetes Specialities Centre,Diabetes	http://mdrf-eprints.in/	24/11/2009	Eprints
11	Eprints@mku Madurai Kamaraj University	http://eprints.mkuniversity.in/	29/10/2009	Eprints
12	Eprints@SBT MKU School of Biotechnology, Madurai Kamaraj University	http://eprints.bicmku.in/	2/07/2008	Eprints
13	ethesis@nitr-ethesis, National Institute of Technology, Rourkela	http://ethesis.nitrkl.ac.in/)	17/04/2009	Eprints
14	Indian Academy of Science	http://smart.ncsi.iisc.ernet.in	Unknown	Eprints
15	Indian Agricultural Research Institute	http://eprints.iari.res.in/	9/11/2009	Eprints
16	Indian Institute of Information Technology	http://eprints.iiita.ac.in/	10/04/2006	Eprints
17	Institute of Minerals and Materials Technology	http://eprints.immt.res.in/	30/05/2009	Eprints
18	Madurai Kamaraj University Repository	http://eprints.mkuoa.in/	29/10/2009	Eprints
19	MedknowEprints	http://eprints.medknow.com/	Unknown	Eprints
20	National Aerospace Laboratories(NAL) Institutional Repository	http://nal-ir.nal.res.in/	9/11/2004	Eprints
21	National Centre for Catalysis Research (IIT): Catalysis Database	http://eprints.iisc.ernet.in/	4/02/2007	Eprints
22	National Metallurgical Laboratory	http://eprints.nmlindia.org/	19/09/2009	Eprints
23	OneWorld South Asia Open Archive Initiative	http://open.ekduniya.net/	Unknown	Eprints
24	Open Access Repository of Indian Theses, CSIR	http://eprints.csirexplorations.com/	2/07/2009	Eprints
25	OpenMED@NIC	http://openmed.nic.in/	22/03/2005	Eprints
26	S.V. National Institute of Technology Repository	http://eprints.svnit.ac.in/	30/04/2008	Eprints

Table 2: Institutional Repositories of India running on EPrints

2.3 Conclusion

Importance of institutional repositories has been realized by the library and information professionals of India. This movement has been accelerated by the availability of Open Source Software namely D-Space, E-Prints, Greenstone, etc. The research institutions in India are actively involved in the development of institutional repositories. Indian Institute of Science, Bangalore, INFLIBNET Centre, Ahmedabad and Documentation Research and Training Centre (DRTC), Bangalore are the leading institutes with major contributions. Institutional repository is an important means for delivering open access to research literature. Most of efforts are continuing to set up open access archives or institutional repositories. In future sustainable growth of open access archives will be seen in India.

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Raja, M. Masoom (2010), '*Institutional Repositories',* paper given at National Workshop on Knowledge Repository, Department of Library & Information Science, Mizoram University.

CHAPTER-3
OPEN SOURCE SOFTWARE: An Overview

3.1 Introduction

Software is generally a group of codes or programming statements, written in any computer language such as C, Java, Perl, Python etc. and compiled to use as object code. Object codes are not readable by a user as it requires a compiler or interpreter to execute the code. In case of proprietary software vendors make advantage of this feature to protect the copy right of the product in such a way that the executable code is distributed with a license agreement without revealing the original source code. This helps the vendors to become the sole owners of the

product and sell it with the price they fix on it. Many of the software's prices are exorbitantly high, making it difficult for an ordinary user to use it for testing and implementation. Open Source Software is a great revolution in this regard.

There is a paradigm shift in the role of libraries from mere storehouse of information/knowledge to knowledge disseminations to knowledge providers and further transformed as digital library. Information/knowledge itself is of no value, it is the use of information that makes it valuable. The role of computers and their associated peripheral media are being increasingly used in library and information services for acquisition, storage, manipulating, processing and repackaging, dissemination, transmission, and improving the quality of products and services of library and information centres. There is a global change in the libraries, which indicates a shift from owning technology to using technology. Open Source Software (OSS) is currently one of the options preferred by most of the libraries, which are not financially sound because of the facilities available in OSS. This new development towards the use of OSS in libraries is also incorporated in Library & Information Science curriculum in the universities of India. Keeping in view of this increasing use of OSS in libraries and easily accessibility, it is freely available in the net, which can be downloaded for use. The modern libraries and information centres facilitate free communication because access to information has become a fundamental right of the clientele. The automation is economically feasible and technologically required in libraries to cope up with the requirements of new knowledge, the enormous increase in the collection of materials, problems of their acquisition, storage, processing, dissemination and transmission of

information. The capabilities of computer associated peripheral media and their application in library activities and services led to a highly significant quantitative and qualitative improvement in on-line technology.

3.2 Definitions of Open Source Software

Open Source Software is defined as computer software for which the source code and certain other rights normally reserved for the copyright holders are provided under a software license that meets the open source definition, that is in the domain.

It is described in www.opensource.org as *"open source promotes software reliability and quality by supporting independent peer review and rapid evolutions of source code. To be certified as open source, the license of a programmer must guarantee the right to read, redistribute, modify, & use it freely"* (Cited by Karmakar, 2010). The term "Open Source Software" originated as a part of a marketing campaign for free software. A report by Standish Group states that adoption of open source software models has resulted in savings of about $ 60 billion per year to consumers.

In the open source software development model, the source code of a software is made freely available along with the binary version so that anyone can see, change and distribute it subject to the condition he/she abide by the accompanying license. According to Open Source Initiative (2003), *"Open source promotes software reliability and quality by supporting independent peer review and rapid evaluation of source code. To be certified as open source, the license of*

a program must guarantee the right to read, redistribute, modify, and use it freely".

Thus, Open Source Software generally refers to the software distributed in source form, which can be modified freely and redistributed. Its basic character is that the source code of the software is open to the world to take, modify and reuse.

3.3 Origin of Open Source Software

Open Source Software (OSS) is not a new idea. The tradition goes back to the beginnings of the Internet, twenty-nine years ago [i.e., ARPANET (Advance Research Projects Agency Networks) project of United States Government in 1969] but the term "open source" itself has been a relatively latecomer. Christine Peterson of the Foresight Institute proposed the term "open source" in late 1997 during a meeting of small group of open source movement key persons (Raymond, 2001). This group registered the domain name opensource.org, defined "open source," developed Open Source Initiative (OSI) group, designed OSI certification and created a list of licenses that meet the standards for open source certification. Recently, technical and market forces joined together to draw a role in open source movement.

3.4 Open Source Software: Ten Commandments

As identified by OSI, there are ten criteria for a software product to be called open source. OSI also certifies a software license as an OSI Certified License on the basis of Ten Commandments as detailed below-

3.4.1 Free Redistribution

The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.

3.4.2 Source Code

The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost preferably, downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately confused source code is not allowed. Intermediate forms such as the output of a preprocessor or translator are not allowed.

3.4.3 Derived Works

The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

3.4.4 Integrity of the Author's Source Code

The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source

code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.

3.4.5 No Discrimination against Persons or Groups

The license must not discriminate against any person or group of persons.

3.4.6 No Discrimination against Fields of Endeavour

The license must not restrict anyone from making use of the program in a specific field of endeavour. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

3.4.7 Distribution of License

The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

3.4.8 License Must Not Be Specific to a Product

The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.

3.4.9 License Must Not Restrict Other Software

The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

3.4.10 License Must Be Technology-Neutral

No provision of the license may be predicated on any individual technology or style of interface. In a nutshell, free is used as in freedom or free speech (adopt, accept and modify the idea) not as in Free Lunch (only cost). It declares absolute freedom to run the program (on/or network), for any purpose, to study how the program (on/or network) and adapt it according to user needs, to distribute copies (of software and specifications), to improve the program and release the improvements to the public.

3.5 Need and Importance of Open Source Software

Open source has been a buzzword in the library community for several years now. We've heard the hype: open-source software is free, more reliable, more secure, boasts faster development cycles, and is just plain cooler than proprietary software. Here are just a few of the reasons why open source is an especially attractive solution for libraries-

3.5.1 Reduce costs: Open-source software is free. We have to pay only for the product support and training (if any) that we need. When an open-source user sponsors development of new functionality, the whole community of users gets benefits. Software functions are paid for only once when it is

developed, and it makes open-source software extremely *cost-efficient*. Libraries using open-source software benefit from many advanced technology solutions that they otherwise could not afford to develop themselves yet they still have the option to steer development if they so desire.

3.5.2 Innovate and collaborate: Open source empower libraries to innovate and collaborate. Not only we can download and use open-source software for free, we're free to alter it in any way we see fit.

3.5.3 Choose the support: In a proprietary software development model, we pay high license fees to use the software. If our vendor isn't providing us with adequate support or isn't allowing us the freedom to customize and improve the software to meet our needs, switching vendors means switching software. And then there's the matter of migrating the data from one vendor to the next: with open-source software, since all we're paying for its support, switching to another service provider or migrating to an in-house solution is simple. Further, an open-source software development model means that our data is OUR data. In case of OSS, customers have unfettered access to all of their data all of the time in standard formats at no additional charge.

3.5.4 The future is 'open': Open source in libraries has its challenges as well. Till now, library software vendors have built their businesses around a proprietary software development model, and, as a result, libraries have been slow to adopt open source. Many libraries simply do not have the in-

house expertise to support open-source software development, and also don't have the ability to train staff on the use of the new technologies. They rely on software vendors to provide them with solutions. This is where LibLime comes in. We're informing libraries about the superiority of the open-source development model so they can provide their patrons with better technology services, faster and cheaper. And we make it possible for vendor-reliant libraries to use open-source software by providing them with outstanding support and training options.

3.6 Licenses for Open Source Software

The most common and popular licenses for Open Source Software include-

3.6.1 GNU Public License (GPL)

The GPL originated from the GNU project of Richard Stallman is one of the original and most common software licenses. This license is now used by most GNU programs, as well as a large number of free software programs that are not part of the GNU project; it is the most commonly used free software license. It gives all recipients of a program the right to run, copy, modify and distribute it, while forbidding them from imposing further restrictions on any copies they distribute. This idea is often referred to as copyleft. It states that-

- Software released under it must be given away freely with its source code.

- Any code derived from the original source is also under the GPL and must be given away freely.

3.6.2 Limited GNU Public License (LGPL)

In 1991, the GNU Lesser General Public License (LGPL), then known as the Library General Public License, was written for certain libraries. 1991 also saw the release of version 2 of the GNU GPL. The GNU Free Documentation License (FDL), for documentation, followed in 2000. The GPL and LGPL were revised to version 3 in 2007, improving their international applicability, and adding protection for users whose hardware restricts software changes. Most GNU software is distributed under the GPL. A minority is distributed under the LGPL, and a handful of packages are distributed under permissive free software licences. This is similar to the GPL but includes one extra provision. It allows software, mainly function libraries to be released so that non-open software may use it.

3.6.3 BSD Style License

BSD licenses are a family of permissive free software licenses. The original license was used for the Berkeley Software Distribution (BSD), a Unix-like operating system after which it is named. The original owners of BSD were the Regents of the University of California because BSD was first written at the University of California, Berkeley. The first version of the license was revised, and the resulting licenses are more properly called modified BSD licenses. Two variants of the license, the New BSD License, and the Simplified BSD License

have been verified as GPL-compatible free software licenses by the Free Software Foundation. The licenses have fewer restrictions on distribution compared to other free software licenses such as the GNU General Public License or even the default restrictions provided by copyright, putting works licensed under them relatively closer to the public domain.

3.6.4 Artistic License

The Artistic License refers most commonly to the original Artistic License (version 1.0), a software license used for certain free and open source software packages, most notably the standard Perl implementation and most Comprehensive Perl Archive Network (CPAN) modules, which are dual-licensed under the Artistic License and the GNU General Public License (GPL). The original Artistic License was written by Larry Wall. The name of the license is a reference to the concept of artistic license. The terms of the Artistic License 1.0 were at issue in a 2007 federal district court decision in the United States which was criticized by some. Presently it is declining in popularity.

3.6.5 Netscape Public License and Mozilla Public License

Mozilla is the custodian of the Mozilla Public License (MPL), an open source/free software license. The current version of the license is MPL 1.1 (html | plain text). There is an annotated version to help people understand the license, and a FAQ (Frequently Asked Questions) to help to use or distribute code licensed under it. Any new code checked into Mozilla's source repositories needs

to comply with the source code licensing policy. Generally, this means using the Mozilla tri-license, which offers users the choice of the MPL, or the GNU Project's LGPL or GPL. Some Mozilla projects have terms other than the MPL or tri-license. Detailed information on the licensing of our existing code can be found by inspecting the relevant source code, or by visiting the license information page in the relevant Mozilla software. Originally developed for Netscape's Open Source, these licenses released their Navigator web browser. They allow changes to be taken private and Netscape Public License (NPL) gives special privileges to Netscape itself.

3.6.6 Apple Public Source License (APSL)

The Apple Public Source License is the open source and free software license under which Apple's Darwin operating system was released. The first version of the Apple Public Source License was approved by the Open Source Initiative (OSI). Version 2.0, released July 29, 2003 conforms to the Free Software Foundation guidelines, and is also approved by the OSI. The Free Software Foundation approved the Apple Public Source License 2.0 as a free software license and say it is acceptable for developers to work on projects that are already covered by this license. They recommend, however, that developers do not release new projects under this license, because the partial copyleft is not compatible with the GNU General Public License and allows linking with files released entirely as proprietary software. The license does, however, require that

if any derivatives from the original source are released externally, that the source be made available. This license has three fundamental flaws-

- Changes

- Even for private use

- Must be returned to Apple Groups releasing modified versions must contact Apple about it and license can be resolved by Apple at any time.

3.7 OSS for Developing Institutional Repository/Digital Library

The creation of institutional repositories involves the use of suitable software & hardware. For building institutional repositories so many open source software is available today. Different software has different special features. Every details of the each software's are available on the own software web pages and which is searchable & freely usable. To build institutional repository in any institutions, the institution has to select the comfortable one according to their aim and need. Here, we have mentioned some popular institutional repositories software's in details which are being used by different institutions.

