The current issue and full text archive of this journal is available at
www.emeraldinsight.com/0033-0337.htm

Institutional repositories in Indian universities and research institutes

A study

M. Krishnamurthy
Documentation, Research and Training Centre, Indian Statistical Institute, Bangalore, India, and
T.D. Kemparaju
Department of Library and Information Science, Bangalore University, Bangalore, India

Received 9 February 2010
Revised 12 January 2011
Accepted 17 January 2011

Abstract

Purpose – The purpose of this paper is to report on a study of the institutional repositories (IRs) in use in Indian universities and research institutes.

Design/methodology/approach – Repositories in various institutions in India were accessed and described in a standardised way.

Findings – The 20 repositories studied covered collections of diverse types. Most of these collections have unique content.

Originality/value – The goal of this study is to study the IR software and data based on the content type, metadata and characteristics. The paper also describes the collections and some important observations from this study.

Keywords Digital libraries, Digital storage, Universities, Research organizations, Communications, India

Paper type Case study

Introduction

Open access is a growing international movement that uses the internet to throw open the locked doors that once hid knowledge. It encourages the unrestricted sharing of research results with everyone, everywhere, for the advancement and enjoyment of science and society. Open access is the principle that publicly funded research should be freely accessible online, immediately after publication, and it is gaining ever more momentum around the world as research funders and policy makers put their weight behind it. The open access philosophy was firmly articulated in 2002, when the Budapest Open Access Initiative (BOAI) was introduced. It quickly took root in the scientific and medical communities because it offered an alternative route to research literature that was frequently closed off behind costly subscription barriers. Open access is described as scholarly literature's free availability on the public internet,

The authors are very grateful for the helpful comments of the editor and the referees in editing this paper.

Program: electronic library and information systems
Vol. 45 No. 2, 2011
pp. 185-198

0033-0337
DOI 10.1108/00330331111129723

permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself (Budapest Open Access Initiative, 2002). The above statement arose from a meeting in 2001 in Budapest organized by the Open Society Institute (OSI). The purpose of the meeting was to accelerate progress in an international effort to make research articles in all academic fields freely available on the web. The participants represented many points of view, many academic disciplines, and many nations, and had experience with many of the ongoing initiatives that make up the open access movement. They explored how OSI, and other foundations, could use their resources most productively to aid the transition to open access and to make open-access publishing economically self-sustaining (www.soros.org/openaccess). Institutional repositories (IRs) adopt the same open access and interoperable framework as preprint archives. However, rather than being discipline-based, such as arXiv (http://arxiv.org) in the physics and mathematics subject area, IRs represent the wide range of research output produced by one institution. A large number of repositories have been built using software such as E-prints, DSpace and other software.

IRs

Over the past few years we have witnessed the emergence of a novel scholarly publishing and communication model in the form of institutional, or digital, repositories (IRs). Johnson (2002), then Enterprise Director at the Scholarly Publishing and Academic Resources Coalition (SPARC www.arl.org/sparc/), defined a digital IR as "any collection of digital material hosted, owned or controlled, or disseminated by a college or university, irrespective of purpose or provenance". SPARC has been a key stakeholder in the development of IRs and the position paper by Crow (2002) was an important publication. A university-based IR is a set of services that a university offers to the members of its community, for the management and dissemination of digital materials created by the institution and its community members (Lynch, 2003). IRs increase an institution's visibility and prestige by:

- bringing together the full range and extent of that institution's research interest;
- acting as an advertisement for the institution for funding sources, potential new researchers, and students, and so on; and
- ensuring long-term preservation of an institute's academic output.

IRs are increasingly becoming a vital tool for universities for the reasons mentioned as well as for faculty to make their work findable, used, and cited more. The more faculty staff experience the benefits of IR, the more hope is that they will deposit their work in university-based IRs. An IR is a natural extension of an academic institution's role as a generator of primary research and its four essential characteristics are:

(1) institutionally defined;
(2) scholarly content;
(3) cumulative and perpetual; and
(4) interoperability and open access.

