Design and development of Institutional Repository: A Study of Indira Gandhi Memorial Library, University of Hyderabad, India.

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Abstract

Institutional Repositories emerged as a new strategy that allows academic and research institutions to apply serious, systematic leverage to accelerate changes taking place in scholarship and scholarly communication through digital content. The main aim of IRs is to increase the grey literature accessibility globally. The increased demand for scholarly information, especially in science and technology demands scholarly societies and universities for centralized access to institutional rich resources revealing the scientific output. Digital publishing, global networking, more research and increased communication among communities of scholars are driving the demand for broader access. This paper reveals the concept of institutional Repository (IR), its relevance, infrastructural requirements, and suitable software's, implementation and the tendency in Universities particular reference to University of Hyderabad, IGM Library.

1. Introduction

Today there is an exponential leap in the digital content being produced. Academic institutions such as Universities are the major contributors to produce and make available their intellectual output like research articles, theses, dissertations, reports, audiovisual collections, etc., in digital form. The University libraries have been entrusted the task of digitizing, preserving, archiving, and publishing such content produced by the faculty, research scholars, and other clientele for the use of future generations. The Universities have established Institutional Repositories to make available these created digital collections of scholarly material that have historical, political, and scientific significance.

Definition

An "Institutional repository is an online archive for collecting, preserving and disseminating –in digital form of the intellectual output of an research institution/ university."

The digital archives of intellectual products created by the faculty, researchers and students of an institute accessible to end users both within and outside the institute. The development of institutional repositories provides a new strategy that enables universities, organizations, and institutions to accelerate the change in scholarly communication traditional publications to digital publication through institutional digital repositories (IDRs). According to Lynch (2003),Institutional Repository "is an archive-based set of services which the 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 association and access or distribution". An Institutional Repository (IR) is a digital warehouse for the scholarly material created by the members of the organization particularly academic and research institutions. These IRs when integrated forming global repositories of knowledge; have a common interface to search and publish the content. Publishing in IRs is the new way of scientific publishing.

The Institutional Repository (IR) evolved into a platform for all institutions in collating all the digital documents into a centralized location. It showcases

the entire institution's knowledge bank including all Journal Articles, books, technical reports, monographs, conference proceedings and magazines etc. with added support for all multimedia files.

1.1   Features of Institutional Repositories

➢   The primary objective of IR is to provide institutional knowledge under open access and it necessitates interoperability across the systems.

➢   The scholarly content hosted on the IR is generated at the host institution by its members; different from other subject-based repositories

➢   The content is stored collectively in one place and has the mandate of long-term preservation to the hosting institution.

➢   The scholarly communication process can be linked to the functions of IR i.e., gathering, preserving, and publishing the information.

2   University of Hyderabad (UoH)

The University of Hyderabadis a prestigious public central research university located in Hyderabad, Telangana, India. Founded in 1974. The university is located in Gachibowli and the campus spreads across 2300 acres, having a large area under forest cover, with two perennial and three seasonal lakes, as well as rock formations characteristic of the Deccan. The residential campus has more than 5,000 students and 400 faculty, from several disciplines.The governor of the state of Telangana is ex-officio the chief rector of the university, while the President of India is the visitor to the university. The university was established along the lines of the Six-Point Formula of 1973. The first vice-chancellor of the university was Banaras Hindu University organic chemist Gurbaksh Singh, from 1974 to 1979. Shri B D Jatti was the first chancellor of the university. In January 2015, the University of Hyderabad received the Visitor's Award for the Best Central University in India, awarded by the President of India. The University has ranked 10th position in Publicly funded Institionsawrded by Institute of National Importance , Central Universites& CFTIs (Higer Education Institutions of top 10 rank). The University having 12 Schools under concern departments offereing various post-graduate courses. UoH conducts its own entrance examinations for all courses during the months of May–June each year. The university offers integrated M.Sc., M.A., MFA, M.Tech., M.B.A, M.C.A.,MPhil and PhD degrees. Admissions to UoH are highly competitive. The university follows the positive-discrimination reservation system as per University Grants Commission of India guidelines.