Software	DSpace	Eprints	Greenstone	Fedora	Invenio	Opus
Company / **developer**	MIT Libraries &Hewlett Packard Labs	University of Southampton	University of Waikato	Virginia & Cornell Universities	CERN Document Server Software Consortium	The Hug
OS family	Cross-platform	Cross-platform	Cross-platform	Unix-like	Unix-like	Cross-platform
Development Status	Active	Active	No information	Current	Active	

Source model	Institutional repository software	Institutional repository software	Digital libraries	Free and open source software	Institutional repository, Digital library	Content Management System
Initial release	November 2002	2000	2000	2003-11-16[1]	No information	No information
Latest stable release	1.6.2 / 16 June 2010; 4 months ago	3.1.3 / May 13, 2009; 17 months ago	Greenstone2: 2.83, Greenstone3: 3.02	14 (Laughlin) / November 2, 2010; 5 days ago	0.99.1 / July 10, 2008; 2 years ago	2.28 / July 6, 2008
License	BSD licence	GPL	GPL	GNU GPL & Various others.	GPL	GPL
Written in	Java	Perl	Java	No information	Python	PHP
Available language(s)	No information	No information	Multilingual	Multilingual	Multi-lingual	No information
Default user interface	No information	No information	Graphical Librarian Interface (GLI)	GNOME	No information	No information
Official website	http://www.dspace.org/	http://www.eprints.org/	http://www.greenstone.org/	**http://www.fedora.info/**	http://invenio-software.org/	**http://opussoft.com**

Table 3: Configuration of different IR Software

3.7.1 D-space Software (http://www.dspace.org)

D-space is a digital repository system that captures, stores, indexes, distributes & preserves an organization's research data. D-space is the software of choice for academics, non-profit, and commercial organization building open digital repositories. It is free and easy to install and completely customizable to fit the needs of any organizations. D-space is jointly developed by Massachusetts

Institute of Technology (MIT) libraries and Hewlett-Packard (HP) labs released in November, 2002.

D-space integrates a user community orientation into a system's structure. This design supports the participation of the schools, departments, research centers and other units typical of a large research institution. D-space was developed in responds to expressed faculty need for an easy to use, dependable service that could manage, host, preserve & distribute materials in any type of digital medium formats i.e. Journal papers, Data sets, Electronic theses, Reports, Conference posters, Videos, Images, jpeg, mpeg, tiff files etc.

3.7.1.1 History

The first version of DSpace was released in November 2002, following a joint effort by developers from MIT and HP Labs in Cambridge, Massachusetts. In March 2004 the first DSpace User Group Meeting (DSUG) took place at Hotel@MIT, and it was there that the first discussions concerning the DSpace community and its future governance were discussed in earnest. The DSpace Federation formed a loose grouping of interested institutions, while the DSpace Committers group was formed shortly after, consisting of five developers from HP Labs, MIT, OCLC (Online Computer Library Centre), University of Cambridge, and University of Edinburgh. Later two further developers from Australian National University and Texas A & M University also joined this group. DSpace 1.3 was released in 2005, and at around the same time the second DSpace User Group Meeting was held at the University of Cambridge. Following

this, two further smaller user group meetings were spawned, the first in January/February 2006 in Sydney, and the second in April 2006 in Bergen, Norway. In March 2008, the DSpace Community released DSpace 1.5. In March 2010, DSpace 1.6 was released.

3.7.1.2 Features of D-Space

Some of the most important features of DSpace are as follows-

- Submission facility allows scientists and researchers to upload digital documents from anywhere in the world;

- Workflow feature allows moderation of the submitted documents;

- Uses persistent handles;

- Conforms to the standards like Dublin Core and OAI-PMH v.2.0;

- Security can be built at various levels to effect restricted access;

- *Indian Language based digital libraries can be built as it conforms to the UNICODE standard;*

- D-Space indexes digital content, so users can search and retrieve results quickly;

- D-Space distributes digital content over the World Wide Web and also searchable through search engines;

- Easy to upgrade;

- D-Space preserves digital materials over the long term;

- Storing reusable teaching materials that can use with course management systems;

- Showcasing students' theses or research works;

- Keeping track of a publications/bibliography;

- Having a persistent network identifier for work, that never changes or breaks;

- No more page charges for images. We can point to our images' persistent identifiers in our published articles.

D-Space's most important functions are to facilitate preservation and access to digital objects. D-Space has a number of preservation features including the ability for libraries to set preservation support by file type, checksums to ensure file authenticity, and persistent identifiers. D-Space uses open standards to facilitate interoperability and hence makes it easy to re-use metadata and for search services, such as Google, to crawl content.

3.7.1.3 DSpace Foundation

On 17 July 2007, Hewlett-Packard and Massachusetts Institute of Technology jointly announced the formation of the DSpace Foundation, a non-profit organization that will provide leadership and support for the DSpace community.

3.7.1.4 DuraSpace

On 12 May 2009, Fedora Commons and the DSpace Foundation joined their organizations to pursue a common mission. The joint non-profit organization is called DuraSpace. DuraSpace's mission is to provide leadership and innovation in open source and cloud-based technologies primarily for libraries, universities, research centers, and cultural heritage organizations. DuraSpace provides leadership and support for both DSpace and Fedora (software).

3.7.1.5 Community Development Model

The DSpace community has attempted to base its formal structure along the same lines as the Apache Foundation community development model. That is, there is a user-base, within which is contained a subset of developers, some of whom are contributors to the core codebase. The developments by these contributors are then added to the distribution under the curation of a core team of committers, whose job is to ensure that the code meets the various guidelines laid out in the developer documentation, and that it contributes effectively to the direction of DSpace development. The community is serviced technologically by a development base at SourceForge, and a number of mailing lists for technical queries and development discussion, as well as a general list for non-technical community members. Membership of the community is implied by being interested and involved - there are no formal membership fees or lists.

3.7.1.6 Technology

DSpace is written in Java. It uses a relational database, and supports the use of PostgreSQL and Oracle. It currently support two primary web interfaces— a classic one which uses JavaServer Pages (JSP) and the Java Servlet, Application Programming Interface (API), and a newer interface (XMLUI) based on Apache Cocoon and using Extensible Markup Language (XML) and Extensible Stylesheet Language Transformations (XSLT) technologies. DSpace holdings are made available primarily via a web interface, but it also supports the OAI-PMH v2.0, and is capable of exporting METS (Metadata Encoding and Transmission

Standard) packages. Future versions are likely to see increasing use of web services, and changes to the user interface layer.

3.7.1.7 System Architecture

The DSpace architecture is a straightforward three-layer architecture, including storage, business, and application layers, each with a documented Application Programming Interface to allow for future customization and enhancement. The storage layer is implemented using the file system, as managed by PostgreSQL database tables. The business layer is where the DSpace-specific functionality resides, including the workflow, content management, administration, and search and browse modules. Each module has an API to allow DSpace adopters to replace or enhance that function as desired. Finally, the application layer covers the interfaces to the system: the web UI and batch loader, in particular, but also the OAI support and Handle server for resolving persistent identifiers to DSpace items. This is the layer that will get much of the attention in future releases, as we add web services for new features (e.g., to support interoperation with other systems) and define Federation services across the range of institutions adopting DSpace.

3.7.1.8 User Interface

DSpace's current user interface is web-based. There are several interfaces: one for submitters and others involved in the submission process, one for end-users looking for information, and one for system administrators. The end-user or public interface supports search and retrieval of items by browsing or searching the metadata (all fields for now, and specific fields in the near future). Once an

item is located in the system, retrieval is accomplished by clicking a link that causes the archived material to be downloaded to the user's web browser. "Web-native" formats (those which will display directly in a web browser or with a plug-in) can be viewed immediately; others must be saved to the user's local computer and viewed with a separate program that can interpret the file (e.g., a Microsoft Excel spreadsheet, an Statistical Analysis Software dataset, or a [computer-aided design](#) and [computer-aided manufa](#)cturing file).

3.7.2 E-prints (http://www.eprints.org/)

E-prints is a free open source software and developed at the School of Electronics and Computer Science, University of Southampton, United Kingdom and released under GPL license in 2000. It is the most flexible platform for building high quality, high value repositories, recognized as the easiest & fastest ray to set up repositories of research literature, scientific data, students thesis, project reports multimedia artifacts, teaching materials, scholarly collections, digitized records exhibitions & performances.

E-print is open source software for building open access repositories that are complaint with the open archive initiatives protocol for metadata harvesting. It shares many of the features commonly seen in document management systems but is primarily used for Institutional Repository & scientific journals.

3.7.2.1 History

EPrints was created in 2000 as a direct outcome of the 1999 Santa Fe meeting that launched what eventually became the OAI-PMH. The EPrints software was enthusiastically received and became the first and one of the most widely used free open access, institutional repository software, and it has since inspired the development of other software that fulfil a similar purpose. Version 3 of the software was officially released on the 24th January 2007 at the Open Repositories 2007 Conference and was described by its developers as "a major leap forward in functionality, giving even more control and flexibility to repository managers, depositors, researchers and technical administrators."

3.7.2.2 Features of EPrints

Some of the very useful features of EPrints are as follows-

- browsing of records by the "keywords" metadata field & alphabetized listing of the author names;

- Customization of repository homepage, metadata fields, and document types;

- It is Unicode-compliant, so the repositories' content and user interface can be in any language that has a script;

- Depending on the open source on which GNU EPrints is being installed, most of the dependent software can be installed along with the operating system;

- The document types and their corresponding metadata elements can be easily configured, if required;

- Browse views can be generated for any of the metadata fields;

- The look and feel of the repository site is easily customizable as required;

- If required, access to full texts can be restricted. At times, to comply with the publishers' policy the repository administrator has to enforce this restriction. The restriction can be revoked anytime. In the latest version of the software, it is possible to send an e-mail request to the authors to get a copy of such restricted articles;

- Local customizations can be retained when the repository is upgraded to newer versions of the software;

- Porting the contents of a repository to a physically different server can be done easily;

- Batch inputting of records can be easily done using the "import_eprints" script;

- Rendering of mathematical and chemical equations and symbols in their actual form can be achieved by encoding the equations and symbols in Latex.

3.7.2.3 E-Prints Services

Apart from the above-mentioned features, E-prints offer different types of services i.e. Hosting & maintaining the repositories, Customizing the repository to user's specification, Importing the legacy data, Providing customized training for repository managers and Information Technology personnel, Assisting with advocacy & promotion, Providing expert project management from project proposed to product launch etc.

The latest version of E-Prints has some major advantages of less typing, more quality inaccurate or miss-spelled data and missing details is a major challenge for repositories, helps users enter quality metadata with fewer keystrokes by using a name authority. For starters, the repository itself can be

used as an authority; metadata already entered in other records - author names, journals, conferences, funding bodies, institutions - is used to create a shortlist. Alternatively, a repository administrator can create a name authority file, or connect E-Prints directly to an external authority service.

Moreover, the E-Prints services team provides a fee-based advice and consultancy service that can deliver a range of solutions, from initial help and guidance through to a completely managed service for an institutional repository.

E-Prints introduces a flexible plugging architecture which makes it easy to create new import and export plugging, opening up. E-Prints to be used with an enormous range of software and services, and making E-Prints the most interoperable platform available for building repositories.

E-Prints is the most flexible platform for building high quality, high value repositories, recognized as the easiest and fastest way to set up repositories of research literature, scientific data, student theses, project reports, multimedia artifacts, teaching materials, scholarly collections, digitized records, exhibitions and performances. Latest E-print 3.0 requires, apache server, mysql, perl modules such as Unicode::String, MIME::Lite, XML::LibXML, and XML::Parser, Gnome DOM (Document Object Model) libraries, the TeX system and ImageMagick for LaTeX equation rendering the antiword – Word document libraries: antiword and pdftotext (from xpdf) are used by E-Prints for full text indexing.

3.7.2.4 Technology

EPrints is a Web and command-line application based on the LAMP (Combinition of Linux, Apache HTTP Server, MySQL and Perl/PHP(Hypertext Preprocessor)/Python) architecture (but is written in Perl rather than PHP). It has been successfully run under Linux, Solaris and Mac OS X. A version for Microsoft Windows was released 17th May 2010. Version 3 of the software introduced a (Perl-based) plugin architecture for importing and exporting data, converting objects (for search engine indexing) and user interface widgets.

Configuring an EPrints repository involves modifying configuration files written in Perl or XML. The appearance of a repository is controlled by HTML templates, Cascading Style Sheetss (CSS) and inline images. While EPrints is shipped with an English translation it has been translated to other languages through (redistributable) language-specific XML phrase files. Existing translations include Bulgarian, French, German, Hungarian, Italian, Japanese, Russian, Spanish and Ukrainian.

3.7.3 Greenstone (www.inflibnet.ac.in/gsdl/cgi-bin/library)

The Greenstone Digital Library Software is a top of the line and internationally renowned Open Source Software system for developing digital libraries. It was promoted by the New Zealand Digital Library project research group at the University of Waikato, headed by Dr. Ian H. Witten, and is sponsored by the United Nations Educational, Scientific and Cultural Organization (UNESCO) (Shreekumar, 2008). The Greenstone was originally released in 2000

under the GNU public license with its current version 2.80, released in December 2007 and Greenstone3 version is parallel release (Bainbridge Witten, 2008). Greenstone3 is a complete redesign and reimplementation of the original Greenstone digital library software (Greenstone2).Greenstone is used in INFLIBNET for managing the UGC funded Major/Minor Research project and the database contained full text of the project report submitted to the University Grants Commission in Science, Humanities, Engineering & Technology, Medicine and Agriculture. The project reports were awarded to the permanent/regular, working/retired teachers in the Universities and Colleges under the Section 2(f) and 12B of the UGC Act, 1956. This full-text database is maintained by INFLIBNET Centre and the copy of the project reports were received by INFLIBNET Centre from the project investigators in soft copy.

3.7.3.1 Importance of Greenstone Digital Library Software Package

In order to develop an institutional repository/digital library, Greenstone Digital Library software is opted due to its features like full text searching, open source system for the construction and presentation of information collections. It builds collections with effective full-text searching and metadata-based browsing facilities that are attractive and easy to use. The GSDL software is very easy software with menu driven step-by-step process. Moderate computer literacy people can install and use the software option existing in GSDL. Transformation mode of digital library like local library and then web library is also advantage. GSDL is only software that has the simple windows operating system. Greenstone

has two separate interactive interfaces, the Reader interface and the Librarian interface. End users access the digital library through the Reader interface, which operates within a web browser. The Librarian interface is a Java-based graphical user interface that makes it easy to gather material for a collection (downloading it from the web where necessary), enrich it by adding metadata, design the searching and browsing facilities that the collection will offer the user, and build and serve the collection.

3.7.3.2 Features of Greenstone

The following are some of the silent features of GSDL relating to digital library context-

- Access and distribution – Web and CD-ROM (Compact Disc, read-only-memory);

- Multiplatform availability: It suits with both Windows (3.1/ 3.11, 95/98/me, NT/2000) and Unix (Linux Sun OS). Any of these systems may be used as a web server;

- Powerful Indexing;

- Full-text searching: It builds collection with effective full-text searching and metadata-based browsing facilities. Collections containing millions of documents, up to several gigabytes can be built. Full-text searching is fast because compression is used to reduce the size of the indexes and text users can browse the list of authors, titles, date, class no. etc;

- Field-based indexing;

- Automatic derivation, explicit assignment;

- Support for Dublin Core and other metadata;

- Boolean and ranked retrieval;

- Case folding, stemming;

- Browsing – Field-based and hierarchical document browsing;

- Support for several documents formats such as Text, HTML, Word, PDF (Portable Document Format), Bibliographic, E-Mail, PPT (Power Point), etc. and plugging can be written to accommodate new document types, the collection can contain pictures, music, audio, video clips, contain pictures, music, audio, video clips, etc;

- Common interface for different Digital Library collection;

- Configurability – indexing, browsing presentation;

- Multilingual support – documents and interfaces;

- Advanced compression for text and indexes;

- Collection administration;

- Access & updating security, activity log;

- Interoperability;

- Z39.50 is supported for accessing external servers and for presenting Greenstone collection to external clients;

- Open Archives Initiatives;

- Good documentation & support (e-mail);

- Strong Research and Development based development group;

- Collection can be updated and new one brought online any time without bringing down the system.