Figure 1 shows a schematic of the core functions of an IR.

Although the current focus is on creating IRs in institutions of higher education, they can be set up by any institution, including public and private research and development laboratories interested in improved preservation, organization and dissemination of their intellectual output. Content in an IR could include published material (journal papers, book chapters and conference papers) as well as unpublished, or "grey literature", research material and theses and dissertations. Though varieties of open-access research repositories exist today including discipline-based repositories like arXiv and Research Papers in Economics – RePEc (http://repec.org), and document type-based repositories like the Networked Digital Library of Theses and Dissertations (NDLTD – www.ndltd.org/), or the Vidyanidhi collection of Indian theses (www.vidyanidhi.org.in/), it is the IR that has caught the imagination of the library and scholarly community and research administrators. The Directory of Open Access Repositories (OpenDOAR – www.opendoar.org) provided details of almost 1,800 repositories worldwide in late 2010. A key component of an IR is the repository management software. The OSI commissioned a study on the availability of several IR system software packages under open source licence (Open Society Institute, 2004). These packages are also observed to be compliant with the Open Archives Initiative Protocol for Metadata harvesting (OAI-PMH). The availability of repository system software identified included: ARNO, CDSWare, DSpace, E-prints, and Fedora. Most of these operate on the Unix/Linux operating system platform. Typical functionality supported by these systems includes:

- user registration;
- document submission;
- approval/moderation of submitted documents;
- archiving; and
- dissemination and administration.

Importance of IRs

IRs have the potential to bring significant benefits to institutions in improved visibility, status and public value, research knowledge management and also, for individual researchers, the establishment of a priority for research findings, improved visibility and impact of research. Interoperable IRs have the potential to accelerate

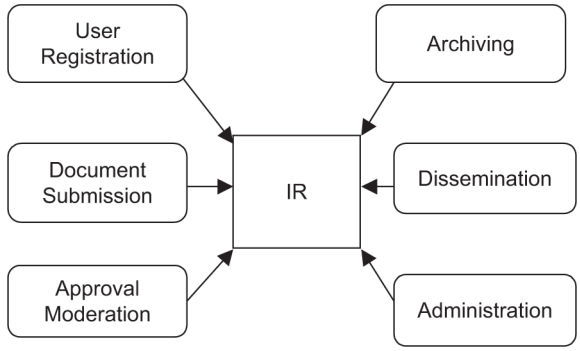

Figure 1.
Core functions of an IR

reforms in scholarly communication enabling open access to a larger body of scholarly material through cross-archive archiving. General study reviews on IRs in developing countries, such as India, and their benefits have been provided by many authors. Fernandez (2006) reported on developments in IRs at the Indian Institute of Science (using ePrints software), INFLIBNET (using DSpace) and the Indian Statistical Institute (also using DSpace). Authors from these, and similar, organizations have also published articles on institutional repositories as case studies to showcase their research output. For instance, Sutradhar (2006) describes the development of an IR at the Indian Institute of Technology at Kharagpur using DSpace. Ghosh and Das (2007) provide details of open-access journals available in India as well as specific IRs. Kashimura (2007) describes a digital archive as a system for preserving valuable digital information obtained by the digitisation of cultural material in a secure and reliable manner and for using it effectively. Kaur (2007) states that most of the cultural and heritage materials are being converted into digital form to provide immediate accessibility anywhere in the world. Knowles (2010) describes a network of IRs in Wales, which provides a search facility across the IRs in the network. One feature that all digital libraries share is a system of organization or management.