2.1   Indira Gandhi Memorial (IGM) Library, University of Hyderabad.

IGM Library is one of the important central facilities of the University catering to the information needs of faculty, research scholars and students in Arts, Humanities, Social Sciences, Management, Sciences and Engineering. This library building was inaugurated by his Excellency late Dr. Shankar Dayal Sharma the then Vice President of India, on 21-10-1988 and named after late Prime Minister Mrs. Indira Gandhi. The main objective is to make the Library the most effective Learning Resource centre to contribute to the quality of higher education. The library also created learning environment by establishing Online Public Access Catalog (OPAC) Searching Area, Laptop zone with Wi-Fi facility. The website of IGM library is : http://igmlnet.uohyd.ac.in:8000/

2.2   Library Collection

IGM library is the first automated university library in the country. The library serves as a resources station to all scholars and has a print collection, include monographs, text books, back volumes of journals, theses / dissertations, CDs/DVDs. It subscribes print journals in various disciplines of the university and provides access to more than 25,000 e-resources including e-books. It also comprises a reading room which is accessible round-the-clock for the benefit of the students.The library has following print and online collection to meet the user's needs in the university.

Table:1 Collection management of IGM library of UoH

Sl. No.	Particulars	Total Collection
1	Books	326639
2	Reference Books	9356
3	Theses ,Dissertations& Project reports	12428
4	Journal (Print)	399
5	Newspapers	21
6	Magazines	21
7	Bound Volumes	94,215
8	Braille Books	2500
9	Databases	45
10	E-Journals,	35000
11	e-books	10221
12	CD-ROMs	8729

2.3   Services Offereing by IGM Library

1) Lending of books
2) Inter-library loan
3) Photocopy service
4) Reference service
5) CD-ROM search service
6) Internet browsing
7) Digital document on demand
8) Document Delivery Services

2.4   Internet based services

1) OPAC
2) E-Resources
3) RemoteXS- Remote access to e-resources through Knimbus (Outside university campus)
4) J-Gate document delivery service (DDS)
5) Anti-Plagiarism software-Turnitin
6) Grammarly @ Edu –Research writing tool

2.5   Library Computerization

The IGM Library is currently using VTLS software (Virginia Tech Library Systems), a full-featured open source software for library automation services. VTLS selected FEDORA from the University of Virginia and Cornell University, as the open source software to serve as the basis of digital asset management software to be called VITAL. The database of books/journals available in the library is being updated and maintained all in-house operations through automation. The library is a part of the campus LAN, it has few information outlets which link a computing node to the campus LAN and to the internet. In addition, the campus is fully WiFi-enabled, scholars are very convenient with their laptops to use the e-resources and facilities available in the library. The library is having its own server, including mirror server to support OPAC services. The campus LAN is connected to all E-learning resources & modules for faster access to the internet.

3.   Objectives of developing an Institutional Repository

Institutional Repositories to provide efficient and effective services to their clientele round the clock. The advantages provided by the digital libraries / institutional repositories have helped the libraries in overcoming the limitations posed in offering the traditional library services, and the main purpose of institutional repository is to bring together and preserve the intellectual output of an institution or organization, this describes the global attention to the research community towards self-archiving of the research purpose. The Institutions/Universities are establishing a digital archive of their publications due to the following reasons:

- Availability of research output in digital form
- Centralized location and digital showcase the entire institution's knowledge bank.
- Provides access to globally to get access to unpublished grey literature and other publications.
- To support the open access movement
- Wider accessibility and interoperability of the content.
- It can be managed as a cost-effective solution for libraries toward building resources in the long run.

3.1   List of Institutional repositories in India.

The present paper learn in detail on various aspects of Indian Institutional Repositories, i.e Universities/Institutions/ and R& D organizations followed by an in-depth analysis of various aspects on planning, implementation, and sustainable development of the Institutional Repository. The list of the Indian Universities and other institutions which have established their IRs has been collected from the official websites of OpenDOAR (Directory of Open Access Repositories-total 105) and ROAR.(Registry of Open Access Repositories-total 93).The following table-2 describes the top 25 oldest IRs of the country with URL and software developed for IRs.

Table 2: Top 25 oldest IRs of the country.

