Reforming Scholarly Publishing and Knowledge Communication: from the advent of the Scholarly Journal to the challenges of Open Access

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Abstract

Purpose – This paper provides an overview of the continuous evolution of scholarly publishing and knowledge communication as a result of the Internet revolution.

Design/Methodology/approach – Information was obtained from a literature review to find the main contributions on "self-archiving" – the broad term often applied to electronic publishing of author supplied documents on the WWW without commercial publisher mediation. The paper also analyses the impact of the *Open Access Movement*, which came to fruition since the *OAI Metadata Harvesting Protocol* was established, as it creates a potential for interoperability between e-prints repositories.

Findings – The paper highlights the benefits for authors and their institutions in publishing in *e-prints repositories*. The paper also points out how the *Open Access Movement* is gaining Momentum, especially since the *Budapest Open Access Initiative* (BOAI). To achieve this requires commitment of each party involved. Several research funding organizations, international organizations and summits have published policy statements on Open Access. In parallel, the *Berlin Declaration on Open Access* has been signed by several dozens of organizations, including large national research organizations. As a result, almost 92% of scientific journals have

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already given their green light to immediate author institution self archiving upon acceptance for publication. The paper also refers to some international, national, research projects that are addressing potential impediments to the success of e-prints.

Value – In a time when knowledge creation and application are increasingly at the core of wealth creation, researchers need speedy access to what is being researched worldwide. The paper points to the roles and responsibilities of Information Managers, mainly in academic and research institutions, in devising clear institutional policies and helping users to self archive their papers to promote and influence the self archiving of papers for the benefit of their own organization and the global scientific communities.

Keywords – self – archiving; e-prints; e-prints archives; institutional repositories; Open Access; OAI.

Category – General review

1. Introduction

This paper provides an overview of the continuing evolution of scholarly publishing, leveraged in the last decades by the tremendous potential of Internet technology. It introduces *self archiving* – the broad term often applied to the electronic publishing, on a web site, of author supplied documents, without commercial publisher mediation. It analyses ways in which *self archiving* has developed - subject *vs* institutional – examines some of the benefits and drawbacks of self archiving and puts into perspective the impact of this innovative development on scholarly publication which, through the *Open Access Movement*, introduces new business models in this area. The intensity of *self archiving* and its pivotal role in scholarly communication is put into perspective through reference to some self-archiving initiatives set in motion in several countries. Finally, the paper concludes by outlining the challenges for Information Managers in developing the full potential of *Open Access*.

2. Evolution of Scientific Communication: its adaptation to the challenges of ICT and the Internet

The origins of formal scholarly publishing date back to the 17th century, to the correspondence among scholars (Boyle's Invisible Colleges) in England (Meadows

1998: 5; Oppenheim 2000: 361). Groups of scholars used to meet regularly to present papers and discuss research results, under the auspices of the *Royal Society*. They were also corresponding by private letters, publishing short accounts of the work in progress to update those members who were unable to attend the meetings. As the volume of correspondence grew, various scholarly journals emerged as a more efficient means to exchange information in a broader sense. *Journal des Sçavans* and the *Philosophical Transactions of the Royal Society of London* were amongst the first titles to be published (Schauder, 1994; Meadows, 1998: 6 - 8).

The scholarly journal may have started in the 17th century as a means of communication – dissemination of important research findings to the wider research community– but throughout the 18th and 19th centuries the "nature of journals slowly changed, resulting in a relative decline in the importance of learned society proceedings, and the successful creation of more specialised journals, reflecting the fragmentation of knowledge into more specialised disciplines" (Day 1999). The scholarly journal soon assumed the additional functions of registering "ownership" - the "scientific paternity", according to Guedon (2001) - establishing "priority" over a particular scientific discovery or advance, and of "packing" current communication into an indexed and readily accessible archive - a "public registry of scientific innovation" (Guedon, 2001).

