

Open Access Initiatives in India - an Evaluation

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Abstract

Developing countries have embraced open access with a view to promoting visibility of research done in these regions. Open access initiatives described in this paper are based on interviews with information professionals responsible for creation and maintenance of online research repositories in India. Open access journals, e-print archives and e-theses repositories are covered with an emphasis on the sciences including the physical sciences, mathematics and the biomedical sciences. Existing repositories were identified from the Registry of Open Access Repositories located at <http://archives.eprints.org>. Key contacts were facilitated by well-known local open access advocates. Participants were contacted by e-mail and sites visited wherever possible. Many universities in India are at present lacking in infrastructure for establishing institutional repositories, so most of the institutions visited were research institutes and informatics centres. Semi-structured interviews were conducted to ascertain the background of participants, institutional culture, software selection, nature of funding, submission policies and future plans of these repositories. Also covered were promotion methods, user feedback and institutional support. Barriers to setting up institutional repositories are identified in this paper. Special features are described. Based on participant feedback a list of best practices is presented. The study has definite implications for the role of Canadian librarians in the promotion of Canadian research.

Keywords: Institutional repositories, open access, evaluation, best practices, Indian institutions.

Introduction

Traditional avenues of publishing are closed to many authors in developing countries. As a result much of the research done in these countries is lost to researchers elsewhere. In India poor access to international journals and the low visibility of papers are major problems facing Indian researchers. Open access is viewed as a solution to remedy this deficit. As a result there has been a concerted effort on the part of local open access advocates and others to actively promote open access.

Promotion of open access in India has been largely due to the efforts of Leslie Chan, Barbara Kirsop, Subbiah Arunachalam and the late T.B. Rajasekhar. In a position paper prepared for an Indo-US Workshop on Open Digital Libraries and Interoperability held in 2003, Rajasekhar outlined the key challenges facing Indian research as the need to

improve local access to global research and global access to local research. In 2002 two back-to-back three-day workshops on electronic publishing were held at the Indian Institute of Science, Bangalore under the banner of the Indian Academy of Sciences. These workshops led Medknow Publications based in Mumbai to launch open access electronic versions of journals now numbering 30. Following these workshops, two other workshops on open access archiving held in 2004 at the M.S. Swaminathan Research Foundation (MSSRF) with Leslie Chan and Leslie Carr as guest faculty led to many institutions setting up OA archives including the Indian Medlars Centre, National Chemical Laboratory, Indian Institute of Astrophysics and so on. One of the participants at this workshop has actually succeeded in mandating OA archiving of the papers of faculty and students at the National Institute of Technology, Rourkela, the only institution in India which has such a mandate. Another training workshop sponsored by the INDEST consortium in July 2004 was conducted by the National Centre for Science Information (NCSI) at the Indian Institute of Science, Bangalore and included participants from premier institutions such as the Indian Institutes of Management, the Indian Institutes of Technology and the National Institutes of Technology. This was in fulfillment of a recommendation of the INDEST consortium to member institutions to set-up OAI-compliant digital archives of their research publications. The INDEST consortium has been at the forefront in the provision of electronic resources to India's premier institutions. Many OA activists including Leslie Chan, Stevan Harnad and Alma Swan have also visited India to promote open access. The existence of an active electronic discussion list (oa-india@dgroups.org) keeps interest in open access alive.

Literature Review

A general overview on the progress of open access archiving in developing countries and its benefits has been provided by Chan and colleagues on Scidev.net. Specific Indian initiatives are mentioned in this context. A recent article on Indian institutional repositories covers the collection development of selected repositories based on information gathered from the Internet as of July 2005. It covers the types of content and software in use at these repositories. Problems listed are mainly due to the limited availability of web servers running the institutional repositories and dead links (Das, Sen and Dutta 91). There are other reports documenting existing institutional repositories such as the Digital Library of Mathematics at Indian Statistical Institute, Bangalore, DSpace @ INFLIBNET, ETD@IISc and Librarians' Digital Library (Krishnamurthy 245-256; Patel, Vijayakumar and Murthy 312-318; Jobish et al.; Madalli). Open access to electronic versions of Indian print journals in the areas of science, technology and medicine is a recent phenomenon. The growth in visibility and impact has been reported for the online version of the Journal of Postgraduate Medicine (Bavdekar and Sahu 5-8) while 2006 saw yet another report from the editors on the progress of open access Medknow journals (Bavdekar and Sahu 3-4). Another article by Kumari discusses global access to Indian research through Indian STM journals online. Recent conference presentations have provided updates on the progress of open access in India. The case of the National Institute of Technology, Rourkela which has mandated deposit of research papers published at the institute in its institutional repository is described by Madhan,

Rao and Awasthi while Ghosh and Das provide an upto date outline of Indian open access initiatives including open courseware and metadata harvesting services.

