Role and Challenges of Digital Repositories in Scholarly Communication

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ABSTRACT

Institutional repositories are digital collection of Institutes or university's resources which available to the users free of charge which has responded in two major factors, that is, first, it plays a role of catalyst in reforming the scholarly communication and second, in preserving the intellectual resources of the Institutes, therefore enhancing the visibility of the research and prestige of the organizations. An attempt has been made to explore institutional repositories from these perspectives and also its potentials and roles played by the various stake holders in the reforming scholarly communication process.

Keywords: Institutional Repositories, Scholarly Communication, Affordability, Scholarly Crisis, DSpace, EPrints, OAI-PMH

INTRODUCTION

Scholarly communication is the creation, transformation, dissemination and preservation of knowledge related to teaching, research and scholarly endeavors. This process was initiated with the launch of the Journal des Savants in 1965 and the Philosophical Transactions of the Royal Society in 1666. The quality of the journal has been ensured by the following the process of peer review. This trend of publishing in journals has borne a very fruitful result as it helps the researchers to prove their work and allows others to build upon their finding and further also it helps in winning many university grant, promotion and adding main feature of their CVs. However, from the last four decades, scholarly communication faces crisis in delivering research output to the researchers for which it was originally meant for communicating their research while maintaining their intellectual property of their work. [1]

Journals once considered the only source of scholarly communication have changed its stance; it has become tool in hands of commercial publishers to take maximum mileage by raising the cost of subscription of journals beyond the reach of the best of libraries. It can be seen from the Association of Research Libraries (ARL) reports that the average cost of STM journals rose by 226% between 1986 and 2000 while the consumer price index rose by 57%. This force many libraries to cancel subscription, thus, reduce the access to the researchers. This is commonly referred as affordability problem or serial crisis. [2,3]

Affordability and Access crisis have made scholarly communication lost their credentials as the only vehicle for sharing their research work with other colleagues. Further, it has been found that the present scientific communication has also certain disadvantages such as time consuming editing and publishing process, delays of content delivery, inflexibility and complicated mechanisms of acquisition, access and archiving etc. [4]. It has become clear that a major paradigm shift in scholarly communication is needed.

Technology has also made an informal communication much more important as a part of scholarly communication. The rapid development of electronic communication through Internet now offers libraries and researchers a chance to change fundamentally the way that scientific information is communicated. It is very common for the researchers to post their research work on the personal, departmental and disciplinary web sites. This movement has helped scientific communication to reach widely and share their results to boost the scientific enterprise. This approach has created a meaningful “community of mind” irrespective of the region or a country. Author’s ambition of reaching the maximum readers and citation is also getting fulfilled. However, to trace the scientific communication on internet, it becomes a daunting task. And also whenever there is a reshuffle of faculties, web site links are not maintained. This led to uncertainty in long term preservation of these documents. [5,6,7,8,9].
Several recent initiatives from various stake holders such as scientists, publishers and funding agencies are challenging subscription-based models for publishing research articles. They fall broadly into three categories:

- **Free and reduced cost dissemination initiatives**

  The world is witnessing a substantial increase in the amount of content, for past five years due digital technology at free of cost to users. A small number of journals allow free access to all their online content and several others allow free access to selected items at the time of publication and many others allow free access only to older content called embargo journals (typically 6 or 12 months after publication), usually through the publisher’s own website or through the aggregators.

  In 1998, the Association of Research Libraries launched the Scholarly Publishing and Academic Resource Coalition (SPARC) as a means of providing cost-effective and high quality alternatives to journals produced by commercial publishers. To make a point, organic Letters was started in agreement with American Chemical Society with subscription cost of $2300 and would compete directly with Tetrahedron Letters, an Elsevier Science title that cost $8000 at that time.[10]

  In some cases, journals are put into a public archive such as PubMed Central.[11] HighWire Press Free Online Full-text Articles are also providing from the journals published with the assistance of HighWire Press[12]. A major boost to free access has come from HINARI, which now provides developing countries with access to nearly 2300 online journals[13]. Open-J gate provides access to 3000 open access journals[14].