In the 19th century, yet another function was added. Publication of articles in journals came to be the prime indicator of professional standing for research professionals and the organizations that employed them (Schauder, 1994: 75). Thus, while primarily allowing academics to inform peers of their findings and to be informed by them, the peer-reviewed journal also fulfilled other requirements (Boyce, 2000: 404; Day, 1999; Rowland, 1997):

- author evaluation – providing a means for judging the competence and effectiveness of authors;

- author recognition - publication in refereed journals, raising an author's profile, improving chances of funding for future research contracts, tenure or promotion;

- validation of knowledge and quality control – through the process of peer review of submitted papers;

- historical record – maintaining the record of progress of science through the years;

- archive – providing a repository for the body of knowledge about a particular field.

As Swan and Brown point out (2004),

> ever since the first scholarly journals were started in mid 1600s, academic authors have strived to publish and disseminate the results of their work for two main reasons – to advance intellectual progress in their subject and to establish rights over any intellectual advances they themselves have brought about (Swan and Brown, 2004: 4).

The appearance of a large number of scientific documents produced by the Allies during World War II and the acquisition of the Axis documents following the War, triggered the need for new ways of organizing, storing and accessing this enormous body of information. Vannevar Bush, a former President of the *Massachusetts Institute of Technology (MIT*) and Director of the *US Wartime Office of Scientific Research and Development*, in his paper published in 1945, envisioned a system to store information (such as books, pictures, articles, newspapers and business correspondence) and which could be searched from a scientist's desktop, using a series of navigational links (Bush 1945). Although the Bush system – *MEMEX* - was microform based, it can be considered as the precursor to the modern hypertext systems of the Web (Large *et al.,* 1999: 43).

The expansion of research, since World War II, brought an exponential growth in the number of scientists over the years due to the increase of R&D activity, financed by industry, in parallel with that sponsored by public funds; the nature of research also evolved, over time, from specialized to interdisciplinary. All of these trends gave rise, over the decades, to different methods of scientific communication (Tenopir and King, 2000: 18 - 21).

Since the 1960s, several government agencies in USA, United Kingdom, the Union of Soviet Socialist Republics and Japan, have been supporting a significant research effort aiming to find solutions to a number of problems within scientific (and technical) communication in general and scientific journals in particular. The problems addressed include the "information explosion", increasing publishing costs (and therefore prices), delays in publishing and distribution inefficiencies – what become known as the "serials crisis" (Tenopir and King, 2000: 21 - 22; Large *et. al*. 1999: 43 - 44). Electronic publishing, digital processing of information and digital

storage of large sets of data are among the many innovations made possible by the application of Information and Communication Technology (ICT).

The electronic journal, electronic abstracting and indexing services and the emergence of electronic databases of bibliographic information, linked to the printed product (such as, *Chemical Abstracts, Engineering Index, Index Medicus*, etc…) (Large *et al*.,.. 1999: 43), are all good examples.

In the 1980s, new research projects, aiming to prove the feasibility of the electronic journal, were financially supported by publishers and, in the UK, also by the *British Library Research and Development Department* (*BLRDD*). Several electronic journal experiments were launched over this period, for example (Tenopir and King 2000: 24) - *ADONIS* (a journal article delivery service using the CD-ROM as the medium; this was a project of *Elsevier*, *Springer* and *Blackwell Science*, sponsored by the *British Library* and the *European Commission*), and others such as *Red Sage, BLEND, ELVYN and TULIP*, also sponsored by commercial publishers.

At the time, libraries were also struggling with spiraling prices and pressures of physical space and there were hopes that the emergence of electronic journals might be the answer to the problem (Tenopir *et. al*.,2003). The development of the Internet and then the Web, in the '90s, has had a significant impact on the decline of the traditional printed journal as the pre-eminent vehicle for scholarly communication. These enabling technologies aroused the interest of some imaginative researchers who in a vociferous and radical way sought to convince the academic community that the printed journal would disappear, within a few decades (Harnad, 1990; Odlyzko, 1995) (quoted in Tenopir and King, 2000: 24). Despite the fact that many journal publishers had begun to set up Web-based services, to give access to electronic versions of their existing printed journals, these radical proponents of electronic communication assumed that this is just replicating, in the new medium, the *status quo* of the print version. Several models of self-publishing (sometimes called self-archiving) have been proposed, using the new enabling technologies as a means of returning the responsibility and ownership of scholarship to its creators (Okerson, 1992).