Study Objectives

This study is intended to evaluate the growth and development of online research repositories in India within the broader framework of open access. It will provide an understanding of the underlying issues involved in the operation of these repositories within the Indian environment and the barriers to implementation. A list of best practices will be presented based on the results. The study hopes to heighten awareness of research being conducted in India and its contribution to a global knowledge base.

Scope and methodology

This paper draws on the results of interviews conducted in the latter half of 2005 with Indian librarians and information professionals involved in the installation and management of online research repositories. It provides a snapshot of current activity and future plans for growth of these repositories and their commitment to open access. Participants were identified with the help of local open access advocates. The use of the term online research repositories is intended to cover e-print repositories, e-theses and dissertations (ETDs) and e-journals. Content includes all types of academic peer-reviewed intellectual output. Interviews were semi-structured and participants were asked to comment on their subject expertise and training, choice of software, resources including staffing, infrastructure and sources of funding, repository policies, promotion and advertising, user feedback, institutional support and future plans. Where person-to-person interviews were not possible, answers to open-ended questions were provided by participants through telephone or e-mail. Questions are listed in the appendix. A few repositories did not respond to the invitation to participate and will be mentioned in brief. In all 17 people participated, three of whom were involved in projects in the planning or development stage.

It is hoped that this study will provide context to the recent growth in Indian research repositories covered by such registries as Registry of Open Access Repositories (ROAR) and Directory of Open Access Repositories (OpenDOAR). While the project was under investigation the number of registered repositories on ROAR increased from 6 in mid-2005 to 13 at the end of the year. More recently this has gone up to 22. Both ROAR and OpenDOAR do not completely represent open access initiatives in India as they depend on voluntary registration. ROAR also includes archives in testing or development phase which may not be openly accessible. While ROAR can provide a graphical representation of the cumulative growth of records in Indian open access archives over the last few years, OpenDOAR has subject and content type classification potentially useful to librarians.

The growth of records in Indian archives since inception is represented in the following graph taken from the Registry of Open Archives at the University of Southampton courtesy of Tim Brody. Only those archives whose data are harvestable by Celestial are

included. Celestial harvests metadata from repositories supporting the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). The number of metadata records may not reflect the number of full-text publicly accessible documents. (Date accessed: March 24, 2006).

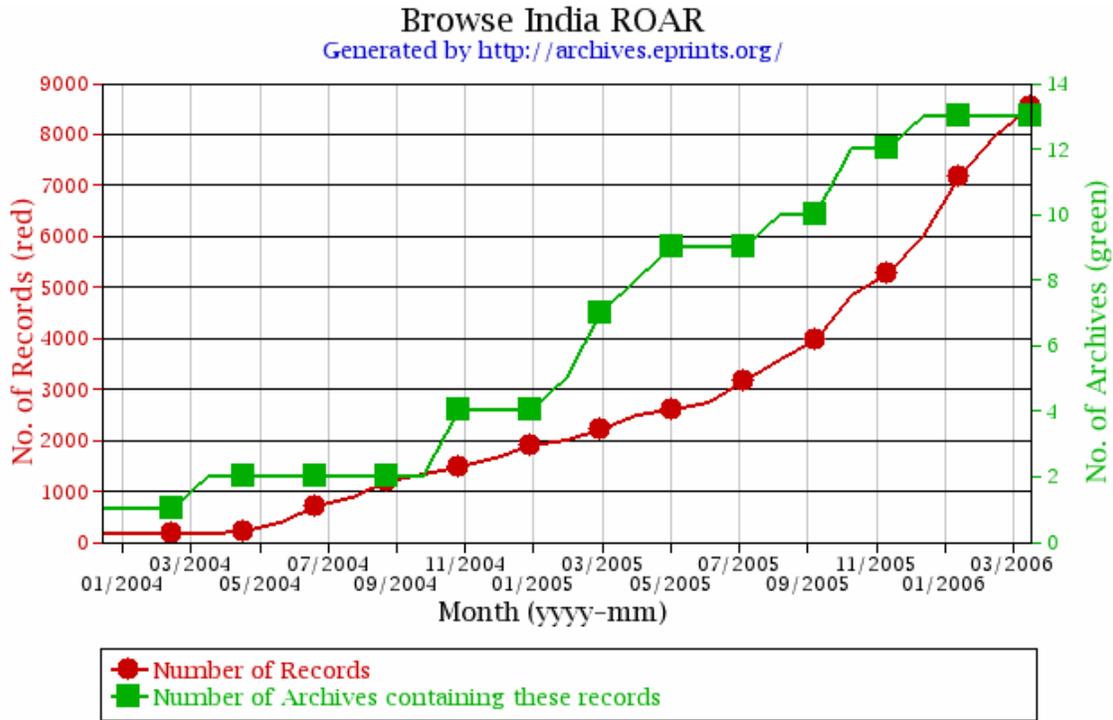


Figure 1

A summary of known online research repositories in India at the end of March 2006 is given below showing the type of repository, software selected and broad subject coverage. A majority of these repositories are devoted to medicine, science and technology. Some of these were under development or in testing phase and not yet registered with ROAR or OpenDOAR. Others are on intranets and not yet openly accessible. Repositories are broadly classified under E-print archives, ETDs and E-journals, the three areas designated in this paper as online research repositories.

