Open Access: The New Frontier Connecting the Learning Commons through Hassle-free and Seamless Scholarly Communication

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Abstract

The developments in technology during the recent past, especially in ICTs (information and communication tools), are tremendous and the magnitude of changes that have been effecting the scholarly communication are amazing. In reality, scholarly communication system has largely been monopolized by publishers. Publishers obtain the copyright from the author while accepting their scripts for publication, and paradoxically, the author or his/her university/ institute will not have access to the article unless they have a subscription to the journal. On the other side, the spiraling costs of scholarly journals and the shrinking library budgets are of grave concern to the academic and research fraternity regardless of geographic conditions. The deprived authors/institutions are now trying out OA (Open Access) alternatives for scientific publication and communication with a view to get rid of the clutches of the publishers. The OA, as it is literally explanatory, intends seamless and free online access to all scholarly works emanating from the scientific fraternity worldwide. OA initiatives are indeed poised to revolutionize the scholarly communication process where the copyright of the article will partly rest (non-exclusive) with the authors, which is a departure from the conventional publishing process. This paper highlights the importance and the broad spectrum of benefits the Open Access movement offers to the academic and research community, especially, policy formulations that would lead to mandating open access to all publications resulting from publicly-funded research. It also suggests the various models of practicing and promoting OA, which could be emulated by these organizations in meeting the growing challenges that they face now in terms of budgetary constraints and in their earnest efforts to providing assured access to a (near) comprehensive body of information and knowledge to their own communities.

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Introduction

The world of academic and scholarly research across the globe has been thankfully embracing the Open Access movement in an unprecendented manner [OA]. Starting from the BOAI (Budapest Open Access Initiative) the open access movement has picked up enormous momentum during the years. The journey continues quite gracefully and the results are gratifying. This assumes great significance, especially for the academic and scientific fraternity, as the scholarly communication system has been largely monopolised by the publishers. As has been the practice over the past several decades or even centuries, publishers take away the copyright of the author while accepting their scripts for publication, and the paradox is that the author or his university/institute will have to pay for accesing his own content, in the published format. That is to say, the public good or the knowledge created by the researcher, by spending the money generated out of tax payers or the public commons, go under lock and key. 'Merely to do the research and then put the findings in a desk drawer is no better than not doing the research at all', say Harnad, Brody, Valliers, *et al*, (2004). It should ideally undergo all the worksflows expected out of a research paper and the scholarly communication process such as peer review, publication, testing of the results by other researchers, sharing the results and feedbacks, and then citing them in turn in their own publications (Harnad, Brody, Valliers, *et* al. 2004). Unfortunately this does not happen in the present day scholarly communication ecosystem.

On the other hand, the spiraling costs of scholarly journals and the shrinking library budgets are of grave concern to the academic and research fraternity the world over. Needless to say, the situations in the developing world are in deep trouble, be it in scholarly information, IT and communication, or laboratory facilities. Of late the deprived stake holders in the scholarly communication ecosystem, by leveraging on the latest IT and digital technologies, are trying out Open Access alternatives for scientific publication and communication with a view to get rid of the clutches of the publishers. Disintermediation and the elimination of non-value adding operations (process chains) using digital and communication technologies in scholarly publication and communication has been offering excellent benefits to authors and the resultant shrinking of the supply chain of information. Open Access, as it is literally explanatory, intends seamless and free access to all scholarly works emanating from the scientific fraternity worldwide. Open Access initiatives are indeed poised to revolutionise the scholarly communication process where the copyright of the article will rest with the authors (non-exclusive), which is a large departure from the conventional publication process.

The phenomenal growth in Open Access capacity

Heather Morrison, in his open access advocay and promotion Blog 'The Imaginary Jounal of Poetic Economics', gives an excellent statistics on 'Open Access' highlighting its present significant capacity [Heather 2008]. The number of open access journals in the DOAJ (Directory of Open Access Journals), maintained by the Lund University, has well crossed the 3000 mark in December 2007. At least 10% of the world's estimated 20 000–25 000 peer-reviewed journals are undoubtedly represented in the DOAJ now. New ones are being added at a rate of at least 1.4 per day. It is estimated that the DOAJ will list about 15% of the world's peer-reviewed journals by the end of 2008. Also, the DOAR (Directory of Open Access Archives) now has more than 1000 open access repositories set up successfully in different parts of the world and

accessible online (OpenDOAR). OAIster, the cross archive search service, added more than 4.4 million records this year, for a very healthy growth rate of 44%. OAIster currently numbers 14.3 million items (OAIster). Similarly, Scientific Commons added more than half a million items, and close to a quarter of a million authors, during October–Decmber 2007 alone! (Scientific Commons). Scientific Commons alone hosts a massive 17 million items contributed by over seven million authors. PubMedCentral, the world's largest open access archive crossed the one million mark in June 2007. Institutional Repository setting up software are on the increase worldwide and there are software to design and publish open access journals too. There is also an unprecedented international sharing and exchanging of knowledge taking place in several fora and platforms towards their implementation. Most importantly, there are more than 40 open access policies by funding agencies and universities, and there are more in the pipeline. Librarians, sources of information, and faculty have, or are developing, expertise in the area of scholarly communication. The idea 'Open Access' has been able to trigger new moves from publishers too, as many publishers have been pondering open access for some time, not to mention experimenting with providing free access to back issues (usually with an embargo of 6 months to one year), hybrid open access, as so forth.

