A STUDY OF MAJOR INSTITUTIONAL REPOSITORIES IN INDIA

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Abstract: Institutional repositories (IR) are digital collections that capture, collect, manage, disseminate, and preserve scholarly work created by the constituent members in individual institutions. The establishment of IR in the developing countries ensures that their national research becomes mainstream and contributes on an equal footing to the global knowledge pool. The paper presents the Indian scenario in developing the Institutional Repositories. The authors depict the main bottlenecks for setting up of IRs in various Indian institutions and come up with appropriate suggestions. Total 33 Institutional Repositories in India have been analyzed based on selected study criteria like software used for repositories, size of the items, contents included, languages, description and Country.

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Introduction

India has prospered through its strong academic and research establishments. The R&D organizations have also developed expertise in their respective areas that are now recognized worldwide. Leading Indian scientific research institutions, such as Indian Institute of Science (IISC), Indian Institutes of Technology (IITs), Indian Statistical Institute (ISI), laboratories under the Council of Scientific and Industrial Research (CSIR), Indian Council of Medical Research (ICMR), Indian Council Agricultural Research (ICAR), Indian Space Research Organisation (ISRO), Department of Atomic Energy (DAE), traditional universities, deemed universities and Corporate R & Ds have been playing crucial role towards national development. The high quality research accompanied by innumerable scholarly communications to various national and internationals journals and conferences has put India in the forefront in the developing world and leader of South Asian countries.

Access to information consequent to the Information Technology revolution was a major landmark of the last century. Scholars from around the world and particularly from the developing countries have been categorically denied access to vital research that could make a big difference. Many factors including the rising cost of publishing, has directly and indirectly have contributed for open access and institutional repository. Today institutions are deploying increasingly complex educational storage and delivery systems ranging from course management systems, personalized portals, students portfolio systems, streaming media services and web content management system.

Repository

- A *Repository* is a network accessible server that holds scholarly material / electronic resources
- An *Archive* is generally accepted as a synonym for a repository

• *Scholarly Archives / IRs* – An established medium to communicate peer reviewed (post prints)
and non-peer reviewed scholarly literature (preprints)

Institutional Repository

An Institutional Repository is an online locus for collecting, preserving, and disseminating the intellectual output of an institution, particularly a research institution. For a university, this would include materials such as research journal articles, before and after undergoing peer review, and digital versions of theses and dissertations, It might also include other digital assets generated by normal academic life, such as administrative documents, course notes, or learning objects.

The four main objectives for having an institutional repository are:

• to create global visibility for an institution's scholarly research;

• to collect content in a single location;

• to provide open access to institutional research output by self-archiving it;

• to store and preserve other institutional digital assets, including unpublished or easily lost literature (e.g., theses or technical reports).

• A convenient definition is a "digital collection capturing and preserving the intellectual output of a single or multi-university community".

An institutional Repository (IR, also called as e-prints archive) is a digital archive of the research output created by the faculty, research staff, and students of an institution and accessible over the Internet to end-users both within and outside of the institution, with few if any barriers to access. As a facility it consists of hardware, software and procedures to capture, organize, archive, disseminate and manage digital research resources of the institution. IR's provide a simple, web-based mechanism to researchers to deposit ('self-archive') and access their research publications.

Importance of Institutional Repository

Research Scholars, Students and Faculty members increasingly recognize the need to store their intellectual output in the form of personal collections, and to make available the results of their work within and outside the institution. Intuitions can develop the repositories of intellectual output for long term archival purposes.

Advantage of Institutional Repository

• Digital archive of their research publications that will be accessible anywhere through Internet

• Improved citation of research publications as the repository will be interoperable (comply with OAI-PMH) and accessible globally.

• Preservation and control of one's own publications

• Instuitional Repository increases the accessibility and impact of research among the students in the colleges.

- IR facilitates more timely access to research publications of faculty members and research scholars.

- IR provides the access digitally and simultaneously facilitates printing facility.