Key features and characteristics of an IR

Among IR software DSpace is the most used worldwide and OpenDOAR (www.opendoar.org) reports that 36 per cent of its repositories were developed using DSpace in late 2010. As any open-source software, it promises to be extremely advantageous to scientists and scholars everywhere, especially to those in the developing world. DSpace is a digital library system designed to capture, store, index, preserve, and redistribute the intellectual output of a university's research faculty in digital formats (www.dspace.org). It was developed jointly by Hewlett Packard (HP) Laboratories and Massachusetts Institute of Technology libraries. The DSpace architecture consists of three layers:

(1) *application layer* – which covers the interface to the systems, the Web, user and interface, and batch loader;

(2) *business layer* – which contains the DSpace specific functionality, workflow, content management, administration, and search and browse modules; and

(3) *storage layer* – which is implemented using the relational database management system Postgre SQL.

Each module has a well-documented API and all original code is in the Java programming language. Other pieces of the technology include a web server and Java servlet engine (Apache and Tomcat, both from the Apache Foundation), Jena (an RDF toolkit from HP labs), and OAICat (from OCLC). The system is available on Source Forge, linked from both the DSpace web site and the HP Laboratories site (Smith *et al.*, 2003). In late 2010, OpenDOAR provided details of 654 repositories worldwide using DSpace. India is noted as having 27 IRs implemented using DSpace – and ranks seventh in the list behind Japan (91), the US (88), Taiwan (81), Spain (39), Norway (37), and the UK (35). The total number of IRs in India in late 2010 is given as 55 on the Registry of Open Access repositories (ROAR – http://roar.eprints.org/view/geoname/), and 42 on OpenDOAR – this can be compared with the 14 noted by Sutradhar (2006).

Application of ICT in India

Rapid advances in ICT and its applications are dramatically affecting economic and social activities, as well as the acquisition, dissemination and use of knowledge. The use of ICT is reducing transaction costs and lowering the barriers of time and space, allowing the mass production of customised goods and services. With ICT use becoming all-pervasive and its impacts transformational, it has become an essential backbone of the knowledge society. The information infrastructure in a country consists of telecommunication networks and strategic information systems. India has thus already developed a vision and strategies to address its transition to the knowledge society. In the main its initiatives have, however, largely been developed around three functional pillars of the knowledge economy: education, innovation, and ICTs. The innovation system plays an important role in acquiring, creating, adopting, and disseminating knowledge, which is crucial for success in the knowledge society (Dahlman *et al.*, 2005). The innovation system in any country consists of institutions, and procedures that affect how the country acquires, creates, disseminates and uses knowledge. Basic scientific research fuels most of our nation's and the world's progress in science. Society uses the fruits of such research to expand the world's base knowledge and applies that knowledge in a myriad of ways to create new wealth and to enhance the public welfare. Yet few people understand how scientific advances have made possible the ongoing improvements that are basic to the daily lives of everyone. Fewer still are aware of what it takes to achieve advances in science, or know that the scientific enterprise is becoming increasingly international in character.

Freedom of inquiry, the full and open availability of scientific data on an international basis, and the open publication of results are the cornerstone of basic research. By sharing and exchanging data with the international community and by openly publishing the results of research, all countries have beneficial new forms of knowledge production, and distribution represents socially beneficial consequences of the expansion of ICTs. These new forms are not only about online video and photo sharing, but indeed represent opportunities as well as challenges in scientific communication. The ICTs enable knowledge trends to cut across all sciences as it impacts on the international exchange of scientific data and information. However, those benefits disproportionately come to the developed world, and developing countries still face the great barrier of the "digital divide". The digital divide is the result of different levels of adoption of technology between developed and developing countries, which can increase the gap between the haves and have-nots. For example, people that have access to high-speed internet at home can take more advantage of the opportunities offered by the ICTs than people who have to walk miles to access the web through a dial-up connection. Furthermore, scientists in the developing world are less likely to have resource-rich libraries. ICTs have not yet played a major role in alleviating the operational holdings, or positively enabling nation-building activities for example, in people participation in governance, health and nutrition security, small farmer profitability, watershed and natural resources management (Dharmadhikari *et al.*, 2007).