Problems of the academic and scientific community

Among the plethora of problems being faced by the research/academic/scholarly community, regardless of countries whether they are developed or not, the most significant of them all, lie with the access to the latest literature in their own areas of research. Steven Harnad and eight others report the findings of a fairly exhaustive study on the above and have identified two major issues being faced by the research/academic community across the world: the *journal-affordability* problem and the *research access/impact* problem (Harnad, Brody, Valliers, *et al*, 2004). World over, as per *Ulrichsweb's* serials analysis system, more than 24 000 peer-reviewed research journals are being published, encompassing almost all disciplines and spread across most of the popular languages (Ulrichweb). And these journals publish about 2.5 million articles per year. But because of the soaring and the spiralling prices of journals and also owing to the shrinking library budgets, there is always growing cuts in journal subscriptions in the university/institutions. This means the academic/research fraternity have to be contented with whatever is available and accessible to them, and this is the research *journal-affordability* problem.

Harnad, Brody, Valliers, *et al.* argue that even if the scholarly publishers lower the prices of journals to no-profit level and offered to universities, most of them will not be in a position to have a near comprehensive collection of journals because of their limited budgets. If research need to progress perversely, researchers should be able announce their findings open after due peer reviewing, and other researchers must find these findings useful, by actually using them and in turn, later citing them in their own findings. And for this, they must first be able to access them. This is the research article *access/impact* problem.

The advocacy

The solution is to make all articles OA. That is, accessible online, free for all. So, if the good old slogan of the research world on quality and sustainable research has been 'publish or perish', the new version is 'publish and open (access) it'. Some strong advocates of open access even go beyond and say 'be open' or 'be obscure'.The rationale behind above arguments are primarily

because it is the government's world over that are spending millions of dollars for fuelling research in their countries and elsewhere. In other words it is the tax payers' money which drives major part of the research. For the academic and research community as well as the common man, scientific journals are the first source where they can access information on such latest research. Unfortunately, the costs involved in accessing scientific journals was (and in many cases still are) forbidding especially in developing countries. The proliferation of information has reached exponential magnitudes with the Internet and the World Wide Web. This so-called information explosion has been even more marked in the scientific domain; providing better access to scholarly communication and also enhancing research activities. Definitely the cycling time of research papers has come down, making the path from the labs to the press/media much shorter and smoother. The Open Access movement gave a further boost to this. Also the common man now has better access to such information which was, till recently, unattainable by him/her.

The OA process is all about ascertaining the scholarly content available online. This presupposes that the content, especially scholarly content, has to be available in digital and electronic format, which is the prevailing and upcoming standards of scholarly content authoring. In other words, OA is technology's answer to the scholarly journals crisis or popular as serial crisis, the world face today.

Considering the above points, the advocacy here is that the peer-reviewed articles stemming from taxpayer-funded research should become fully accessible and available online at no extra cost to the public. Towards this, scientists, researchers and scholarly authors should seriously consider publishing their research through OA journals. And also, while submitting articles for journals of their choice whether open or proprietary, they should self-archive the author's post-peer reviewed version of the article (postprint) in their OAI compliant IR (Institutional Repository. Most importantly, institutions, universities, organizations, governments and funding agencies should soon madate the OA as a pre-requisite and factor it into the award of research grants and the practice of research dissemination process. A step-by-step guidance towards optimizing OA self-archiving mandates could be seen at Stevan Harnad's OA Achivangelism (Open Access Archivalngelism).

Open Access

The BOAI launched by the OSI (Open Society Institute) gives a candid explanatory note on OAOSI. It says 'Open Access is the ultimate convergence of an age old tradition and the new technology, to make possible an unprecedented public good. The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the Internet. The public good they make possible is the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious brain. Removing access barriers to this literature will accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, make this literature as useful as it can be, and lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge'.

BOAI, by 'open access' to literature, mean its free availability on the public Internet, permitting any user 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.

The ultimate goal of the OA movement is open access to peer-reviewed scholarly journal literature. Presently BOAI suggests two ways to attain this goal:

1 OAP (Open Access Publishing), famous as '*golden road*' to OA. In this model, as against the tradition, journal/s are published as open access publications and they provide instant online open access to articles upon publication.
2 OAA (Open Access Archiving) or open access self-archiving, also called the '*green road*' to OA. In this model, as a new trend, authors submit their pre-peer reviewed versions of papers (pre-prints) or post peer-reviewed published article/s (post-prints) into the archive for open access.

OA literature is digital, online, free of charge, and free of most copyright and licensing restrictions (Suber). It is all about democratizing the scientific intellectual capital, which often draws its energy from publicly or privately funded research. It is not against proprietary or peer reviewed scholarly journals.