One of the key assumptions behind this movement, "to develop innovative publishing models for scientific communication is that, when scholars and scientists publish in peer-reviewed journals, they are not interested in monetary reward (royalties) but in having their work read, used, built-upon and cited" (Harnad and Hemus, 1998). Researchers and academics are only too aware that job opportunities, tenure, promotion and merit pay are all dependent on the attention

their papers receive; consequently, authors of journal articles seek impact instead of royalties (Cronin and Overfelt, 1995; Walker, 2002).

As a result, the established scholarly journal system has been experiencing significant challenges to its continuing pre-eminence, due to several factors. Some of these are pointed out by Sompel and Lagoze (2000) and include:

- the rapid advances in most scholarly fields means that the turnaround time of the traditional publishing model is an impediment to the speedy dissemination of R&D results among peers (Tenopir and King, 2000);

- the traditional model, requiring full transfer of intellectual property rights from author to publisher, works against the promotion and wide dissemination of results and obtaining peer recognition and visibility among colleagues (Bachrach *et al.,* 1998);

- the current peer review, as an essential feature of the scholarly review process, is too rigid as it stands at present and often works against the expression of new ideas, by favoring publication of papers originating from authors in the more prestigious organizations and by causing unacceptable delays in publication (Harnad, 1998; 1999; 2000);

- the disparity between increases in journal subscription rates, often exceeding rates of inflation and affordable library budgets (Tenopir and King 2000; Walker 1998); the so called "serials pricing crisis"[1] which is seriously jeopardizing the economic viability of the printed system of scholarly communication, stems from several contributing factors, as Bot and Burgemeester (1998) point out:

> General inflation and increase in size – (more pages per issue, more issues per volume, more volumes per year) - in conjunction with a dramatic decrease in personal subscriptions, which started in the 1970s. Publishers have apparently addressed this fall in revenue by increasing institutional subscription rates, thereby causing a vicious circle of cancellations and further increases in institutional rates.

This environment has encouraged the emergence of novel publishing models for formal and informal communication among scientists, based on Internet technologies for the dissemination and communication of research materials, with

[1] On the reduced access to serials, the Association of Research Libraries, representing the 124 top libraries in North America, reports a 5 % drop (1986-2001) in serials purchases among its members (Kyrillidou and Young 2002). Far more drastic drops in access to serials in the developing world are documented for Africa (Rosenberg 1997) and for India (Patel and Kumar

functionalities that far exceed those existing in print world. As well as promoting rapid access to information existing in scientific documents, in many cases without a fee, they also facilitate access to large amounts of multimedia materials on the Web and stored in databases, like biological sequences, time series, videos, etc.

The new publishing models being tested in different disciplines included, as outlined by Kling, Spector and McKim (2002):

- *electronic journals* (*e-journals*) – an edited package of articles that is distributed to most of its subscribers in electronic form. Articles from an e-journal may and probably will be printed for careful reading; they might be stored in libraries in a printed form, for archival purposes. However, e-journals are accessed primarily in electronic form (Kling and McKim, 1999: 891);

- *hybrid –paper electronic* (or the *p-e*) journal – (this is usually the electronic version of a paper journal) - it is a package of peer-reviewed articles available through electronic channels, but whose primary distribution channels are paper based; or the *e-p journal* (*hybrid e-p*) which is primarily distributed electronically and has a limited distribution in paper form (Kling and McKim, 1999: 891);

- *author's self posting* - author's posting their articles on their Web-sites (Okerson and O'Donnell, 1995);

- *field/subject wide e-print repositories* (Ginsparg, 1997; Holtkamp and Berg, 2001; Brown, 2001a; 2001b).

In their paper, Kling, Spector and McKim (2002) have also proposed the *Guild Publishing Model* (*GPM)* as an important scholarly communication model. This is derived from the formal research manuscript series (the *e-script series*) that are sponsored by academic departments and research institutes and which finds counterparts in the electronic environment, in the areas of economics, business, demography, higher energy physics, logic and information systems.