Furthermore, UNESCO web page says about the aim of this software "is to empower users, particularly in universities, libraries, and other public service institutions, to build their own digital libraries. Digital libraries are radically reforming how information is disseminated and acquired in UNESCO's partner communities and institutions in the fields of education, science and culture around the world, and particularly in developing countries. We hope that this software will encourage the effective development of digital libraries to share information and place it in the public domain".

3.7.3.3 Steps for Installation of Software

Following steps are needed for installation of GSDL on Windows (Web Library) -

- Install the web server IIS (Internet Information Server)/Apache

- Install the Java 2 Runtime Environment from the internet (latest version)

- After installing J2RE (Java 2 Runtime Environment), Go to GSDL Folder "gsdl-2.41-win32" (Setup file) from the Internet "MyComputer-GSDL-"gsdl-2.41-win32.exe"

- Choose Setup Language. English [United States] is the default

- The Install Shield Wizard will begin the installation of GSDL software. Click<next>

- Accept all the terms of license agreement by clicking on <yes> button

- Choose the type of installation we need and choose the collection/s that we want to be installed.

- Set the admin password (The above step will install web library edition of GSDL and any other sample collection/s and/or GSDL documentation, Compact Disk exporting function depending on what was checked or unchecked)

- Check the Greenstone Directory Structure:

o D: gsdl/Collect

o CGI (Common Gateway Interface)-bin

o Micros

o Gli (Global Links Initiative) etc.

3.7.4 Fedora (http://www.fedora.info)

Fedora is a collection of software including an operating system based on the Linux kernel, developed by the community-supported Fedora Project and sponsored by Red Hat. The Fedora Project's mission is to lead the advancement of free and open source software and content as a collaborative community.

One of Fedora's main objectives is not only to contain software distributed under a free and open source license, but also to be on the leading edge of such technologies. Fedora developers prefer to make upstream changes instead of applying fixes specifically for Fedora this ensures that their updates are available to all Linux distributions.

Fedora has a comparatively short life cycle: version X is maintained until one month after version $X+2$ is released. With 6 months between releases, the

maintenance period is a very short 13 months for each version. This can lead to trouble should one wish to use a particular version of Fedora for product development (i.e., embedded systems) where long term support is more important than maintaining leading edge revisions of software. In 2008, Linus Torvalds, author of the Linux kernel, stated that he used Fedora because it had fairly good support for the PowerPC processor architecture which he favored at the time.

3.7.4.1 History

The Fedora Project was created in late 2003, when Red Hat Linux was discontinued. Red Hat Enterprise Linux was to be Red Hat's only officially supported Linux distribution, while Fedora was to be a community distribution. Red Hat Enterprise Linux branches its releases from versions of Fedora.

The name of Fedora derives from Fedora Linux, a volunteer project that provided extra software for the Red Hat Linux distribution, and from the characteristic fedora used in Red Hat's "Shadowman" logo. Fedora Linux was begun in 2002 by Warren Togami as an undergraduate project, intended to provide a single repository for well-tested third-party software packages so that non-Red Hat software would be easier to find, develop, and use. The key difference between the approaches of Fedora Linux and Red Hat Linux was that Fedora's repository development would be collaborative with the global volunteer community. Fedora Linux was eventually absorbed into the Fedora Project, carrying with it this collaborative approach. Fedora is a trademark of Red Hat, and although this had previously been disputed by the creators of the unrelated Fedora repository management software, the issue has now been resolved.

3.7.4.2 Features

The key features of Fedora Repository Software are-

- Store all types of content and its metadata

o Digital content of any type can be managed and maintained

o Metadata about content in any format can be managed and maintained

- Scale to millions of objects

- Access data via Web API (Application Programming Interface)s (REST/SOAP)

- Provide RDF (Resource Description Framework) search (SPARQL)

- Rebuilder Utility (for disaster recovery and data migration)

- The entire repository can be rebuilt from the digital object and content files.

- Content Model Architecture (define "types" of objects by their content)

- Many storage options (database and file systems)

- JMS (The Java Message Service) messaging (your apps can "listen" to repository events)

- Web-based Administrator GUI (Graphical User Interface) (low-level object editing)

- OAI-PMH Provider Service

- GSearch (fulltext) Search Service

- Multiple, customer driven front-ends.

3.7.5 Invenio (http://invenio-software.org/)

Invenio is an open source software package that provides the tools for management of digital assets in an institutional repository. Invenio was developed by the CERN Document Server Software Consortium, and is freely available for

download. Free and paid support models are available. The technology offered by the software covers all aspects of digital library management from document ingestion through classification, indexing, and curation to dissemination. Invenio complies with standards such as the Open Archives Initiative metadata harvesting protocol (OAI-PMH) and uses MARC 21(Machine-Readable Cataloging) as its underlying bibliographic format. The flexibility and performance of Invenio make it a comprehensive solution for management of document repositories of moderate to large sizes (several millions of records).

Invenio has been originally developed at CERN to run the CERN document server, managing over 1,000,000 bibliographic records in high-energy physics since 2002, covering articles, books, journals, photos, videos, and more. Invenio is being co-developed by an international collaboration comprising institutes such as CERN (European Organization for Nuclear Research), DESY (Deutsches Electronen-Synchrotron), EPFL (Ecole Polytechnique Federale de Lausanne), FNAL (Fermi National Accelerator Laboratory, US, Dept of Energy), SLAC (National Accelerator Laboratory, Stanford University) and is being used by about thirty scientific institutions worldwide.

3.7.5.1 History

Prior to July 1, 2006 the package was named CDSware (OAI-compliant software for document). Since the release of version 0.90.0 in 2006, the software has been renamed CDS Invenio. Nowadays the software is known under the name OF Invenio.

3.7.5.2 Features of Invenio

The main features of Invenio are-

3.7.5.2.1 Navigable collection tree

- Documents organised in collections;

- Regular and virtual collection trees ;

- Customizable portalboxes for each collection;

- At CERN, over 1,000,000 documents in 700 collections.

3.7.5.2.2 Powerful search engine

- Specially designed indexes to provide fast search speed for repositories of up to 2,000,000 records

- Customizable simple and advanced search interfaces

- Combined metadata, fulltext and citation search in one go

- Results clustering by collection

3.7.5.2.3 Flexible metadata

- Standard metadata format (MARC)

- Handling articles, books, theses, photos, videos, museum objects and more

- Customizable display and linking rules

3.7.5.2.4 User personalization

- user-defined document baskets

- user-defined automated email notification alerts

- basket-sharing within user groups

- Amazon-like user comments for documents in repository and shared baskets

3.7.6 OPUS System (http://opussoft.com)

Opus is a free, open source content management system for publishing content on the world wide web and intranets. It is written in the PHP programming language and uses the MySQL database.

3.7.6.1 History

Opus was developed to publish a web site and online newspaper for the village of Milton, Cambridgeshire, United Kingdom. Most of the original Opus code was written by Paul Oldham.

3.7.6.2 Features

Opus is easy to use, and once installed requires little or no knowledge of PHP (Hypertext Preprocessor), MySQL or HTML to maintain. The default layout has a sidebar with links to articles, and a top-left icon, with a main panel extended right from the sidebar in which the content resides but it is possible, through the use of templates, to create web pages laid out in any way the site owner wishes. It supports the publication of news articles in a most-recent-first format with an option to allow blogging and to add an RSS (Really Simple Syndication) feed. It has a flexible authentication system that allows editors to be granted selective rights over different areas of the site.

3.8 Conclusion

Use of open source software by the libraries has been increasing since the recent past years. The adoption of open source software has enabled to revolutionize the concept of library services in the digital era. Potential of using open source software in library will lead to maintain the technical competency of

a library and will be a solution for the shrinking library budget. A library running with only open source software for all its services will not be a distant dream.

Philosophy behind sharing source code of a program not only ensures to check the cost escalation on the acceptability and popularity of the program, but also gives assurance of the sanctity of the program. Security is assured on open source code as the user will be aware of execution of each piece of code. Collaborative coding can lead to unprecedented quality of the programs. From the 1000 lines code of basic Linux kernel, it has grown to a sophisticated, full-fledged robust and reliable free operating system due to the contribution of selfless volunteers.

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CHAPTER 4
INSTIUTIONAL REPOSITORY OF NEHU: An Overview

4.1 Introduction

North-Eastern Hill University (NEHU), one of the premier institutes of India was established in 1973 with the motto of disseminating and advancing knowledge in the Northeastern region. The main campus of the University is located at Mawlai of East-Khasi Hills District of Meghalaya, which is covered with verdant green pine trees. The University has another campus located at Tura in Meghalaya. This potential university has been able to

attract persons with brilliant academic career from almost all parts of the country even from abroad to serve as its academic fraternity.

In a short span of 37 years, NEHU has shown its intellectual excellence in education and research. In 2006, it had been chosen as a 'University with Potential for Excellence' by the University Grants Commission (UGC). It is a great proud for the university to be counted among the top selected universities of India. There are 67 undergraduate colleges affiliated to NEHU awarding professional and other degrees. NEHU is among the first few selected Universities, which provide affiliation to Minority Educational Institutions from all over the country.

The University has progressed continuously in research, consultancy and extension services. Currently it has research collaborations with more than 20 institutions of repute in the country and 7 abroad. A University Academic Staff College has also established under the university. The University hosts two Rajiv Gandhi chairs, one in the areas of 'Tribal Development' sponsored by the Rajiv Gandhi Foundation, and the other on 'Protective Discrimination' sponsored by the Ministry of Human Resource Development, Government of India. It also received a special grant from the UGC for setting up the North-East India Centre of Diversities. The Centre will display the rich diversities of the region through a Cultural Park and a Bio-Park. The University has also been identified for PIHEAD (Promotion of Indian Higher Education Abroad), Study India Programme and as the EDUSAT (Education Satellite) hub for Northeast.

4.2 North-Eastern Hill University (NEHU) Library

The NEHU central library was started with a collection of 600 books in 1973. Now

it is a premier university library of the North-Eastern Region with a collection of over 2.3 lakhs volumes of books and bound periodicals. The library is also supplemented by huge information resources available through the UGC-INFONET Consortium and the links to global information resources and services provided on its webpage.

The NEHU Central Library is now ready with its high potential technological strategies to provide sound in-house and online services. It has initiated a major effort to provide the best services through internal renovation, optimization of available resources and introducing innovative services. The institutional repository of NEHU is one of these services.

4.2.1 Library Services

The Central Library of NEHU is providing library services through Internet-

4.2.1.1 Bibliography-on-Request: Bibliography-On-Request is a customized service offered to the students, research scholars, faculty and administrative officials of the university who are registered members of the university library. This service is provided by the Documentation Section, of the library. This service has been launched on the library's website with a view for providing library members an appropriate channel for obtaining the request form for bibliographies or reading lists on diverse topics relevant to their research works or projects. All requests are subject to authentication of the applicants' membership in NEHU Central Library, Shillong or NEHU Campus Library, Tura.

4.2.1.2 Citation Verification Service: Citation Verification Service is a new service launched by the Documentation Section of NEHU Central Library. It assists the students, research scholars and faculty of the university in the verification of citations/references and authentication of bibliographical details of books, articles, reports, theses and other published material. The service has been launched on the library's website with a view to providing library members an appropriate mechanism for verification of citations/references obtained from sources other than authoritative indexing and abstracting services offered by reputed publishers and licensed database producers.

4.2.1.3 Database Search Service: Database Search Service (DBSS) is a new service launched by the Documentation Section of NEHU Central Library. This service is specifically for the M.Phil/Ph.D. scholars and university faculty for obtaining information critical to their proposed or ongoing research work. The accuracy of the search results will be determined by the specificity and validity of keywords/combinations of search terms selected by the applicants, as well as the availability and accessibility of authoritative and licensed online/CD-ROM databases. Some very important rules related to this service are-

- Request Form submitted as E-Mail attachment will also be entertained;

- All requests will be attended to only on University working days;

- Search results will normally be sent as E-Mail attachment at the E-Mail address submitted by the applicant;

- For getting print-outs/photocopies of search results, users have to pay on the spot;

- Applicants will be informed about the amount needed to be paid in advance for fax transmission, courier or speed post delivery of search results;

- In case no response is received within one week, an applicant may contact the Information Scientist on Monday to Friday.

4.2.1.4 Document Delivery Service: The Document Delivery Service is a new service initiated by Information and Library Network (INFLIBNET) Centre in collaboration with six university libraries which serve as Document Delivery Centres and deliver, on demand at nominal cost, the copies of papers from learned journals, conference proceedings and other materials available in their collections. The role of INFLIBNET is mainly to act as a catalyst in promoting this service to the academic and research community in India. This service is being operationalised in the North-Eastern Hill University by the Documentation Section of the NEHU Central Library, Shillong. The service is open to anyone who is working or studying in the academic and research institutions, government departments and other public funded organizations. Requests from profit making and commercial organizations will also be accepted. However, priority will be given to the requests received from registered members of NEHU Central Library, Shillong and NEHU Campus Library, Tura. Requests with incomplete bibliographical information of items required will not be entertained.

4.2.1.5 E-Query Service: E-Query Service is a Web-enabled contemporary reference service offered to the registered members of the NEHU Central Library, Shillong and NEHU Campus Library, Tura. The Documentation, Reference and Enquiry Sections of the NEHU Central Library together handle queries received

in person or by post/e-Mail. E-Queries may sometimes need to be followed-up with telephone, fax, regular mail, or personal interactions. E-Query Service is provided in two forms: i) In instances where information can readily be obtained from sources available in the NEHU Central Library, appropriate and brief information gathered in response will be sent to the enquirer through e-Mail within three consecutive working days from the date of receipt of the query. 2) In instances where the nature of the query and the information sought warrant retrieval of extensive data/information/graphics from print and/or digital resources, the responses will generally include contact information or links to specific websites, databases and other information resources. In such cases, a period of at least one week may be required by the library to respond.

4.2.1.6 E-Mail Alerts: E-Mail Alerts Service is a special service offered to the registered members of the NEHU Central Library, Shillong and NEHU Campus Library, Tura, who submit their User Interest Profiles. This service provides web-based Selective Dissemination of Information (SDI). It has been launched by the Documentation Section of NEHU Central Library on the library's website with a view to providing the registered library members an appropriate channel for receiving the latest updates, news, events trends, and research and development concerning their areas of interest. The comprehensiveness and accuracy of the information sent through E-Mail Alerts Service is subject to availability and accessibility of relevant resources and services.