Contents of Institutional Repository

Institutional Repository content the following documents

- Published material- Ex.: Journal papers (post-prints), book chapters, conference papers

- Unpublished / gray material- Ex.: Pre-prints, working papers, minutes, theses and dissertations, technical reports, progress/ status reports, committee reports, course material, presentations, multimedia material, etc.

- Supporting material - Ex.: Data sets, models, simulations, All file types, including streaming media

Types of Institutional Repositories in India- In India, some institutions have established open access institutional repositories (IRs) that disseminate research outputs of respective institution. Sometimes, these are self-archived. Otherwise, administrator of the repositories collects the research documents from different sources and submits the documents to the IR on behalf of the persons concerned. Another band of digital repositories also exist in India that store and provide access to subject specific collections of documents. These repositories accept scholarly publications from any professional or researcher who belongs to the respective subject. *Librarian's Digital Library* (LDL) of Documentation Research and Training Centre (DRTC), Bangalore is an example of subject-specific repository for the library and information professionals. Another subject-specific repository established in India is *OpenMed@NIC*, maintained by National Informatics Centre, New Delhi. Other kind of digital repositories existing in India stores and provides access to document type specific collections. Vidyanidhi of University of Mysore is an example of document type specific collection that stores and provides access to theses and dissertations. Vidyanidhi accepts any thesis or dissertation from any researcher or student that is accepted in any of the Indian universities or institutions.

Research Methodology

Total 33 Institutional Repositories (IR) was selected and browsed for the present paper. The data related to the institutional repositories have been collected from their respective websites, institutions' websites and other secondary sources (Opendoar and ROAR website). The data is analyzed based on selected parameters, like software used for repositories, size of the items, content included, languages, and related and Multidisciplinary nature of the subjects.

Objectives of the study

- To know and enumerate the Institutional Repositories in India.
- To analyze the 33 IRs based on selected study criteria eg.
  - o software used for repositories,
  - o size of the items,
  - o content included,
  - o languages,

> o description
> • To compile the web directory of IRs.

The study hopes to enlighten awareness of Institutional Repositories being developed in India and its contribution to a global knowledge base.

Analysis of Data and Interpretations

Table 1 Name of the Institutional Repositories in India

S.N.	Name of the Organizations	Name of Repositories
	Bibliographic Informatics Division, National Informatics Centre (NIC), India	OpenMED@NIC
	Central Drug Research Institute (CDRI),	Digital Knowledge Repository of Central Drug Research Institute (DKR@CDRI)
	Delhi College of Engineering	Delhi College of Engineering Repository
	Documentation Research & Training Centre (DRTC)	Librarians' Digital Library https://drtc.isibang.ac.i
	IBS Ahmedabad	DSpace at IBS Ahmedabad
	IITB	http://dspace.library.iitb.ac.in/dspace/
	Indian Institute of Astrophysics	Indian Institute of Astrophysics Repository
	Indian Institute of Management Kozhikode	DSpace at Indian Institute of Management Kozhikode, http://dspace.iimk.ac.in
	Indian Institute of Science	Open Access Repository of IISc Research Publications
	Indian Institute of Science	Electronic Theses and Dissertations at Indian Institu of Science
	Indian Institute of Technology, Delhi	EPrints@IITD,http://eprint.iitd.ac.in/dspace/
	Indian Statistical Institute, Bangalore	Digital Library at Indian Statistical Institute, Bangalore
	Indira Gandhi National Open University, (IGNOU)	eGyankosh
	INFLIBNET	DSpace@INFLIBNET http://dspace.inflibnet.ac.in/
	Information Centre for Aerospace Science and Technology (ICAST), India	National Aerospace Laboratories Institutional Reposit (NAL Repository)
	Institute of Petroleum Management, Pandit Deendayal Petroleum Univeristy PDPU	Petrospace – PDPU Open Repository
	Management Development Institute	Management Development Institute – Open Access Repository,http://eprints.iimk.ac.in
	National Aerospace Laboratories	National Aerospace Laboratories Institutional Repository, http://nal-ir.nal.res.in
	National Centre for Catalysis Research (NCCR), India	Catalysis Database (ePrints@NCCR)
	National Chemical Laboratory	DSpace at National Chemical Laboratory
	National Informatics Centre	http://openmed.nic.in/
	National Institute of Immunology (NII), India	ePrints@NII
	National Institute Of Oceanography	DRS at National Institute Of Oceanography, ttp://drs.nio.org/drs/
	NCRA	DSpace at NCRA
	NISCAIR (National Institute of Science Communication and Information Resources), India	NOPR (NISCAIR Online Periodical Repository)
	NITR National Institute of Technology, Rourkela	http://dspace.nitrkl.ac.in/dspace/
	OneWorld South Asia	OneWorld South Asia Open Archive Initiative
	Raman Research Institute	Raman Research Institute Digital Repository
	Sardar Vallabhbai National	ePrints@SVNIT (Sardar Vallabhbai National Institute o