These new electronic publishing models based on *self-archiving* or author *self archiving* – has the potential to revolutionize scholarly communication, rendering it more efficient and effective. *Self – archiving* is a broad term to mean simply mounting of a document of author supplied research in a publicly accessible

2001). Source: Willinsky, *JODI*, Note 2 http://jodi.ecs.soton.ac.uk/Articles/v04/i02/Willinsky/#Willinsky02b.

website, without publishers' mediation (Crow, 2002: 11; Pinfield, 2003). The following paragraphs deals with *e-Prints* and its impact on scholarly communication.

3. *e-Prints*

3.1. Overview

As discussed above, the advent of the Internet enabled researchers and academics to recognize that the information and communication technologies gave them efficient ways to share results, to combat the rise in journal costs fast outpacing a library's ability to afford them (serials crisis), to overcome the barriers raised by the full transfer of Intellectual Property Rights from author to publisher and to improve on the hitherto slow turnaround of traditional publishing. While several of their initiatives began as *ad hoc* vehicles for dissemination of preliminary results, a number of them have evolved into a more formal means for the efficient sharing of research results among peers in the field (Correia and Neto, 2002).

The term *e-print* encapsulates a wide range of meanings. Originally it was defined as an electronic preprint circulated among colleagues and field specialists to obtain feedback; the concept of e-print was then generalised to include any electronic version of academic research manuscripts circulated by the author outside of the traditional scientific publishing environment (Luce, 2001).

In turn, Pinfield (2003) defines *e-prints* as electronic versions of research papers or similar research output. They may be *pre-prints* (drafts of papers before they have been refereed) or *post-prints* (after they have been refereed). They may also include material such as journal articles, chapters from scholarly books or conference papers or any form of research output, which may not be formally refereed but are nevertheless important research output.

An *e-print archive* or *repository* is simply an online repository of these materials, which is publicly accessible. The term repository is preferred, especially by most professional archivists, to make clear that curatorship and preservation are not their main functions (Pinfield and Hamish, 2003). Some e-prints may be peer reviewed before being posted on the servers; others are posted without peer review and authors request feedback on the results submitted (Garner, Horwood and Sullivan, 2001: 250).

In some cases, the e-prints are loaded onto servers, but are also submitted to traditional journals that have a peer review process. This procedure varies depending on the discipline (*e.g*. physicists, mathematicians, computer scientists

and astronomers *vs*. bio-medicine and chemistry) (Kling, Spector and McKim, 2002: 2; Brown, 2001a: 188) and on the prior publication policies of some journals towards publication and subsequent publication of *e-prints* (Brown, 2001a:188), as will be discussed later in this paper.

The first *e-print* server was the *Los Alamos Physics Archive*, presently known as *arXiv.org*, which was created in 1991 by Ginsparg (Ginsparg, 1997; Luce, 2001) at the *Los Alamos National Laboratory*, to give access to pre-prints in the domain of high-energy physics. Since July 2001, this archive has been located at Cornell University. During the last fifteen years, it has evolved to become the primary means of scholarly communication and the largest non-peer review research works deposit available, worldwide. It is a fully automated electronic archive for research papers in physics and related disciplines, mathematics, non-linear sciences and computational linguistics. The *arXiv.org* archive is mirrored on several continents, in more than fifteen countries. Brown (2001a; b) and Pinfield (2001) describe how *arXiv* is currently used by physicists and the success of this new method of scientific communication and its acceptance among researchers and academics.

Since the creation of *arXiv*, a number of separate *e-print repositories* have been set up in the late 1990's for separate subject communities, *e.g*.:

- *CogPrints* (http://cogprints.soton.ac.uk/), covering cognitive sciences (namely, psychology, neuroscience, linguistics, and biology);

- *RePEc – Research Papers in Economics* (http://repec.org), in the field of economics, mainly in the domains of management, business and finance where it was common to circulate "working papers" in a similar way to the physics preprints, (Krichel, 2000; Cruz and Krichel, 2002);

Even allowing for existing differences between disciplines, in relation to the degree of adoption of electronic communication, as Kling and McKim (2000) have described, there are already, in most disciplines, examples of services providing access to electronic research papers. For example, the *Department of Energy* (DoE) of US *E-Print Network* provides a gateway to over 16,000 Websites and databases worldwide containing *e-prints* in basic and applied sciences, primarily in physics, but also in chemistry, biology and life sciences, material science, nuclear sciences and engineering computer and information technologies and other disciplines of interest to the *DoE* [URL: http://www.osti.gov/eprints]. It attempts to address the problems that arise because readers usually want information organized by subject and not by geographical /institution location.

