
DEVELOPING INSTITUTIONAL REPOSITORIES: A CASE STUDY OF ASSAM UNIVERSITY, SILCHAR

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Abstract

The paper describes the basic concept of Institutional Repositories (IRs), its genesis, its worldwide developments and information infrastructure required for creating Institutional Repositories (IRs).

Keywords: Institutional Repositories; Universities; Institutions- North Eastern India, OAI-MH; DSpace; Digitization; Assam University Knowledge Bank; Assam University Institutional Knowledge Bank

1. Introduction

The emphasis on distance learning and instructional technology at many universities in recent years has led to an increased awareness that the digital content being created by members of the academic community is an institutional asset. Difficult economic times have heightened the need for universities to identify new ways to generate revenue. As a result, there is a growing interest among university administrators in collecting, in preserving, and in creating value-added services from the digital content produced in conjunction with teaching and research. This interest aligns well with the mission of academic libraries, although it requires the library to expand its focus to include management of unpublished as well as published electronic content.

At the same time, many academic librarians are working to create change among their campus communities by talking about the rising costs of journal subscriptions and encouraging scholarly publication in new alternative lower-cost journals. Some have taken responsibility for hosting such alternative publishing venues, becoming electronic publishers themselves. Certainly academic libraries are well qualified to provide leadership and coordination in these arenas but they, too, have limited resources. How can such challenges be met?

One possible solution is for the library to recognize and to articulate the convergence that is occurring among the various digital initiatives in which the university has been engaged so that potential synergies and opportunities for more significant outcomes through collaboration are recognized. Funding, whether the source is internal or external, will be easier to obtain if it can be shown that it will have a broad and lasting impact and move the university toward achievement of its vision (Roger 2003).

1.1 Defining Institutional Repositories

Institutional repositories" is a new concept for collecting, managing, disseminating, and preserving scholarly works created in digital form by faculty and students in individual universities and colleges. It is born out of problems with the current scholarly communication model structured by commercial journal publishers and vendors. To properly implement these repositories, libraries will need to recruit librarians who possess digital collection management and Open Archive Information System (OAIS) management skills. In addition, training faculty and students to use OAIS, helping them prepare their digital products, involving them in institution-wide policy making, and setting repository goals would be some of the new tasks that libraries will face.

1.2 University/ Institutional Libraries in North Eastern Region of India

North Eastern Region (N E Region) of India has attracted attention of the government of India since two decades for overall development of the region. North Eastern Region is comprising of seven states which is popularly known as seven sisters and recently in 2001 the eighth State "Sikkim" has been included in the North Eastern Region. These states are viz., Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura.

North Eastern Region is bestowed with seven Central Universities, (Assam University, Silchar; Tezpur University, Tezpur; NEHU, Shillong; Nagaland University, Kohima; Mizoram University, Aizawl; and Manipur University, Imphal and Rajiv Gandhi University, Arunachal Pradesh), three State Universities (Gauhati University, Dibrugarh University, and Tripura University), two Agricultural Universities (Agricultural University, Jorhat and Central Agricultural University, Imphal,) , and few institutions of national importance like IIT, Guwahati, Sikkim Manipal Institution of Medical Science, North Eastern Regional Institute of Technology, Itanagar, National Institute of Technology, Silchar and North Eastern Regional Institute of Medical Sciences, Shillong

1.3 Impact of Information Technology on University Libraries/ Institutional Libraries of N E Region of India

Most of the Library and Information Centres (LICs) of India have started using computers and Information Communication Technologies in organising their collections, housekeeping operations, processing, retrieval and dissemination of information to the end users. The use and impact of ICTs is now visible in Indian library and information centres which may be due to the drastic reduction / escalation of the cost of hardware and software and their easy availability in the markets with service support from the suppliers or vendors.

The automation and networking of many universities, national institutions and other institutions of higher learning has been initiated by the national agencies dealing with information and library networks like NICNET, INFLIBNET, DELNET, CALIBNET and other metropolitan and city networks which have started developing various bibliographic databases of their holding. NICNET and ERNET have made e-mail/ Internet service available to the academic as well as in Government sectors. Some of the metropolitan and city library networks like ADINET, MALIBNET, CALIBNET, MYLIBNET, PUNNET, BONET etc. have also been initiated and couple of them have started functioning and providing various on-line services through these networks.

