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OPEN ACCESS AND DIGITAL REPOSITORIES IN SCHOLARLY COMMUNICATION: AN INSTITUTIONAL EXPERIENCE

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INTRODUCTION

Since last three centuries, the basic model for scholarly communication in science and technology has remained unchanged with the journal playing a pivotal role. The publication of the first journal was in French – Le Journal des Savants started in 1665, followed by the Philosophical Transactions of the Royal Society, London. The journal number reached to 750 by the turn of the 18th century and at present the figure has reached to a staggering number of 2,80,000 by the end of 2006. (Lawal, I., 2002 and Ratnakar, A., 2006)

There have been tremendous changes in printing from Gutenberg to Internet era in publication, which has directly affected the trinity of publishers, researchers and the end users. The impact of ICT has completely changed the publishing landscape. There emerged the desktop publishing during 1980s as a viable alternate to traditional printing. By 1990s, we could see that any one could share his ideas with rest of the world through Internet, and this opportunity could give countless writers-in-search-of-publishers a platform in which one could share his thoughts with others. (Misek, M., 2004).

The literature is growing astronomically. With the advent of ICT, the journals are being printed in both print and electronic forms. This has added fuel to existing costs and increasing more than the inflation rates. There cannot be any librarian who is not affected by the so called "serials crisis". Rising journals costs and falling library budgets are order of the day. (Gedye, R., 2004). This has directly affected library subscriptions with dwindling library budget resulting in drastic cuts in subscription. Several studies carried out during 1990s indicated that the subscription rates have increased over 80%.

As a result of proliferation of electronic resources and cuts in library budgets, the library professionals have started looking into other means so as to share precious information resources with others. There emerged consortium concept, where like-minded professionals came together and negotiated with publishers for access to more information with optimum payment. The consortium approach was one of the modes as far as access to all available information is concerned. Added to this, there have been demands for open access to literature published by authors in different journals, as authors are the sole originators of the piece of information generated, for which libraries have to pay and subscribe and access to information. (Patil,Y.M.,2006). Due to barriers of access and copyright, there emerged Open Access Movement, with three distinct parameters attached, viz. Open Access Journals, Open Archives and Institutional Repositories to facilitate scholarly communication.

WHAT IS OPEN ACCESS?

Traditionally, scholars carry out research and report their findings in the form of articles, which appear in peer-reviewed journals published by academic societies or commercial publishers. These journals are sold to libraries at regularly hiked prices. The usage is restricted and only those who afford the subscription can have access to information and it does not reach to all end users. In addition, authors have to sign away

copyrights and publishers have complete control over such writings. This holds good for restricted access publishing. On the other hand, in an OA, articles published are available on the Internet free of cost to all users. In such situations, authors are holding partially or fully copyright. Thus scholarly works are no longer restricted to any user either at institutional or individual level. Full access to generated fund of knowledge is a vital aspect for any effective research. As a matter of fact, not only free access, but dire need to further distribution, dissemination, use in course materials, data mining, and reexamination is required for crystallization of knowledge. (Waller, A. and Morrison, H.; Velterop, J., 2004).).

OPEN ACCESS: WHY?

The scientists conduct research and put across their results in the form of papers. The experience shows that the results of research normally do not reach to end-users due to various reasons like cost factor or access problems. Keeping this in view, the concept of Open Access (OA) has emerged as a major development in the world of scholarly communication. The very basic concept of OA is to facilitate free access to information without any barriers. The Open Access has become a buzzword amongst authors, publishers, and librarians, involving issues like copyright, funding mechanisms, business models, peer review, access to content and all issues are addressed to government agencies. The only solutions could be that every scientist and librarian's dream is to access perpetual, unfettered access to all scholarly content in the world without restrictions or any barrier. (Chesler, A., 2004).

Benefits of Open Access

The following could be the benefits one can derive from Open Access Movement.

- Libraries can cope with subscription costs and stable budgeting;
- Remove access barriers to research and use by all strata of the society;
- Researchers can have more control over their research work;
- To bridge the knowledge gap;
- To maximize impact of research by facilitating access to information;
- Greater support for the researchers having made their research out-put publicly accessible.