3.2 Subject *vs.* institutional preprint repositories

Apart from the above-mentioned subject-specific repositories, others in various disciplines were set up by enthusiastic researchers or publishers, such as the three preprint repositories set up by *Elsevier*, in Chemistry, Mathematics and Computer Sciences. Despite their wide readership, these research communities did not contribute articles or online comments to the preprint service in sufficient numbers to justify further development. Consequently, on the 24th of May, 2004, these three *Elsevier Preprint Servers* stopped accepting new submissions to their sites.

As an alternative, many supporters of self-archiving /e-print archiving have advanced another strategy: *institutional repositories*. These are open-access archives set up and managed by research organizations to house articles published by authors of the institutions involved.

3.3 Benefits provided by the publication in *e-prints* repositories

For scholars and academics, there are several benefits to be gained from archiving their scientific work in *e-print* repositories. The benefits stem from the fact that *e-print repositories* lower the barriers created by the conventional publication system (Pinfield 2004a:4), consequently increasing visibility – papers become freely available for others to consult and cite (Pinfield, Gardner and MacColl, 2002; Harnard and Brody, 2004; Antelman, 2004). Studies began to demonstrate that open access also increases impact. Hitchcock (2005) has an on-going bibliography of studies on the "The effect of open access and downloads ('hits') on citation impact: a bibliography of studies", which provide evidence that work that is freely available is more cited.

Other complementary benefits from the point of view of the researcher, as contributor/reader of the literature are highlighted:

- rapid dissemination of information to a wider audience – depending on what document types are accepted in the archive (*pre-prints* or *post-prints*), online repositories help to accelerate dissemination of the research findings- better quality and improved efficiency in the R&D activity (by avoiding duplication) and faster communication, between academia and industry (Warr, 2001);

- improved archiving of scientific data - regarding this aspect, Internet technologies offers advantages of the multimedia and the supporting files, as Garner, *et al.* (2001: 252) point out,

> (…) They have the potential to improve the way the results are portrayed by including large data sets such as digitised images and the results of failed experiments (…). It is beneficial to have systems that can help scholars and scientists to learn from each other's experiences, both successes and failures (Garner *et. al*., 2001: 252).

The *e-prints* offer substantially more features than their print equivalents: for example, in some cases, annotation facilities are provided to allow commentaries/ observations on existing data, by peers, to be posted, data integration - *i.e*. tying together data from various sources and exporting/publishing data in agreed formats.

From the institutional point of view, an institutional repository will reform scholarly communication as it potentially serves as a tangible indicator of an institution's quality. Visibility, prestige, public value all enhance the profile and help provide wider dissemination of R&D output. This, in turn, attracts high quality researchers and more research funds because their research output is widely disseminated, read and cited; it also has an impact on the number of citations of papers produced by the institutional staff. Institutional repositories also provide valuable support for HEIs – Higher Education Institutions, to carry out their mission in researching and teaching (Pinfield, 2004 b:303).

Furthermore, the *e-prints repositories* bring added benefits for scientists in the poorly resourced organizations or countries. By accessing e-prints repositories available anywhere in the world, they are provided with access to the global knowledge base. Equally important are the opportunities created by the *e-prints* repositories which offer the possibility, for scientists in less resourced countries or organizations, to distribute local research in a highly visible way and without the difficulties and bias associated with publishing in traditional journals, which tend to favour the publication of papers from well known authors or from known organizations in more developed countries (Chan and Kirsop, 2001).