E-print Archives	Software	Institution	Subject Coverage
	GNU EPrints	Indian Institute of Science, Bangalore	Science and technology
	GNU EPrints + DSpace	Indian Institute of Management - Kozhikhode	Management disciplines and IT
	GNU EPrints	OpenMed (Indian Medlars Centre, NIC)	Health sciences MESH classification
	GNU EPrints	National Aerospace Laboratory	Aerospace sciences NASA classification
	GNU EPrints	One World South Asia	ICT for development
	DSpace	National Institute of Technology - Rourkela	Engineering, physical and mathematical sciences
	DSpace	Indian Statistical Institute - Bangalore	Mathematics and statistics
	DSpace	Librarians' Digital Library, DRTC, Bangalore	Library and Information Science
	DSpace	Indian Institute of Technology - Delhi	Engineering sciences Not yet in ROAR.
	DSpace	INFLIBNET – Inter University Centre	Library Science and IT DDC Classification
	DSpace	Indian Institute of Astrophysics, Bangalore	Astronomy and astrophysics
	DSpace	Raman Research Institute, Bangalore	Physics and astronomy
	GNU EPrints	University of Delhi	Multidisciplinary
	GNU EPrints	MedknowEprints	Hosting service for archives. LC classification
Under development	DSpace	Indian National Science Academy (INSA)	Members publications, events, images. Not yet in ROAR.
Testing	GNU EPrints	Indian Institute of Information Technology	Content unknown.
Intranet	GNU EPrints	Rajiv Gandhi Centre for Biotechnology	Biotechnology

Table 1

ETDs	Software	Institution	Subject Coverage
	DSpace	Indian Institute of Science, Bangalore	Science and technology. DAI classification.
	DSpace	National Chemical Laboratory, Pune	Chemistry and biological sciences
Under development	DSpace	University of Hyderabad	Multidisciplinary Multilingual
Intranet	Greenstone	Indian Institute of Technology, Mumbai	Engineering and basic sciences.
Under development	DSpace	Vidyanidhi - National e-theses repository	Multidisciplinary. Access by registration.

Table 2

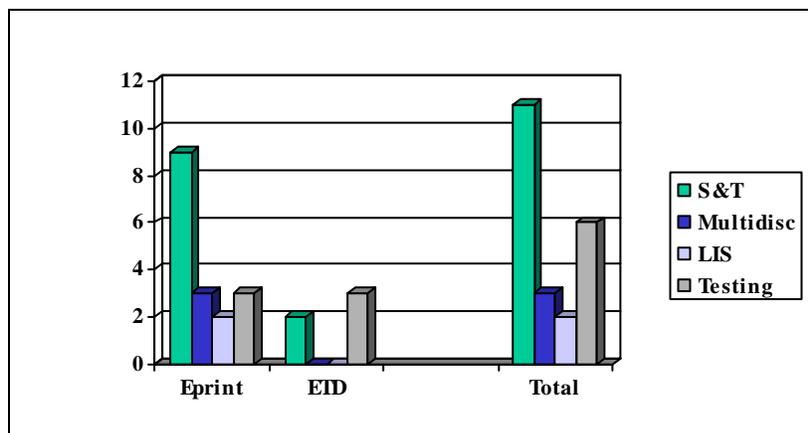


Figure 2: Subject Distribution of Archives

E-journals	Organization	Subject Coverage
4	Indian National Science Academy (INSA)	Science multidisciplinary, mathematics, history of science.
11	Indian Academy of Sciences (IAS)	Science – multidisciplinary. Partially indexed by Web of Science.
1	Indian Institute of Science - Journal of the Indian Institute of Science	Science- multidisciplinary, published by J.R.D. Tata Memorial Library.
29	Medknow Publications	Medicine – medical society journals. 14 are indexed by major A&I services.
38	Indian Medlars Centre MedInd journals	Medical and allied sciences society journals. Indexed in IndMed.
1	International. Association of. Bioinformation (IAB). Bioinformation journal	Biological knowledge discovery by mathematical and computational analysis of data.
1	Indian Statistical Institute – Sankhya: the Indian Journal of Statistics	Statistics – applied statistics, mathematical statistics and probability

Table 3

Summary Responses from Interviews

Aggregated responses to the many issues concerning repositories are detailed below. These issues are common to all repository types and key to understanding the challenges faced by research repositories in India and how they are handled.