		Institute of Technology (SVNIT),	Technology EPrints)
		India	
		School of Biotechnology (SBT),	Eprints@SBT MKU
		Madurai Kamaraj University (MKU),	
		India	
		Thapar University (TU), India	DSpace@TU
		The Institute of Mathematical	IMSc Eprint Archive
		Sciences, India	
		University of Delhi, India	DU Eprint Archive

Table No.1 shows an indicative list of established institutional repositories and subject repositories in India. These repositories follow self-archiving model. There are many repositories in India but for the present study 33 Institutional Repositories have been selected based on OpenDOAR website. Table No. 1 also indicates that maximum number of institutional repositories belong to scientific and technological (S&T) areas than humanities and social sciences areas.

Table No. 2 Software Used for Institutional Repositories in India

S.N.	Name of the Repositories	E-Prints
1	Delhi College of Engineering Repository	326
2	Digital Library at Indian Statistical Institute, Bangalore	191
3	DKR@CDRI	135
4	DRS at National Institute Of Oceanography	220
5	DSpace at IBS Ahmedabad	171
6	DSpace at Indian Institute of Management Kozhikode	165
7	DSpace at National Chemical Laboratory	407
8	DSpace at NCRA	84
9	DSpace at Vidyanidhi	1835
10	Dspace@iitb	25
11	Dspace@INFLIBNET.	428
12	Dspace@NITRKL	653
13	Eprint@NII	10
14	DSpace@TU	*
15	DU Eprint Archive	170
16	edt!@IISc	206
17	eGyankosh	6190
18	Eprint@IITD	2141
19	ePrints@NCCR	644
20	Eprints@SBT MKU	1
21	ePrints@SVNIT	14
22	IMSc Eprint Archive	5
23	Indian Institute of Astrophysics Repository	1077
24	Kautiya@igidr	172
25	Librarians' Digital Library	249
26	Management Development Institute - Open Access Repository	*
27	National Aerospace Laboratories Institutional Repository	1320
28	NOPR (NISCAIR Online Periodical Repository)	2020
29	OneWorld South Asia Open Archive Initiative	75
30	Open Access Repository of IISc Research Publications	5090
31	OpenMED@NIC	1632
32	Petrospace - PDPU Open Repository	1
33	RRI Digital Repository	1372

Item included in IR has been shown in Table No. 3. Maximum numbers of items are posted by IGNOU e-Gyankosh (6190) followed by IISc (5090) Institutional repositories. Out of 33 IRs, 2 institutional Repositories were not provided the total number of items included in Institutional Repositories.