As Pinfield (2004 a:5) points out,

> there are wider social and economic benefits which might follow from making high – quality research more easily available. Fundamental curiosity driven research could easily have an impact in applied areas. For example, there would be greater opportunities for knowledge transfer between the academic sector and the commercial sector.

> There would also be the potential for public understanding of science to be enhanced […] the attraction for making publicly funded research more accessible to the public is in principle a strong [argument] …. (Pinfield 2004 a:6).

4. Movement towards Open Access scientific literature

4.1 OAI -Open Archives Initiative

With a number of separate e-prints repositories beginning to appear in the late 1990s, a movement began to develop amongst some stakeholders in the scholarly communication process, as it became clear that their usefulness would be enhanced by the development of the interoperability between them. The *OAI - Open Archives Initiative* (http://www.openarchives.org/) addresses this issue; the initiative emerged from the *Santa Fe Convention* held in 1999. The *OAI* aims to create cross-searchable databases of research papers and make them freely available on the web by developing and promoting interoperability standards that will facilitate the efficient dissemination of content. Using these standards, institutions can put content on the Internet in a manner that makes individual repositories interoperable.

At the centre of this work is the *OAI Metadata Harvesting Protocol* (http://www.openarchives.org/OAI/openarchivesprotocol.htm). This creates the potential for interoperability between e-prints repositories by enabling metadata from a number of archives to be harvested and collected together in a searchable database. The metadata harvested is in the Dublin Core format and normally includes information such as author name, keywords in the title, subject terms, abstract, and date (Pinfield, Gardner and MacColl, 2002). As Pinfield (2004 a: 6) points out,

> … tools are now available to ensure that OAI-compliant metadata can also be converted in HTML so that they can be crawled by robots of mainstream search engines as Google. This means that papers available in OAI compliant e-print repositories are accessible to users not just via specialized OAI Service Providers but also via standard web search engines services. (Pinfield, 2004 a:6).

The *eprints.org* (http://www.eprints.org/), developed at the University of Southampton, was the first free software that enables any institution to install OAI-complaint archives (*i.e*. using the OAI metadata tags). It is designed to run centralised or distributed, discipline-based or, institution-based archives of scholarly publications (Chan and Kirsop, 2001). It is the most well established and is now known as *GNU eprints* (eprints.org). There are other, more recently released

repository OAI software applications, such as *DSpace* - developed by MIT Libraries and Hewlett Packard (http://www.dspace.org), which is being widely adopted.

The publication *"A Guide to Institutional Software v3"* (http://www.soros.org/openaccess/software) is a good source of information to learn about OAI-compliant software and the technical barriers for setting up an interoperable e-print repository; these barriers are now almost insignificant, with the latest technology.

OAI-compliant e-prints servers provide value-added facilities. They can compile statistics and provide key metrics, such as citation analysis of self-archived papers. *Citebase* (http://citebase.eprints.org/cgi-bin/search) is an example of this; they can also produce an online publications list by author or by academic department. The contents of servers around the world can be searched simultaneously by using the OAI protocol. Furthermore, one can cross search using developing services such as the *OpCit – The Open Citation Project* (http://opcit.eprints.org) (a project funded by the *Joint NSF-JISC International Digital Libraries Programme* - http://www.dli2.nsf.gov/internationalprojects/intlprojects.html), whose aim is to provide integration and navigation through citation linking. These are value-added services in e-prints repositories, as they provide enhanced reference linking and give authors citation and impact analysis of their work (Nottingham ePrints, *About Nottingham ePrints* http://eprints.nottingham.ac.uk/information.html).

4.2 *BOAI - Budapest Open Access Initiative*

A meeting was convened in Budapest by the *Open Society Institute (OSI)*, on December 1-2, 2001. Its aim was to accelerate progress in the international efforts to make scientific and scholarly research results freely available on the Internet.

The participants represented many viewpoints, academic disciplines and nations. They brought first-hand experience of many of the ongoing initiatives that make up the open access movement. They discussed how best the separate initiatives could be coordinated to achieve better progress. They examined the most effective and affordable strategies for serving the interests of research, researchers, and the institutions and societies that support research. Finally, they explored how *OSI* and other foundations could use their resources most productively, to aid the transition to open access and to make open access publishing economically self-sustaining.