Participants' Background and Experience

The majority of participants were from a library science background with additional training in programming or computer applications. Three of the respondents were scientists, one with a medical degree. Where there is a lack of technical proficiency they are able to draw on staff members with a computer science background or enlist support

from other departments. Some participants held leadership positions in the organization and had responsibility for institutional repositories among other duties. Almost all participants except those involved in journal publishing had attended or participated in training workshops on GNU EPrints or DSpace. They subscribe to listservs such as a digital libraries research group forum moderated by Documentation Research and Training Centre (DRTC), or are members of an OA list for open access proponents or a LIS forum for librarians. They may also belong to the DSpace and EPrints technical discussion lists. Peter Suber's Open Access News blog, or the American Scientist open access forum were not specifically mentioned although participant showed awareness of global issues concerning open access.

Institutional background

Institutions covered included research institutions, informatics centres, universities and technical institutes. These are all degree granting institutions, except for the Indian Medlars Centre at the National Informatics Centre, which provides information services to the medical community, and the Indian Institute of Management which awards postgraduate diplomas. Documentation Research and Training Research Centre (DRTC) a division of the Indian Statistical Institute, Bangalore has the distinction of being started under the aegis of the renowned librarian S.R.Ranganathan. It awards post-graduate associateships in documentation and information science as well as research fellowships. Universities were poorly represented with only two participants being associated with a university. Publishing centres such as Medknow Publications, Indian Medlars Centre, Indian National Science Academy (INSA) and Indian Academy of Sciences (IAS) were included as they held responsibility for locally published e-journals, the electronic versions of existing print journals.

Funding for higher education in India occurs through different agencies which are centrally funded. University Grants Commission (UGC) disburses grants placed at its disposal by the Central Government to universities established by Central and State Governments. The responsible ministries are Ministry of Human Resource Development and the Ministry of Science and Technology, the former covering all levels of educational institutions including the Indian Institutes of Technology (IIT), Indian Institutes of Management (IIM) and Indian Institute of Science (IISc), while the latter covers the science and technology departments and their respective laboratories and institutes. Other agencies such as the Indian Council of Medical Research (ICMR) and the Indian Council of Agricultural Research provide specialized funding. Almost all of the centres and institutions covered in this study come under the purview of one or other of these agencies.

Choice of software:

There is an overall commitment to using open source software for setting up archives although proprietary software is generally used for word-processing and presentations. The use of GNU EPrints and DSpace software for E-print repositories and of DSpace for ETDs is shown above in the summary listing of various institutional research

repositories. The use of DSpace for both theses and publications as part of a single repository is not common. Participants indicated that earlier versions of GNU EPrints were cumbersome to install and many librarians had moved to DSpace because of its ease of installation, its broad applicability and the promise of future development. DRTC is also providing a shell script for installation of DSpace to ease the installation process. The ability to provide communities and collections and the CNRI (Corporation for National Research Initiatives) handle facility in DSpace were stated as other reasons for its choice. Greenstone Software for Digital Libraries has been promoted by UNESCO for digital publishing in developing countries and continues to be used by some Indian libraries mostly in prototype projects. The use of EPrints software has recently been gaining ground. The need for a repository to exist as part of an integrated digital library system was also voiced. For e-journal publishing, in-house software is used or publishing is outsourced to external agencies. Participants indicated interest in Open Journal Systems which was developed by the Public Knowledge Project at University of British Columbia and is OAI compliant.

Resource Requirements

Institutions need 1-2 staff members to manage their research repositories. Staffing limitations were not mentioned by respondents and appear to be adequate at present. In addition, library student trainees are involved in routine tasks such as uploading documents. Checking of metadata and copyright provisions is done by library staff. Promotion of the repository among researchers is generally done by the information professional responsible for administration of the information centre. Staff requirements are quite consistent with an estimate by Arthur Sale who mentions that in the next 2 years after start-up of a repository a half-time commitment by a librarian should be sufficient to manage and promote a repository. Other posts on the American Scientist open access forum (<http://www.ecs.soton.ac.uk/~harnad/Hypermail/Amsci/4443.html>) and in SPARC e-news (<http://www.arl.org/sparc/pubs/enews/aug01.html#6>) also speak to this issue.

Almost all the institutions covered in this study have the required infrastructure for installing repositories, with dedicated servers and broadband Internet access. However, at least one respondent mentioned that the need for upgraded facilities was one of the reasons for providing access through the intranet rather than offering open access.