The landmark US law and the NIH public access policy

On 26 December 2007 the Federal law of the Consolidated Appropriations Act of 2007 (H.R. 2764), was enacted into force by the US Congress. The law directs the NIH (National Institutes of Health) to provide the public with open online access to findings from its funded research (OA News). This is the first of its kind the US government has mandated public access to research funded by a major agency. This is a bold, beautiful and laudable step taken by the Congress, as the implications of this law are not limited to US only. Receipients of NIH research grant all over the world (which is a vast sum amounting over $29 billion!) will now be required to deposit electronic copies of their peer-reviewed manuscripts into the online archive of National Library of Medicine, PubMed Central. Full texts of these articles will be publicly available and searchable online in PubMed Central no later than 12 months after publication in a journal. And the audience of this service is the whole world! This is simply a fantastic development. A novel model and movement, which other nations well as international funding agencies, also should emulate.

Comments and praises started pouring in from all over the world immediately after the law's press announcement. 'Congress has just unlocked the taxpayers' $29 billion investment in NIH,' said Heather Joseph, Executive Director of SPARC (the Scholarly Publishing and Academic Resources Coalition), a founding member of the ATA, (Alliance for Taxpayer Access) (SPARC), (ATA). 'Facilitated access to new knowledge is key to the rapid advancement of science,' said Harold Varmus, president of the Memorial Sloan-Kettering Cancer Center and a Nobel Laureate. 'The tremendous benefits of broad, unfettered access to information are already clear from the Human Genome Project, which has made its DNA sequences immediately and freely available to all via the Internet. Providing widespread access, even with a one-year delay, to the full text of research articles supported by funds from all institutes at the NIH will increase those benefits dramatically.' 'Years of unrelenting commitment and dedication by patient groups and our allies in the research community have at last borne fruit,' said Sharon Terry, President and CEO of Genetic Alliance.

Noteworthy Open Access initiatives

The following are some of the noteworthy initiatives lined up to support the open access movement since the launch of the BOAI in February 2002 (BOAI):

- The IFLA (International Federation of Library Associations) and Institutions

released the IFLA Statement on Open Access to Scholarly Literature and Research Documentation, 24 February 2004 (IFLA).
- OECD (Organisation for Economic Co-operation and Development). Declaration on Access to Research Data From Public Funding, 30 January 2004 (OECD).
- UN WSIS (World Summit on the Information Society) Declaration of Principles and Plan of Action, 12 December 2003 (WSIS).
- Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities, 22 October 2003 (Berlin).
- Bethesda Statement on Open Access Publishing, 20 June 2003 (Bethesda).
- ACRL (Association of College and Research Libraries) Principles and Strategies for the Reform of Scholarly Communication, 28 August 2003 (ALA).
- NKC Statements on Open Access (National Knowledge Commission, India), 2007 (NKC).

Open Access Publishing

In this model, as against the traditional practices, journals are published as open access publications and these journals provide instant and free online access to articles upon publication. There is confusion between free journals and open access journals. Free journals give only free access to the journals and the content is always under threat, as they have every reason to withdraw the facility even without notice or justification. The OA journals are that way highly dependable and reliable as they assure unlimited and unrestricted access to the journal content for both current as well as retrospective data. Lots of learned society publishers are now coming up with OA models for their journals. Best examples of open access publishers are BMC (BioMed Central) and the PloS (Public Library of Science). Major expenses for publishing online journals include the costs towards article processing, peer review of articles, journal production charges, and the online hosting and archiving charges.

OAP (Open Access Publishing) resorts to different business and revenue models, conceived on different strategic principles. Prominent among them are the (1) author paying model, (2) institutional membership model, (3) sponsorships/sponsored titles, (4) publication fee model. and so on. The author charges or the publication fee could be ranging from US $1500 to 2500, depending on the title of the journal, subject/discipline, readership and the OA publisher. Authors, in turn, can budget the publication fee into their research proposals towards recovering this cost. Sponsors and funding agencies are also there for the rescue of the authors, especially to those hailing from developing countries.

OA Publishing Direcotries/ Publishers' Policies

DOAJ hosted by the Lund University Libraries is world's largest free, full text, quality controlled scientific and scholarly journals directory. The service covers almost all major subject disciplines and languages. DOAJ is being constaly visited and referred by thousands of users and libraries form over 160 countries. During the preparation of this manuscript, an amazing 3055 journals are listed in this directory of which around 993 journals are searchable at article level. And as many as 167 969 articles are included in the DOAJ service (Figure1) (DOAJ).

The SHERPA project of the University of Nottingham runs the appreciated RoMEO service which gives publishers' copyright policies on self archiving (RoMEO). RoMEO lists as many as 169 publishers worldwide and categorizes publishers into 'green', 'blue', 'yellow' and 'white' publishers based on their policies on author archiving rights. Those allow archiving of pre-prints as well as post-prints are called green publishers. Seventy-nine per cent of

the publishers in SHERPA allow some form of author archiving and a significant 45% among these are green publishers.