4.2.2 Services Available In-House

- Audio-Visual and Microform Services;

- Consultation Services for Visitors/Scholars from Other Institutions;

- Contents Alerts Services;

- Databases available in the Library;

- Enquiry Desk;

- Inter-Library Loan Services;

- Internet Access;

- Lending, Renewal & Reservation Services;

- List of Additions(Books);

- Library Tours and User Orientation Programmes;

- Reprography/Word-Processing/Scanning Services;

- User Awareness Lecture-cum-Demonstrations.

4.3 University with Potential for Excellence (UPE)

'Universities with Potential for Excellence' is a financial grant system introduced by University Grant Commission (UGC) for the development of higher academic institution. The Indian higher education system has, in recent times, become fully aware of the need for quality. Hence, institutions will have to adapt modern methods of teaching and learning, developing learner-friendly teaching materials, changing their evaluation methods and striving for excellence, to sustain them in this competitive world.

Quality and excellence do not happen by accident. Organized and focused efforts are needed to achieve global standards in post-graduate teaching and research programmes. Universities are also expected to have a strategy to ensure that the positive outcome of these innovations in teaching penetrate to the undergraduate level.

The UGC initiated this approach in five universities (Jawaharlal Nehru University, Hyderabad University, Madras University, Pune University and Jadavpur University) in the IX Plan period. Later on it identified few more universities and supported them during the X Plan to improve their academic infrastructure and research facilities. NEHU was selected in the XI plan for the period of 2007 to 2012. These universities are achieving better standards in teaching and focusing on research in selected thrust areas.

4.3.1 Objectives

The core objectives of Universities with Potential for Excellence (UPE) project are as follows-

- To strengthen the academic and physical infrastructure for achieving excellence in teaching, research and outreach programmes;

- To promote flexible and effective governance;

- To enhance the quality of the learning process and teaching at the undergraduate and postgraduate level with the help of a flexible credit based

modular system, and a whole range of innovations currently accepted across the world;

- To promote academic programmes relevant to the social and economic needs of the nation;

- To improve undergraduate education in colleges by the interfacing of the Post Graduation programme;

- To promote networking with other centres/departments and laboratories in the country;

- To achieve excellence in education, training and research to face the challenge of globalization.

In brief, these innovations would constitute the foundation of the new approach and improved mode of internal governance, the establishment of more and more autonomous colleges and a different system of examinations, marking a gradual but planned transformation.

4.3.2 Purpose

The prime purpose of this financial assistance is to improve academic infrastructure and research facilities in the university libraries.

4.3.3 Amount Ceilings

The upper limit of financial assistance for the scheme is thirty crore rupees

for a period of five years.

4.3.4 Eligibility

Universities would become eligible for this financial grant, if they satisfy the following pre-requisites -

- Accreditation by National Assessment and Accreditation Council (NAAC);
- Should have had at least 25% of the existing postgraduate departments been identified by the UGC under SAP/COSIST programme/National facility/Innovative programmes;
- Proven evidence of successful academic, administrative and financial reforms during the last decade;
- Substantial research and development activity initiated through projects from external funding during the last decade;
- Potential for evolving an effective academic and management system that can serve, in general, as a model for reorganizing the university system in the country.

4.3.5 Nature of Assistance

The upper limit of financial assistance for the scheme is thirty crore rupees for a period of five years. The details of funding and its use would be finalized by the monitoring committee which would have the following membership-

- One member of the Standing Committee

- One other Expert

- UGC Vice-Chairman or his nominee

4.3.6 Tenure

The tenure of the scheme shall extend to the entire duration of the XI Plan period (2007-2012). There will be no extension beyond this period.

4.3.7 Procedure for Applying for the Scheme

The application will be invited through a UGC notification and the UGC Website. Interested universities have to apply through this form. Subject to the fulfilment of the criteria, universities have to send ten (10) copies of the proposal of their University directly to the Joint Secretary, University Grants Commission, Bahadur Shah Zafar Marg, New Delhi - 110 002.

4.3.8 Procedure for Approval of the UGC

Individual departments have been helped by the UGC with a number of wide ranging development schemes. It is time to go beyond that kind of assistance. Each university with all its components is to be treated as a unit. Everything connected with the campus and colleges wherever they exist is to be improved in terms of funding, range of activities, ratio between investment and output and the quality of performance. It is envisaged that only those universities which have potential for excellence may look forward to such financial assistance of the programme.

4.3.8.1 Selection Process

- The Standing Committee shall assess the proposals received from various universities based on the competence and academic credentials of the universities;

- The short listed universities will be invited for presentation of their proposals before the Standing Committee;

- The Standing Committee would recommend suitable names to the Commission for assistance;

4.3.8.2 Standing Committee

The Standing Committee consisting of following nine members would recommend suitable names to the Commission for assistance -

- Two Commission members, one of them being the Vice-Chairman,

- Two academicians of repute (one from the Sciences and one from the Humanities and the Social Sciences),

- One person with a background of technology,

- One eminent person connected with the National Laboratories,

- One eminent person from industry,

- One eminent educationist,

- One person with expertise in distance education.

The Monitoring Committee would visit the university at least for one day,

interact with the faculty and others also who may be concerned and work out a plan of action which would then be presented to the Standing Committee for approval and amendment, if necessary. This whole process should not take more than two months.

The same Committee, without necessarily revisiting the university, would review the progress made at the end of one year and report to the Standing Committee within two months of the completion of each year.

4.3.9 Procedure for Release of Grants by the UGC

The University will present its plan of action before the Expert Committee. The grant, which is for creating excellence, will be sanctioned based on the merit of the plan in any sector/area. This plan should be basically to provide superior education with the new developments and challenges, both of the present and the future. This seed money shall, however not be utilized, until the Plan of Action submitted by the University is finally recommended by the Committee along with the critical requirements of items and is then finally approved by the Commission. The review of progress in this respect shall be undertaken every year. The status and privilege may be withdrawn on non performance and the funding already given, may be refunded or adjusted against the grant of the university. Designating these institutions with the potential of excellence and the amount of the funding shall be decided on the basis of competence and value of the proposal.

4.3.10 Procedure for Monitoring the Progress of the Scheme

The scheme shall be reviewed, monitored and evaluated from the date of

its implementation from time to time by the Standing Committee in consultation with different monitoring committees. These committees will consist of two members in each Committee, and the Vice Chairman, UGC will be the Chairman of each Committee. The Standing Committee shall update the Commission with an assessment report with regard to the academic / research achievements and progress of the work done by the identified universities within six months after the completion of each year.

4.4 Institutional Repository of NEHU Central Library

The North-Eastern Hill University (NEHU) has been making many significant achievements in researches and has been publishing a great deal of research results. It is necessary for NEHU to fulfill a good model to preserve and disseminate those research outputs. Presently, NEHU has undertaken a project known as UPE (University with Potential for Excellence) for establishing an Institutional Repository; and the project was started in 2007 and it will continue till 2012. For this, NEHU has established an operational Institutional Repository system which is under the supervision of Prof A. S. Chandel, Visiting Fellow & Chairman, Library Digitization Section. There are two more out-sourced staffs under the supervision of the administrator, basically engaged with digitization. The repository is still in its infant stage. Therefore, now, it is too early to evaluate the institutional repository from users' point of view. The strength of the collection of the NEHU-IR is increasing day by day.

4.4.1 Goal of the Institutional Repository of NEHU

The goal of the NEHU repository is to maximize the visibility, usage, and impact of NEHU's research output. A secondary goal is to encourage the academic fraternity to produce more number of scholarly outputs. A third, de facto, goal is to preserve the scholarly output of NEHU for the future. The institutional repository of NEHU is clamoring for achieving all of these goals.

4.4.2 Growth and Development of the Institutional Repository of NEHU

Success does not come by fortune. Organized and focused efforts are needed to achieve national as well as international recognition. The building of institutional repository of North-Eastern Hill University has come across the following stages-

4.4.2.1 Planning Stage

The proposal for institutional repository was initiated from the Department of Library & Information Science of North-Eastern Hill University under University with Potential for Excellence by Late Prof Veena Saraf. The proposal was physically placed in front of University Grant Commission (UGC) in 2006. NEHU was identified as university with potential for excellence by UGC. The proposal went through various stages, which was finally approved by UGC and a grant of one crore was initially sanctioned in its XI plan (2007-2012). The tenure of this IR project is five years which is going to be completed in January, 2012.

For the planning of the institutional repository of NEHU, a steering committee was consisted under the chairmanship of the vice chancellor. This is

the highest level committee for this particular project. There are some other committees at departmental level with selected members. There is also an implementation committee for this project under the chairmanship of Prof A.S. Chandel with other six members, which take policy decisions in various matters. Some committees for technical purpose are also constituted for a specific work, like purchase of scanner, selection of software etc. There are also some external members for opting technical advices. The implementation committee had various meetings regarding the infrastructure of the institutional repository. In these meetings outside experts sought some suggestions. In this planning stage different relevant literatures were went through for gaining ideas for the same. Other libraries where institutional repository had been already planned and implemented were visited and experiences gained from those libraries were implemented in the planning of NEHU-IR.

Moreover, the committee also discussed about the modalities, training of the staffs, space requirements for the lab etc. The committee even identified the types of documents to be digitized and made available in the repository.

4.4.2.2 Implementation Stage

The lab for the creation and implementation of the institutional repository was established by the computer professionals and the hardware and software suppliers. Before that workstations networking were already set up. High speed of Internet connectivity is the basic requirement, failing which input, edit of records

are not possible. DSpace software was selected for running the repository. Installation of the software was done by hardware and software suppliers.

Technical expertise was developed from in-house staff. At the time of installation of the institutional repository software, extensive training was provided to concern library staff regarding basic administrative procedure like scanning, uploading, keeping back-up etc. For maintenance of the institutional repository, trained personnel and computer knowledgeable persons were selected.

Still there is a need of technical professional, who can take care of hardware maintenance and taking care of regular back up. There are three servers in the repository for keeping data secured.

4.4.2.3 Collection Development Stage

For the development of the collection of institutional repository of NEHU, the faculties were requested for depositing their publications. All faculty members were approached through Deans, HOD (Head of the Department), and co-coordinators to deposit their articles in the repository. To motivate them various meetings were conducted within the university. Letters were sent to each department for requesting the faculties to submit their publications. Of course, it is seen that personal meetings, individual talks have proved more effective than several circulars. It was very difficult to involve all faculty members in building Institutional Repository in the initial stage. The administrator of the repository used to talk to them formally and informally whenever and wherever he met them

and explained the usefulness of such collection for the contributors as well as for the users.

The collections of the institutional repository of NEHU have been collected on the following basis-

- Publication of the faculties of NEHU in any form,

- Theses with Abstract,

- Any publication which don't fall under copyright restriction and useful to the academic community,

- Administrative Documents,

- NEHU, Tura Campus,

- NEHU Journals,

- Examination question papers etc.

Publications of Science faculties have been archived in the repository; on the contrary faculties from Humanities and Social Sciences have not yet submitted their all publications. Theses of Social Sciences and Humanities have been digitized with abstracts. Collections of North-East are also digitized. Statutes, Ordinance, Executive Committee's decisions are being planned to be incorporated in the near future. All the issues of NEHU journal have been digitized and uploaded with full text. Question papers of various Masters programmes are also included to the repository.

The publications of research scholars are not yet included in the repository. If request come from their part, a separate community will be created for the research scholars.

In case of collection development of NEHU-IR, copy right issues have seriously taken into account. Those authors who don't want to allow for access of their publications, the administrator blocks such publications to be accessed without authorization. In such cases only metadata are accessible. Till now NEHU is not getting any problem from publishers in this regard. This problem may arise when there will be large numbers of articles under copyrights restriction.

4.4.2.4 Collection Management Stage

Most of the publications are submitted in hard copies, later on which are scanned and stored in files, and then these files are uploaded with the bibliographical data to form a single record with uploaded file. Before archiving the records, proper editing has done. After acceptance and approval of the text, it is included in the repository and records are placed in community and collection. The editing of metadata and approval of records are done only by the administrator.

For the security purpose of the contents of the repository, regular back-up is maintained. For keeping of back up extra hard disk and tape drive is used. Apart from this, the links of the contents are checked regularly.

4.4.3 Organization of NEHU-IR

There are two options for structuring content in the institutional repository: by document type or by subject area. To a certain extent the content and structure of a repository is influenced by the software controlling it. Thus 'communities and collections' are core to the DSpace software, while Eprints software allows managing by year, format or department. Both are user-configurable. As NEHU is running on DSpace Software, the repository is structured by communities and collections. Presently there are 38 communities in the institutional repository of NEHU, including Tura Campus, NEHU Journal and Examination Question Papers, Administrative Documents etc. Within these 38 communities total number of items is almost 2230 and total number of contributors is 830. The records of the NEHU repository have been uploading regularly since 2nd February of 2010. (http://dspace.nehu.ac .in/, accessed on 10/12/2010)

4.4.4 Problems Facing by NEHU-IR

There are some problems which institutional repository of NEHU is still facing. All the faculties of NEHU do not co-operate with the institutional repository project. Some of the faculties are not interested to deposit their publications in the repository. Apart from this, the institutional repository of NEHU is also facing hardware problems. Scanner and computers when go out of order, it takes time to repair them, since the engineers for scanners are not locally available. Besides this, selecting and purchasing of hardware is also a problematic area. Moreover, in some cases, for scanning, books have to be opened fully to separate the pages. In some cases pages have to be xeroxed before scanning.

Again, the number of outsourced person is not inadequate to complete the pending works for digitization. Moreover full time staff with capability of indexing all types of documents is required. Maintenance of hardware particularly, servers, network, scanners etc needs specialized technical skill.

4.5 Conclusion

Institutional repository is the most powerful tool to publish & provide the efficient service among the community of an institution. In fact, Institutional repositories are sometimes referred to as open digital libraries, and open models, such as open archives, have emerged at every level of intellectual property sharing. University Grants Commission (UGC) is also realizing the importance of hosting research activity of the institute, therefore, they have forced the institutions to create and develop their own institutional repository.

Institutional repositories are one of the most promising developments that utilize new web technologies to offer a viable and sustainable alternative to the current model of scholarly publishing. The repositories also serve as a comprehensive publications database of the parent organization. It facilitates better management of research knowledge, better visibility and wider access, better impact and citations, rapid communication of research, and long-term preservation. The institutional repository of North-Eastern Hill University is also in the way to achieve a great success in this regard. It is a unique example for rest of the universities of North-East region.