Funding does not appear to be a limitation for these institutional repositories. If needed, special requests are made for project funding. For example, NCSI is developing a cross-journal metadata harvester using external funding. In general existing library budgets and staff are sufficient to manage these repositories. Here too the costs are not visible as they have been absorbed into existing services and activities. This situation is similar to that encountered by Swan et al. who when looking at management costs and resources for existing UK repositories found hard data difficult to come by for the same reasons (34). However, with growth and expansion of these repositories costs could become a factor.

In the case of e-journals, open access to online versions of journals already being published in print requires minimal additional funding. None of these journals charge

authors. The cost of going online for a commercial publisher such as Medknow is as little as 3-5% of total costs. Society memberships and advertisements are major sources of funding for Medknow journals. For Govt. funded centers such as INSA, IAS and the Indian Medlars Centre which host online versions of journals, funding is obtained from granting agencies such as DSIR or ICMR. The need to show value is important to these centres to get continued funding. This is where use statistics and user profiles can help.

Repository Policies

Institutional support is a necessary condition for the installation and maintenance of repositories. It also offers a long term commitment to their continued existence. Content varies with the institution but academic output includes faculty publications, conference proceedings, reports and patents. Except for OpenMed, most e-print archives do not have well documented collection policies. Research institutions accept research publications from constituent departments. Indian Institute of Science has well written submission guidelines for authors. Most institutions allow both unmediated and mediated submission of documents. The most commonly accepted document formats are MSWord, PDF and LaTeX . Both current and retrospective material is uploaded after checking for publishers' copyright policies with regard to self-archiving at the SHERPA site (<http://www.sherpa.ac.uk/romeo.php>). National Centre for Science Information (NCSI) at IISc also offers a selected list of publishers' policies for local use.

E-theses are generally deposited as electronic copies after the hard copy has been accepted by the degree granting body. Scanning of theses from earlier years is ongoing in most institutions. Universities are recent entrants in the ETD area and accept multidisciplinary and multilingual documents. All ETDs use Dublin Core metadata elements and follow ETD-MS, a widely used metadata scheme for theses recommended by the Networked Digital Library of Theses and Dissertations (NDLTD). Recent guidelines from the University Grants Commission encouraging the preparation of e-theses for deposit at the institutional level should help in the development of additional e-theses repositories. INFLIBNET/UGC has a community entitled dArchive-India in its DSpace repository intended to promote archiving of Indian intellectual content by academics but so far has not been successful in attracting deposits. The reasons for this failure are unclear as INFLIBNET did not respond to an invitation to participate in this study. Another initiative at the University of Mysore, the Vidyanidhi project (<http://www.vidyanidhi.org.in/home/index.asp>) is designed to act as a national repository for e-theses providing support to universities which may not have the resources to manage their own repositories. Apart from the wider dissemination of research particularly among Indian researchers, the project hopes to improve the quality of theses and to prevent duplication of research.

At present open access to full-text is uneven in Indian ETD repositories. In some cases access is only available on the intranet or by registration. Copyright ownership is a subject that is vigorously being discussed. The prevailing view is that the degree-granting institution has the right to disseminate the works of affiliated authors. However, most repositories are providing consent forms for authors. Where open access is available,

printing is allowed with no downloading option. Among the premier institutions there exists the perception that research scholars in smaller institutions may plagiarize their work without the knowledge of thesis supervisors. In at least one institution authors are required to deposit the electronic copy of their theses in the institutional repository by institutional mandate with the understanding that it will be made open access after a six-month embargo period. This allows for publishing of articles or patents before access becomes widely available.

E-journals are generally online versions of print journals. They are published by professional societies, science academies or institutes, or by granting agencies such as the research councils. These are subscription-based peer-reviewed journals with all submissions following editorial policy. The decision to offer open access is the editor's prerogative or by policy decision of the governing body. For example, INSA journals provide access after registration only. Medknow journals allow online submission by authors. 15 Medknow journals are archived at Bioline International (<http://www.bioline.org.br/>) which provides increased visibility. Apart from Medknow journals, only Pramana – Journal of Physics published by the Indian Academy of Sciences offers online submission for authors.

Feedback

There are two aspects to be considered, feedback for users and feedback from users. Most repositories do not provide current access statistics for the benefit of users. eprints@IISc has access statistics for an earlier period on its website. Librarian's Digital Library used to provide detailed statistics on its website with both monthly and cumulative statistics on number of searches, words searched, a breakdown of types of pages viewed and details of items viewed more than 20 times. This is no longer available at the site. At present some managers of ETD repositories do not feel the need for use statistics preferring to reach a critical mass of deposited documents before providing statistics.

E-journal publishers vary in the statistics provided. Medknow Publications follows the Counter Code of Practice and provides users with the most detailed statistics including the number of times an article is viewed, e-mailed and printed, and times cited with citation information. MedInd provides a counter to indicate the number of visitors accessing each of its journal sites, other statistics are available by login. INSA keeps statistics obtained by registration for determining user profiles. Detailed access statistics provided by the outside agency which publishes its journals is kept for internal use.