IMPACT OF OPEN ACCESS

Open access, now dominates discussion everywhere due to major shift in the landscape of publishing. We see major discussions bringing about new declarations by major societies, publishers, consortium, or governmental agencies supporting open access. As a matter of fact, several new open access journals are emerging in the horizon with new publishing models to test new ways to increase readership and access. Several studies have been made to establish a clear correlation between openly accessible materials and citation impact and it is established that the materials available in the open access or subject/institutional repositories is more often cited than that available as journal article. Therefore, self-archiving or posting in subject or institutional repository is no less as compared to non-OA sources. In order to establish impact factor of OA sources, further studies are to be undertaken. (Thompson ISI, 2004; Harnad, S. and Brody, T, 2004; Hajjem, C., et al., 2005; Brown, C., 2001; Eysenbach, G., 2006).

OPEN ACCESS INITIATIVES

Open Access became a movement after the Information Program of the Open Society Institute convened a meeting in Budapest in December 2001. Later several rounds of meetings were held in different places with elite groups of scholars in order to propose and implement Open Access Movement and declarations of policy statements at each meeting, which are briefed as below:

Budapest Open Access Initiative (BOAI) was released on **14 February 2002**.
(http://www.soros.org/openaccess/index.html)

There were over 100 institutions and 2000 individuals who have joined the original signatories to commit to promoting open access to peer-reviewed journal literature. Open access to peer-reviewed journal literature is the goal. Self-archiving and a new generation of open access journals are the ways to attain this goal. (ARL, 2002).

To achieve this, the following two complementary strategies were proposed:

- Self-Archiving - to deposit refereed articles in the archives conforming to standards mooted by OAI so that search engine and other tools can treat the separate archives as one when searches are made for content access;
- Open Access Journals – Scholars need the means to launch a new generation journals committed to open access and to help existing journals that elect to make the transition to open access.

Glasgow Declaration on Libraries, Information Services and Intellectual Freedom, IFLA, Glasgow, 19th August 2002.

"At a meeting in Glasgow on 19th August 2002, IFLA proclaimed the fundamental right of human beings both to access and express information without restriction.... IFLA asserts that a commitment to intellectual freedom is a core responsibility of the library and information profession worldwide, expressed through code of ethics and demonstrated through practice..... IFLA therefore calls upon libraries and information services and other staff to uphold and promote the principles of intellectual freedom and to provide uninhibited access to information" (Glasgow Declaration.2002)

Bethesda Statement on Open Access Publishing (BSAOP), released on June 20, 2003.

The meeting was held on April 11, 2003 on Open Access Publishing. The purpose of the meeting was to stimulate discussion within the biomedical research community on how to proceed, as rapidly as possible, to the widely held goal of providing open access to the primary scientific literature. The document could bring aspects relating to: definition of Open Access Publication, statement of the Institutions and Funding Agencies Working Group, Statement of the libraries and Publishers working Group and Statement of Scientists and Scientific Societies working Group. (BSOAP, 2003).

Berlin Declaration on Open Access to Knowledge (BDOAK) in the Sciences and Humanities, **October 22-23, 2003.**

In continuation to BOAI and BSOAP declarations, the Berlin Declaration drafted document to promote the Internet as a functional instrument for global scientific knowledge base and human reflection and to specify measures which research policy makers, research institutions, funding agencies, libraries, archives and museums need to consider. The goal was to realize the vision of global and accessible representation of knowledge; the future web has to be sustainable, interactive and transparent. Content and software tools must be openly accessible and compatible. (BDOAK, 2003).

IFLA Statement on Open Access to Scholarly Literature and Research Documentation, 5th December 2003.
(http://www.ifla.org/V/cdoc/open-access04.html

The International Federation of Library Associations and Institutions (IFLA) is committed to the widest possible access to information for all peoples in accordance with the principles expressed in the Glasgow Declaration on Libraries, Information

Services and Intellectual Freedom. This statement was adopted by the Governing Board of IFLA at its meeting in The Hague on 5th December 2003.

Washington D.C. Principles for Free Access to Science, March 16, 2004.
(http://www.dcprinciples.org/statement.htm)

A group of not-for-profit publishers endorse the declaration during a meeting held on March 4, 2004 to continue to support broad access to the scientific and medical literature through the following publishing principles and practices:

- Mission is to maintain and enhance the independence, rigor, trust and visibility that have established scholarly journals as reliable filters of information emanating from clinical and laboratory research;
- That we reinvest all of the revenue from our journals in the direct support of science worldwide, including scholarships, scientific meetings...and improvements in scientific publishing.

Through numerous organizations that serve the entire scholarly publishing community, not- for - profit publishers have freely shared their ideas and innovations, with the common goal of improving the dissemination of vital scientific and medical information throughout the world. (Washington D.C. 2004).