Heather Morrison in his classic study on the dramatic growth of open access during 2007 and the predictions for 2008 reports in crystal clarity (Figure 2) the amazing growth of the open access journals over the past year and compares giant journal aggregator/ publisher counterparts and their kitty strengths (Heather-DOAJ).

Open Access Archives

An archive is a generally accepted synonym for a repository. A repository is a network accessible server that holds scholarly digital content or eprints. Scholarly archives or institutional repositories are established medium to communicate peer reviewed (post-prints) and non-peer reviewed scholarly literature (pre-prints). There are basically three types of scholarly archives in vogue, that is, author archives, institutional archives and subject archives. Subject archives are also called as central archives. According to Stevan Harnad, open archiving is just self-archiving the articles the author has published in (peer-reviewed) non-OA journals. Hence it neither bypasses nor replaces peer-review. It has nothing to do with changing peer review. Self-archiving is a way of supplementing non-OA journal access with an OA version for those would-be users whose institutions cannot afford the non-OA journal.

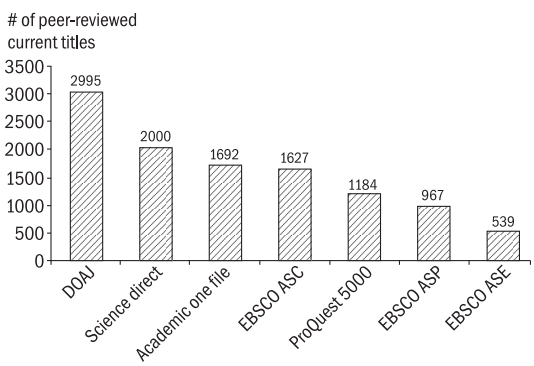

Figure 2 DOAJ Journals Vs. Aggregated Journal Packages

There are numerous advantages that OA boasts while they campaign worldwide. Authors as well as Institutions can derive a number of benefits out of archives. For authors, instant dissemination of the fruits of their long years of rigorous research to a global audience is the first and foremost. OA papers get increased visibility through novel models of harvesting done by search engines such as the Google, Citeseer, and so on, and

the interoperability among similar archives achieved through the OAI (Open Archives Initiative,) PMH (Protocol for Metadata Harvesting) are unparallel value additions to OAA. While more visibility leads to more citations, one's research impact naturally gets scaled up. Authors are therefore attracted to come to OAA. Additional benefits to self archiving include the assurance of the long term preservation of their articles and the facility to have a proper control as well as meticulous monitoring of one's own publications.

For institutions too, a long list of advantages and benefits invite them to OA. First, the institute's archive, popularly known as institutional repository helps in pooling the organization's intellectual capital into once central place which is otherwise scattered, distributed and unnoticed. The archive therefore serves as a one-stop-source or a single access point for the research output of an institution. It provides ample scope for introspection as to whether the institute is moving in the right direction on its research activities. Necessary strategies and meticulously designed action plans could be charted out based on the feedback.Institutional repositories facilitates instant generation of research reports and thereby saves a valuable amount of time otherwise spent unwanted. Most importantly the archives ensures long term preservation of its scholarly materials with the help of open source softwares and open standards of data models and data structures.

Proponents of the Open Access movement strongly argue for OA self-archiving by researchers and OA Self-Archiving Mandates by researchers' institutions and funders towards maximizing research access. This is to maximize research uptake, usage, impact, productivity and progress, for the benefit of research, researchers, their institutions and funders, and the tax-paying public that supports them and in whose interests the research is being conducted and published.

Open archive directories and search engines

There are many value added services which index OA archives spread globally, as well as harvest metadata records for search and retrieval. OpenDOAR, the Directory of Open

Figure 3 Open DOAR Directory of OA Archives

Access Repositories has hit the 1000 mark recently and these OA archives are spread worldwide (OpenDOAR). OpenDOAR is a joint effort led by the OSI (Open Society Institute), along with the JISC (Joint Information Systems Committee), the CURL (Consortium of Research Libraries) and SPARCEurope (JISC), (CURL). DMOZ, the largest open directory of the Web, lists 59 free access online archives (DMOZ). The Registry of Open Access Repositories (ROAR) hosted by Eprints.Org lists 973 plus open access archives (Figure 3) (ROAR). OAIster, one of world's outstanding OA repository registry services offered by the University of Michigan, indexes over 929 OAI-compliant open repositories worldwide with an overwhelming 14 626 548 records (OAIster). Arc, developed by the Old Dominion University, is among the early federated search services based on OAI-PMH protocol (Arc).

Noteworthy OA worldwide efforts

Internationally, a number of initiatives are fast progressing spreading the novel open access concept and the open publishing philosophy of scholarly communication amongst the academic fraternity. There are three major categories upcoming predominantly, such as, (i) author driven initiatives, (ii) commercially driven initiatives and (iii). collaborative projects. Examples of author driven initiatives include the e-print services such as the physics e-print archives arXiv and the PubMedCentral (PMC). The earnest efforts of e-prints.org software development team and the FOS (Free Online Scholarship) Movement aiming the open access to journal literature by freeing authors from publishers' monopoly, and so on, are laudable initiatives.