References

http://dspace.nehu.ac .in/

http://www.ugc.ac.in/

CHAPTER-5
DATA ANALYSIS AND FINDINGS

5.1 Analysis of Data

The purpose of the research work is to make an overall study on the institutional repository of North-Eastern Hill University (NEHU), based on the questionnaire of the faculties and research scholars as well as interview of the administrator of the repository. The data related to the study were collected by the scholar primarily through questionnaire and interview schedule. There are about 300 faculties and 150 research scholars, which form the total population. Therefore, as mentioned in the methodology, a stratified sampling technique was

adopted to obtain representative samples as the samples constitute a heterogeneous group. In total, 175 questionnaires were distributed among the faculties and research scholars, out of which 121 filled questionnaires were received there by giving a response rate of 69.14%. However, the non respondents constitute 30.86% in total. The data were tabulated for analysis in accordance to the objectives of the study. Some respondents furnished some valuable comments in the space provided for the purpose; those comments were incorporated in the study at the appropriate places.

5.1.1 Response Rate

Faculties and research scholars from different academic areas responded to the questionnaire. The Table-4 along with Graph-1 represents the response rate of the respondents of this particular study. Here 150 questionnaires were distributed among the faculties, out of which 110 are collected by the researcher. While, in case of research scholars out of 25 distributed questionnaires, 11 were came back.

No of Questionnaire	Sent	Returned	Response Rate
Faculty	150	110	73.33%
Research Scholar	25	11	44%

Table 4: Rate of Response
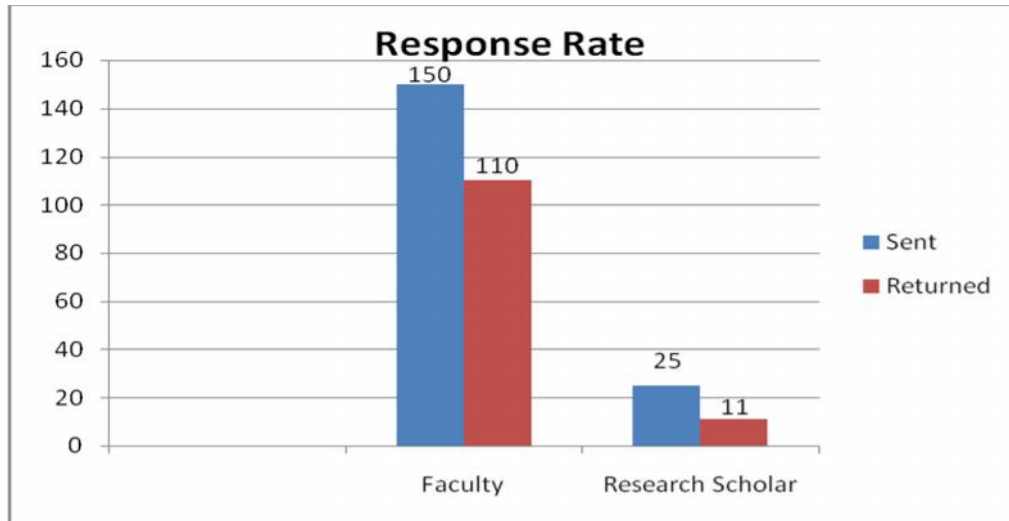
Graph 1: Rate of Response

The Table reveals that 73.33% faculties and 44% research scholars are responded to the questionnaire. It seems that faculties are more responsible and more interested towards the repository of their institute in comparison with the research scholars.

5.1.2 Year of Teaching Experiences

Table-5 shows the years of experiences of the faculties in their teaching fields. The analysis reflects that faculties within seven years of teaching experience formed a majority of the survey sample (31.82%), followed by faculties within eight to ten years of teaching experience (17.27%). The availability of scholarly material, research work and teaching material from more experienced faculties would be beneficial to the faculties with less experience.

Years of Experience	0-3 yrs	4-7 yrs	8-10 yrs	10+ yrs	No Response	Total
No of Faculties	18	35	19	8	30	110

Percentage	16.36%	31.82%	17.27%	7.27%	27.27%	100%

Table 5: Year of Teaching Experiences
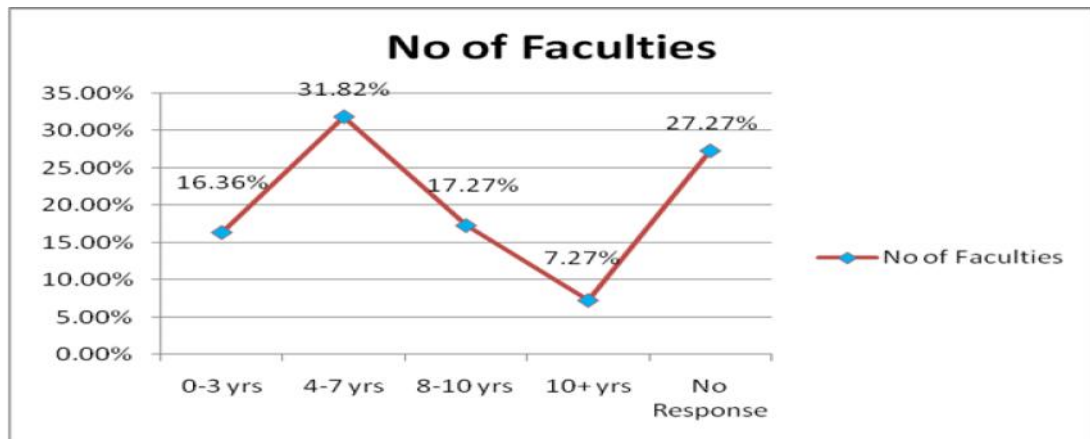
Graph 2: Year of Teaching Experiences

5.1.3 Basic Knowledge on Institutional Repositories

An Institutional Repository is a web-based database of the scholarly output of an institution, owned and maintained at either departmental or institutional level. In this study it is found that almost 70% percent respondent of the target group claim to know what is meant by an 'institutional repository' and they are aware about the ongoing project on developing an institutional repository at their university. Some of their assumptions on institutional repository concept are very simple as such-

➢ *It is an integral part of a higher institution.*

➢ *Conversion of those printed collection have their copyright into digital form.*

➢ *In which all scholarly publication of an institution is kept in soft copy.*

- *Facilitates sharing of knowledge across geographical, cultural, political and economical barriers.*

- *A good source of knowledge.*

- *A proper way of scholarly communication.*

- *A way to expose research done by the university*

- *Extension of library services.*

- *A good source for information search.*

- *A collection of articles/papers for quick access.*

- *Very informative and handy way for research.*

- *Very useful and convenient.*

- *Digital presentation of valuable materials*

- *Fastest information source*

- *Way to make the university more visible.*

On the contrary, 30% of the respondents have a very poor knowledge about institutional repository. Basically the research scholars excluding the scholars from the department of Library & Information Science are not aware about it. Some of them heard the word for the first time during the survey.

Again, 75% faculties are aware that they can deposit their work in their institutional repository, but 25% still do not aware about it.

5.1.4 Knowledge sharing

Knowledge is nothing but organized set of information. Knowledge is valueless until and unless it is shared. Here knowledge refers to the scholarly publications of the faculties. At this point, faculties are asked whether they are ready to share their teaching and scholarly material with their students and colleagues or not.

Modes of Knowledge Sharing	No of Faculties	Percentage
Only with Students	31	28.18%
Only with Colleagues	3	2.73%
With All	70	63.64%
Don't want to Share	6	5.45%
Total	110	100%

Table 6: Comments of the Faculties Regarding the Sharing of Articles in the IR
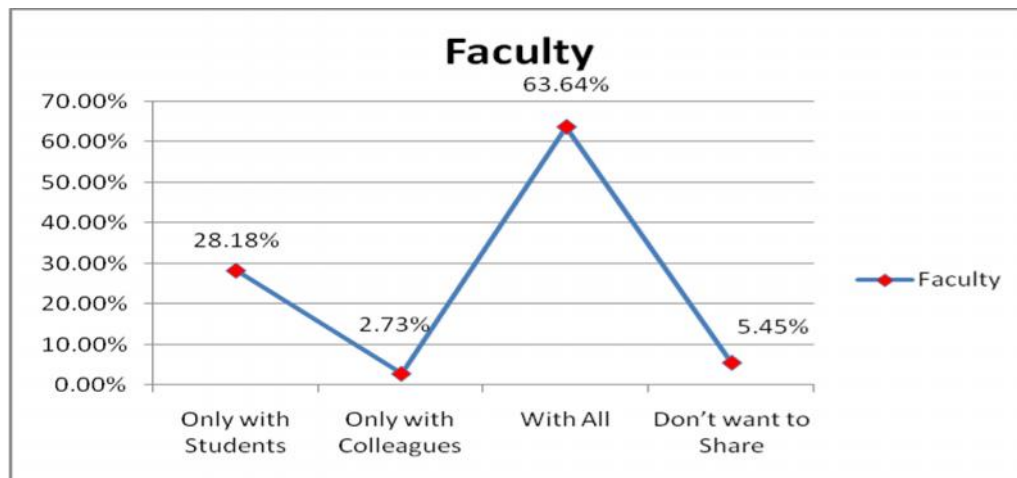
Graph 1: Comments of the Faculties Regarding the Sharing of Articles in the IR

Table-6 supported with Graph-3 point that out of the 110 respondents (faculty), 63% are ready to share their articles with all and 28.18% are ready to share with students only. Again, 2.73% respondents are wanted to share only with their colleagues. On the contrary, 5.45% are not at all willing to share their scholarly publications. This indicates that a large number of faculties are willing

to share their teaching and scholarly materials with others. Very few academics are reluctant to share their data freely.

5.1.5 Growth of collections in NEHU-IR

The collection of the institutional repository of NEHU is growing day by day. The uploading of items in full fledging to the NEHU repository started from February 2010. Within these 10 months, as much as 2022 records are uploaded (till 24th Nov'10). Table 7 supplemented with Graph-4 below reflects the number of uploading of items to the repository. Here it is seen that in April, August and October more than 300 items were uploaded. But in July only 29 items were uploaded.

Duration	Feb-10	Mar-10	Apr-10	May-10	Jun-10	July-10	Aug-10	Sept-10	Oct-10	Nov-10	Total
Number of Item	177	300	339	256	67	29	342	99	305	108	2022

Table 7: Growth of collections in NEHU-IR
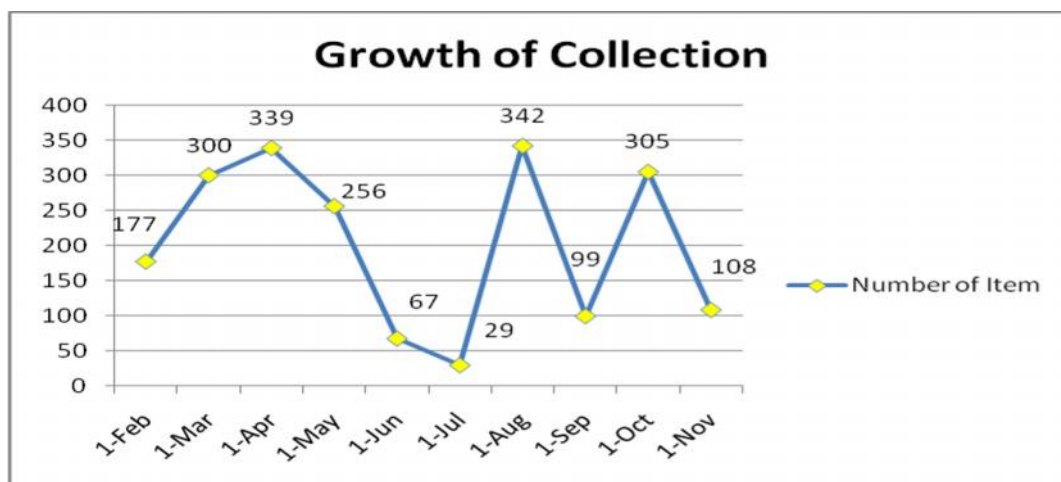
Graph 4: Growth of Collections in NEHU-IR

5.1.6 Leading Contributing Communities in NEHU-IR

The institutional repository of NEHU is consists of 34 communities; and each community is again consists of sub communities. These sub communities mention the number of contributors to the particular community. Table below along with the graph reveals the leading contributing communities and their number of contributors in the repository.

Community	Chemistry	Botany	Zoology	Physics	Biochemistry
Number of Contributor	91	59	46	43	34

Table 8: Leading Contributing Communities in NEHU-IR
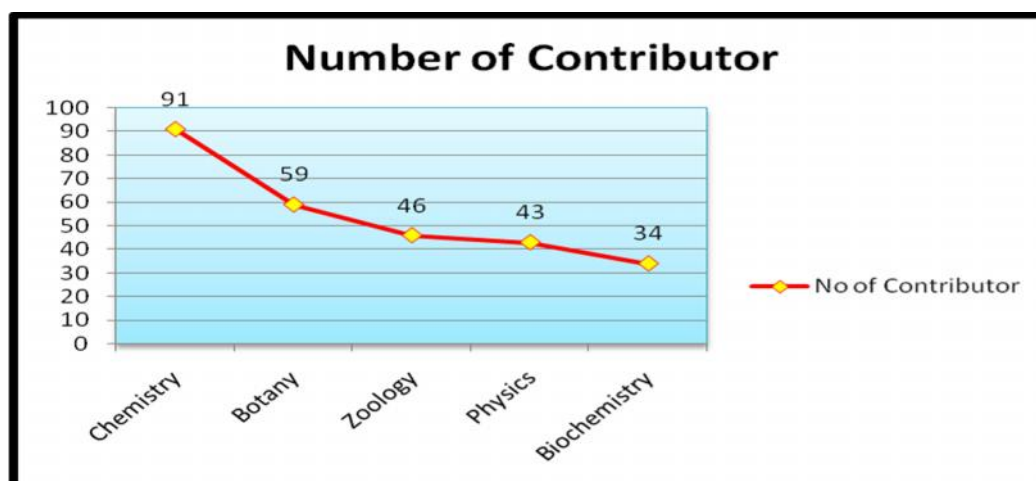
Graph 5: Leading Contributing Communities in NEHUIR

Here it is seen that Department of Chemistry has maximum number (91) of contributors followed by Department of Botany with 59 contributors. Again Zoology, Physics and Biochemistry are in 3rd, 4th and 5th position respectively. It reflects that the faculties from the School of Life Sciences and Physical Sciences are more aware and interested to deposit their publications in the repository.

5.1.7 Awareness about Open Access (OA)

Just over half (55.9 percent) of the faculties mention that they know what is meant by 'open access', of course, their understanding are varied. Responses range from making information freely available to everyone, especially scientific and academic or scholarly information. Some other faculties feel open access as a platform where people can put their results or peer reviewed work on the Web, and others can access and download them without paying a subscription fee.

5.1.8 Rating of the Institutional Repository of NEHU

The scholar has displayed the rate of satisfaction of both faculties and research scholars regarding the institutional repository of North-Eastern Hill University under Table-9 affixing data in Graph-6 (a) and (b) for a clear understanding. Here the researcher made use of five-point Likert scale. The Likert scale ranged from "Excellent" (1) to "Very poor" (5) for all items associated with each variable.

At first most of the research scholars did not have any idea about an institutional repository. Therefore they directly refused to give their feedback. But after getting basic knowledge about it from the researcher, they agreed to reply the questionnaire.