- **Open Access Initiatives**

  The most profound challenge to the existing model of scientific publishing comes from the open-access movement. Budapest Open Access Initiative defines the definition of open access[15]. Further, it also recommends two complementary strategies for authors to participate in open access movement:

  - To publish in open-access journals, which do not charge for subscription or access fees. It is based on other models for covering the publishing expenses.
  - The practice of depositing e-prints (published papers and preprints) into open electronic archives—preferably ones set up by the researchers’ own institutions or subject based repositories.

  Several publishers have launched new open access journals, including BioMed Central (a commercial publisher) and the Public Library of Science (a not-for profit publisher currently supported by charitable funding). Lund University has compiled the Directory of Open Access Journal (DOAJ) listing fully peer-reviewed journals that place no financial barriers between the papers published online and readers. There are now 7353 journals in the directory. Currently 3516 journals are searchable at article level and one can access articles without incurring any access charge from the DOAJ service[16].

  From 2003 onwards, there is ample support from funding bodies to open access movement. In April, 2003, a meeting organized by the Howard Hughes Medical Institute resulted in the Bethesda Statement[17]. In October, 2003, all the major German funding bodies signed the Berlin Declaration supporting the open access. The German Research Foundation, DFG began requiring grantees to provide open access to DFG-funded research either through deposit in discipline-specific or institutional electronic repositories following conventional publication, or through publication in a peer reviewed open access journal[18]. Welcome Trust in UK, one of the largest funding bodies in the field of biomedical sciences has informed their grantees that their research must be deposited in PubMed Central not later than six months after their publications[19]. The European Commission report on STM publishing and OA in Europe published in 2006 recommended public access to publicly-funded research results, shortly after publication, as a condition for funding[20]. The Berlin Declaration has also been adopted by, amongst others, the CNRS and INSERM in France etc[21]. This support from the funding agencies has come about as they realize that it is their responsibility to support the wider dissemination of research results funded by them.

  Interest in open access is also increasing at the political level. In December 2003 the UK House of Commons Science and Technology Committee announced an enquiry into scientific publications. Their findings supported taxpayer access to UK publicly funded research through copyright retention by authors and article postings in open access repositories[22]. In USA, Alliance for Taxpayer Access (www.taxpayeraccess.org/index.html) was formed with the assistance of SPARC and library community. It supports open access to taxpayer-funded research[23]. ATA, SPARC and library community have lobbied strongly for passage of the NIH Public Access Policy which has become law in May, 2005. It states that “…all investigators funded by the NIH submit or have submitted for them to the National Library of Medicine's PubMed Central an electronic version of their final, peer-reviewed manuscripts upon acceptance for publication, to be made publicly available no later than 12 months after the official date of publication: Provided, That the NIH shall implement the public access policy in a manner consistent with copyright law[24].“ There have been similar efforts in other countries to provide OA access to the results of government-sponsored research.

- **Digital Repositories**

  New technology applications are offering opportunities to assist scholars in making their intellectual assets visible and accessible. Institutional repositories provide a practical and cost effective model to support scholarly communication. A common definition of IR is that it is a Web-based archive of scholarly material produced by the members of a defined institution. Accordingly, the content of the repository, as well as the policy on selection and retention, is also defined by the institution. This is in contrast to the discipline- or subject-based repository, such as the Physics Archive-Arxiv.
A large number of Institutional repositories have been established worldwide, around 2600 repositories have been registered with Registry of Open Access Repository as maintained by Open Archive Initiative's web site. This is in contrast to the discipline- or subject-based repository, such as Arxiv or the Cogprint archive, whose depositing policies are determined by the research communities. For the benefits and alternative means of scholarly communication, many academic institutions try to build Institutional repositories. For the benefits and alternative means of scholarly communication, many academic institutions try to build Institutional repositories. Some initiatives have been described below:

**DSpace is MIT's IR**, launched in November 2002 funded by Hewlett Packard. The DSpace software is designed to support Institutional repositories and is very flexible and customizable. The software has been released under an open source license and is being used members of the DSpace Federation (Cambridge, Columbia, Cornell, Massachusetts Institute of Technology, Ohio State, Rochester, Toronto and Washington) and others.

**DARE (Digital Academic Repositories)**: [http://www.darenet.nl/en/page/language.view/repositories] is a collective initiative by the Dutch universities to make all their research results digitally accessible. It can be seen as a national level, though, federally structured, repository.