Sl	University/Organisation	home_page URL	software
1	Indian Institute of Science, Bangalore, India	http://eprints.iisc.ernet.in/	eprints
2	National Aerospace Laboratories	http://nal-ir.nal.res.in/	eprints
3	Dspace@IIA: Indian Institute of Astrophysics	http://prints.iiap.res.in/	dspace
4	Raman Research Institute Digital Repository	http://dspace.rri.res.in/	dspace
5	National Institute of Technology, Rourkela, India	http://dspace.nitrkl.ac.in/dspace/	dspace
6	Delhi University	http://eprints.du.ac.in/	eprints

7	Indian Institute of Management Kozhikode	http://dspace.iimk.ac.in/	dspace
8	Indian Institute of Information Technology	http://eprints.iiita.ac.in/	eprints
9	Kautilya Digital Repository	http://oii.igidr.ac.in:8080/jspui/	dspace
10	National Institute Of Oceanography, India	http://drs.nio.org/	dspace
11	Indian Institute of Management Kozhikode	http://eprints.iimk.ac.in/	eprints
12	ISI Library, Bangalore	http://library.isibang.ac.in:8080/dspace/	dspace
13	INFLIBNET, Gandhinagar	http://ir.inflibnet.ac.in/	dspace
14	National Center for Antarctic Research , Goa , India	http://dspace.ncaor.org:8080/dspace/	dspace
15	National Centre for Catalysis Research (IIT): Catalysis Database	http://www.eprints.iitm.ac.in/	eprints
16	Welcome to ePrints@CFTRI - ePrints@CFTRI	http://ir.cftri.com	eprints
17	DSpace at Guru Gobind Singh Indraprastha University, Delhi	http://dspace.ipu.ernet.in:8080/dspace/	dspace
18	Digital Knowledge Repository of Central Drug Research Institute (DKR@CDRI)	http://dkr.cdri.res.in:8080/dspace	dspace
19	Niscair Online Periodicals Repository (NOPR)	http://nopr.niscair.res.in/	dspace
20	S.V. National Institute of Technology Repository	http://eprints.svnit.ac.in/	eprints
21	Eprints@SBT MKU	http://eprints.bicmku.in/	eprints
22	Digital repository of Cochin University of Science & Technology	http://dyuthi.cusat.ac.in/	dspace
23	Dyuthi at CUSAT	http://dyuthi.cusat.ac.in/dspace/	dspace
24	KR@CIMAP	kr.cimap.res.in	dspace
25	National Institute of Immunology (NII), India	http://eprints.nii.res.in/p	eprints

3.3 Benefits of Institutional Repositories to the Universities

➢ Can become a centralized store for all kinds of organizational Intellectual outputs including the unpublished literature.

➢ Helps in long-term preservation and organization of the University's research output.

➢ The research, teaching, and learning activities can be supported and encouraged in the virtual environment by utilizing the created links and the digital library catalogs.

➢ The organizational records can be hosted and authenticated by linking the individual records to the full-text articles.

➢ Enables provision for analyzing and keeping track of the research performances.

➢ Repository as a showcase enhances the visibility and reputation of the University.

➢ The high profile nature of IR will support the marketing activities resulting in attracting high-quality staff, students and an increase in funding sources.

3.4 Challenges of Institutional Repositories

The need for sharing the knowledge by providing unlimited access has necessitated building Institutional Repositories. The primary aim of the IR is to create ease in the scholarly communication process by reducing the restrictions. There is a mismatch between the high expectations from the IR and the reality. The central point is the faculty adopting and trusting the IR. The other concerns are lack of sufficient infrastructure, technology issues, etc.Pickton& Barwick (2006), narrated the probable implications and likely to be barriers to the success of IR as below.

- Difficulty in gathering content
- Proprietary rights and Policy issues
- Working culture issues

3.5 Mechanisms required for creating Institutional Repositories
3.6

Creating and developing an organizational repository is primarily centered on the content, content providers, infrastructure, and the staff. For building an Institutional repository, it is mandatory to require the high-end technical infrastructurefacilities based on the requirements of the institutional needs and the data available formats and the strength of the data to be evaluated for future scope, for all this required high-performance technology-based system; without

high-tech infrastructural support, the institutional repository cannot be done. The essential information, infrastructural support and service in terms of hardware and suitable software, speed internet connection, various other supported tools are necessary for successful implementation of IRs.