Salvador Declaration on Open Access: the developing Countries perspectives, Salvador, Brazil, **20-23 September 2005**. (Parallel meeting held with 9th World Congress on Health Information and Libraries).

The meeting emphasized the need for open access in the context of developing countries and urged governments to make open access a high priority in science policy including (SDOA, 2005):

- Requiring that publicly funded research is made available through open access;
- Considering the cost of publication as part of the cost of research;
- Strengthening the local OA journals, repositories and other relevant initiatives;
- Promoting integration of developing countries information in the worldwide body of knowledge.

Bangalore Declaration - Workshop on Electronic Publishing and Open Access: Developing Countries Perspectives, 2- 3 November 2006

Keeping in view all previous declarations, another meeting was held in Bangalore where more than 30 experts attended the workshop from developing countries like India, China, Brazil and South Africa and some from developed countries. Besides presentations of articles reflecting developing countries scenario, the workshop ended with discussion on a proposed national policy that should promote acceptance of the open access strategies as declared in the Budapest Open Access Initiatives and based on what was envisaged in Salvador Declaration for Open Access for Developing Countries. The proposed National Open Access Policy for Developing Countries should provide a major fillip in adopting open access as the way to release all publicly funded research publications from financial and other barriers, thus facilitating wider access to scientific information worldwide. (Kirsop, B., 2007). Many such meetings have declared unequivocal support for open access to literature.

STRATEGIES TO ACHIEVE OPEN ACCESS

The Budapest Open Access Initiative has recommended two complementary strategies to achieve open access to scholarly journal literature (BOAI, 2002). They are:

I. *"Self-Archiving:* First, scholars need the tools and assistance to deposit their refereed journal articles in open electronic archives, a practice commonly called, self-archiving. When these archives conform to standards created by the Open Archives Initiative, then search engines and other tools can treat the separate archives as one. Users then need not know which archives exist or where they are

located in order to find and make use of their contents.

II. *Open-access Journals:* Second, scholars need the means to launch a new generation of journals committed to open access, and to help existing journals that elect to make the transition to open access. Because journal articles should be disseminated as widely as possible, these new journals will no longer invoke copyright to restrict access to and use of the material they publish. Instead they will use copyright and other tools to ensure permanent open access to all the articles they publish. Because price is a barrier to access, these new journals will not charge subscription or access fees, and will turn to other methods for covering their expenses.....There is no need to favor one of these solutions over the others for all disciplines or nations, and no need to stop looking for other, creative alternatives".

OPEN ACCESS JOURNALS

Due to rapid growth in ICT, there has been tremendous scope to publish articles in a new breed of media, i.e. Open Access Journals (OAJ). The basic criteria of OAJ is to be available freely on the Web to any one to read, download, to save and down load either on Institutional Archives or Central Archives with no barriers of any kind. There are journals with online access but majority of them are accessible only on subscription. It has been estimated that there are about 5% of scholarly publishing, which follow open access model. It is to be noted that OA journals also follow all rigorous treatment of peer review as of non-OA journals.

The **Directory of Open Access Journals** is hosted and maintained by Lund University Libraries. There are now 2588 journals in the Directory. Currently, 773 journals are searchable at article level. As of March 2007, there are 127571 articles included in the DOAJ service. (DOAJ, 2007). Informatics India's OpenJgate lists about 3750 open access journals of which 1750 are refereed journals.

Characteristics of open access journals

The characteristics of open access journals as identified by Suber, P (2005) are:

- OA journals conduct peer review;
- OA journals typically let authors retain copyright;
- OA journals levy fee from the authors or his employer;
- Some OA journal publishers are not-for-profit (e.g. PLoS) and some are for-profit (e.g. BioMed Central or BMC);
- OA journals are economically viable and disseminate information at a faster rate;

Some publishers of Open Access Journals

Cost wise, OA journals are not for free. The up - front subscription fee is avoided as in traditional journals. One model is to charge authors for a submission fee. There are a few publishers, who initiated publishing altogether new journals keeping in view Open Access Initiative, which grew out of a meeting convened by the Open Society Initiative in Budapest in December 2001. Some important publishers are given as below:

Public Library of Science (PLoS)(http://www.plos.org)

PLoS is a non-profit organization established in October 2000, engaged in publishing eight leading biological journals with high Impact Factors and citations and provides Open Access as per the mandate. The business model is - expenses are recovered in part by charging publication fee to authors or research sponsors for each article they publish. It also offers complete or partial waiver of fees to authors who do not have funds to cover publication fees. Also, it has institutional memberships that allow all scholars at the member institution to submit articles free of charge.