Grade	Faculties	Percentage	R/S	Percentage
Excellent	2	1.82%	0	0%
Very Good	11	10%	0	0%
Good	59	53.64%	5	45.45
Poor	14	12.73%	0	0%
Very Poor	3	2.73%	0	0%
No Response	20	18.18%	6	54.55

Total	110	100%	11	100%

Table 9: Rating of the Institutional Repository of NEHU
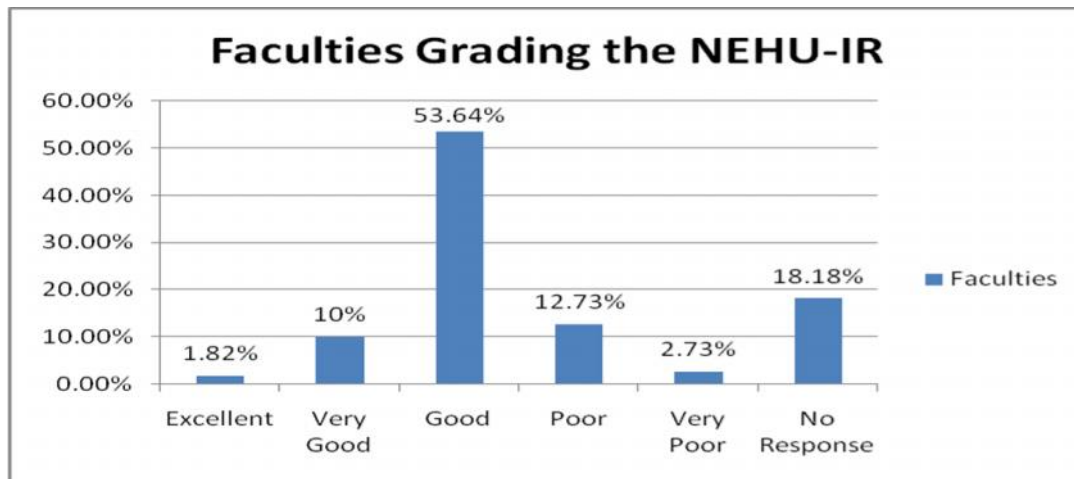
Graph 6 (a): Grading of the NEHU-IR by the Faculties
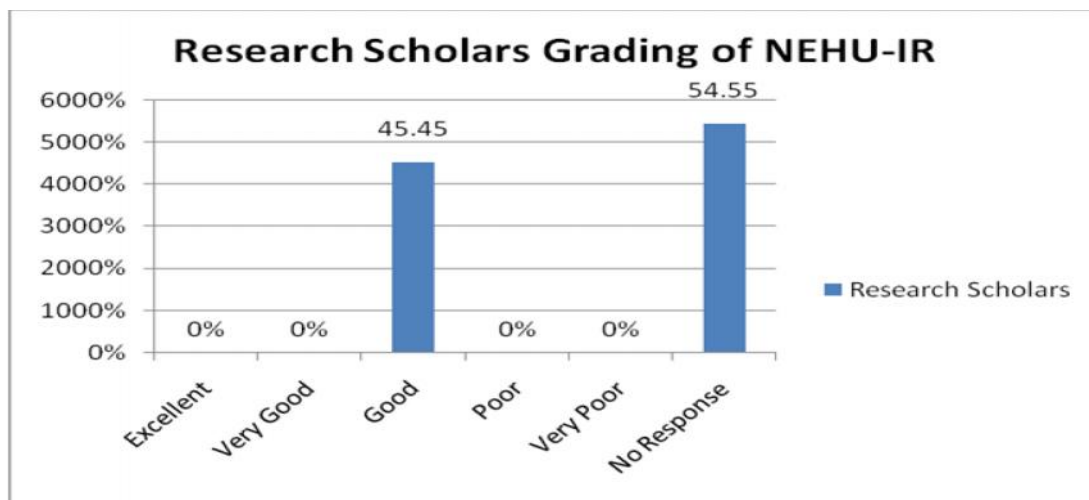
Graph 6 (b): Grading of NEHU-IR by the Research Scholars

Here, Out of 110 faculties 53.64% have remarked the repository as "Good" and 1.82% have graded as "Excellent". Only 2.73% have commented as "Very Poor". On the other hand out of 11 research scholars 45.45% have ranked it as "Good". No scholar has remarked the repository as "Excellent" or "Very

Poor". However, it is seen that the majority of faculties and the research scholars remark the repository as good.

5.1.9 Problems in Depositing Articles in NEHU-IR

In depositing the articles in the repository most of the faculties are of different opinion as shown in the table accompanying with graph below. Ofcourse, majority of the respondents (64.55%) expressed that they are not facing any problem in depositing their scholarly works in the repository as uploading of articles in the repository is done by the administrator and other repository staffs.

Problems	Number of Faculties	Percentage
Technical Problem	3	2.73%
Lack of Information	16	14.55%
Copyright Problem	20	18.18%
No Problem	71	64.55%
Total	110	100%

Table 10: Problems Facing by the Faculties in Depositing the Articles in IR
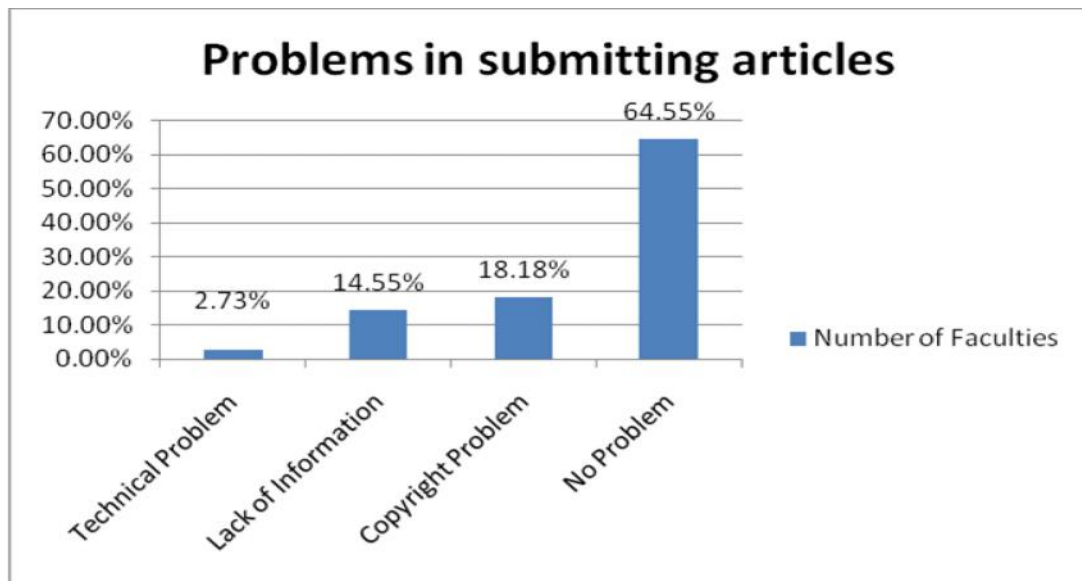
Graph 7: Problems Facing by the Faculties in Depositing the Articles in IR

5.1.10 Hindrance from the Publishers for Submitting Published Articles in the IR

Generally, institutional repositories have to follow some publishers' rules in uploading those scholarly articles which are already published in journal. These rules come under copy-right rule. Here faculties are asked whether they have faced any hindrance from the publishers in case of depositing those articles which are already published in journal.

Comments	Number of Faculties	Percentage
Yes	13	11.82%
Not Yet	91	82.73%
No Response	6	5.45%
Total	110	100%

Table 11: Problems Faced from the Publishers in Submitting the Articles in the IR
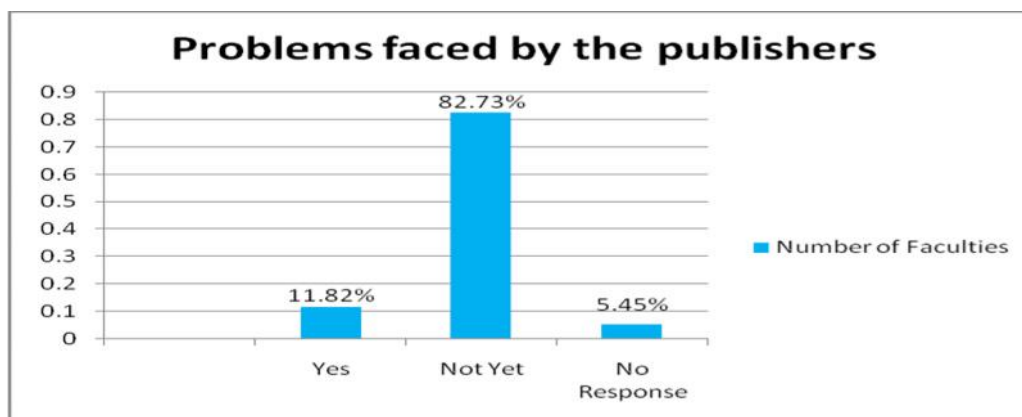
Graph 8: Problems Faced from the Publishers in Submitting the Articles in the IR

Table-11 complemented with Graph-8 show that majority of the faculties (82.73%) have not yet faced any problem from the publishers. However, some of the faculties belong to the science stream viewed that they are having problem in

contributing their publications in repository due to copy right problem, as they already have come under bonding with publishers.

5.1.11 Benefit of the faculties for depositing article in the IR

Here faculties are asked how they will be benefited by depositing their articles in the repository. As a whole, faculties were rational about depositing their work in the NEHU-IR. Some of them are very happy to see their articles in the repository.

Benefits	Number of Faculties	Percentage
Increase Citation	25	22.73%
Wider use of Articles	44	40%
Open Access	21	19.09%
Increase Reputation	13	11.82%
Way of e-publication	7	6.36%
Total	110	100%

Table 12: Benefits of an IR for the Contributors
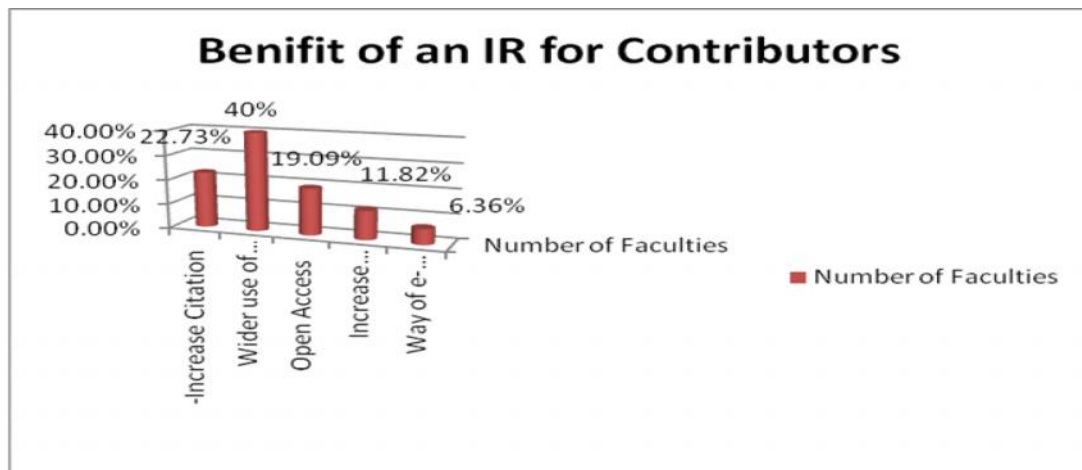
Graph 9: Benefits of an IR for the Contributors

Table-12 along with the Graph-9 reveals that out of 110 respondents 40% feel that it helps in wider use of articles. 22.73% of faculties deposit their articles for increase the rate of citation. However, 6.36% of faculties view that it is a way of e-publication. On the other hand, 19.09% of respondents assume that open access

of their works is a great benefit for them. Moreover, 11.82% consider that submitting an article in the repository increases their reputations.

5.1.12 Publishing of an Article in the Repository and Rate of Citation

Citations are notes placed in the main text of an academic publication that give a bibliographic reference to published work which has been used or quoted by the author. In simple words it is a quotation from an authoritative source, used, for example, to support an idea or argument· Here faculties are asked whether publishing an article in the repository will increase the rate of their citation or not.

Comments	Number of Faculties	Percentage
Yes	91	82.73%
No	10	9.09%
No Response	9	8.18%
Total	110	100%

Table 13: Increasing Rate of Citation
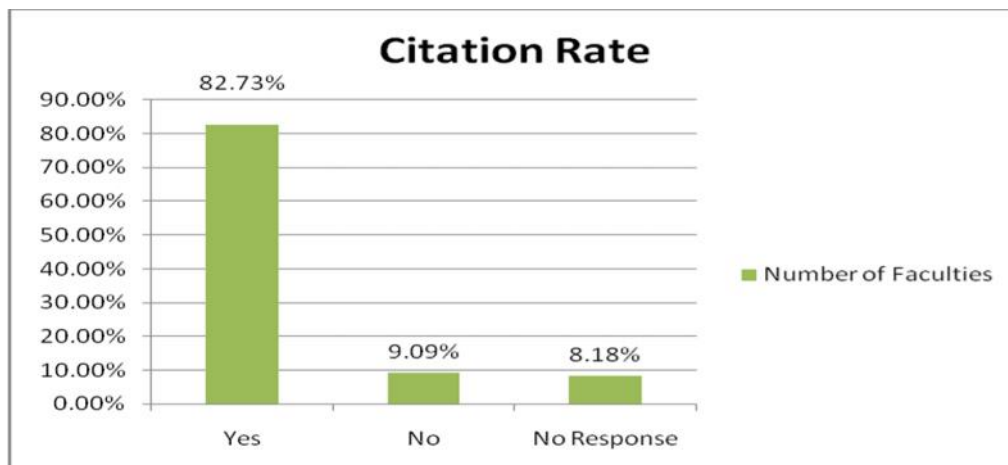
Graph 10: Increasing Rate of Citation

The above Table and Graph reveal that majority of the faculties (82.73%) have responded positive way. Very few (9.09%) have mentioned that they don't think

that it will increase the citation rate. Again 8.18% respondents have no idea about it.

5.1.13 Benefits of an Institution for having an IR

In the present digital age institutional repository is must for an institution. An institution can achieve lots of benefits by having a repository. Here the benefits of an institutional repository expressed by the faculties as well as the research scholars under the study are tabulated under Table-14 and complemented with Graph-11 which clearly depict the relevant information on the field.