Table 3: Hardware and Software requirement for IR.

Hardware/Server requirements	Software requirements
Operating System UBUNTU 18.04LTS OR Windows server 2012 R2 or UNIX-like OS	Web designing software's like JAVA, XML, Frontpage, Apache Ant, Maven &Tomcat)
Quad-Core Processor (CPU cores: 4 cores/2 cores)	RDBMS relational databases for supporting (ORACLE, PostgreSQL)
Hard disk for Server and Clint in LAN (>1TB)	OCR (Optical Character Recogniser)
Web Server and FTP Server High-speed Internet and LAN	Adobe Acrobat Reader (pdf, Html, jpg et.)CD-Read /Write software.
Desktop PC's (RAM 4GB/8GB/12GB/16GB) with Printer	
Capture devices like ADF (Auto documents feeder) scanner, Flatbed & Overhead scanners	
Secondary storage technologies include USB flash drives, floppy disks, DVD, CD-ROM disk	

3.6 Choosing a Software platform

To build Institutional Repositories, suitable software has to be procured. Many IR software packages are available both on an open-source and commercial basis. The kind of software chosen depends on the availability of computer and networking infrastructure, human resources, and programming capabilities within the institute. Several well-proven software packages are available free of cost from open source software directories like Sourceforge (https://sourceforge.net/). The most popular open source among them are DSpace, EPrints, and Greenstone etc. and examples of commercial software are CDSWare, Dienst, OCLC-ContentDM, IBM Content Manager, Digitool (Ex Libris) etc.

IGM Library of UoH has chosen *Dspace* an Open source software to create the institutional repository for the benefit of the institute, by comparing with other open-source softwares, Dspace is considered as a very powerful and user-friendly software for retrieving the information which can support long term preservation of the digital material. The Dspace is a joint venture of the MIT library and HP lab. DSpace has over 3000 organizations that are currently using the software in a production or project environment, some of the major features of Dspace are:

➢ DSpace is organised to accommodate the multidisciplinary and organisational needs of a large Intuitions within different community's needs to form anInstitutional Repository.

➢ DSpace allows contributors to access control on collection and the individual item level.

➢ UTF-8 Support (Unicode Transformation Format 8-bit.)

➢ Manage and preserve all format of digital content (PDF, Word, JPEG, MPEG, TIFF files)

➢ For searching and retrieval of Dspace submission process allows for the description of each item using an international standard for metadata schema version Dublin core.

➢ DSpaceact as a service model for open access and/or digital archiving for perpetual access.

3.7 Open Archives Initiative Protocol for Metadata Harvesting (OAI - PMH)

The OAI Protocol of Metadata Harvesting (OAI-PMH) defines a mechanism for harvesting records which contain metadata about repositories. Metadata is not only used to describe the digital objects on Institutional Repositories but also helps in searching and retrieving relevant information. In this context, the metadata standard that will be chosen achieves significance and shall be critical. The metadata standard selected should be the one that is compatible across the platforms and is an international standard, such as HTTP (Hypertext Transport Protocol) and XML (Extensible Mark-up Language, Dublin Core, or MARC, VRA Core, etc. The selected metadata standard shall have the ability

to search and display the collection and its items in a preferred way. The metadata to be harvested may be in any format which is agreed by a community. The collected metadata from various sources can be stored together in a single database and services can be provided from this centrally harvested or "aggregated" database.A flexible metadata standard is a globally recognized standard that allows us to override the defaults by making the provisions to customize it according to the local requirements.The institutional repository of IGM Libraryis also OAI-PMH protect which facilitates the users of other repositories to have access to the metadata about the content of this repository.