The rationale was a need for a potential solution to the scientific communication crisis – referred to above - and to ensure that the results of publicly funded

research remain publicly available, avoiding the need to purchase them from commercial sources, with the expenditure of even more public money.

As a result, the *BOAI-Budapest Open Access Initiative* (*OSI*) was announced (http://www.soros.org/openaccess/) which is a "statement of principle, a statement of strategy, and a statement of commitment".

The *BOAI* insists on author consent: i) its focus is peer-reviewed research literature, ii) for *BOAI*, free access must depend on author consent and not user need or desire. In the first instance BOAI address peer-reviewed research literature, that is:

> all content for which authors do not expect payment, namely scholarly monographs on specialized topics, conference proceedings, theses and dissertations, government reports and statutes and judicial opinion. (*BOAI public statement*, in BOAI FAQ, 2005 http://www.earlham.edu/~peters/fos/boaifaq.htm).

As Butler (2002) points out, in an article posted at *Nature's Forum on future e – access*,

> Research institutions and funding agencies that sign up to the *BOAI* commit themselves to making policy changes, such as creating local open-access electronic repositories, and making it compulsory for grant recipients to deposit their papers there. Individual signatories agree to deposit their research in freely available electronic repositories, and to support alternative journals as authors, editors and referees (Butler 2002).

So far, (March 2005) there have been ca. 3650 individuals and 304 organisations as signatories to the *BOAI - Budapest Open Access Initiative* (http://www.soros.org/openaccess/view.cfm).

There is a strong international movement that, at least in some scientific areas, seeks to make research papers available by this method. *The SPARC Open Access Newletter* (http://www.earlham.edu/~peters/fos/index.htm), published by Peter Suber, is a highly useful resource for keeping up to date with developments in all areas related to electronic scholarly publishing (see in particularly *Timeline for Open Access Movement* http://www.earlham.edu/~peters/fos/timeline.htm , which is the most comprehensive account of major developments]

The frequently updated *Scholarly Electronic Publishing Bibliography*, *1996-2005*. (http://info.lib.uh.edu/sepb/sepb.html), published by Charles Bailey (1996 - 2005), includes two sections with relevant articles, one on *New Publishing Models* and

other on *Repositories, e-Prints and OAI*, which are relevant to keep up to date on the issues addressed in this paper.

4.3 Open Access Journals – OAJ providers. *DOAJ – Directory of Open Access Journals*.

Scholarly articles can be made freely available to potential readers in two main ways- by being published in an *Open Access Journal* or by being deposited in an electronic *repository*, which is *OAJ compliant* and that is searchable from remote locations without restrictions on access (Swan and Brown, 2004: 8-11).

The Open Access Journals are those that share one characteristic; they make their quality controlled content freely available to allcomers, using a funding model that does not charge readers or their institutions for access. There are several operational models in place.

The simplest one is where the journal is set up and run by a university department, published electronically using only the institution's server space and edited and administered, including peer review, by interested scholars. A modification of this is when the journal receives some funding – either by grants or sponsorship – to support some of the editorial or management costs. Example of this is the *D-Lib Magazine* (http://www.dlib.org), which is funded by grants from *DARPA* (Defence Advanced Research Project Agency) and *NSF* (National Science Foundation). The other main model for open access is that of commercial publishing. In this model, authors or their institutions pays a fee to have their article published and the publisher then makes the article freely available electronically, after publication. There are several publishers using this model, such as *BioMed Central* (BMC) (http://www.biomedcentral.com), which launched its open access publishing service in 2000 (*op. cit*, 8-9; Bosc, 2003-2005).

The *Directory of Open Access Journals* (*DOAJ*) produced by the *Lund University Library* (www.doaj.org), was created to increase the visibility and ease of use of Open Access scientific and scholarly journals, thereby promoting their increased usage and impact. In May 2004, it included **1485** peer reviewed Open Access journals, spanning all disciplines from Agriculture to Philosophy.