BioMed Central (BMC) (http://www.biomedcentral.com)

BMC is a publisher of more than 170 peer-reviewed open access journals in the field of medical and allied sciences. It is an independent publisher dedicated to making the results of scientific research freely accessible. Like, PLoS, some funding for the project is provided by page charges. Sales of supplemental products such as reprints and paper copies of journals to libraries and individuals generate additional funding. They are immediately and permanently available online without charge and are open access. A number of journals require an institutional or a personal subscription to view other content, such as reviews or paper reports. Free trial subscriptions to these journals are available.

BMJ Group of Journals (Selective titles)
http://journals.bmj.com/misc/aboutus.shtml

The journals.bmj.com website is owned by BMJ Publishing Group Limited, a private limited company. The low income and low-middle income countries are entitled to free access. They include 113 developing countries, areas and territories included in the HINARI Initiative. There is no need to subscribe to access the full-text, which automatically qualify for free access.

Indian Academy of Sciences, http://www.ias.ernet.in

The Academy, founded in 1934, aims at promoting the progress and upholding the cause of science in pure and applied branches. Major activities include publication of journals and special volumes, etc. The Academy's eleven journals are open access and full text is available as pdf files on each journal's website.

Indian National Science Academy,
http://www.insa.ac.in/html/home.asp

The Indian National Science Academy was established in January 1935 with the object of promoting science in India and harnessing scientific knowledge for the cause of humanity and national welfare. Keeping this in view, the importance and impact of electronic publishing aids in Science and Academy's mandate of promoting and publishing scientific knowledge, the INSA being a premier scientific body took the initiative to propose a project on "Building Digital Resources: Creating facilities at INSA for hosting S & T Journals Online". The six journals published by them are available for open access.

The other known Indian Open Access Journal publishers are: MedKnow, Indian Medlars Centre (NIC), Kamala-Raj-Enterprises and IndianJournals.com which cover a few journals in the area of science and technology, medicine and humanities.

OPEN ACCESS INITIATIVES BY SOME OTHER WELL-KNOWN PUBLISHERS:

Some leading societies and commercial publishers are supporting open access to articles published by authors in some of the journals based on payments either by sponsorship or by the authors/institutions and some representative examples are given below:

The American Physical Society has announced release of **FREE TO READ (APS,2006)**

The APS has announced its Open Access (OA) offering articles published in Physical Reviews (PR): A to E, Physical Review Letters (PRL), and Reviews of Modern Physics (RPM). It is in operation since September 2006, which can be applied to any article or group of articles published in the above said journals back to 1893. Any one may, by paying a one-time fee, make articles published in APS journals available to all readers at no cost and without subscription. Readers will have access to pdfs and postscript versions of the FREE to READ articles through APS online journals.

The FREE TO READ fees will initially be $975 for articles in PR; $1300 in PRL. Articles in RMP differs depending upon size of the paper and is considered on a case-by-case basis. This initiative represents a path by which APS would gradually move to full open access.

American Chemical Society offers **ACS *AuthorChoice*** Open Access Option (ACS, 2006)

ACS now offers an important publishing option in support of the Society's journal authors who wish or need to sponsor open access to their published research articles. The ACS *AuthorChoice* was launched in October 2006, provides a fee-based mechanisms for individual authors or their research funding agencies to sponsor the open availability of their articles on the Web at the time of online publication. Under this policy, the ACS as copyright holder enables unrestricted Web access to a contributing author's publication from the Society's Website, in exchange for payment from the sponsoring author. ACS *AuthorChoice* also enables such authors to post electronic copies of published articles on their own personal websites and institutional repositories for non-commercial scholarly purposes. The option is extended to authors only after peer-review and editorial acceptance of their articles for publication. The base fee set is at $3000 through 2007, with significant discounts applied for contributing authors who are members of ACS and/or who are affiliated with an ACS subscribing institution.

As per latest news, there is a very interesting program for ACS authors, which can be used to make articles open access. They have what is called **Articles on Request** program (ACS, 2007).

As an extension to author's e-print service, ACS permits within the first 12 months of publication up to 50 complimentary article downloads to interested readers who are not already ACS subscribers; at 12 months and there after, reader access via author – directed links is unlimited. Under this scheme, the authors are at liberty to e-mail or post links to final published articles as published by the society. Articles access via the links is from the ACS web site only, and is provided without charge to the reader, with no access limitations after 12 months.