Table No. 4 Contents included in Institutional Repositories of India

S.N.	Name of the IRs	Contents included						
		Articles	Multimedia	Learning Objects	Conferences	Theses	Unpublished	Others (Books/Patents)
1	Delhi College of Engineering Repository	?						
		English				Hindi	Any Other	
1	Delhi College of Engineering Repository	?				x	x	
2	Digital Library at Indian Statistical Institute, Bangalore	?				x	x	
3	DKR@CDRI	?				x	x	
4	DRS at National Institute Of Oceanography	?				x	x	
5	DSpace at IBS Ahmedabad	?				x	x	
6	DSpace at Indian Institute of Management Kozhikode	?				x	x	
7	DSpace at National Chemical Laboratory	?				x	x	
8	DSpace at NCRA	?				x	x	
9	DSpace at Vidyanidhi	?				x	x	
10	Dspace@iitb	?				x	x	
11	Dspace@INFLIBNET.	?				?	x	
12	Dspace@NITR	?				x	x	
13	Eprint@NII	?				x	x	
14	DSpace@TU	?				x	x	
15	DU Eprint Archive	?				x	x	
16	edt@IISc	?				x	x	
17	eGyankosh	?				?	x	
18	Eprint@IITD	?				x	x	
19	ePrints@NCCR	?				x	x	
20	Eprints@SBT MKU	?				x	x	
21	ePrints@SVNIT	?				x	x	
22	IMSc Eprint Archive	?				x	x	
23	Indian Institute of Astrophysics Repository	?				x	x	
24	Kautiya@igidr	?				x	x	
25	Librarians' Digital Library	?				?	?	
26	Dspace @Management Development Institute – Open Access Repository	?				x	x	
27	National Aerospace Laboratories Institutional Repository	?				x	x	
28	NOPR (NISCAIR Online Periodical Repository)	?				x	x	
29	OneWorld South Asia Open Archive Initiative	?				x	x	
30	Eprints@IISc	?				x	x	
31	OpenMED@NIC	?				x	x	
32	Petrospace – PDPU Open Repository	?				x	x	
33	RRI Digital Repository	?				x	x	
		33				3	1	

		Total					

Table No. 5 shows the language wise items included on Institutional Repositories in India. All selected 33 Institutional Repositories posted English language documents. eGyankosh by IGNOU included Hindi language documents also . Only Librarian's Digital Library posted the documents in other languages like Kannnada.

Table No. 6 Interdisciplinary Subjects Listed In IRs in India

S.N.	Name of IR	Interdisciplinary Subjects							
		Science & Technology	Social Sciences	Business & Economics	Health & Medicine Medicine	Computer And IT	LIS	Management	Other and Multidisciplinary
1	Delhi College of Engineering Repository	?	x	x	x	x	x	x	x
2	Digital Library at Indian Statistical Institute, Bangalore	?	x	x	x	x	x	x	x
3	DKR@CDRI	?	x	x	?	x	x	x	x
4	DRS at National Institute of Oceanography	?	x	x	x	x	x	x	x
5	DSpace at IBS Ahmedabad	X	x	?	x	x	x	x	x
6	DSpace at Indian Institute of Management Kozhikode	X	x	x	x	x	x	?	x
7	DSpace at National Chemical Laboratory	?	x	x	x	x	x	x	x
8	DSpace at NCRA	?	x	x	x	x	x	x	x
9	DSpace at Vidyanidhi	X	x	x	x	x	x	x	?
10	Dspace@iitb	?	x	x	x	x	x	x	x
11	Dspace@INFLIBNET.	X	x	x	x	x	x	x	?
12	Dspace@NITR	?	x	x	x	x	x	x	x
13	Eprint@NII	?	x	x	x	x	x	x	x
14	DSpace@TU	X	x	x	x	x	x	x	?
15	DU Eprint Archive	X	x	x	x	x	x	x	?
16	edt@IISc	?	x	x	x	x	x	x	x
17	eGyankosh	x	x	x	x	x	x	x	?
18	Eprint@IITD	x	x	x	x	x	x	x	?
19	ePrints@NCCR	?	x	x	x	x	x	x	x
20	Eprints@SBT MKU	?	x	x	x	x	x	x	x
21	ePrints@SVNIT	?	x	x	x	x	x	x	x
22	IMSc Eprint Archive	?	x	x	x	x	x	x	x
23	Indian Institute of Astrophysics Repository	?	x	x	x	x	x	x	x
24	Kautiya@igidr	x	x	x	x	x	x	x	?
25	Librarians' Digital Library	x	x	x	x	x	?	x	x
26	Dspace @Management Development Institute - Open Access Repository	x	x	x	x	x	x	?	x
27	National Aerospace Laboratories Institutional Repository	?	x	x	x	x	x	x	x
28	NOPR (NISCAIR Online Periodical Repository)	x	x	x	x	x	x	x	?
29	OneWorld South Asia Open Archive Initiative	x	x	x	x	x	x	x	?
30	Eprints@IISc	x	x	x	x	x	x	x	?
31	OpenMED@NIC	x	x	x	?	x	x	x	x
32	Petrospace - PDPU Open Repository	?	x	x	x	x	x	x	x