Comments coming from users of these repositories are generally positive and are conveyed by e-mail or through personal communication. There are suggestions regarding metadata, or technical issues related to access. Copyright issues are prevalent at most sites. OpenMed handles all enquiries concerning copyright by pointing to Stevan Harnad's Self-Archiving FAQ (Frequently Asked Questions) at <http://www.eprints.org/openaccess/self-faq/>) which is linked to its website. Participants found the SHERPA site helpful to show users that publishers' policies on self-archiving are being adhered to. One respondent mentioned how open access has provided new

opportunities for international collaboration. As well, the advantages of 24 hour access to these is not lost to users. In one instance open access was credited with allowing a scientist to share his thesis information abroad by citing the item's unique handle identifier information, a persistent identifier available in DSpace.

In the case of e-journals, Journal of Postgraduate Medicine Online published by Medknow Publications has received many accolades from authors and users. Comments on the journal's manuscript management system and the presentation and navigability of its website are in the annual report published in this journal (Bavdekar and Sahu 7). Other e-journal publishers have received requests for cross-searching of journals and online submission of manuscripts.

Promotion and Advertising

Both top-down and bottom-up methods are used to promote repositories and advocate for open access. Respondents organize talks, seminars and training workshops to promote institutional repositories. E-mails to faculty and addressing library committees are other methods used to encourage deposit. Enlisting support from top levels of administration is recognized as the way to go. If there are prolific authors at the top convincing them of the benefits of self-archiving can help promote the repository. One institution has prepared a poster highlighting its eprints repository to encourage deposit by showing value to authors. These include better impact, wider access and visibility, the ability to create publication lists by author and department and long term preservation. Author benefits and copyright issues are also detailed on the website.

Indian Medlars Centre promotes its e-journals, database and e-print archive through talks at local and international fora. Medknow e-journals are promoted through local workshop presentations, internationally through its association with Bioline International and by advertising its services on its website and in the print version of the journal. Both agencies post regular announcements on new journals and services on international listservs, Medknow also contacts Google to promote new journal releases. Other journal publishers promote the electronic versions of their journals on their websites and through lectures and online presentations.

Future plans:

Filling up repositories is a priority with respondents. Providing open access to full-text and diversification of content where it does not exist are other priorities. Adding value by customization, developing a chemistry plug-in for molecular content, automatic extraction of metadata and support for special characters in metadata submission was also mentioned. They are also working on simplification of submission procedures to improve author compliance. There is long-term commitment to maintaining repositories with the development of robust systems having back-up facilities. Journals will continue to exist with print as the archival format, electronic versions providing added value.

The expansion of content through an extension of the INDEST consortium is being pursued. This is a consortium for E-journals and databases which primarily addresses the needs of the premier institutions such as the IITs and IIMs. IIT Delhi already has an e-print archive and has an ETD installation awaiting Council approval. IIT Mumbai will move from its present Greenstone software to DSpace. IISc would like to put its entire corpus of publications online for its centenary year in 2009. The building of a national level harvester is also being pursued at NCSI. Expanded access to university Ph. D. theses with standardized metadata format is being enabled through the University Grants Commission and Vidyanidhi. Recent publications by UGC include regulations as well as a guidebook for submission of theses and dissertations in electronic format. E-journal publishing by the major players is also expected to increase with more titles in the pipeline. Medknow Publications has plans to introduce online only journals. Medknow belongs to the Association of Learned and Professional Society Publishers (ALPSP) Learned Journals Collection, a consortium in partnership with SWETS giving it wider exposure.

Special Features :

Indian institutional repositories have introduced innovative features. The Indian Institute of Science is a model site for both e-print and e-theses repositories with the National Center for Scientific Information spearheading the deposit process. ETD@IISc offers its users theses templates in both MSWord and Latex. It also has a browse function by guide and by subject which has been customized for local use by NCSI (National Centre for Science Information). Display of number of items in individual collections was also developed at NCSI. Dissertation Abstracts International classification scheme is used. Eprints @IISc is well populated with almost 3500 publications and growing. Not all publications are available for open access, some are for registered users only, others are linked to publishers' websites. For faculty members too busy to do their own deposits NCSI allows deposit by e-mail with attachments. It also provides a selected list of publishers' copyright policies which is useful for local verification.

Documentation Research and Training Centre which is responsible for the Librarians' Digital Library (LDL) also offers SDL (Search Digital Libraries) a selective harvester for archives and e-journals in library and information science. At present it covers 13 archives and over 6000 documents. Archives including E-LIS and DLIST can be browsed individually or searched together. DRTC would like to include open access journals in library science but as many of these journals were started before OAI-PMH was introduced they are not OAI compliant. Future plans include the use of webcrawler software to harvest metadata from these journals using heuristics, conversion of the metadata to Dublin Core and making it OAI compliant.