3.7 Institutional Repository Planned under IGM Library ofUoH.

3.8

The importance of an Institutional Repository is an essential tool for categorization and dissemination of information and to enrich teaching, learning and research in the digital age. ThereforeUoH Library have planned to create or to develop al repository for the Institutional Research scholars, faculty members, Graduate/post graduate students and other members of the university library and provide them an opportunity to access, communicate and publish their research. We have identified the materials for an Institutional Repository such as University publications (journal artilces), Thesis and dissertations, Departmental materials, Conference proceedings, Conference Presentations (e.g. PPT slides), Course content (e.g. syllabi, lectures) other digital material etc. The objectives of the IR of UoH as follows.

- ➢ To publish its own faculty and students research and to make it available to all the users.
- ➢ To collect the scattered materials in a single location to storeand preserve the valuable published and unpublished materials.
- ➢ To enhance the library services and create a common platform for the users to access Institutional materials.

The Intuitional Repository of UoHbrings its various intellectual materials as well as research outputs in its digital repository, for this Dspace an open-source software has been used to create the IR, which is having the feasibility of different searching facilities to get access of the documents. Patrons can open the UoHIR

webpage*https://dspace.uohyd.ac.in/home*under this present 48 Communities are created to browse

available collection. Users can access the content by following ways.

- ➢ Issue Date (users can sort issue date or submit date in ascending/descending order)
- ➢ Author (shows in Alphabetical order by ascending/descending order)
- ➢ Title ((users can sort issue date or submit date in ascending/descending order)
- ➢ Subject (subject keywords arranged in alphabetical in ascending/descending order)
- ➢ Supervisor (shows in Alphabetical order by ascending/descending order)

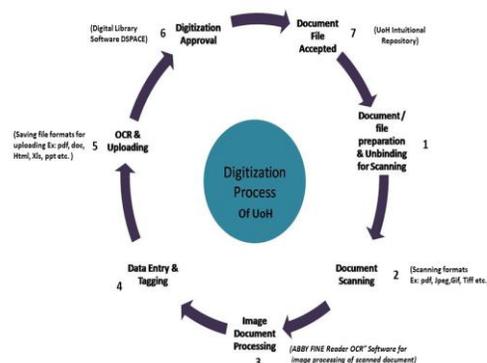### 3.9 Process of digitization & Implementation of IR at IGM Library @ UoH.

Fig.1: Process of implementation of IR of UoH.

3.10Measures taken towards effective functioning of IR

3.11

As digital preservation denotes a digital archiving of the intellectual output of an institution, it represents the quality scholarly content of the institution by making accessible this to others, worldwide through the internet. Effective digital preservation and institutional repository demand an organizational commitment, at the first level, in terms of training of human resources engaged in IR, financial support for building necessary infrastructure and formulation of standards, policies for proper functioning and utilization.
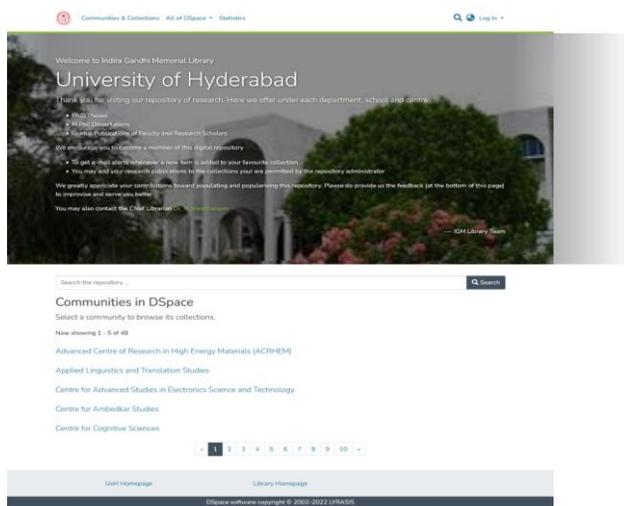
Fig.2: Institutional Repository home page of UoH.

4 Role of IGM library professionals in the Institutional Repository

Libraries are the gateway of intellectual content produced by their institutions or university. Thus a librarian is a most suitable manager for any organization to develop and maintain an institutional repository. The IGM Librarian and other library and information professionals has to play an important role in exposing intellectual content produced by the university and some of their important responsibilities in IR as follows:

➢ Forming the repository

➢ Creating awareness among the faculty members, staff and students about the benefits of self archiving in institutional or subject repositories.
➢ Performing as a meta-data editors and repositories managers.
➢ Conducting of user awareness seminars and training programs on IR.
➢ Administrating and inviting authors to deposit their articles and other works in it.