The impact of IT is also evident on the activities of many LICs associated with universities and other institutions of the national importance. Thanks to University Grants Commission for establishing INFLIBNET which have been playing an important role since its inception for initiating the automation and networking activities of library and information centres of universities, colleges, R&D laboratories, and various institutions of higher learning. So far 142 universities have been covered under the INFLIBNET Programme which have been funded with non-recurring grant of Rs.6.5 Lakhs for infrastructure development, purchase of computers and peripherals and recurring grants for five years to support the salary of information Scientist, data entry work, telephone charges for Internet use, and maintenance of the systems

The North Eastern India has also experienced the changes in the library automation and networking activities, which is possible mainly due to inclusion of 12 university libraries for financial assistance under INFLIBNET Programme, which made possible the initiation of Information Infrastructure Development of University Libraries and Database Creation Work for Library Automation & Networking. Besides that other institutions of national importance like IIT, Guwahati, Sikkim Manipal Institution of Medical Science, Agricultural University, Jorhat and Central Agricultural University, Imphal are getting financial assistance from their respective parent bodies and funding agencies like AICTE, ICMR and ICAR.

These universities and institutions of national importance located in this region have been catering the needs of the people of North Eastern Region and contributing in the human resource development of the region. According to the latest UGC Report there are 1230 numbers of colleges scattered throughout the NER having 120000 students and 15000 teachers. Teachers of universities have been engaged in research and development activities and have been producing qualified manpower for sustaining the economy of NER in particular and India in general.

1.4 Background of Assam University and Knowledge Resources Available in Assam University Central Library

Located in the heart of nature, the Assam University was established on January 21, 1994 at Silchar a District town of Cachar in Southern Assam by an Act XIII of the Parliament promulgated in 1989. In a short span of time, since its inception, the university has taken long strides and today it occupies its permanent campus with 31 Post-Graduate Departments and 3 Inter-Disciplinary Centres. These departments are distributed under 9 Schools Viz., School of Environmental Science, School of Humanities, School of Information Sciences, School of Languages, School of Life Sciences, School of Management Studies, School of Physical Science, School of Social Sciences and School of Technology. This University serves the aspirations of the academia and the students of the southern part of the State of Assam comprising the Districts of Cachar, Hailakandi, Karimgunj, North Cachar Hills, and Karbi Anglong. It is a teaching –cum- affiliating University having 52 colleges of Professional and Degree levels.

The Knowledge Resources available in Assam University Library have been categorized in 13 collections arranged in separate Hall. 1) Text Book Collection, 2) Social Science and Humanities Collection (including Business Studies, Commerce & Information Science), 3) Language Collection, 4) Science Collection, 5) Reference Collection, 6) Periodical Collection (Current and Back Volumes), 7) Ph.D. Theses / M. Phil Theses Collection, Master Degree Dissertations , 8) Reports and Conference

Proceedings Collection, 9) Gifted Collection, 10) Donated Collection of Eminent Scholars of the Locality having important Manuscripts and rare documents, 11) North East Collection, 12) Audio-Visual Collection and, 12) Digital Collection including CD-ROM/ DVD Databases, E-Journals, Internet Resources, In-House Databases of Books, Serial, and Theses and On-Line OPAC Service

At present the library has altogether 65392 books, which includes Textbooks, General books, Reference books relating to all disciplines. Besides, A.U Library also developed special collection on North Eastern Region (NEC Collection), collection of donated books (Donated by eminent scholar Prof. Asim Dutta, Prof. R.D. Dutta and Prof. K.P. Sinha). Besides, we have some gifted books received from various organizations, Government Reports, M. Phil/Doctoral Thesis, Back volumes of journals few CD-ROM supplied with journals and books.

1.5 Research Output of Assam University, Silchar and Other University of NE Region

The expansion of universities and institutions of higher learning as evident from the above paragraphs leads to production of enormous number of research output in the form of Doctoral, M. Phil. And Masters level Theses and Dissertations, Research Monographs, Proceedings of Seminars and Conferences, Research Reports of ongoing research projects funded by various funding agencies, valuable scholarly publications in Indian and foreign peer reviewed journals, publications, in-house publications reference books etc. Most of the in-house publications are kept in the universities in printed form and the faculty, research scholars and students can access these resources which are mainly kept and maintained in central libraries.