The BMC (BioMed Central) and the PLoS (Public Library of Science) who provides open publishing facility for the biomedical researchers, 'CrossRef', a publisher-linking service promoted by over 170 publishers the world over, are examples of commercially driven initiatives (Crossref).

Examples of collaborative endeavours include the ICAAP (International Consortium for the Advancement of Academic Publications), SPARC, High-Wire Press and many more such efforts (ICAAP). The ICAAP does wonderful job and publishes a number of journals for the developing countries. SPARC (Scholarly Publishing and Academic Resources Coalition) an alliance of universities, research libraries, and organizations built as a constructive response to market dysfunctions in the scholarly communication system. HighWire Press hosts the largest repository of free full-text life science articles in the world, with more than 600 000 free, full-text articles online. Since 1995, with the launch of the JBC (Journal of Biological Chemistry), to the continuous online production of hundreds of prestigious journals, such as Science Magazine, the New England Journal of Medicine, PNAS and JAMA, HighWire has established an outstanding reputation for helping to disseminate primary scientific information on the Web. In the year 1997, the US National Library of Medicine of the NIH) made Medline, the most comprehensive index to medical literature on the planet, freely available. Usage of Medline increased a hundred fold when Medline became free, strongly suggesting that prior limits on usage were indeed impacted by lack of access (Medline).

ELSSS the Electronic Society for Social Scientists, INASP (International Network for the Availability of Scientific Publications), and the EPT (Electronic Publishing Trust) for Development (EPT) are other international initiative promoting open publishing and open access systems [ELSSS],[INASP],[EPT].

A new genre of open access material started appearing recently, namely, OCW (open cousewares). OCW are now gaining popularity

and momentum amongst the academic community quite actively and prominently. The MIT courseware project is the first in the lot and followed by MIT, many universities and educational institutions are now putting their courses online for open access.

Open Archives Initiative

In October 1999, in a meeting held in Santa Fe, USA to discuss mechanisms to encourage the development of open repository solutions and the integration and interoperability among the existing distributed and scattered e-print archives, the OAI (Open Archives Initiative) was formed. The consensus was to work on a framework facilitating the federation of content providers on the Web. Since that first meeting, the OAI has undergone a period of intensive development both organizationally and technically. The OAI is therefore to support the development of open access e-print archives and to provide seamless interoperability between them. The mission statement of OAI says 'The Open Archives Initiative develops and promotes interoperability standards that aim to facilitate the efficient dissemination of content. The Open Archives Initiative has its roots in an effort to enhance access to e-print archives as a means of increasing the availability of scholarly communication. Continued support of this work remains a cornerstone of the Open Archives program. The fundamental technological framework and standards that are developing to support this work are, however, independent of the both the type of content offered and the economic mechanisms surrounding that content, and promise to have much broader relevance in opening up access to a range of digital materials. As a result, the Open Archives Initiative is currently an organization and an effort explicitly in transition, and is committed to exploring and enabling this new and broader range of applications. As we gain greater knowledge of the scope of applicability of the underlying technology and standards being developed, and begin to understand the structure and culture of the various adopter communities, we expect that we will have to make continued evolutionary changes to both the mission and organization of the Open Archives Initiative'.

Two major applications came out of the OAI movement are the Protocol for Metadata Harvesting (OAI-PMH) and the OAI Repository Explorer which is useful for interactive exploration and validation of OAI repositories (OAI-PMH), (OAI Explorer). The OAI-PMH protocol harvests metadata between hundreds of OA archives at the low barrier metadata level and passes them on to OA service providers. The service, by focusing mainly on metadata, relieves the digital objects as well as the data provider OA servers from the burden of searching and the resultant retrieval. The OAI community complimented the movement with over two dozens of interesting OAI based value added tools and services and they are available in the OAI site [OAI Tools].

OA Application Tools

Open Journal Systems (OJS)

The public knowledge project developed the open source publishing software OJS (Open Journal Systems), which is the most used open source application for developing and launching open access journals around the world (OJS).

Institutional Repository Softwares

There are many world renowned free open source IR (Institutional Repository) softwares available such as EPrints, DSpace, FEDORA, ARNO, i-TOR, CDSware, and so on. They are issued either under GNU public license or the BSD license and can be downloaded from their own sites or open source software directories such as SourceForge (sourceforge). Each of the

software has a host of features, unique facilities and excellent capabilities, which the users could explore and experiment.

Open Archives Harvester

The OA harvester service PKP (Public Knowledge Project) harvester software developed by the is an excellent application software which can be easily downloaded, configured and customized (PKP).

Open CourseWare

The OCW (Open CourseWare) is a new genre of academic content category, in line with and supporting the OA objectives, focused at the academia as well as those with a curious mind for learning, at a global scale. It was UNESCO in 2002 which first mooted and adopted the idea of opening up educational resources for all, especially targeting the developing countries. Access to state-of-art and quality educational material has always been at acute dearth among the rural communities worldwide and the whole of developing countries in particular. The movement soon received wholehearted support from the MIT, with its mission to advance knowledge, education and discovery with the kind gesture of serving the globe with the premium content of one of world's leading universities which has the distinction of values of excellence, innovation and leadership. The OCW services of MIT is an outstanding Web based e-publishing initiative, with a massive coverage of over 1800 courses spread across in as many as 35 plus disciplines (OCW). Developing countries also have started endorsing this movement with China, India, Japan, Singapore and Malaysia forging ahead in the region on OA movements.