IRs in India overview

IRs are a practical, cost effective, and strategic means for universities to build partnerships with their faculty to advance scholarly communication. IRs are built on

growing faculty practices of posting research output online, often on personal web sites, but also on institutional web sites or in disciplinary repositories, suggesting an increasing desire for expanded exposure of, and access to, their work. Furthermore, IRs allow universities to offer secure digital hosting and archiving services combined with more effective web dissemination, while the universities can benefit from the enhanced visibility of their research outputs and the prestige that this confers. The emerging economies among the developing countries are not far behind in building up the necessary information structure, essential for sustainable economic development. These emerging countries however, have limitations in terms of bridging the digital divide within their societies, due to co-existence of marginalised and privileged communities.

With the availability of advanced ICT and by building the necessary information infrastructure, India has become an active contributor to global open-access literature, a contribution almost proportionate to its flow of scholarly literature through subscription based channels. The digitisation of centuries-old publications and rare documents is being carried out in different institutions across the sub-region to preserve this heritage and make items accessible through networks of digital archives. Indian information professionals are experimenting with open-source software such as Greenstone, DSpace and ePrints. In India, for several years, universities have generated valuable knowledge through research and development activities in the form of theses, dissertations, project reports, courseware, pre-prints and so on. In these are hidden a huge amount of valuable data and material, which is probably not available in any published resource. Unfortunately these are inaccessible in the absence of appropriate mechanisms. Even those resources that eventually appear in print and are published may still be inaccessible to a vast majority of institutions due to the high cost of subscription to the source material in which they are published. IRs are widely seen as one way of enhancing access to research carried out using public funds, while at the same time improving visibility of research especially for developing countries. Table I shows details of a selection of IRs in India.

Scope and methodology

This study was limited to the web sites of universities and other national institutes. The web sites were identified with the help of search engines and those that have registered with Open DOAR and ROAR and also are in the Cross Archive Search Service for Indian Repositories (CASSIR – http://casin.ncsi.iisc.ernet.in/oai/). Five elements were noted: name of institution, URL, IR software, subject coverage and metadata. In this study 25 institutes in India used DSpace software and only three institutes used e-prints. These repositories contain research publications, conference papers, conference proceedings, theses and dissertations related to the subject scope of their organization. This work was originally carried out between October 2009 and January 2010.

More details of some Indian IRs

ETD@IISc

The ETD@IISc is the repository for theses and dissertations at the Indian Institute of Science (IISc) – a joint service of the National Centre for Science Information (NCSI) and the IISc library. This repository is compliant with OAI-PMH (Protocol for

Table I.
Details of some IRs in India

Institutions	URL	Software	Coverage	Metadata	No. in collection
Aryabhatta Research Institute of Observational Science	http://202.141.125.171:8080/jspui/	DSpace	Science and Technology	OAI-PMH	1,260
Asia Pacific Institute of Management Studies	www.dspace.org/www.asiapacific.edu/	DSpace	Management Studies	OAI-PMH	460
Bangabondhu Shekh Mujib Medical University	http://sunzil.lib.bku.hk/hkuto/index/jsp	DSpace	Medical Science	OAI-PMH	890
Bangalore Management Academy	www.bma.ac.in:8080/dspace/	DSpace	Management	OAI-PMH	470
Guru Gobind Singh Indraprastha University	http://dspace.ipu.ernet.in:8080/	DSpace	Multi-disciplinary	OAI-PMH	369
ICFAI Business School, Ahmedabad	http://202.131.96.59:8080/dspace	DSpace	Management	OAI-PMH	1,110
IGNCA	http://tdil.mit.gov.in/coilnet/ignca/		Heritage	OAI-PMH	4,200
Indian Institute of Astrophysics	http://prints.iiap.res.in/	DSpace	Astronomy	OAI-PMH	5,107
IIM, Khozikode	http://dspace.iimk.ac.in	DSpace	Management	OAI-PMH	674
Indian Institute of Science	http://eprints.iisc.ernet.in/	E-prints	Science and Technology	OAI-ster Google, ARC (unified cross archive search)	8,563
Indian Institute of Technology (IIT), Mumbai	http://dspace.library.iitb.ac.in/dapce/	DSpace	Engineering	OAI-PMH	1658
IIT Delhi	http://eprint.iitd.ac.in/	E-prints	Engineering, allied science	OAI-PMH	485
Indira Gandhi Institute of Development Research	http://oii.igidir.ac.in:8080/dsapce	DSpace	Economics and social science	OAI-PMH	200
Indian Statistical Institute	http://drtc.isibang.ac.in/	DSpace	Library and Inf Science	OAI-PMH	489
INFLIBNET (UGC)	http://ir.inflibnet.ac.in/	DSpace	Multi disciplinary	OAI-PMH	1,144
Institute of Mathematical Science	http://in.arxiv.org/	E-prints	Physics, mathematics, Computer Science	OAI-PMH	760