These publications are not available to other scholars located in other parts of the country. They have to either visit the concerned university libraries or borrow documents under resource sharing exchange programme of the universities, which consumes lot of time. If these sources are available in digital form and kept on the institutional servers, which are connected to information networks, may be accessed over Internet. Then the research output will be extensively used in the research and development activities of the researcher not only in our country rather throughout the world.

In view of above the concept of digitization of library resources, Electronic Theses and Dissertations, conversion of major research output in digital form and sharing the information over library and information networks have emerged which creates the need of developing Knowledge Bank or Institutional Repositories in Universities where information resources are available in digital form and which can be accessed over Internet free of cost by the entire research community of a particular university or universities of region, or country or research community throughout the world.

Electronic publishing has revolutionizing the format of the recorded knowledge. Electronic information services are attracting reader's attention in today's network environment. This changing scenario in library environment has arisen for the need and use of e-journals along with print version. Electronic journals (e-journals) bring new challenges before the library and information professionals to give full text access to scholarly publications both in print and electronic version to its end users.

The research output of Indian scholars is mainly published in primary sources of information i.e. scholarly journals which are published either from academic, professional associations or organisations, universities, research institutions and commercially from major publishers of the world in print as

well as in e-journal form like Springer Verlag, Kluwer Online Academic Press, Oxford University Press, Cambridge University Press and many other renowned publishers which are publishing scholarly journals in print, online form. But the cost of peer reviewed scholarly journals are increasing day by day which restrict the academic institutions to purchase relevant scholarly print or print + Online version or e-journals for their library end users.

Due to price escalation of foreign journals, which are considered to be peer reviewed and the academic and professional associations publish referred scholarly journals. Besides society publications, there are many commercial publishers who are selling their journals at higher cost. It is not possible for any institutions or universities to subscribe all the journals required by their faculty members and scholars. This forces the academic community to find out a solution to these problems. The Ministry of HRD, UGC and other agencies have taken initiatives to subscribe journals under e-journals consortia through which journals are being subscribed at reasonable cost and the libraries under consortia are allowed to access these collections (e-journals and bibliographic databases, Abstracting and Indexing Journals) over Internet as per the guidelines and license agreement for access right. Following e-journals consortia have been established in India out of which some are running successfully and some are on experimental basis:

- UGC-INFONET: E- Journals Consortium (<http://www.inflibnet.ac.in>)
- Indian National Digital Library in Science and Technology (INDEST) Consortium
<http://www.library.iitb.ac.in/indest/>.
- FORSA Consortia
- CSIR (Council of Scientific and Industrial Research) Consortium ([http://www.niscair.res.in/activitiesandservices/major projects/majproj.htm](http://www.niscair.res.in/activitiesandservices/major%20projects/majproj.htm))
- IGCAR (Indira Gandhi Centre for Atomic Research) Consortium
- IIM (Indian Institute of Management) Consortium
- Urdu Research Library Consortium (URLC) ([http://dsal.uchicago.edu/cgi- bin/uric.pv](http://dsal.uchicago.edu/cgi-bin/uric.pv))

2. Need of Developing Institutional Repositories in Universities

The E-journals Consortium initiatives are being coming up as described above to fulfill the need of faculty members and research scholars. These initiatives are very much cost effective but various factors are involved to sustain its subscription policy by the UGC or MHRD or other institutions. Still there is gap from have and have not universities and institutions because these initiatives are restricted to certain number of universities and institutions, which is under experiment. Those universities where this facility is not available, they have to depend on print or print + online versions or electronic versions available in CD-ROM/DVD. In order to meet the demand of scholarly publications/communications, developing an Institutional Repositories or Knowledge Bank is need of the hour. The Institutional Repositories are the solutions for those universities and institutions where these facilities are not available.