Options	Number of Faculties	Percentage	Number of R/S	Percenta
Represents the Institute	23	20.91%	Nil	0%
Preservation of the Output	29	26.36%	6	54.55%
Way of Open Access	21	19.09%	4	36.36%
Point of Attraction	4	3.64%	Nil	0%
Increase the Reputation	33	30%	1	9.09%
Total	110	100%	11	100%

Table 14: Importance of IR for an Institution

Out of 110 faculties 33(30%) assume that an institutional repository increases the reputation of the institution. Likewise, 29(26.36%) faculties feel that it is a way of preservation of the scholarly output of an institution for the future. Similarly, 23(20.91%) faculties presume that an institutional repository represents the institute in front of the globe; and 4(3.64%) faculties believe that it is a point of attraction for the outsiders.
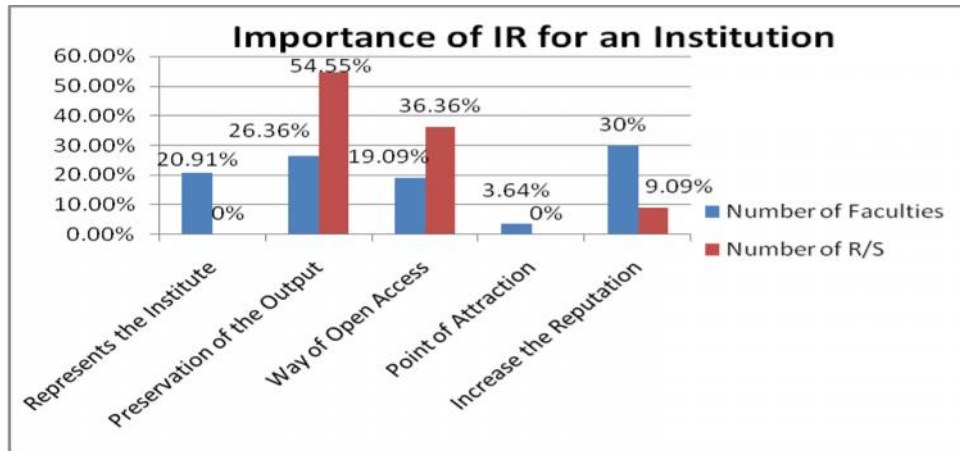
Graph11: Importance of IR for an Institution

Similarly, as shown in the figure above, out of 11 research scholars, 6(54.55%) mention that institutional repository is beneficial for an institute because, it preserves the research output of the institution. Again, 4(36.36%) research scholars think that it is a way of open access of scholarly resources. It seems respondents have different assumptions on the importance of institutional repository for an institute.

5.1.14 Importance of IR in teaching learning process

In case of examining the importance of institutional repository in teaching-learning process, a number of faculties and research scholars reacted in various way. Most of the faculties opined that it is necessary for teaching process. Some of them feel that it is not only necessary but urgent for the same. Similarly, a good number of research scholar commented as institutional repository is an urgent tool for learning process. Even 18.18% research scholars claim that it is very urgent for the same. On the contrary, no one has mentioned that institutional repository is

not necessary for teaching-learning process. It means an institutional repository is a significant asset for an educational institution.

Comments	Number of Faculties	Percentage	Number of R/S	Percentage
Very Urgent	2	1.82%	2	18.18%
Urgent	32	29.09%	5	45.45
Necessary	40	36.36	2	18.18%
Not Necessary	5	4.55%	Nil	0%
No Response	31	28.18%	2	18.18%
Total	110	100%	11	100%

Table 15: Comments on the Importance of IR in Teaching-Learning Process
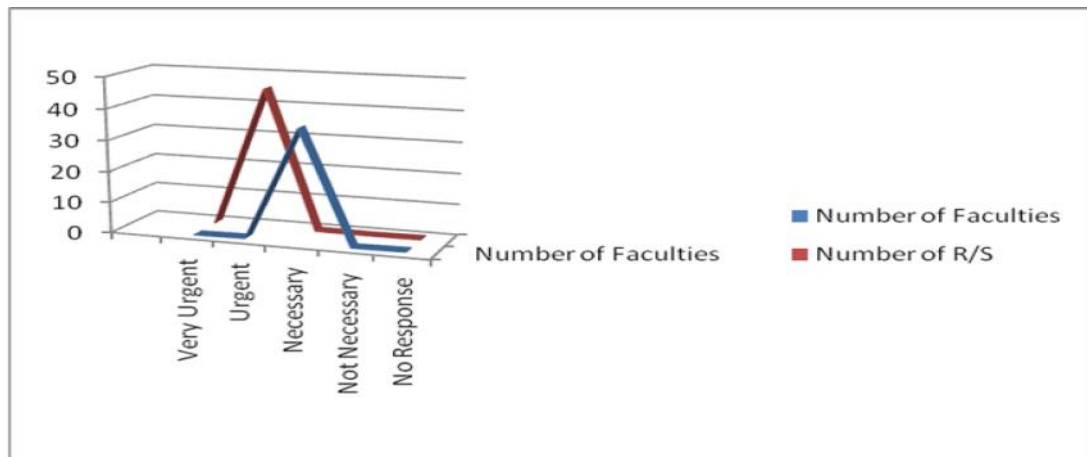
Graph 12: Comments on the Importance of IR in Teaching-Learning Process

More over, some of the faculties have furnished the following comments regarding the importance of an institutional repository for teaching-learning process-

➢ *Increase knowledge in relevant research area;*

➢ *Added knowledge to all the students;*

➢ *Can enhance the learning process;*

➢ *Easy access of teaching materials which are urgently needed;*

➢ *As ready responses students can have access to the departmental output anytime;*

> *Students can have a direct access to reading materials and thereby teachers may find it easier to impact compulsion;*

> *It helps in updating knowledge in a specific discipline. Also acquaints the students with the ways to gear out information and collect them purposefully;*

> *It enhances the knowledge base of faculties and gear up a thrust to the students for further reading;*

> *Helps in uploading knowledge.*

5.1.15 Importance of IR for Research work

Research is a journey from unknown to known. It is an investigation which seeks to increase one's knowledge of a given situation. Therefore, a researcher needs to review lots of literatures already published on that particular field. For this purpose an institutional repository is a very helpful tool for a research work. Both faculties and research scholars are of different opinion when they expressed about the importance of an institutional repository for research work. In this regard the researcher tabulated the comments of the faculties and research scholars under Table-16, supported with the Graph-13 for clear understanding of the same.

Comments	Number of Faculties	Percentage	Number of R/S	Percentage
Very Much Essential	Nil	0%	2	18.18%
Very Essential	23	20.91%	7	63.64%
Essential	61	55.45%	Nil	0%
Not Essential	3	2.73%	Nil	0%
No Response	23	20.91%	2	18.18%
Total	110	100%	11	100%

Table 16: Importance of IR for Research Work
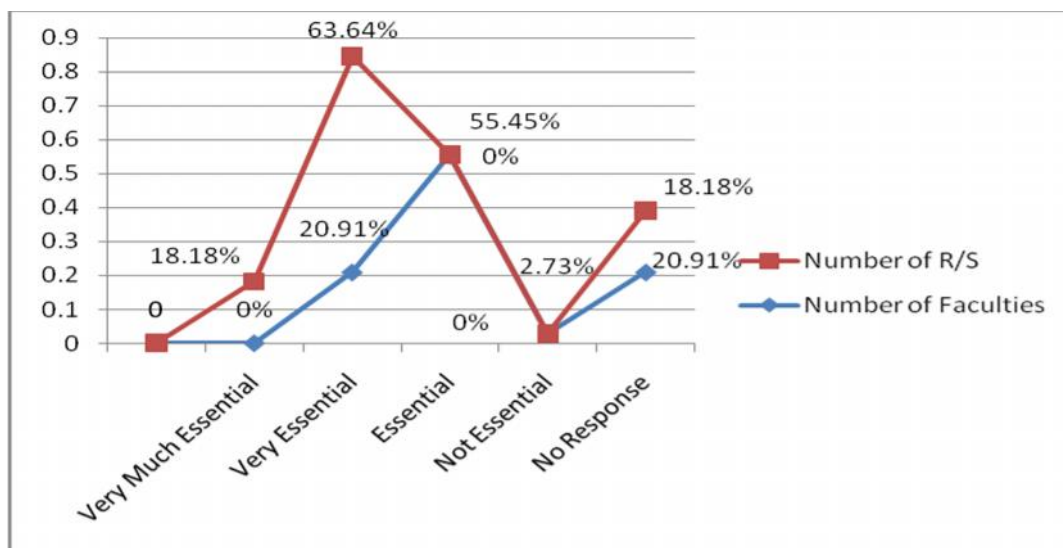
Graph 13: Importance of IR for Research Work

Analysis of the Table reveals that 55.45% of faculties comment it as essential and 63.64% of research scholars feel it as very essential for the same. It is surprising to know that 2.73% of faculties don't feel the necessity of an institutional repository for research work. It means research scholars feel more necessity of an institutional repository for their research work in comparison to the faculties.

5.1.16 Strengths of the Institutional Repository of NEHU

At this point faculties and research scholars are asked to mention the strengths of the institutional repository of their institute. Here also six-point Likert scale is used. The various opinions between the faculties and research scholar regarding the strengths of the institutional repository of NEHU are showing below in the Table-17 supplemented with Graph-14. It clarifies the success of that particular repository.

Strengths	Number of Faculties	Percentage	Number of R/S	Percentage
Well Planned	15	13.64%	1	9.09%
Well Managed	15	13.64%	1	9.09%

Up-to-date	6	5.45%	Nil	0%
Easy to Navigate	21	19.09%	3	27.27%
Open to All	45	40.91%	4	36.36%
No Response	8	7.27%	2	18.18%
Total	110	100%	11	100%

Table 17: Strengths of the NEHU-IR
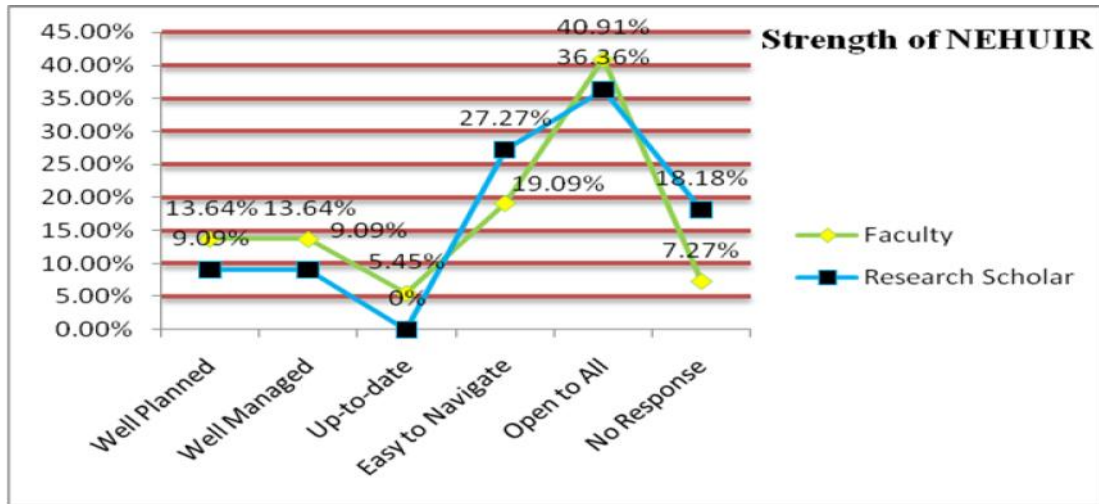
Graph 14: Strengths of the NEHU-IR

While analysis of the above Table it is found that majority of respondents feels that openness is the basic strength of the institutional repository of NEHU followed by easy navigation. Moreover, 13.64% faculties and 9.09% research scholar remarked that the NEHU repository is well planned and well managed. It shows that the institutional repository of NEHU has some pivotal strength which reveals the success of that particular repository.

5.1.17 Weaknesses of the Institutional Repository of NEHU

Each and every organization has some strengths and weaknesses. The institutional repository of North-Eastern Hill University is also not free from it. Here respondents are asked to point out the weaknesses of the institutional

repository of their institute. The scholar has charted the comments of the respondents under the Table-18

Weaknesses	Number of Faculties	Percentage	Number of R/S	Percentage
Less Literature	15	13.64%	3	27.27%
Lack of Publicity	26	23.64%	Nil	0%
Lack of User Awareness	31	28.18%	5	45.45
Lack of Updateness	26	23.64%	3	27.27%
No Weakness	4	3.64%	Nil	0%
No Response	8	7.27%	Nil	0%
Total	110	100%	11	100%

Table 18: Weaknesses of the NEHU-IR
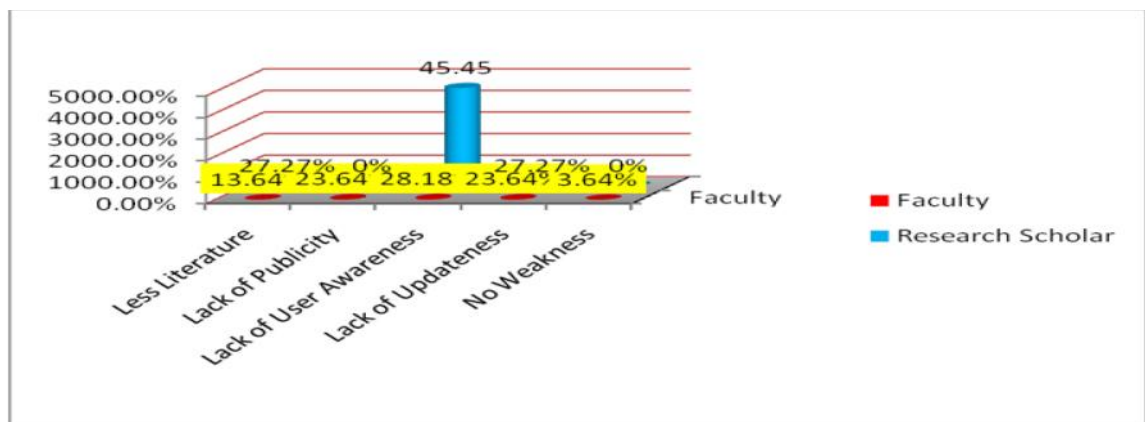
Graph 15: Weaknesses of the NEHU-IR

The above Table accompanying with Graph depicts a clear picture on various weaknesses of the surveyed institutional repository, opined by both the faculties and research scholars. Out of 110 faculties 31 (28.18%) and out of 11 research scholars, 5(45.45%) feel that lack of user awareness is the major drawback of that particular repository. On the other hand 26(23.64%) faculties assume that lack of publicity and lack of updateness are two noticeable weaknesses of NEHU-IR. Again, 15(13.64%) faculties and 3(27.27%) research

scholars remark that the number of literature in the repository is comparatively less. Ofcourse, 4(3.64%) faculties comment that there is no weakness in the institutional repository of that particular institute. The analysis shows that lack of user awareness is the major problem of that particular repository. It also indicates that most of the users are not aware about the repository of their institute may be due to lack of special user orientation programme especially on institutional repository.

5.1.18 Feeling proud on the NEHU-IR

Here the respondents are asked how they feel proud of their institutional repository being the first repository in the North-East Region. The table 19 below furnishes the comments of faculties and research scholars about their proud on the institutional repository of their institute.