(*continued*)

Table I.

Institutions	URL	Software	Coverage	Metadata	No. in collection
NAL	http://nal-ir.nal.res.in/	DSpace	Aero Engineering	OAI-PMH	3,401
NCCR, IIT Madras	http://203.199.213.48	E-prints	Energy Sources, nano Materials	OAI-PMH	410
National Chemical Laboratory	http://dspace.ncl.res.in/dspace	DSpace	Chemistry and Biological Science	OAI-PMH	870
National Institute of Oceanography	http://drs.nio.org	DSpace	Marine science	OAI-PMH	3,740
National Institute of Science, Communication and Information Resources, New Delhi	http://nsdl.niscair.res.in	DSpace	Unknown	OAI-PMH	9,673
National Institute of Technology, Rourkela	http://dspace.nitrkl.ac.in/dspace/	DSpace	Engineering/Technology	OAI-PMH	1,226
Raman Research Institute,	http://dspace.rri.res.in/	DSpace	Physics, Astrophysics	OAI-PMH	3,760
School of Communication and Management Studies (SCMS) Cochin	http://dspace.scmsgroup.org	DSpace	Management	OAI-PMH	1,000
Sree Narayana Gurukulam College of Engineering	http://dspace.sngee.ac..in	DSpace	Engineering	OAI-PMH	290
Thapar University, Patiala	http://dspace.thapar.edu:8080/dspace/	DSpace	Unknown	OAI-PMH	190
University of Hyderabad	www.diglib.uohyd.ernet.in/dspace	DSpace	Multi disciplinary	OAI-PMH	539
University of Mysore	http://dspace.vidyanidhi.org/in:8080/dspace/	Dspace	Multidisciplinary	OAIster-	5,150

Metadata Harvesting) and indexed in the CASSIR, OAIster and OpenDOAR. The record display page of individual theses provides links to full-text objects, along with descriptive metadata, such as title, author, subject, keywords, date of submission, publisher, abstract, URL, and the name of the collection. Figure 2 shows a screenshot of the opening page of this IR.

Indian Statistical Institute

The Indian Statistical Institute's Librarian's Digital Library deals with collections of library and information science materials. The Search Digital Libraries (SDL) is a metadata harvesting service for open-access repositories in the area of library and information science.

National Institute of Technology Rourkela

The National Institute of Technology Rourkela (NITR) is one of the Indian national institutes of technology (NITs) and is engaged in higher education and research activities in the areas of engineering, technologies and applied sciences. This institute's IR preserves conference papers, journal articles, preprints and theses authored by NITR researchers and faculty members. This repository is compliant to OAI-PMH and indexed in the CASSIR, and in OAIster and OpenDOAR. Figure 3 shows the opening page of the EThesis@NITR repository.