Institutional Repositories are based on the principles of open access archives / initiatives where relevant information is made available free of cost using open source software like D space. Our university / institutions are the center of learning where various research activities is going on by the faculty and researchers. The academicians and researchers are generating the huge information in

university and institutions, which needs proper archival storage for future access. The outcome of research, proceedings of seminars, conferences, workshop, training materials, Hands on Notes, Class notes, monographs, Annual Reports of Institutions/ universities, newsletter, university journals, theses dissertations, project reports etc may be kept in institutional repositories in digital form and these information resources may be made available over the Internet through which people from campus, other universities of the region, or at national and international level may have free access for research and academic work.

The American and European Countries have taken initiatives in this direction and many knowledge banks or Institutional Repositories are being coming up. 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 organization and access or distribution. While operational responsibility for these services may reasonably be situated in different organizational units at different universities, an effective institutional repository of necessity represents collaboration among librarians, information technologists, archives and records managers, faculty, and university administrators and policymakers. At any given point in time, an institutional repository will be supported by a set of information technologies, but a key part of the services that comprise an institutional repository is the management of technological changes, and the migration of digital content from one set of technologies to the next as part of the organizational commitment to providing repository services. An institutional repository is not simply a fixed set of software and hardware.

While early implementers of institutional repositories have chosen different paths to begin populating their repositories and to build campus community acceptance, support, and participation, that a mature and fully realized institutional repository will contain the intellectual works of faculty and students—both research and teaching materials—and also documentation of the activities of the institution itself in the form of records of events and performance and of the ongoing intellectual life of the institution. It will also house experimental and observational data captured by members of the institution that support their scholarly activities.

At the most basic and fundamental level, an institutional repository is a recognition that the intellectual life and scholarship of our universities will increasingly be represented, documented, and shared in digital form, and that a primary responsibility of our universities is to exercise stewardship over these riches: both to make them available and to preserve them. An institutional repository is the means by which our universities will address this responsibility both to the members of their communities and to the public. It is a new channel for structuring the university's contribution to the broader world, and as such invites policy and cultural reassessment of this relationship.

3. Requirement of Information Infrastructure for Developing Institutional Repositories

Indian university and institutional libraries are in hybrid stage where both computers based and manual library and information services are being offered to their clientele. Those universities (142 university Libraries), which are funded under INFLIBNET Programme, have developed Information

Infrastructure and doing computerized housekeeping operations and library and information services. Most of them are fully computerized and many are still under hybrid stage performing both manual as well as computerized library services [10]

Those university/ institutional libraries, which are fully computerized, are being shifted to Digital library where digital library technologies and infrastructure are being developed. These libraries are thinking for introducing an Institutional Repositories, which would be in Digital Form, and the digital content will be created and managed by the concerned universities and institutions. The information mounted on IRs server will be made available to University Campus over University Intranet or will be available to all universities and institutions in the country or some may be available to all over Internet. For establishing IRs the university and institutions will be required to developed following infrastructure, which comprises of hardware and necessary equipments, software, campus Intranet or optic fiber campus network to have access to information available in Institutional Repositories.

3.1 Institutional Repository Design Architecture

IR may have multi-tier design architecture, which has been divided into three essential components or groups:

- Operational Architecture: It is an information management system which represents systems, services and data management layers;
- Technical Architecture: It breaks downs operational architecture in to functional components and capabilities; and
- System Architecture: It shows the technology enablers and their possible inter-relationships.

Institutional Repositories is developed and based on the principles of Designing Digital Library (DL). In Digital Library architecture, communities can have access to the digital library services locally through campus wide Intranet and globally over Internet. Basically the digital library design architecture has the following important components such as general to specific communities, archives or repositories to serve the needs of the communities, services design as per the requirement of the communities, and scalability and Interoperability to provide seamless access to the university communities. Design of individual services, user interface, display formats, indexing styles, digital preservation, data federation, service federation, web services, security and uniform standards are some other important issues which need attention of the developers of Institutional Repositories.

3.2 Need of Information Infrastructure For IRs

The essential information infrastructure support in terms of latest hardware configuration requirements, Intranet and Internet connectivity either through lease line or through V-SAT connectivity and other various technological tools to support the design and development of the Institutional Repositories or Knowledge Bank System are very important factors for successful implementation of the plan.