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|33    |RRI Digital Repository        |?      |x    |x    |x    |x    |x    |x    |x      |
|      |Total                         |18     |0    |1    |2    |0    |1    |2    |10     |
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Table No. 6 shows the analysis of Interdisciplinary subjects listed in Institutional Repositories (IRs) in India. 33 IRs also covers the other interdisciplinary subject's education, computer, IT, Health and Medicine, Business and Economics, science, social-science and Management. 18 institutions posted their institutional repositories on Science and Technology. Ten IRs posted multidisciplinary subjects repositories. There is only one repository which is related to LIS facets i.e. 'Librarians' Digital Library'.

Findings

- It is observed that D-Space and E-Prints software is most commonly used open source software for institutional repositories.(Table No. 2)
- Maximum numbers of items (6190) are posted by IGNOU, e-Gyankosh followed by IISc Institutional repositories (5090). (Table No. 3)
- Most of the (26) IRs posted the articles. 13 IRs posted the unpublished materials on their institutional repositories. Theses content is posted by 17 LISIR.   (Table No. 4)
- It is observed that All selected 33 Institutional Repositories posted English language documents. (Table No. 5)
- Maximum 18 institutions in India, developed their institutional repositories on Science and Technology. (Table No. 6).

Constraints of Institutional Repositories

The Open Access Movement has a big challenge especially the publishing industry of journals under commercial sector challenging their sovereignty. The management support, availability of IR expertise, willingness of authors to participate are very important factors for the success and sustainability of IR.

- Absence of a well defined institutional policy is a serious constraint for IR development. Uncertainty will exist about the norms to be adopted for inclusion of documents regarding the person depositing the document, the need for review and technical evaluation of the document, types of documents to be included and the level access control.

- IR being a new development, there is serious lack of IR expertise especially in a developing country like India. Many institutions although serious to set up IR failed due to non-availability of IR expertise from both library and IT staff.

- The management and the authors concerned about forms a serious bottleneck in building the content of an IR. Many institutions fail to allocate sufficient funds for IR. The basic necessities like IR infrastructure availability of expertise can not be fulfilled without adequate funds

- Another important constraint is apathy of authors towards time consuming and lengthy deposition procedure.

- Ignorance of users in the absence of appropriate literacy program is another constraint with viz. one cannot expect any developments in IR.

- In case of journals and conference proceedings usually copyright of a research publication lies with the publishers. The publisher's rigid attitude for allowing the published item in IR and the authors concerned in this matter is another constraint to be sorted out appropriately

- A good number of institutions in India although have set up the IRs, but made them available only on the LAN of their institute or on a single system due to various reasons like copyright problem from publishers or reservation of their management to throw open their publications. Apathy of Creators/authors for depositing content

- Customization of open source software is a bottle neck .

- They affect the balance of institutional power as some departments proceed faster than others.

- Nature of content: Classified/restricted and Unclassified/Open

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

- They rely on unproven methods for long term digital preservation.

Suggested Measures

An Institutional Repository is the intellectual capital of an institute which recognizes the intellectual life and scholarship of our academic and research organizations. IRs facilitates building the digital collections to be searched and accessed freely by anybody in world. Above all, IRs preserves the heritage of the institute. Setting up of an IR needs a planned approach for the implementation tasks defined by their governance structure, management framework, operational strategies and a well documented workflow. Adoption of the standards and choice of models are critical factors for developing an IR.