Indian Institute of Astrophysics

The IR at the Indian Institute of Astrophysics (IIAP), which is a premier research institution devoted to research in astronomy, astrophysics and related physics,

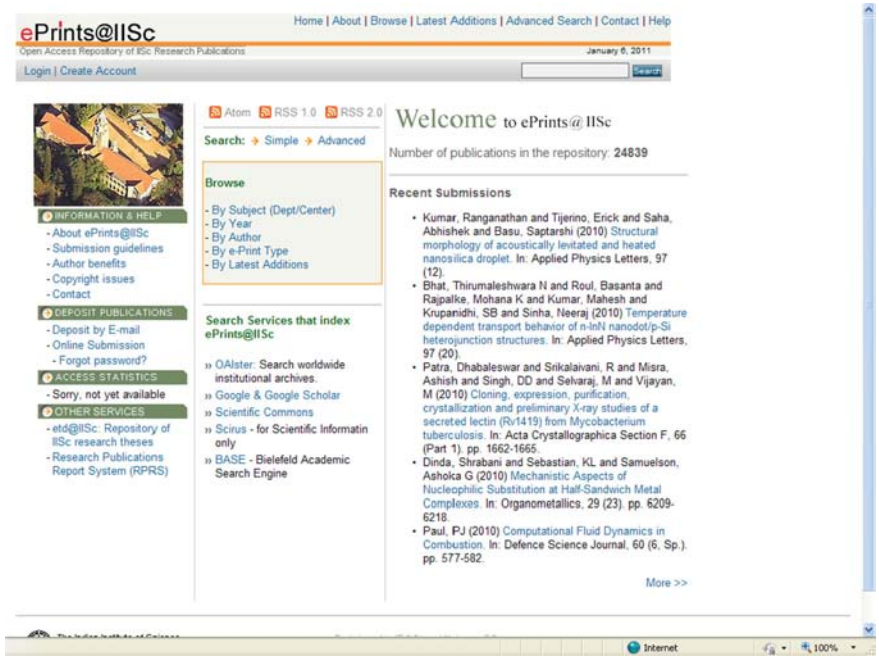

Figure 2.
Opening page of ETD@IISc

Figure 3.
EThesis@NITR

includes old records, manuscripts, publications and photographs. This repository is compliant to OAI-PMH and indexed in the CASSIR, OAIster and OpenDOAR. Figure 4 shows the opening page of this IR.

Indian Institute of Management

The Indian Institute of Management (IIM) is involved in academic and sponsored research in the interdisciplinary areas of economics, management, trade, commerce, industries and related areas. This repository provides open-access archiving facilities to the IIM communities, such as faculty member, students and researchers. It covers book reviews, case studies, journal articles, conference papers, working paper and conference proceedings.

Raman Research Institute

The Raman Research Institute (RRI) is a research centre in the area of physical science. Its IR consists of the annual reports, lectures and newspaper clippings. This repository is compliant to, and indexed in, the CASSIR, OAIster and OpenDOAR. Figure 5 shows the opening page of the IR at the RRI.

INFLIBNET

The Information and Library Network (INFLIBNET) centre, India, is an autonomous inter-university centre of the University Grants Commission, involved in creating an information infrastructure for academic and research institutions in India. This IR contains proceedings of INFLIBNET's conferences, such as CALIBER and PLANNER. It also provides full-text access to collections such as, dArchive India (Digital