Comments	Number of Faculties	Percentage	Number of R/S	Percentage
Yes	78	70.91%	6	54.55%
No	23	20.91%	Nil	0%
No Response	9	8.18%	5	45.45
Total	110	100%	11	100%

Table 19: Proud For NEHU-IR

Here it is found that a good number of faculties (70.91%) and research scholars (54.55%) feel proud of their repository. Moreover, the faculties have come with the following comments-

➢ *It is still in its infant stage and miles to go a long way for any comment or complement.*

➢ *Very proud, hope it will do better in future.*

- *Consider myself fortunate to have been involved with the university's Institutional Repository initiative since its conceptual stage.*

- *I am happy that our university is taking up the project and I wish that it will be a great success and help to the learning community of the North East.*

- *Feel free to tell others to visit our university website and feel somewhat proud.*

- *It is must for an institute of repute.*

- *It is a small step towards a bigger goal.*

- *Feel proud since our university is the first institute in North East to start the institutional repository and hope in future other institutions from the region follow the same.*

- *It is a great initiative.*

- *Good, feeling to be pioneer in this field.*

- *It is a good beginning and the same may percolate to other institutes for knowledge transformation.*

- *There is nothing much to feel proud of yet.*

- *No sense of being proud. Better compare with a large region.*

5.2 Findings

The present study is aimed to make an overall study of the institutional repository of the North-Eastern Hill University with various issues related to it. The study also intended to examine the impact of institutional repository on academic fraternity and to evaluate it from the users' point of view. The primary data for this research work were gathered through questionnaire answered by

faculties and research scholars and interview of the administrator of the particular repository. The sample of the study included all the contributors and users of the repository which include faculties and research scholars of the university under study. After due analysis of the data, the following major findings were drawn:

1. Analysis to the response rate of the particular study, faculties have responded quite in a large number (73.33%) in comparison to research scholars (44%). It shows the responsibility and interest of the faculties towards the repository of their institute.

2. The scholar while analyzing the teaching experience wise classification of the faculties deduced the inference that faculties within four to seven years of teaching experience formed a majority of the survey sample (31.82%) followed by faculties within eight to ten years of teaching experience (17.27%).

3. The scholar after analysis of the basic knowledge of faculties and research scholars on institutional repository found that almost 75% percent respondents (faculty) of the target group claim to know about 'institutional repository' and they are aware about the ongoing project on institutional repository at their university. But it is surprising to know that most of the research scholar respondents are not aware about it. Some of them heard the word for the first time during the survey. Only the scholars from the department of Library & Information Science are aware about institutional repository. It seems user awareness programmes are urgently required to organize specially on the importance and use of institutional repository. Because, it is the user who will add value to the repository.

4. The scholar analyzed the approach of the faculties to deposit their articles in repository and found that out of the 110 respondents (faculties), 63% are ready to share their articles with all and 28.18% are ready to share with students only. Again, 2.73% respondents are ready to share only with their colleagues. On the contrary, 5.45% are not at all willing to share their scholarly publications. This indicates that a large number of faculties are willing to share their teaching and scholarly materials with others. Very few academics are reluctant to share their data freely.

5. The growth of collection of the institutional repository of NEHU was duly analyzed by the scholar and inferred that the full fledging uploading of items to the repository started from February 2010. Within these 10 months of its inception, total 2022 records are uploaded (Up to 24th Nov'10). Here it is seen that in April, August and October more than 300 items were uploaded. But in July only 29 items were uploaded. It implies that the progress of the uploading of collections in the repository is not proportionate.

6. The researcher obtain the data from repository website (http://dspace.nehu.ac.in/jspui/) on the leading contributing communities to the repository and after due analysis it could be deduced that the Department of Chemistry has maximum number (91) of contributors followed by Department of Botany with 59 contributors. Again Zoology, Physics and Biochemistry are in 3rd, 4th and 5th position respectively. It indicates that the faculties from the School of Life Sciences and Physical Sciences are contributing more to the repository.

7. The data relating to the Open Access Movement was analyzed by the scholar to draw the conclusion that just over half percent (55.9 %) of the respondents were aware about this concept. As such, the library should take more initiative to focus the concept of open access by organizing seminars, conferences etc.

8. The scholar analyzed the ratings of the NEHU institutional repository and found that out of 110 faculties 53.64% remarked the repository as "Good" and 1.82% graded as "Excellent". But 2.73% have commented as "Very Poor". On the other hand out of 11 research scholars 45.45% ranked it as "Good". No scholar has remarked the repository as "Excellent" or "Very Poor". However, it is seen that the majority of faculties and the research scholars ranked the repository as good.

9. Analysis to the problems of depositing articles in the repository reveals that majority of the respondents (64.55%) are not facing any problem in depositing their scholarly works in the repository as uploading of articles in the repository is done by the administrator and other repository staffs.

10. The scholar after analysis of the information about hindrances from the publishers in case of depositing those articles which are already published in journal, come across that majority of the faculties (82.73%) have not yet faced any problem from the publishers. However, some of the faculties belong to the science stream viewed that they are having problem in contributing their publications in repository due to copy right problem, as they already have come under bonding with publishers.

11. Benefits of the faculties for depositing article in the repository is duly analyzed by the scholar and deduce that out of 110 respondents (faculty) 40% of feel that it

helps in wider use of articles. 22.73% of respondents deposit their articles for increase the citation. However, 6.36% view that it is a way of e-publication. On the other hand, 19.09% of respondents assume that open access of their works is a great benefit for them. Again 11.82% consider that submitting an article in the repository increases their reputations. As a whole, it is seen that faculties are rational about depositing their works in the repository.

12. The scholar obtained data from the respondents on the relation between depositing articles in the repository and the rate of citation and found that most of the faculties (82.73%) think that the rate of citation of an article increases after uploadig it in the repository. It seems institutional repository has a great role in increasing the rate of citation of a particular item.

13. While analyzing the comments of the respondents on the importance of a repository for an institution, it is come to know that out of 110 respondents (faculty) 30% assume that an institutional repository increases the reputation of the institution. Likewise, 26.36% feel that it is a way of preservation of the scholarly output of an institution for the future. Similarly, 20.91% faculties presume that an institutional repository represents the institute in front of the globe; and 3.64% faculties believe that it is a point of attraction for the outsiders. Similarly, out of 11 research scholars, 54.55% mention that institutional repository is beneficial for an institute because, it preserves the research output of the institution. Again, 36.36% research scholars think that it is a way of open access of scholarly resources. It seems respondents have different assumptions on the importance of institutional repository for an institute.

14. Analysis of the comment of respondents on the importance of institutional repository for teaching-learning process, a number of faculties and research scholars reacted in various ways. Most of the faculties opined that it is necessary for teaching-learning process. Some of them feel that it is not only necessary but urgent for the same. In the same way, a good number of research scholar commented as institutional repository is an urgent tool for learning process. Even 18.18% research scholars claim that it is very urgent for teaching-learning process. On the contrary, no one has mentioned that institutional repository is not necessary. It means an institutional repository is a very important asset for an educational institution.

15. The scholar after analysis of the views of the respondents on the importance of institutional repository for research work found that 55.45% of faculties comment it as essential and 63.64% of research scholars feel it as very essential for the same. It means research scholars feel more necessity of an institutional repository for their research works in comparison to the faculties.

16. The scholar obtained the remarks of the respondents on the strengths of the institutional repository of NEHU and it revealed that majority of the respondents feel that openness is the basic strength of the institutional repository of NEHU followed by easy navigation. Moreover, 13.64% faculties and 9.09% research scholars remarked that the NEHU repository is well planned and well managed. It shows that the institutional repository of NEHU has some pivotal strength which reveals the success of that particular repository.

17. Analysis to the comments of the respondents on the weaknesses of institutional repository depicts a clear picture of various weaknesses of the surveyed institutional repository. Out of 110 faculties 28.18% and out of 11 research scholars, 45.45% feel that lack of user awareness is the major drawback of that particular repository. On the other hand 23.64% faculties assume that lack of publicity and lack of updateness are two noticeable weaknesses of that repository. Again,13.64% faculties and 27.27% research scholars remark that the number of literature in the repository is comparatively less. It shows that lack of user awareness is the major problem of that particular repository. It also indicates that most of the users are not aware about the repository of their institute may be due to lack of special user orientation programme especially on institutional repository.

Besides distributing the questionnaire, the scholar also had an interview with the administrator of the repository to know the problems they faced in planning and implementing institutional repository project in North-Eastern Hill University. Some of the important points mentioned by the interviewee are as follows:

1. The ongoing institutional repository project of North Eastern Hill University is known as UPE (University with Potential for Excellence) project, funded by University Grant Commission.

2. In the planning stage of the repository a committee was formed. This committee had various meetings on necessary architecture for institutional repository. The committee took suggestions from outside experts, went through relevant literature

and visited other institutions where institutional repository had already been planned and implemented. Even the committee decided about the software to be used, space for the lab, training of staffs and selection of documents to be digitized etc. It reflects that the institutional repository of NEHU is well planned in its beginning stage.

3. The institutional repository lab of NEHU was established by the computer professionals and the hardware and software suppliers. High speed of Internet connectivity is a basic requirement, failing which inputting, editing of records are not possible. It seems that NEHU has established a well developed infrastructure.

4. At the time of installation of institutional repository software, extensive training was provided to the concerned library staff regarding basic administrative procedure and keeping data back-up. It reveals that the concerned library staffs of North-Eastern Hill University are well trained for handling the repository.

5. Technical expertises were developed from in-house staff. Still there is a need of technical professional, who could take care of hardware maintenance and taking care of regular back up. Three servers are required which may function in different environment are to be maintain properly so that data remain secured. It points out that still there is a need for high technical person for the hardware management of the repository.

6. Publications of the faculty members are collected in hard copies or in PDF format which are scanned stored in files, these files are later uploaded with the bibliographical data to form a single record with uploaded file. Before archiving the records, proper editing is done. After acceptance and approval of the text it is

placed in community and collection. It reveals that before uploading an item to the repository, it goes through a long procedure and at last it is reviewed and permitted by the administrator.

7. Presently (till November, 2010) there are almost 2050 records are uploaded in the institutional repository of NEHU, mostly consists of journal articles, conference proceedings and few number of books.

8. All authors do not co-operate with the development of the institutional repository. It is difficult to involve all faculty members in building the institutional repository. Some of the faculties are very reluctant to deposit their publications in the repository. It reflects that the institutional repository of NEHU has not achieved support from all of the faculties in case of collection development.

9. Those authors who don't want to give access of their publication, the administrator blocks such publication to be accessed without authorization. In such cases users can only access the metadata. Ofcourse, it seems that the repository is not fully open to all.

10. During library orientation, the institutional repository of NEHU is being explained. It is planned to organize some special user awareness programmes basically on the use of institutional repository. It seems repository authority have felt the need of some precise user awareness programmes to make users known about the repository.

11. The institutional repository of North-Eastern Hill University is still in its infancy stage. It is too early to evaluate the impact of the repository. It will take time for its popularity.

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Dear Sir/ Madam

*I have under taken a research work leading to M.Phil degree in Library & Information Science under the guidance of Dr. R. K. Ngurtinkhuma of Mizoram University, Aizawl. The title of my study is **"Institutional Repository using D-Space in North Eastern Hill University".** Your feedback on this is very much necessary for completion of my research. I would be very grateful if you could spend your valuable time and provide me required primary data. Your comments and suggestions will lead me towards the finding of facts.*

I assure that, the data provided by you will be used only for the purpose stated above and will be kept confidential.

Thanks & Regards

Yours Sincerely,

(Nirmali Chakraborty)

(Questionnaire for the Faculties)

1. Personal Dossier:

   (ii)   Name: Mr. / Ms
   (iii)   Designation:
   (iv)   Dept:
   (v)   Educational Qualification:
   (vi)   Year of Teaching Experiences:
   (vii)   Sex: Male / Female
   (viii) Age:
   (ix)   Language known:

(x)   E-mail:

(xi)   Contact No:

2. What do you think about an Institutional / Digital Repository?

3. Are you aware about Open Access Movement?

4. How do you want to grade the Institutional Repository of your university?

Excellent	Very Good	Good	Poor	Very Poor

5. Do you agree to deposit your articles in the repository? With whom do you want to share your scholarly publications?

Modes of Sharing	Response
With All	
Only with Students	
Only with Colleagues	
Don't want to Share	

6. What are the problems that you face in submitting your articles in the repository?

Technical Problem	Lack of Information	Copyright Problem	No Problem

7. Are you facing any hindrance from the publishers for submitting those articles which are already published in journals?

Yes	
No	

8. Do you think that IR is beneficial for the contributors? If yes how?

Increase Citation	Wider Use of Articles	Open Access	Increase Reputation	Way of E-Publication

9. Do you think that publishing of an article in the repository will increase the rate of citation?

Yes	
No	
No Comment	

10. How Institutional Repository is beneficial for an institution?

Presents the Institute	Preservation of the output	Way of Open Access	Point of Attraction	Increase the Reputation

11. How institutional repository is beneficial for teaching-learning process?

12. How institutional repository is beneficial for research work?

13. What are the strengths of the Institutional Repository of your university Library?

Well Planned	Well Managed	Up-to-date	Easy to Navigate	Open to all

14. What are the weaknesses of the Institutional Repository of your university Library?

Less Literature	Lack of User Awareness	Lack of Publicity	Lack of Updateness	No Weakness

15. Express how you feel proud of the Institutional Repository of your university being the first ever repository of North-East region?

16. What is your suggestion for the improvement of the Institutional Repository of NEHU?

17. Please provide few of your valuable lines!

Date: Signature
Place:

(Questionnaire for the Research Scholars)

1. Personal Dossier:

    (xii)   Name: Mr. / Ms
    (xiii)   Dept:
    (xiv)   Educational Qualification:
    (xv)   Sex: Male / Female
    (xvi)   Age:
    (xvii)   Language known:
    (xviii) E-mail:
    (xix)   Contact No:

2. What do you think about an Institutional / Digital Repository?

3. Are you aware about Open Access Movement?

4. How do you want to grade the Institutional Repository of your university?

Excellent	Very Good	Good	Poor	Very Poor

10. How Institutional Repository is beneficial for an institution?

Presents the Institute	Preservation of the output	Way of Open Access	Point of Attraction	Increase the Reputation

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16. What is your suggestion for the improvement of the Institutional Repository of NEHU?

17. Please provide few of your valuable lines!

Date: Signature
Place:

Photo Plate 1: Central Library of NEHU

Photo Plate 2: Ambiance of the Central Library of NEHU

Photo Plate 3: Book shelves of the Central Library of NEHU

Photo Plate 4: Periodical Section of the Central Library of NEHU

Photo Plate 5: Documentation Section of the Central Library of NEHU

Photo Plate 6: Computer Section of the Central Library of NEHU

Photo Plate 7: Digitization Lab (UPA Project) of the Central Library of NEHU

Photo Plate 8: HP Deskjet f4400 Scanner of Digitization Lab of NEHU

Photo Plate 9: HP Designjet Scanner of Digitization Lab of NEHU