Indian Medlars Centre provides a number of interesting services. Its eprint archive [OpenMed@NIC](#) has value added features such as MESH classification and offers RSS feeds to its users. MedInd open access journals are searchable through IndMed a searchable database of over 75 peer-reviewed Indian medical journals. MedInd journals are a subset of these journals with links to full-text. IndMed and PubMed can be searched

together as a meta search on this site. The full extent of services provided is shown on the following webpage.

Indian Medlars Centre
A Centre jointly setup by NIC and ICMR to cater to the information needs of medical community of India.

IndMED: A Bibliographic database of Indian biomedical journals

medIND: Fulltext of 38 Journals Indexed in IndMED.

MetaMED: - A meta-search tool to search IndMED and PubMed with single click.

Union Catalogue: A database containing journal holdings of major medical libraries of India.

Other Links: Other important Services and Resources.

OpenMED@NIC: Open Access Archive for Bio-Medical and Allied Sciences.

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Figure 3

National Chemical Laboratory (NCL) has a chemoinformatics initiative called Moltable (<http://moltable.ncl.res.in/index.htm>). Moltable will provide one point access to molecular related data such as computed and experimental data, biological activity data, toxicological data and literature information harvested from the Internet and presented in computable format. A recent article explains how chemical information can be harvested from the Internet (Karthikeyan et al. 452-461). Moltable proposes to link molecules to species data where available. NCL also has a Biodiversity Informatics site (<http://www.ncbi.org.in/>). DSpace theses at NCL are openly accessible. Patents and reports are also available at this site.

Discussion

Open access to Indian research is still in its infancy. A few of India's premier institutions, particularly in the science and technology area are providing open access to their research publications. In these repositories access to retrospective material appears to be substantial both in terms of research articles and theses, with less access to preprints and current publications. Much of the content is designed to showcase the intellectual product of the institution giving wide coverage to publications in international journals and less of the "hidden science" targeted by open access advocates, whether it be research published locally or unpublished research output mentioned by Rajasekhar or institutional records of scholarship. However, even provision of metadata in an interoperable format is a step forward, as it provides visibility and one can always request the document if required. At present there is not much support for adopting a national approach to e-print archives in India, distributed repositories being favoured.

Electronic versions of Indian print journals do provide access to locally published research but because not all are OAI compliant they may not fully reach a global audience. Although foreign author submissions appear to have increased, in general print subscriptions have not increased substantially. Exceptions are a select list of journals from Medknow Publications which show increase in subscriptions from 2003 to 2005 as described by Sahu and Parmar. Many of these journals are not indexed by well-known abstracting and indexing services and thus lack visibility. 15 Medknow journals are listed at the Bioline International website (<http://www.bioline.org.br/>), 11 of which are OAI compliant through the Bioline International EPrints Archive at the University of Toronto (<http://bioline.utoronto.ca>). JPGMOnline from Medknow Publications provides an example of what a wider “circle of accessibility” can achieve. The journal is indexed by A & I services including PubMed and Directory of Open Access Journals (DOAJ), and is OAI compliant through the Bioline International EPrints Archive. Statistics showing the number of visitors and downloads can rival some of the better known international medical journals. Moreover the number of citations to articles published in JPGMOnline has been increasing every year (Bavdekar and Sahu 3-4).

The same issues regarding open access that are prevalent in the developed world are reflected in India. Intellectual property issues continue to dominate the open access agenda. As a result many ETD installations are either in the development stage or on intranets pending clarification of these issues. A recent article covers copyright and IPR issues of electronic theses and dissertations based on a survey of Ph.D. research scholars and guides, some of whom have reservations regarding global online access (Vijayakumar, Murthy and Khan 697-704). Concerns include copyright violations, plagiarism and for a few respondents the perception of low quality theses.

Apart from author noncompliance, barriers to the widespread implementation of institutional repositories at universities include a lack of leadership and poor infrastructure. The difficulty in filling top library positions and improving infrastructure in the 310 universities/institutions in the country has been discussed by Cholin in the context of INFLIBNET’s mandate to improve computer and networking facilities in Indian libraries (Cholin 192). If recent UGC regulations on the submission of theses and dissertations in electronic format are universally adopted we will see a proliferation of institutional repositories in the country. INFLIBNET the inter-university agency involved in the networking of Indian libraries already maintains an online catalogue of Ph.D. theses produced in India while the Vidyanidhi project at the University of Mysore is actively promoting the development of ETD repositories at the university level.