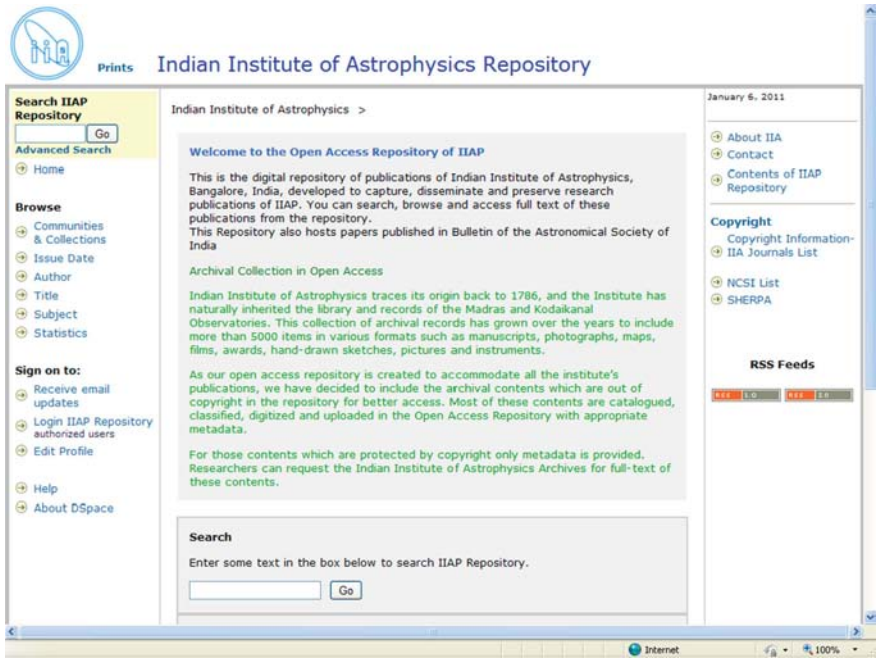

Figure 4.
Opening page of the IIAP IR

Figure 5.
The IR at the RRI

Academic and Research content for Value Education), news clippings about INFLIBNET, course materials, and library automation materials.

General points

Most of the IRs investigated operate on a UNIX/Linux operating system platform. Typical functionality supported includes: user registration; document submission; approval/moderation of submitted documents; archiving; dissemination; and administration. Unfortunately, however, the growth of IRs in Indian universities has not been of the desired level and order. While the elite institutions such as the IISc, the IITs and a few elite universities have been quick to build IRs, a very large number of universities, especially the state universities, colleges and institutions of higher education, have yet to initiate any major action in building IRs. Tilak (2009) reports that there are 421 universities and over 18,000 colleges in India. A substantial portion of research being carried out in these institutions will remain inaccessible if efforts are not initiated to develop IRs to enhance the visibility of the scholarly output of these institutions. There are several factors that have contributed to this state of affairs. Many of these universities and colleges could be lacking the expertise or resources required to set up IRs. India is a multilingual country with several scripts being used. A substantial amount of the research output in Indian universities is in the regional languages. Fortunately, today we have access to digital publishing technologies and global networking, enabling interoperability protocols and metadata standards, all of which have contributed to providing practical and cost-effective technical solutions that can be implemented even by small institutions. While IRs centralise, preserve, and make accessible an institution's intellectual output, at the same time they will form a part of a global system of distributed, inter-operable repositories providing the foundation for a new disaggregated model. Digital publishing and networking technologies harnessed by an increasingly dissatisfied library market, as well as by authors themselves, are now driving fundamental changes in universities. India still seems to be far behind tapping into, and making effective use of, existing IR technologies.

Conclusion

Open access to knowledge and information as we may see from this listing has far to go in India. With the availability of advanced ICTs and by building up the necessary infrastructure in India, particularly in academic institutes, this will become an active contributor to global open-access literature. It is largely achievable in a country where policy frameworks, institutional frameworks, information infrastructure, trained manpower, and financial resources are adequately available. The information infrastructure in a country consists of telecommunications networks, strategic information systems, policy and legal frameworks affecting their deployment, as well as skilled human resources needed to develop and use it. To develop strong information infrastructure, it is necessary to mobilise the many stakeholders that are involved in its deployment and use: government, business, individual users, the telecommunications and information service providers and so on. IRs in universities generally include pre-prints of journal articles, seminar papers, technical reports, research data, theses, dissertations, work in progress, important print and image collections, teaching and learning materials, and materials documenting the history of the institution. IRs expand access to research, facilitate control over the research output of universities and institutions of national importance, and provide a sustainable management system for digital content.

References

Budapest Open Access Initiative (2002), "Budapest Open Access Initiative", available at: www.soros.org/openaccess/read.shtml (accessed 5 January 2011).

Crow, R. (2002), "The case for institutional repositories: a SPARC position paper", The Scholarly Publishing and Academic Resource Coalition, Washington, DC, available at: http://works.bepress.com/cgi/viewcontent.cgi?article=1006&context=ir_research (accessed 5 January 2011).