Springer Open Choice: Open Access Publishing: Springer, 2006

Springer operates a program called **Springer Open Choice**. It offers authors to have their journal articles made available with full open access in exchange for payment of a basic fee (article processing charge).

In this model, authors submit manuscripts for peer review as in the traditional system. When article is accepted for publication, the author does not transfer copyright, but, instead, arrange for payment of 'processing fee', which defrays the publisher's costs and as a result, the article will be published with immediate and permanent full open access online. The basic fee for Springer Open Choice is $3000.00. Springer Open Choice articles are freely available for any one to read, downloads, or print from SpringerLink. Here publisher is giving publishing service and the publisher is paid for, not content. In this model, the main customers are authors (and or sponsors). The aim is to make and keep the best option around for publishing with open access in established journals.

SELF-ARCHIVING

Self-archiving refers to the process wherein individual authors submit their articles to a server or any archive of their choice. The recent spurt in the growth of archives is due to common protocol for metadata retrieval defined by Open Archives Initiative (http://www.openarchives.org) enabling OAI-compliant archive to be searched seamlessly. (Chan, et al, 2005). The OAI which aims to develop and promote the use of a standard protocol, known as **Open Archives Initiative Protocol for Metadata Harvesting (OAI – PMH)**, designed for better sharing and retrieval of eprints residing in distributed archives. With the OAI harvesting protocol, articles in OAI compliant servers will form a global library that facilitates searching, data retrieval, cross linking, as well as long term archiving.

The UK-JISC funded **RoMEO** Project (Rights Metadata for Open-Archiving) was carried out vis-à-

vis IPR issues relating to academic author self-archiving of research papers. The study concluded that self-archiving is not best supported by copyright transfer to publishers and recommends that institutes must assert in copyright ownership in the long term, and that publisher consider new-ways of protecting the value they add through journal publishing. (Gadd, E. et al, 2003). The strong proponent of Open Access Movement, Stevan Harnad argues that research papers currently given away to "toll-gated" journals should instead be made openly available through free Web-based access.

There has been mixed reactions and apprehension about author's self-archiving, which may result in potential damage to journal subscriptions. There have been studies to show that there is little or no evidence to suggest that such posting is affecting journals as yet. In the realm of physics, where the **arXiv** preprint repository has been in operation since 1991, publishers of physics and related journals do not report any unusual drop either in submissions or in subscriptions. (Morris, S., 2004). As an example, for subject repository, arXiv is briefed below:

ArXiv for Literature in Physics (http://arXiv.org):

The e-print arXiv, which was implemented during August 1991, is the oldest archive, which facilitates free access to global resources of physics, mathematics, computer science and quantitative biology. Since inception, it has grown in size containing over 375,000 articles with more than 40,000,000 full text downloads per year. It is an international project, with dedicated mirror sites in 18 countries and has provided crucial lifeline for isolated researchers in developing countries.

This archive is entirely scientist driven and articles are deposited either before, simultaneous with or after peer review and articles are available immediately for access throughout the world. It has a heuristic steering mechanism, including a filter on institutional affiliation of submitter, or to ensure insofar as possible that submissions are at least "refereeable quality". (Ginsparg, P., 2006).

As per APS and IoP, it has been observed that in spite of the existence of arXiv for over 15 years, there has been no cut in subscription of journals they publish or they could not have any loss as a result of emergence of arXiv. (Swan A. and Brown, S., 2005).

INSTITUTIONAL REPOSITORY

With recent developments in scholarly communication, institutional repository concept is gaining momentum in making Open Access Movement a success. Raym Crow defines the institutional repository as a collection of digital material hosted, owned or controlled, or disseminated by a college or university, irrespective of purpose or provenance and the one capable of supporting two complementary purposes: as a component in a restructured scholarly publishing model, and as a tangible embodiment of institutional quality. Clifford Lynch (2003) defines IR as " a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these materials, including long-term preservation where appropriate, as well as organization and access to distribution".

With free access to some open source softwares for creating institutional repositories, several institutions around the world have developed institution-based repositories. Some of the open source softwares are: **Eprints** (http://www.eprints.org/), **FEDORA** (http://www.fedora.info/) and **DSpace**. The prominent software, which is used by many, is DSpace (http://www.dspace.org/), developed by MIT, Cambridge in collaboration with Hewlett-Packard with a slogan of "durable digital documents", created to capture, distribute and preserve the intellectual output of MIT (Kwasik, H and Fulda, P.O., 2005).