Indian Scenario

With particular reference to India, the research fraternity in the country face a number of problems with regard to infrastructure, be it in IT and communication, scholarly information or laboratory facilities. Most of our campuses are weakly endowed, barring exceptions like the IISc, IITs, IIMs, few other MHRD Institutions and the laboratories which are part of the central research councils and central research bodies such as the CSIR, ICAR, ICMR, DBT, DAE, DRDO, and others. Few of the Indian universities, especially the central universities, are also fortunate enough. Rest of the whole big lot are suffering from acute information poverty, which is to be addressed proactively at the earliest. Access to world class scholarly literature, nascent as well as retrospective, is a prerequisite for state-of-art research and development, whereas the ground reality in most of our research centres and academic institutions is really lamentable and panicking. Whereas India's scientific potential and innovations in science have been accredited worldwide, our performance in terms of contributions to the world of science during the past couple of years have been a lamentable all time low, a shaming <1%, as against the earlier 8–10%. The intensity of the matter was best described in a recent letter of warning issued by the country's noted scientist Prof. C N R Rao to the Prime Minister, who is also the chairman of the Scientific Advisory Council to the Prime Minister (Rao, CNR). Unless there is a level playing ground provided to our scientists and the academic community, India will never be able to compete with their first world counterparts, and the OA movement at this juncture is a real blessing for developing countries.

OA efforts in India

The academic and the scientific fraternity in India, since the beginning of OA movement worldwide, have been striving its best in promoting and scouting for the cause of open and unrestricted access to scholarly literature. India also has been able to convince the

international community, with an array of local, national, regional as well as international initiatives, taken up in different parts of the country. These include publishing of open access journals, setting up of open access archives (institutional repositories), configuring and commissioning of open archive harvester services, providing open coursewares to the academic world, imparting of training programmes on e-publishing of journals as well as on institutional repositories, and so on. Some of the commendable activities such as the OA journals of the (IAS) Indian Academy of Sciences, eprints@iisc, ldl@drtc, sdl@drtc, OpenMED and the indMed services of NIC New Delhi, efforts of MedKnow publications, the e-journal initiatives and archives at INSA, IIT Delhi, Raman Research Institute, NIT Rourkela, Vidyanidhi, and so on, deserve special mention (OpenMED). From the corporate world, the OPEN J-Gate open access journal portal service, is a laudable service accessible worldwide [OPEN J-Gate].Unlike the US, UK and other major developed economies, journal publishing in India have been, for long, primarily a public funded activity and generally done by government agencies such as the CSIR, ICAR, DRDO, ICMR, IAS, INSA (Indian National Science Academy) and so on, and by a few learned societies. Compared to the number of articles published by Indian authors from India, the number of journals published in India are relatively not many. This may be due to the fact that authors wish to have more impact, visibility and readership for their articles and they doubt if published in India it may not receive due respect. However, the coverage of Indian journals in international indexing, abstracting and full-text database services are very poor. There are many challenges Indian journals face, such as quality of articles, stringency in peer-review process, timeliness of production, infrastructure and funding, subscriptions and readership, distribution channels and market demand, and so on. In spite of all these, many organizations and scientific bodies are striving their best to make the journals open access. Some of the laudable efforts include:

1 The Indian Medlars Centre of NIC provides free full-text access to 38 Biomedical Journals through the 'medIND' Service (IMC).
2 The Indian Academy of Sciences has put all its 11 journals in the public domain (IAS-journals).
3 The Indian National Science Academy's all 4 journals are available in the public domain (INSA).
4 MedKnow publications has, within the past three years, has brought 48 Indian Biomedical Journals into the Open Access domain (MedKnow).
5 Kamala-Raj Enterprises has brought 7 social science and humanities journals to open access (Krepublishers).
6 IndianJournals.com provides open access to 11 scholarly journals (IJCom)

Added to these, several other single title open access efforts are also on the progress in the country, such as 'Sankhya' of the Indian Statistical Institute Calcutta, EPW (Economic and Political Weekly).

OA Harvester Services

Two of the major value adding features of OA archives, among many others, is their Internet presence (omnipresence) and interoperability. The interoperability feature keeps all OA archives virtually a single digital library system wherein they share their metadata through some common services called metadata harvesters or service providers using the OAI-PMH protocol. A number of tools are now available for starting such services and the PKP archive harvester is the appreciated and simple one used by many (PKP). CASSIR (Cross Archive Search Service for Indian

Repositories) is a DSIR sponsored cross-repository indexing and search service recently launched by NCSI (National Centre for Science Information), IISc., (CASSIR). CASSIR, a PKP archive server based service, harvests metadata from country's OAI-PMH compliant institutional repositories, and provides search and browse functionality over the Web. Institutional Repositories can add their IR in the service by clicking and passing the necessary details of the IR. CASSIR has indexed 23 461 records from 18 repositories in the country. SJPI journal harvester service of NCSI has over 1000 papers harvested and indexed from 13 journals (SJPI). Open J-Gate, perhaps the second largest open access archive after Medline, has indexed over one million articles from more than 3000 open access journals of which more than 1500 are peer-reviewed scholarly journals. DRTC's SDL (Search Digital Libraries) harvester service has indexed about 20 931 records from 9 archives spread globally (SDL). Knowledge Harvester@INSA has indexed over 2000 articles from different archives (KHI). The harvesting service SEED at IIT Delhi has over 6176 records indexed in it (SEED).