Dahlman, C., Utz, A. and Davidson, J. (2005), *India and the Knowledge Economy: Leveraging Strengths and Opportunities*, World Bank Institute, Washington, DC, available at: http://info.worldbank.org/etools/docs/library/145261/India_KE_Overview.pdf (accessed 5 January 2011).

Dharmadhikari, V., Jagdish, N. and Rajagopalan, S. (2007), "Fifty years retrospective and future imperatives in information and communication technologies for national development", *Information Studies*, Vol. 13 No. 1, pp. 5-23.

Fernandez, L. (2006), "Open Access Initiatives in India- an evaluation", *Partnership: the Canadian Journal of Library and Information Practice and Research*, Vol. 1 No. 1, available at: www.criticalimprov.com/index.php/perj/article/view/110/171 (accessed 5 January 2011).

Ghosh, S.B. and Das, A.K. (2007), "Open access and institutional repositories – a developing country perspective: a case study of India", *IFLA Journal*, Vol. 33 No. 3, pp. 229-50.

Johnson, R. (2002), "Institutional repositories: partnering with faculty to improve scholarly communication", *D-Lib Magazine*, Vol. 8 No. 11, available at: www.dlib.org/dlib/november02/johnson/11johnson.html (accessed 5 January 2011).

Kashimura, M. (2007), "Digital archiving of rare books by HUMI project: an introduction to the digital archives of rare books and their preservation", *Journal of Information Science and Technology*, Vol. 57 No. 2, pp. 89-93.

Kaur, A. (2007), "Preservation of digital heritage materials in the 21st century", *SRELS Journal of Information Management*, Vol. 44 No. 4, pp. 385-94.

Knowles, J. (2010), "Collaboration nation; the building of the Welsh Repository Network", *Program: electronic library and information systems*, Vol. 44 No. 2, pp. 98-108.

Lynch, C.A. (2003), "Institutional repositories: essential infrastructure for scholarship in the digital age", *ARL: A Bimonthly Report on Research Library Issues and Actions*, No. 226, available at: www.arl.org/resources/pubs/br/br226/br226ir.shtml (accessed 5 January 2011).

Open Society Institute (2004), *A Guide to Institutional Repository Software*, 3rd.ed., OSI, New York, NY, available at: www.soros.org/openaccess/pdf/OSI_Guide_to_IR_Software_v3.pdf (accessed 5 January 2011).

Smith, M., Bass, M., McClellan, G., Tansley, R., Barton, M. and Branschofsky, M. (2003), "DSpace: an open source dynamic digital repository", *DLib Magazine*, Vol. 9 No. 1, available at: www.dlib.org/dlib/january03/smith/01smith.html (accessed 5 January 2011).

Sutradhar, B. (2006), "Design and development of an institutional repository at the Indian Institute of Technology Kharagpur", *Program: electronic library and information systems*, Vol. 40 No. 3, pp. 244-55.

Tilak, J.B.G. (2009), "Private sector in higher education: a few stylized facts", *Social Change*, Vol. 39 No. 1, pp. 1-28.

Further reading

Klaure, M. (2006), "Institutional repositories: their emergence and impact on scholarly publishing", available at: www.sheridanpress.com/assets/pdf/inst_repositories.pdf (accessed 5 January 2011).

Mittal, R. and Mahesh, G. (2007), "Digital libraries and repositories in India: an evaluative study", *Program: electronic library and information systems*, Vol. 42 No. 3, pp. 296-302.

Sen, B.K. and Josiah, J. (2008), *Open Access to Knowledge and Information: Scholarly Literature and Digital Library Initiatives the South Asian Scenario*, UNESCO, New Delhi.

Simpson, P. (2006), "Repositories for research: Southampton's evolving role in the knowledge cycle", *Program: electronic library and information systems*, Vol. 40 No. 3, pp. 224-31.

Corresponding author

M. Krishnamurthy can be contacted at: mkrishna_murthy@hotmail.com