More than 1,100 IRs have been set up in the world, and India with 33 IRs as listed in Open DOAR and ROAR leads the developing countries with in this regard. Most of the IRs particularly in India have neither preferred the governance and management structures nor documented the procedures and practices. A good number of institutions in India although set up their IRs have not made the content open access due to various reasons. There is no perceived growth in the number of documents added to many IRs in the world. Apart from a good number of metadata harvesting services like OAISter, ARC, general Internet search engines like Google, Yahoo and SCIRUS also harvest the metadata of repositories in the world and give the links to the individual IRs for full texts. Among the IR software adopted DSpace and GNU Eprints are very popular and also are open source.

- The government and the governmental agencies including universities, and important research establishments like CSIR, ISRO, DRDO, ICAR, ICMR, ADE, DST, DBT have to take a policy decision for setting up of IRs in their respective organizations.

- An intensive awareness should be brought among both the librarians and the users (contributors and readers) covering the benefits of IR both for the individual concerned and the institution.

- Apart from inclusion of the topic IR as a part of syllabus in Indian L & IS curriculum.

- Need to conduct workshops and training programs leading for creating expertise in setting up of IRs.

- At national level, we need to develop the capability of customizing the Open Access software to suit local requirements.

- It would be nice if one arrives at consensus on standards to be adopted for implementation of IRs in the country.

- While one can think of announcing some incentives for contributions of research output to IR, one can also think of making it mandatory at individual Institutional level for contribution.

- While it is advisable to have IRs at the Institutional level, one can also think of setting up of metadata harvesting services covering different sectors both by organizations and by subject.

- There is a need to set up a Registry of Indian Repositories in line with ROAR and OPENDOAR registries.

- All leading universities and R&D establishments and also consortia coordinators should write to all commercial and societal publishers to allow individual scientist to deposit their research publications from the concerned individual institutional IRs. This would facilitate development of IRs without infringement of IPR of publishers.

- All institutions should provide necessary infrastructure including servers, PCs, scanners, internet bandwidth and software required for setting up of IR and also required funds and manpower.

- It is better for the institution intending to set up IRs to adopt one of the open source software like Dspace or Eprints as they are already popular and satisfy most of the functionalities of IR, open source and comply with all open source standards concerned.

- Apart from developing Institutional repository, the individuals can also think of making available publications through subject based e-print archives and also individual personal websites as another step towards Open access movement.

- Libraries should also try to integrate OPACs with their respective IRs.

- Solutions to be found for restricted reports, Copyrighted material access. Proper review required for unpublished and unreviewed (peer) material.

- There is a need to pick up the manpower training for developing IRs as well motivate the authors to submit their documents.

- There have been few open access declarations by few professional societies and also governments of few countries by legislation. This move is yet to picked up by other countries.

- A collaborative effort by academicians/scientists/users, librarians, IT professionals and archivists is required to develop a successful and sustainable IR.

- The self deposition of documents by the creators is yet to pick up in the world and in particular, India. The copyright restrictions of publishers discourage the authors to submit their papers to IR. However, many publishers including the commercial ones have relaxed their attitudes in this regard by allowing the copy of the final referred manuscript of the paper accepted for depositing in IR. The SHERPA's RoMEo Project serves as a directory

of copyright policies of different publishers. Both IR Managers and the users recognize the important role of library professionals in the IR development.

Conclusion

Institutional repositories are now clearly and broadly being recognized as essential infrastructure in the digital world. The importance and usefulness of open access literature have been realized throughout the world. At present there is no single comprehensive and authoritative list which records academic open access repositories.

It's a new technique for digital college building, managing preserving information and creating new information in digital form. By using this repository the institution can offer service like dissemination of information, access to preserve and use information and as well as content submission and organization of information. Libraries and LIS professional should have to take part in Institutional Repositories in developing successful and valuable repositories for their institution.

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