EVALUATION OF IRS

Institutional repositories are basically data providers and expected to provide full range of service to its potential user communities. As a service, IR needs to be subjected to periodic evaluation to ensure that it is fulfilling its basic institutional requirements and user needs for which it has been implemented in the organization. The basic aspects related to evaluation is: whether the IR is fulfilling needs defined; communities are well served; whether all communities represented in the IR are posted with articles by the faculty; if not what are the reasons; how best is the usage pattern; how concerned are the faculty for posting/ submission of their pre or post prints. (Davis, P.M. and Connolly, M.J.L., 2007).

INDIAN SCENARIO IN DEVELOPING INSTITUTIONAL REPOSITORIES

The Indian R & D organizations, which have the best facilities with all required infrastructure are developing institutional repositories as could be seen in the Directory of Open Access Repositories (open DOAR: http://www.opendoar.org/) where over a dozen prominent IRs have been listed. The Indian scenario is well documented in the paper by Ghosh and Das (2006). The important Indian Digital Repositories are given in Table:1. Also there have been extensive discussion in the LIS forums and literature regarding open access and implementation of IRs and choice of hardware and software in the Indian libraries (Madalli, Devika P. and Seth,R.,2005; Krishnamurthy, M., 2005; Das R., et al, 2006; Rajashekar, T.B., 2006; Birdie, Christina and Vagiswari, A.,2006; Sukhdev Singh and Pandita Naina, 2006; and Girija Srinivasan, et al, 2007).

List of Indian Digital Repositories as given by the OpenDOAR:

http://www.opendoar.org/countrylist.php?cContinent=Asia

- **Indian Institute of Astrophysics** - http://www.iiap.res.in/

  Indian Institute of Astrophysics Repository (DSpace@IIA) http://prints.iiap.res.in/

- **Indian Institute of Management Kozhikode (IIMK)** - http://www.iimk.ac.in/

  1. *DSpace at Indian Institute of Management Kozhikode (DSpace@IIMK)* http://dspace.iimk.ac.in/
  2. *Indian Institute of Management Kozhikode Scholarship Repository (ePrints@IIMK)* http://eprints.iimk.ac.in/

- **Indian Institute of Science, Bangalore (IISc)** - http://www.iisc.ernet.in/

  1. *Electronic Theses and Dissertations at Indian Institute of Science (etd@IISc)* http://etd.ncsi.iisc.ernet.in/
  2. *Open Access Repository of IISc Research Publications (ePrints@iisc)* http://eprints.iisc.ernet.in/

- **Indian Statistical Institute, Bangalore Centre (ISI)** - http://www.isibang.ac.in/

  1. *Digital Library at Indian Statistical Institute, Bangalore (ISI Library)* http://library.isibang.ac.in:8080/dspace/
  2. *Librarians' Digital Library (LDL)* https://drtc.isibang.ac.in/

- **Information and Library Network Center (INFLIBNET)** - http://www.inflibnet.ac.in/

  DSpace@INFLIBNET http://dspace.inflibnet.ac.in/

- **Information Centre for Aerospace Science and Technology (ICAST)** - http://www.icast.org.in/

National Aerospace Laboratories Institutional Repository (NAL Repository)
http://nal-ir.nal.res.in/

- **National Chemical Laboratory (NCL)** - http://www.ncl-india.org/

  DSpace at National Chemical Laboratory (DSpace@NCL)
  http://dspace.ncl.res.in/dspace/

- **National Informatics Centre (NIC)** - http://home.nic.in/

  OpenMED@NIC
  http://openmed.nic.in/

- **National Institute Of Oceanography (NIO)** - http://www.nio.org/

  DRS at National Institute Of Oceanography (DRS@nio)
  http://drs.nio.org/

- **National Institute of Technology, Rourkela (NITR)** - http://www.nitrkl.ac.in/

  Dspace@NITR
  http://dspace.nitrkl.ac.in/dspace/

- **OWSA (OneWorld South Asia)** - http://www.southasia.oneworld.net/

  OneWorld South Asia Open Archive Initiative
  http://open.ekduniya.net/

- **Raman Research Institute** - http://www.rri.res.in/

  RRI Digital Repository (Raman Research Institute Digital Repository)
  http://dspace.rri.res.in/dspace/

- **University of Delhi** - http://www.du.ac.in/

  DU Eprint Archive
  http://eprints.du.ac.in/

RRI DIGITAL REPOSITORY (E – SANGRAH): http://dspace.rri.res.in

Keeping in view, the developments around the world, and to join the main stream for supporting Open Access Movement (OAM), we decided to develop institutional repository using the open source software, DSpace (http://www.dspace.org). It collects preserves and disseminates in digital format the research output of the RRI community. It facilitates RRI community to deposit their preprints, post prints and other publications using a web interface and organizes these digital products for easy access and retrieval. We are briefing in a nutshell about the RRI Digital repository.