3.3 Hardware, which comprises of followings:

- Digital Computer powered by Pentium IV with high capacity hard disk for Server and Clients in the LAN, Web Servers and FTP Server etc;
- Desktop Workstations –PCs;

- Capture Devices such as Scanners, Cameras Cards etc.
- Cartridge Tape or Disk for backup;
- High Power UPS (10 or 20 KV)
- Printers (Laser and Ink jet printers (latest model), Consoles and Test Computers;
- Secondary Storage or Output Devices comprising of CD-ROM Disk (R and RW), DVD, CD-Tower, Flatbed Scanners and Optical Character Recogniser (OCR), Data Compression Device;
- High Speed Local Area Network (LAN, WAN), Internet Connectivity ether through Dial-up Connectivity or V-SAT, or through Lease Line or Radio Modem etc

3.4 Software comprises of

- Operating System Software;
- Optical Character Recognition (OCR) Software;
- Scanning Software;
- Adobe Acrobat Reader;
- CD-Read/ Writer Software;
- Digital Library Software i.e., DSpace, Greenstone, Fedora. E-Print etc.
- Windows-NT Networking Software, SQL Server Software, Database Management Software;
- Web Designing Software like Java, Front Page, XML etc.
- RDMBS (Relational Database) Supporting the variety of Digital Databases like ORACLE, PosgreSQL, My SQL etc;
- Full Text Search Engines to index and provide access to digital resources

3.5 Open Source Software

Besides above some free open source software will be required to develop IRs

The most important factor in development of an OAI Compliant Institutional Repositories is Open Source Software, which are available for the development of an Institutional Repositories in University/ Institutional libraries. Some important open source software are given below:

Dspace	:	http://cdsware.cem.cem/www.dspace.org
Eprints	:	http://cdswarew.cem.ch/www.eprints.org
i-ToR	:	http://cdsware.cem.ch/www.i-tor.org/en/toon
MyCoRe	:	http://cdsware.cem.ch/www.mycore.de/eng/index.html
CDSWare	:	http://cdsware.cem.ch/
FEDORA	:	http://www.fedora.info/

This software may be accessed for more details at <http://www.soros.org/openaccess/software/>

3.6 Open Archives Initiatives Protocol for Metadata Harvesting (OAI-PMH)

Interoperability refers to the ability of a digital library to work cooperatively with other digital library in an attempt to provide higher quality services to users. The OAI is an initiative to develop and

promote interoperability standards that aim to facilitate the efficient dissemination of content. The OAI Protocol for Metadata Harvesting (OAI-PMH) provides an application independent interoperability framework based on metadata harvesting. OAI-PMH enables automated distribution of any kind of metadata, which may be aggregated into searchable databases by harvesting systems. The OAI evolved out of a need to increase access to scholarly publications by supporting the creation of interoperable digital libraries. As a first steps towards such interoperability, a metadata harvesting protocol was developed to support the streaming of metadata from one repository to another , ultimately to a provider of user service as such as browsing, searching or annotation [1]

3.7 Other Equipments

Besides required hardware and software, other equipments like Scanner, Digital Camera, Handy Cam, High Quality Laser Printer -cum- Xerox, Copier Fax, LCD Projector, CD / DVD Writer/Player etc. are required for developing IRs in university libraries.

4. International Initiatives

In the fall of 2002, something extraordinary occurred in the continuing networked information revolution, shifting the dynamic among individually driven innovation, institutional progress, and the evolution of disciplinary scholarly practices. The development of institutional repositories emerged as a new strategy that allows universities to apply serious, systematic leverage to accelerate changes taking place in scholarship and scholarly communication, both moving beyond their historic relatively passive role of supporting established publishers in modernizing scholarly publishing through the licensing of digital content, and also scaling up beyond ad-hoc alliances, partnerships, and support arrangements with a few select faculty pioneers exploring more transformative new uses of the digital medium.

Many technology trends and development efforts came together to make this strategy possible. Online storage costs have dropped significantly; repositories are now affordable. Standards like the open archives metadata harvesting protocol are now in place; some progress has also been made on the standards for the underlying metadata itself. The thinking about digital preservation over the past five years has advanced to the point where the needs are widely recognized and well defined, the technical approaches at least superficially mapped out, and the need for action is now clear.