There are training issues which need to be addressed in the installation and maintenance of repositories. Indian library professionals may lack the technical expertise for software implementation especially if additional programming is necessary. Fortunately there is a culture of sharing. DRTC and NCSI provide workshops and consultations to colleagues all over the country. In addition, cross-institutional organizations such as INFLIBNET and Vidyanidhi have the resources to provide additional training. DRTC has prepared a shell script for installation of DSpace which can be downloaded from their site. A step by

step manual for implementation of DSpace is being planned. Subscription lists for sharing expertise are available and show active participation.

In the area of e-journals, the economics of publishing is based on the print subscription model. The incremental costs of going online are low enough so as not to affect journal viability. Open access has distinct advantages in providing more visibility and widening the geographical distribution of both readers and authors. However, promotion of these journals continues to be challenging as only some of these journals are indexed by well-known abstracting and indexing services. Moreover if they are not OAI compliant they cannot be searched by search engines as part of a universal archive.

Best Practices

In order to promote the open access agenda, best practices should be shared with other Indian libraries and could include the following points.

- Show value to authors. Many authors need to provide a list of publications for assessment purposes. Preparing publication lists and author web pages using open archives software can help convince authors on its wide applicability and the increased visibility it provides. Prolific authors can be specially targeted.
- Provide access statistics, preferably at the document level. Uniform metrics should be adopted for all repositories.
- Get support from the top. Where top levels of administration support self-archiving institutional repositories have flourished.
- Create public opinion for mandating deposits. A recent statement at the special session on open access at the 93rd Indian Science Congress calling for mandatory deposit of research papers in institutional repositories was targeted at funding agencies. The accompanying FAQ provided an explanation of open access (<https://mx2.arl.org/Lists/SPARC-OAForum/Message/2716.html>).
- Increase training opportunities among staff by holding workshops and providing education on open access. This is already being done to good effect but needs to be more widespread by targeting universities and research laboratories S.
- Provide better visibility by registering repositories with open access registries such as ROAR, OpenDOAR and federated search services such as OAIster.

Concluding Comments

Since this study was completed, the number of institutional repositories in India has increased substantially. Ghosh and Das provide a detailed listing of institutional repositories in India complete with URLs and number of items available on a specified date. Also listed are online versions of journals being hosted by two other commercial publishers which provide open access to full-text. However, there are other institutions of national importance which do not yet provide open access to their research. For example, Chan et al. mention a hundred years of epidemiological and surveillance data from South India held by the National Institute of Tuberculosis which could be of tremendous value to tuberculosis researchers. Besides according to Rajasekhar there are a very large number of research laboratories which come under the umbrella of government science departments whose research output is not available in journals or conferences.

Canadian institutions can learn a few lessons from their Indian counterparts. If Canadian research is to be promoted we must adopt some of the strategies used by our Indian colleagues. Promotion of the benefits of open access among faculty could help publicize the issues involved. Subject librarians could participate to a larger extent in these efforts as part of their liaison activities. Mediated deposit can be utilized where faculty non-compliance is an issue. Sharing of best practices among institutions could help generate more interest in developing research repositories. Mark and Shearer of the Canadian Association of Research Libraries (CARL) have conducted an international review of content recruitment strategies for existing institutional repositories and provide useful tips for libraries considering the development of an institutional repository or adding content to an existing one. Canada's International Development Research Centre (IDRC) has been proactive in announcing the development of an open archive to raise the visibility and facilitate retrieval of its research output. Other research funding agencies will hopefully follow suit. In this context the recent consultation with scholars conducted by SSHRC and CIHR is to be commended. Universities should take note and plan for the dissemination of their research output whatever form it may take.

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APPENDIX

List of questions posed to participants

Background Information

- Q1. Please could you describe your qualifications and expertise.
- Q2. What is the primary objective of your institution - education, research or other? Please could you comment on the institutional background and how your information centre relates to the institution.

Resource Based Questions

- Q3. Could you describe the choice of software for your repository and the reason for its choice. Please comment on the infrastructure required?
- Q4. How many personnel are involved in maintaining your repository?
- Q5. What are your sources of funding?

Repository Policies

- Q6. What is the nature of content in your repository? What is the subject coverage of the repository? Do you have a collections policy?
- Q7. Do you have a submission policy? Who submits and what formats are accepted? Who authorizes deposit?

Promotion and Advertising

- Q8. How do you promote and advertise your repository?
- Q9. Do you offer any training for users?

Feedback

- Q10. What feedback have you received – technical, metadata or other?
- Q11. Do you have access statistics? Is it available for users?

Intellectual property issues

- Q12. How do you handle copyright and licensing issues?
- Q13. Could you please comment on rights management in your repository.

Future plans

- Q14. What are your future plans? Do you have plans for expansion, migration, diversification?
- Q15. Do you belong to a consortium or plan to join one? Do you have a network of colleagues to share expertise?
- Q16. Is there a long term institutional commitment to maintaining a repository?
- Q17. Would you like to comment on any barriers you have experienced in setting up/maintaining a repository?