4.4 Open Access Movement is gaining Momentum

Progress is steady and gaining momentum towards Open Access. Establishing OA requires active commitment of each party involved. 2003 was the first year when regular items appeared in specialised literature, addressing both open-access

repositories and journals (Pinfield 2004 a: 12). This year also saw the launching of an increasing number of policy statements supporting open access. These included, several from research funding organizations like

i) *Bethesda Statement on Open Access Publishing*, June 20, 2003
URL: http://www.earlham.edu/~peters (from US research funders);

ii) *Wellcome Trust Position Statement on Open Access*, 1 October 2003
URL: http://www.wellcome.ac.uk/doc_WTD002766.html (from UK research funders).

International organizations and international summits had a very important influence, conferring another dimension to the Open Access movement, as can be seen from these statements from *OECD* and the *UN World Summit, on the Information Society*:

iii) *OECD Declaration on Access to Research Data from Public Funding*, 30 Jan 2004). URL:
http://www.oecd.org/document/0,2340,en_2649_34487_25998799_1_1_1_1,00.html

iv) *UN World Summit on the Information Society Declaration of Principles and Plan of Action*, December 12, 2003
URL: http://www.itu.int - Document 1
URL: http://www.itu.int - Document 2

In parallel, *The Berlin Declaration on Open Access*, launched on 23rd October 2003, [http://www.zim.mpg.de/openaccess-berlin/berlindeclaration.html] which defines Open Access (OA) as *immediate, permanent, free online access to the full text of all refereed research journals articles* (2.5 million articles a year, published in 24000 refereed journals, across all disciplines, languages and nations) has been signed so far by 55 institutions, globally, including large national research organizations such as France's CERN and German Max-Plank Institutes; national Academies of Sciences such as those of China, India and Netherlands, along with several individual universities and research funding organizations (Harnard, 2005). The Berlin 3 meeting took place recently (March 2005) and gave added prominence to the Open Access issue.

International and national research projects are addressing potential impediments to the success of *eprints archives* – copyright, peer-review and quality control, long term preservation, cultural issues (differences between subject domains, diverse nature of research institutions, …). Among such Programmes are the following:

i) *FAIR (Focus on Access to Institutional Resources*) programme, funded by the UK Higher Education Council's *Joint Information Systems Committee*

(JISC) (2002- 2005); this programme funds some projects investigating (among other things) e-print repositories, e-theses services and intellectual properties rights
(URL: http://www.jisc.ac.uk/index.cfm?name=programme_fair);

ii) *California Digital Library eScholarship Repository (http:*//escholarship.cdlib.org/*)*;

iii) *DARE* (Digital Academic Resources) programme, which involves collaboration of The *National Library of the Netherlands*, the *Royal Netherlands Academy of Arts and Sciences (KNAW)* and the *Netherlands Organisation for Scientific Research (NWO)* with almost 20 university and research organisations (http://www.darenet.nl/en/toon).

5. Conclusion: Roles of Information Management profession within the *Open Access Movement*

Information Managers at large have a very important future role to perform within their organizations, regarding the future of self-archiving, particularly in relation to peer-reviewed journals. These include:

- Take the initiative to build open access repositories for their institutions; this embraces addressing the communication cultures within different disciplines, develop management frameworks that take account of the technical possibilities, and take responsibility for the quality of the metadata (enhancing/validating the provided by authors);

- Ensure archival stability;

- Promote discussions among academia and administrators, at the highest level, regarding the advantages of *Open Access* deposition;

- Demonstrate to scholars the benefits of wider exposure via *Open Access*;

- Introduce and make available innovative performance indicators, such as counting downloads and citations at the article level, this can also be seen as a complementary form of quality assessment;

- Coordinate programmes to advise and support scholars on copyright issues and how best to negotiate the right to self- archive;

- Support potential authors in their electronic publishing activities;

In conclusion, Information professionals have to be aware of the (r)evolution which is taking place in scholarly communication and influence it as much as possible, for the benefit of their own organizations and the global scientific and scholarly communities. Information professionals have to become skilled in the use of new applications and should be looking to take advantage of the new opportunities, created by the ready availability of these Open Access resources.

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