Why need for the Repository

We had been thinking for a kind of system wherein we could accommodate the following materials, which could be archived for future use and for access and retrieval of required document with full text. The documents in question were:

- Newspaper clippings of C.V.Raman collected during 1930 – 1960s, which have become too fragile to handle;
- Collected pdfs of all RRI research papers from early 1990s since onset of online journals and also scanned articles from journals and conference proceedings dating back to early 1970s;
- To create an information centre for collected works of C.V.Raman and literature published on him by other scholars; and
- Institutional gray literature, including annual reports and other miscellaneous publications relating to RRI.

Software selection

In order to accomplish the above project, we were looking for suitable hardware and software so that institute's research output is projected in a best possible manner. At the same time, few software, viz. GNU Eprints, Greenstone Digital Library Software (GSDL), FEDORA Digital Library and DSpace Digital Library were already in place and many libraries were using

them across the world. Keeping in view our collection of varied nature, and exposure by way of training of library staff members, DSpace was selected for our library. The application of DSpace provides the ways for capturing, storing, indexing, preserving and disseminating digitally held objects. (Baudoin, P. and Margaret Branschofsky, 2003). It complies with the Open Archives Initiative (OAI) framework allowing publications to be easily indexed and searched by web search engines. The details of the Digital Repository hardware/software are as given below:

Configuration of RRI Digital Repository:

URL: http://dspace.rr.ires.in;
IR software: DSpace version 1.3.2;
Software: CentOS 4.0 Linux, Apache Tomcat 5.5.9, Apache Ant 1.6.5, PostgreSQL 8.0.0, Sun Java JDK 1.5.0_01;
Server: Intel 4, CPU 3 GHz, 1 GB RAM, 160 GB SATA Mirrored Hard Disks.

Contents of RRI Repository

The main scope of the IR is defined by Crow (2002) as " a digital archive of the intellectual product created by the faculty, research staff and students of an institution...". They may contain a wide range of digital materials that reflects the intellectual wealth of an institution – e.g. Preprints and working papers, published articles, enduring teaching materials, student theses, data sets, etc. Based on Institutional research output, the content essentially consists of the following digital products:

- Preprints/post prints;
- Published articles in journals, conference proceedings;
- Annual Reports;
- News Paper Clippings of C.V.Raman;
- Collected works of C.V.Raman;
- RRI - Masters/Doctoral dissertations/theses; and
- RRI Photo Gallery.

Benefits to the authors/institution and the society

There are many benefits, at many levels, to institutional repositories (Prosser.D.C.), viz.

- **For the individual** – Provide a central archive of their work; increase the dissemination and impact of their research; acts as a full CV; the papers could have higher citation than the traditionally published articles; can stamp priority of ideas;
- **For the institution**: Increases visibility and prestige; acts as an advertisement to funding sources, potential new faculty and students, etc;
- **For Society**: provide access to the world literature of research; ensure long-term preservation of institute's academic output; and they can accommodate increased volume of research output.

Content and copyrights issues

The major concern of DR is intellectual property rights. Normally, every publisher demands authors to sign copyright when paper is accepted for publication and this varies with publishers.

We have different categories of the documents posted in the repository and copyright for each has to be looked into differently. In case of News Paper Clippings and Raman's collected works, we had to seek copyright permission from each publisher. Wherever, we were trying to get copyright permission for such documents, publishers willingly permitted us for hosting the documents for the reason that the documents are of historical significance. In normal case of research articles, we have followed guidelines as given in each publisher's site and posted them accordingly without infringing copyright laws.