Conclusion

The paper discussed the enormous and astounding ways of unlocking the academic and scholarly knowledge which empower both the learning commons in particular and the society in general. It also shared the numerous initiatives, programs and projects on OA happening globally and in particular the noteworthy ones from India. Looking at the whole gamut of activities and initiatives that are happening worldwide, these are excellent time and opportunities which were inaccessible and impossible for the pre-web and the pre-Net societies. Technology has been the key enabler in these pathbreaking movements and coupled with the philanthropic, forward looking and innovative actions of many, the landscape of the world of knowledge is indeed changing for the better, if not for the best. As it is rightly captioned in BOAI, 'open access' is an unprecedented 'public good' made possible with the convergence of the good old academic and scientific tradition of sharing scholarly knowledge and the great potential of latest technologies. Ensuring free and unrestricted peer-reviewed scholarly literature accessible worldwide shall definitely accelerate research and enrich education and thereby bridge the widening digital divide between the developed and the underdeveloped nations. After all science can cooperate as well as compete with one another only if there is a level playing ground provided for a free and fair performance. This new form of electronic publishing could potentially and drastically alter the dynamism among authors, publishers and consumers of scholarly works. And this can definitely pave way for excellence in science and academics from an all world perspective. It is heartening to note the selfless contributions pumped in by the open source software (OSS) front, the compliments from the FSF (Free Software Foundation) and the generous funding received for the cause of science are absolutely praiseworthy (OSS), (FSF). For the global academic and the research fraternity the OAP, OAA and the OCW initiatives are central and crucial as far as its academic and scientific agenda for the coming years are concerned. It is a step forward in preserving knowledge that are created with the help of the society, for the betterment of the society, and maintained and preserved by the society.

However, given the magnitude of India's wealth of scholarly knowledge base, appreciated IT expertise and the strength of the academic/scientific community, it is felt that they are not just good enough unless the policy makers' whole hearted support is ensured for the successful implementation of

repositories in therespective institutes from where the professionals were rigorously trained. Similarly the country's major journal publishing organizations should come up with open access models of publishing. CSIR, ICAR, ICMR, ICSSR, DRDO are just few examples. What is more important is the involvement of the university system in the OA movement, which is unfortunately not making any headway as yet in this direction. UGC could consider taking the lead and involve Institutions like the INFLIBNET in capturing the invaluable intellectual capital being unattended and untapped in our universities and put them together into Open Access Archives. Similarly the national level research councils, that is, CSIR, ICAR, ICMR, DRDO, ICSSR, etc. could consider collecting and archiving their research papers into a central archive which could be accessed by all, while individual institutional repositories which are interoperable, could be attempted simultaneously. In other words, preserving the public commons by the commons and for the commons. Ultimately, it is not the adequate progress of technology, but lack of long-range vision and proactive policies which pull us back from success in most cases. In this context, the recent initiative of the NKC (National Knowledge Commission) of India on open access is a welcome move.

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References

ALA. <http://www.ala.org> last accessed on 16 April 2008.
Arc. <http://arc.cs.odu.edu> last accessed on 16 April 2008.
ARL. < http://www.arl.org> last accessed on 16 April 2008.
arXiv. <http://arxiv.org/> last accessed on 16 April 2008.
ATA <http://www.taxpayeraccess.org>, last accessed on 16 April 2008.
Berlin. <http://www.zim.mpg.de/openaccess-berlin>, last accessed on 16 April 2008.
Bethesda. <http://www.earlham.edu/~peters>, last accessed on 16 April 2008.
BOAI (Budapest Open Access Initiative). <http://www.soros.org/openaccess/>, last accessed on 16 April 2008.
CARL.<http://www.carl-abrc.ca/projects/create_change/doc/Cdn%20create%20 change-e.doc >
CASSIR<http://casin.ncsi.iisc.ernet.in/oai/>
Crossref. <http://www.crossref.org>, last accessed on 16 April 2008.
CURL. < http://www.curl.ac.uk/>, last accessed on 16 April 2008.
DMOZ. <http://dmoz.org/Science/Publications/Archives/Free_Access_Online_
Archives/>, last accessed on 16 April 2008.
DOAJ. < http://www.doaj.org/>, last accessed on 16 April 2008.
ELSSS. <http://www.elsss.org.uk/>, last accessed on 16 April 2008.
FSF. <http://www.fsf.org>, last accessed on 16 April 2008.
Gisnparg, P. <http://www.physics.cornell.edu/profpages/Ginsparg.htm>, last accessed on 16 April 2008.
Harnad S. < http://www.ecs.soton.ac.uk/~harnad/> , last accessed on 16 April 2008.
Harnad S, Brody T, Valliers R, Carr L, Hitchcock S, Gingras V, Oppenheim C, Stamerjohanns H, and Hilf E. 2004.
The Access/Impact Problem and the Green and Gold Roads to Open Access. Serials Review 30(4) <http://dx.doi.org/
10.1016/j.serrev.2004.09.013> , last accessed on 16 April 2008.
Heather Morrison, 2008. <http://poeticeconomics.blogspot.com>, last accessed on 16 April 2008.