In the UK, the JISC is funding a series of projects under the FAIR programme (Focus on Access to Institutional Resources). The SHERPA project (Securing a Hybrid Environment for Research Preservation and Access) has been set up to encourage change in the scholarly communication process by creating open-access institutional eprint repositories for the dissemination of research findings. The outcomes of the project will be advice on the building and maintenance of Institutional repositories guidelines on IPR and copyright issues, and advocacy material to publicize an institution's repository.

**ePrints UK** to develop a national service provider repository of eprint records based at Bath. DAEDALUS is the establishment of a range of OAI-PMH-compliant digital collections at the University of Glasgow. InTARDIS: To investigate and report on strategies to overcome the technical, cultural and academic barriers, which currently restrict the development and particularly the acquisition of content of institutional e-Print archives.

**CARL**: The CARL Institutional Repositories Pilot Project is an initiative to implement institutional repositories at several Canadian research libraries. The project, which is spearheaded by the Canadian Association of Research Libraries, was launched in September 2002 and has 12 libraries participating.

**Caltech's CODA (Collection of Open Digital Archives)** repository was established in 2001. It currently consists of some 11 archives with a further six listed as in development.

**Ohio State University (OSU Knowledge Bank)**: A project team under Joe Branin, Director of Libraries, has developed a detailed proposal for an IR at OSU to be known as the OSU Knowledge Bank. The proposal was submitted in June 2002 and is freely available from the Knowledge Bank website.

In India, Institutional repositories are gaining a lot of momentum with the establishment of more than 60 Institutional repositories established by various organizations in India. The most prominent and first to establish is Indian Institute of Science (IISc), Bangalore with the maximum number of papers deposited followed by various other organizations. Apart from IRs, there exist digital repositories that store and provide access to subject specific collections of documents. OpenMed@NIC maintained by National Informatics Centre provides stores and provides access to biomedical literature, Vidyamahotsav of National Paralympic University relates to thesis and dissertations and Librarian's Digital Library (LDL) of Documentation Research and Training Centre (DRTC) is an example of subject-specific repository for the library and information professionals.
Emerging Platforms for Repositories

The trend in growth of institutional repositories can also be attributed due to the availability of open source software for setting up institutional repositories. In order to develop interoperability among institutional repositories, the Open Archive Initiatives (OAI) has developed interoperability standard known as Open Archive Initiatives, the Protocol for Metadata Initiative (OAI-PMH). This standard has been growing to extend interoperability to a broad range of digital objects [44].

There are number of major players in digital repository software. DSpace was launched in 2002 under the open source category and developed by MIT and HP labs. DSpace has generated a lot of enthusiasm and excitement in downloading, testing and establishing institutional repositories in the world. At present, it has been used in more than 200 institutions all over the world. Eprints software developed at the University of Southampton, which was released as open-source software in 2001. Eprints is designed specifically to facilitate archiving of more familiar or traditional forms of scholarly publications [45]. Fedora (Flexible Extensible Digital Object and Repository Architecture) is developed by Virginia and Cornell with funding from Mellon [46]. Open Access Initiative provides a useful “guide to Institutional Repository software v3” [47].

Apart from open source software, there are commercial software such as Content DM, Open Repositories are providing commercial solution in establishing institutional repositories.

To make these diverse repositories to a global digital library, various service providers are harvesting metadata from these institutes, aggregate, post-process and refine it with the aim of developing service. There are number of service providers who are harvesting the contents on a regular interval, for example, Arc: A Cross Archive Search Service, OAISTER and CASSIR(Cross Archive Search Service for Indian Repositories) etc. At the same time, Institution provides search engine capable of simultaneously searching metadata at multiple remote repositories and returning the search results to the user [48]. This system is supported by Endeavor ENCompass and ExL.iris Metalib [49].

POLICY DECISIONS FOR INSTITUTIONAL REPOSITORIES

The successful deployment of Institutional repositories requires that various policies should have clearly been defined. Firstly, Institutional repositories should define their services offered such as whether digitization of printed document is undertaken, modification of metadata and proxy in adding content to the repository. Institutional repositories should have defined its policy in providing long term access to files in various formats. Institutional repositories should also define the owner of the content and kind of restrictions if any imposed on the users to view the content. And also the document once submitted can be withdrawn and how much time takes it to withdraw content from the repositories [50].