As a part of the survey process, the Project RoMEO compiled a list of journal publishers' copyright policies on "self archiving", a useful source that is currently maintained by the SHERPA Project. (http://www.sherpa.ac.uk/romeo.php). They have used a color

code to classify the self-archiving policies of various publishers. *Green Publishers*-allowing archiving both pre-prints and post-prints; *Blue Publishers* – allowing archiving of post-prints but not pre-prints; *Yellow Publishers* – allowing archiving of pre-prints but not post-prints; *and White Publishers* – no archiving allowed. (Guedon, J-C., 2004 and SHERPA).

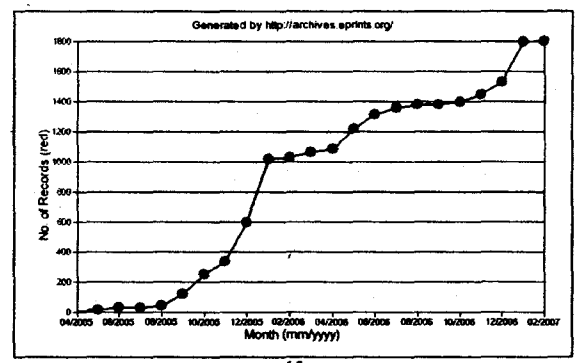
Policies and guidelines for DR

We have identified different set of documents for our repository including not only research output of the institute but also the collected works of C.V.Raman, the founder of the RRI, and gray literature consisting of annual reports and theses. The following communities have been taken into our repository, which acts as Information Centre of RRI providing access to all scattered information at one place. There are over 2200 items held in the DR as of March 2007.

- Archives- consisting annual reports; Gandhi Memorial Lectures, News Paper Clippings (items available – 747);
- Astronomy and Astrophysics (382);
- Light and Matter Physics (44);
- Soft Condensed Matter (245);
- Theoretical Physics (148);
- C.V. Raman's Collected Work and articles on Raman (498)
- Theses and Dissertations (digitized 112 theses and expected to be posted soon);
- Photo gallery (this is being developed)
- Miscellaneous (63).

We have yet to formulate institutional mandate for the Digital Repository for posting of papers by researchers and the students. Our main contributors are the faculty members and the research students. To facilitate, online submission, we placed brief note on "Submission Guide" on our repository home page. To begin with, majority of the papers were posted by the project team of the library, where all submissions are checked including copyright clearance, correct format, edit of metadata, etc. In case, where copyright clearance is not there, we have posted articles for access with full bibliographic details indicating publisher site as an alternate location. We are trying to rope in all researchers/students to post their papers in the form of preprints/post prints or published and permitted papers from publishers in the repository. The growth of the DR is given in the following graph:

RRI Digital Repository records holding:



Content Development

The success of the repository is largely defined by quantity of content. The widespread feeling is that content development in an institutional repository is a painful exercise, as Gibbons (2004) puts it, "Recruitment of content, not technology, is the greatest barrier to success". The setting – up of institutional repository implies an institutional commitment to the ongoing management of information. Several studies have indicated that relying on self-submission from authors alone is not enough and the project staff have to have open mind to develop content in the repository. (Chan, 2005, Foster, 2005; Mackie, 2004; Hunter, P. and Day, M.,2005; and Gibbons, S.,2004). There are several reasons for authors' poor response for posting their papers, viz.

- Authors are not willing to take additional burden of posting work;
- They have apprehension of violating copyrights and are not well versed with different publishers' copyrights;

- Fear of plagiarism; and
- Benefits not immediately obvious with a reason as to why to deposit in an institutional repository when their papers are archived in a well-known subject repository like arXiv.

Mark and Shearer (2005) have strongly advocated a multi-pronged approach in order to promote submission to the repository. They have identified and classified these strategies into six categories, viz. general promotional activities, mediated depositing services, content harvesting, researcher bibliographies, usage information and self-archiving policies. These strategies will enhance submission to repository (Girija Srinivasan, et al, 2007).

Conclusions

The journals crisis has forced the stakeholders in scholarly communication, i.e. publishers, researchers, librarians and the users of information to look for ways and means for free and open access to literature published, as research is funded by the society and the society has right to free access to information generated. As a result, the Open Access movement has emerged. This has given the way for developments in self-archiving, publishing open access journals and creating institutional repositories to achieve the set goals

The Institutional Repository will better serve the authors and the users by way of wider dissemination and by removing access barriers to the information they seek. The purpose for which the repositories are created is to maximize the impact of research, visibility of authors and the institutions. This will enhance research and education worldwide and society is benefited for the investments made. RRI Digital Repository supports open access movement; collects, preserves all research output at a central place; showcases institutional gray literature and enhances visibility of authors and the institution.