Heather Morrison. DOAJ < http://poeticeconomics.blogspot.com/2007/12/directory-of-open-access-journals.html >, last accessed on 16 April 2008.
HighWire Press. <http://highwire.stanford.edu>, last accessed on 16 April 2008.
IAS-Journals. <http://www.ias.ac.in/pubs/journals.html>
ICAAP. <http://www.icaap.org>, last accessed on 16 April 2008.
IFLA. <http://www.ifla.org>, last accessed on 16 April 2008.
IJCom. <http://www.indianjournals.com>
IMC. <http://medind.nic.in/>
INASP. <http://www.inasp.info/>, last accessed on 16 April 2008.
INSA. <http://www.insa.ac.in/html/journals.asp>
JISC. < http://www.jisc.ac.uk/>, last accessed on 16 April 2008.
KHI. <http://61.16.154.195/harvester/>, last accessed on 16 April 2008.
Krepublishers. <http://www.krepublishers.com/KRE-New-J/>
MedKnow. <http://www.medknow.com/journals.asp>
Medline. <http://www.nlm.nih.gov/PubMed>, last accessed on 16 April 2008.
NKC <http://knowledgecommission.gov.in/downloads/documents/ wg_lib. pdf>, last accessed on 16 April 2008.
OA <http://openaccess.eprints.org/>, last accessed on 16 April 2008.
--- Archivangelism < http://openaccess.eprints.org/index.php?/archives/136-guid.html>, last accessed on 16 April 2008.
OAISter. <http://oaister.umdl.umich.edu/o/oaister/>, last accessed on 16 April 2008.
OAI. <http://www.openarhives.org>, last accessed on 16 April 2008.
Explorer. <http://re.cs.uct.ac.za/>, last accessed on 16 April 2008.
OA News <http://www.earlham.edu/~peters/fos/2007/12/oa-mandate-at-nih-now-law.html >, last accessed on 16 April 2008.
OA News PMH. < http://www.openarchives.org/OAI/openarchivesprotocol.html> , last accessed on 16 April 2008.
OA News Tools. < http://www.openarchives.org/tools/tools.html>, last accessed on 16 April 2008.
OCW. <http://ocw.mit.edu>, last accessed on 16 April 2008.
OECD. <http://www.oecd.org>, last accessed on 16 April 2008.
OJS. < http://pkp.sfu.ca/?q=ojs/>, last accessed on 16 April 2008.
OpenDOAR. < http://www.opendoar.org/>, last accessed on 16 April 2008.
OPEN J-Gate. < http://www.openj-gate.com/>
OpenMED. <http://openmed.nic.in/>
OSI. <http://www.soros.org/>, last accessed on 16 April 2008.
OSS. <http://www.opensource.org>, last accessed on 16 April 2008.
PKP. <http://pkp.sfu.ca/?q=harvester>, last accessed on 16 April 2008.
PMC (PubMed Central). <http://www.pubmedcentral.com>, last accessed on 16 April 2008.
Rao, CNR. <http://www.indianexpress.com/story/8817.html>, last accessed on 16 April 2008.
ROAR. <http://archives.eprints.org>, last accessed on 16 April 2008.
RoMEO. < http://www.sherpa.ac.uk/romeo.php >, last accessed on 16 April 2008.
Scientific Commons <http://www.scientificcommons.org/>, last accessed on 16 April 2008.
SDL. <http://drtc.isibang.ac.in/sdl/>
SEED. <http://eprint.iitd.ac.in/seed/>, last accessed on April 2008.
SJPI. <http://144.16.72.144/harvester/>, last accessed on 16 April 2008.
Sompel. <http://public.lanl.gov/herbertv/>, last accessed on 16 April 2008.
Sourceforge. <http://www.sourceforge.com>, last accessed on 16 April 2008.
SPARC. < http://www.arl.org/sparc/>, last accessed on 16 April 2008.
Suber, P. < http://www.earlham.edu/~peters/>, last accessed on 16 April 2008.
Wikipedia. <http://en.wikipedia.org/wiki/Open_access>, last accessed on 16 April 2008.
WSIS. <(http://www.itu.int-Document 1),(http://www.itu.int - Document 2)> , last accessed on 16 April 2008.
Ulrichweb <(http://www.ulrichsweb.com/ulrichsweb/analysis/)>, last accessed on 16 April 2008.