The development of free, publicly accessible journal article collections in disciplines such as high-energy physics has demonstrated ways in which the network can change scholarly communication by altering dissemination and access patterns; separately, the development of a series of extraordinary digital works had at least suggested the potential of creative authorship specifically for the digital medium to transform the presentation and transmission of scholarship.

The leadership of the Massachusetts Institute of Technology (MIT) in the development and deployment of the DSpace institutional repository system <<http://www.dspace.org/>>, created in collaboration with the Hewlett Packard Corporation has been a model pointing the way forward for many other universities. In 2003, with funding from The Andrew W. Mellon Foundation and other sources, MIT's DSpace is scheduled to be replicated at a number of additional institutions around the world; the software has also been released publicly under an open source arrangement, greatly lowering the

cost and development barriers to implementing repositories for all institutions. The MIT software is not the only option available, although I believe it is the most general-purpose; for example, there is software from the University of Southampton in the U.K. <<http://www.eprints.org/>> designed more specifically for institutional or disciplinary repositories of papers, as opposed to arbitrary digital materials.

Over the past few months, I have had a number of opportunities to speak about the roles and significance of institutional repositories as a strategy for supporting the use of networked information to advance scholarship, notably at a workshop jointly sponsored by ARL, CNI, and SPARC in Washington, D.C., at the DSpace launch celebration at MIT, and at the University of Tennessee and the University of British Columbia. While video recordings of some of these events are available on the Net, this article is an attempt to summarize and articulate the views I've expressed at these various events about the nature and functions of institutional repositories and their role in transforming scholarship.

5. Future Developments in Institutional Repositories

Not every higher education institution will need or want to run an institutional repository; though I think ultimately almost every such institution will want to offer some institutional repository services to its community. We will see various forms of consortia or cluster institutional repositories. Well-designed institutional repositories will separate system operation from curatorial and policy control (e.g. submission, preservation, etc) of specific sets of content. Thus we can expect institutional repositories to be a basic part of the negotiations in the development of regional or disciplinary consortia among universities or libraries.

Finally, university institutional repositories have some very interesting and unexplored extensions to what we might think of as community or public repositories; this may in fact be another case of a concept developed within higher education moving more broadly into our society. Public libraries might join forces with local government, local historical societies, local museums and archives, and members of their local communities to establish community repositories. Public broadcasting might also have a role here. In the long run it raises questions about "publishing" (and particularly nonprofit publishing) not in the scholarly context, but by members of arbitrary, perhaps but not necessarily geographically defined, communities or other interest groups. It is not inconceivable that we might also ultimately see commercial repository services for the public at large.

It is clear that the institutional repository is a very powerful idea that can serve as an engine of change for our institutions of higher education, and more broadly for the scholarly enterprises that they support. If properly developed, it advances a surprising number of goals, and addresses an impressive range of needs. Some of the results seem clear, though there are also likely to be any number of unexpected consequences. This is an area where universities need to invest aggressively, but where they also need to implement thoughtfully and carefully, with broad consultation and collaboration across the campus community (with intellectual leadership from the faculty and the library working in partnership) and with a full understanding that if they succeed they will permanently change the landscape of scholarly communication.

6. Conclusions

These benefits of open access, open source, and open standards are numerous. The benefits include lower costs, great accessibility, and better prospects for long-term preservation of scholarly works. Libraries should embrace all three of these concepts now and in the future. By supporting open access, open source, and open standards libraries not only can help ensure that their current and future patrons will have easier and more comprehensive access to scholarly research, they will also be helping other libraries around the world, including those in disadvantaged areas, to have access to important scholarly research.

The important beneficiaries to the Institutional Repositories are faculty, research scholars, and postgraduate/ graduate students from the third world or developing countries which give them an opportunity to access, communicate and publish their research findings without any delay and simultaneously they may participate in global research activities, , conferences, workshop and training etc. Therefore the main objective of the IR is to facilitate researcher, academic community and those who are interested to know the recent trends in research and development in their respective areas of interest.

Indian Universities/Institutions are generating huge amount of knowledge which must be accessed by all the concerned and the research output may be utilized optimally by the academic community of the world.

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