DISSCUSSION

It is evident that institutional repositories are growing in number. It has been noted that a large number of libraries are taking part in establishing institutional repositories and also becoming responsible in maintaining the intellectual heritage of the institutions. In India, majority of institutional repositories are maintained by library and information professionals. Indian Institute of Sciences repositories which is also having largest number of papers, OpenMed maintained by National Informatics Centre, second largest open repositories in the field of biomedical sciences, National Institute of Technology Rourkela has made it mandated that all research publication should be deposited in the Institute repository etc are all maintained by library and information science professionals. This trend can also be observed at international level [51].

As success is proved, more authors, readers, university administrators, librarians, and funding bodies are becoming aware of the limitations of the current system and the possibilities of the new models. More importantly, they wish to take positive action to bring about a change in the system as quickly as possible.

The success of institutional repositories may also be attributed to various service providers such as Google Scholar, Scirus by Elsevier, OIASTER, ARC for harvesting metadata from these repositories to make it a part of global information system. Directory of Open Access journals has also contributed in listing open access journals and also providing access to full text articles to some select journals. It has been indicated that papers archived in institutional repositories and published in open access journals have gained more number of citations from the authors and thus have more visibility of their research [52].

CONCLUSION

Institutional repositories have effected a change in scholarly communication at Institutional level with the active support from various stake holders such as proponents of open access movements, various funding agencies and government forming law in case of NIH Access policy by making mandatory for researchers after a certain period of time depositing of research publications in subject based or institutional repositories.

Though institutional repositories are proliferating, yet it is taking a long to reach a critical mass to effect a change in scholarly communication. It has to be ensured that benefits of filling up institutional repositories are to be expressed so that participation of researchers should increase. Various stake holders and funding agencies have to contribute in terms of clear guidance and making it mandatory to self archive their research in Institutional repositories.

It is possible with the power of Internet to construct a modified scholarly communication system that better serves authors by giving them a wider access to their publications and users by
removing the restrictive access to the contents held by commercial publishers. It is the dream of many stakeholders such as authors, users, libraries, funding agencies, publishers that institutional repositories should become an integral part of scholarly communication.

REFERENCES


10. SPARC home page (http://www.sparc.org)

11. PubMed Central home page (http://www.pubmedcentral.nih.gov/)


13. HINARI Project http://www.who.int/hinari/

14. Open JGate home page (http://www.openj-gate.com/)

15. Budapest Open Access Initiative website+ (http://www.soros.org/openaccess/


20. Suber Peter Home Page http://www.earlham.edu/~peters/fos/newsletter/05-02-06.htm

21. Suber Peter Home Page http://www.earlham.edu/~peters/fos/newsletter/11-02-06.htm

22. UK Parliament Science and Technology Committee web site: http://www.parliament.uk/parliamentary_committees/science_and_technology_committee/sctech111203a.cfm


27. McLendon, W op cit


29. Open Archive Initiative’s web site (http://www.openarchive.org)


31. Cogprint homepage http://cogprints.org

32. DSpace Homepage https://dspace.mit.edu


34. JISC home page http://www.jisc.ac.uk/index.cfm?name=programme_fair

35. JISC SHERPA Home page http://www.sherpa.ac.uk/
36. ePrints UK home page http://www.jisc.ac.uk/whatwedo/programmes/programme_fair/project_eprints_uk.aspx
37. DAEDALUS - A JISC FAIR Project http://www.lib.gla.ac.uk/daedalus
38. TARDis Homepage http://tardis.eprints.org/
39. Project RoMEO Homepage http://www.lboro.ac.uk/departments/ls/disresearch/romeo/index.html
40. CARL Home Page http://www.carl-abrc.ca/projects/institutional_repositories/institutional_repositories-e.html
41. CALTECH Library Services Home page http://library.caltech.edu/digital/default.htm
42. Ohio State University Home page http://www.lib.ohio-state.edu/
45. E-prints home page (http://www.eprints.org/)
46. Fedora Home page (http://www.fedora-commons.org/)
47. Digital Repository Software Home page http://www.soros.org/openaccess/software/
49. Ex Libris Metalib Home page http://www.exlibrisgroup.com/category/MetaLibOverview