4.1 List of Scholarly Content currently available in the repository of UoH.

The primary objectives of the IGM IR of UoH is toprovided the research and academic content to the university end user. The IR offers the each schools under their department faculty members and students by providing the various scholarly contentto encourage their research process. The IR presently offers Ph.D.thesis, M.Phil dissertations and Journal articles of faculty and research scholars under 48 department communities. Each depatemnt having their faculty publications and thesis.

The following table-4decribes the department/subjects wise documents uploaded in IGM Library IR of UoH.

Table 4: Department wise documents uploaded inIR of UoH

Sl No.	Department	Available collection	
		Publications	Thesis
1	Advanced Centre of Research in High Energy Materials (ACRHEM)	124	13
2	Applied Linguistics and Translation Studies	15	39
3	Centre for Advanced Studies in Electronics Science and Technology	1289	4
4	Centre for Ambedkar Studies	1	1
5	Centre for Cognitive Sciences	189	2
6	Centre for Comparative Literature	9	28
7	Centre for Earth, Ocean and Atomospheric Sciences (CEOAS)	379	3
8	Centre for Endangered Languages and Mother Tounge Studies	0	0
9	Centre for English Language Studies	10	0
10	Centre for Folk Culture Studies	2	10
11	Centre for Health Psychology	75	12
12	Centre for Knowledge Culture and Innovation Studies (CKCIS)	0	1
13	Centre for Modelling, Simulation and Design	332	0
14	Centre for Nano Science & Technology	0	9
15	Centre for Regional Studies	6	13

16	Centre for Study of Indian Diaspora	31	3
17	Centre for Study of Social Exclusion and Inclusion Policy (CSSEIP)	5	10
18	Centre for Women Studies	4	12
19	Centre of Buddhist Studies	0	4
20	Department of Animal Biology	768	118
21	Department of Anthropology	19	38
22	Department of Biochemistry	443	101
23	Department of Biotechnology and Bioinformatics	585	25
24	Department of Communication	42	3
25	Department of Dance	0	18
26	Department of Education and Education Technology	2	0
27	Department of English	118	33
28	Department of Fine Arts	0	0
29	Department of Hindi	0	89
30	Department of History	60	43
31	Department of Music	1	0
32	Department of Philosphy	31	30
33	Department of Plant Sciences	935	122
34	Department of Political Science	107	56
35	Department of Sanskrit Studies	22	4
36	Department of Sociology	96	33
37	Department of Systems and Computational Biology	147	0
38	Department of Telugu	0	73
39	Department of Theatre Arts	0	13
40	Department of Urdu	0	36
41	School of Chemistry	2804	278
42	School of Computer and Information Sciences	1261	61
43	School of Economics	206	97
44	School of Engineering Sciences and Technology	360	15
45	School of Management Studies	96	41
46	School of Mathematics and Statistics	211	16
47	School of Medical Sciences	300	0
48	School of Physics	1634	119
	Total available collection in IR	**12719**	**1626**

5   Conclusion

The Institutional Repositories provide access to research publications and other digital documents of respective institutions. The popularity of this concept is growing rapidly in the higher educational and research institutions to disseminate newly emerged knowledge and expertise. The creation and effective organization of the Institutional Repository at IGM library of UoH has done through the proper planning, technical and managerial competencies. Such IR projects always shall be guided by the project management methodologies under the umbrella of the library. The planning of the IR programs and the project shall be always inconsistent with the goals and the information needs of the university. The leadership qualities of the librarians will be of immense use while taking the responsibility of completing the IR project successfully. The librarian shall take the suggestions, the guidance of the advisory committee constituted specifically for the establishment of Institutional Repository. The users' expectations can be best reached if the services are effectively provided with the best management procedures both in the use of technology, infrastructure as well as human resources. UoH Institutional Repository shall encourage the sharing of the information without any restrictions, enable wider communication of research and academic outputs, and results in new collaborations with other institutes of higher learning.

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