



Five years on – the impact of the Budapest Open Access Initiative

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1. Introduction

February 14, 2007 marked the fifth anniversary of the release of the Budapest Open Access Initiative (BOAI), which offered the first definition of Open Access [1]. This paper examines the impact of the BOAI over the past five years. Background information on the role of the Open Society Institute (OSI)/Soros foundations will be provided, followed by an examination of key objective measurements for analyzing the impact of the BOAI.

In 2001 OSI's Information Program began to follow the developments of several projects which shared the ultimate goal of making peer-reviewed scholarly content freely available online. Among these projects were arXiv.org, the preprints archive for Physics, Mathematics, Computer Science and Quantitative Biology and the Public Library of Science's petition, which called on researchers not to submit their articles to any publisher which did not allow articles to be freely available after six months. OSI organized a meeting in Budapest in December 2001 which brought together a group of leaders who were exploring alternative publishing models. During the meeting it was decided to link the blossoming repository (or self-archiving) movement with Open Access journal publishing. Thus the BOAI defined these as two complementary strategies for achieving Open Access. The simultaneous promotion of the two strategies has proven to be highly productive. Ultimately to succeed, both strategies rely on mandating Open Access to publicly funded research.

Following the release of the BOAI, OSI's Information Program pledged \$3 million to support Open Access initiatives. While OSI initially intended to spend these funds over a three year period, we realized that the transition to Open Access will require a longer time commitment on the part of OSI and more funding than initially pledged. This paper documents both the impact of OSI's direct funding of the principles outlined in the BOAI, as well as broader policy and funding discussions which followed the release of the BOAI.

2. Methodology

Key objective measurements for evaluating the impact of the BOAI include:

- a review of meetings which have followed the BOAI;
- the number of Open Access journals and institutional and subject-based repositories which have developed in the past five years;
- the number of sites which link to the BOAI as well as to some of the Open Access projects which OSI has funded;
- a review of the response of publishers to the Open Access movement;
- an examination of the major declarations and funders' policies regarding Open Access which have followed the BOAI.

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3. The Development of a Movement

Having defined Open Access, the BOAI inspired lively debates among publishers, academics, librarians, and funders (both governmental and private) regarding the future of scholarly communication. Much of OSI's funding in the past five years has been dedicated to meetings, conferences and workshops which introduce the concept of Open Access. As of January 2007, OSI has provided \$441,300 in funding to support over 40 meetings to introduce and promote Open Access throughout the world.

In addition to supporting meetings on Open Access, OSI has funded projects which directly advocate for Open Access. Examples of these are the Open Access News blog, which is written by Peter Suber. Open Access News has come to be regarded as the main source for information on the Open Access movement and this can be seen in the over 5,400 sites which link to it. OSI also supports some of SPARC's (the Scholarly Publishing and Academic Resources Coalition) work to advocate for Open Access. SPARC has developed the Alliance for Taxpayer Access, an organization representing taxpayers, patients, physicians, researchers and institutions that support Open Access to taxpayer-funded research.

Seeing the need to facilitate the discovery and use of Open Access journals and repositories, OSI funded the development of the Directory of Open Access Journals (www.doaj.org) and the Directory of Open Access Repositories (www.openoar.org). The DOAJ was developed by Lund University Libraries and as of April 2007 lists 2,622 Open Access journals, an increase of over 2,300 since its launch in 2003.

To complement the DOAJ, OSI brought together a group of funders to support the development of the Directory of Open Access Repositories by the University of Nottingham and Lund University Libraries. Currently OpenDOAR lists 853 institutional repositories and 15,400 sites link to the OpenDOAR.

As of April 2007, 522 sites link to the BOAI. In particular, organizations often link to the BOAI in reference to defining Open Access.

Beyond the Open Access meetings and projects which OSI has funded, the discussion regarding Open Access has been broadened since 2002 to include national, international and institutional funders. In 2003, the Howard Hughes Medical Institute (HHMI) and the Max Planck Society both held meetings which addressed Open Access from a funder's perspective. The HHMI meeting produced the Bethesda Statement [2] (the meeting was held at HHMI's headquarters in Bethesda, Maryland) and the Max Planck conference developed the Berlin Declaration [3]. Both the Bethesda Statement and the Berlin Declaration provide definitions of Open Access which focus on the role of funders. Thus adding the Budapest definition to this mix, many refer to the "BBB" definition of Open Access.

4. Publishers' Reaction to Open Access

The BOAI received stiff criticism from publishers' associations when it was announced in February 2002. Sally Morris of the Association of Learned and Professional Society Publishers (ALPSP) said: "We are convinced all of our scholarly communities will be ill-served by an initiative which promotes systematic institutional archiving of journal content without having in place a viable alternative model to fund the publication of that content. This can only serve to undermine the formal publishing process which these communities value. She warned against those who would 'give it all away first and then start worrying later' [4].

However by the fall of 2002, ALPSP and OSI held a joint workshop in London which described the Open Access publishing model. This was the first in a series of three ALPSP/OSI workshops. By the third workshop, Martin Richardson of Oxford University Press (OUP) described how OUP was experimenting with the hybrid model of Open Access. Through the hybrid model publishers offer authors the choice of paying the article processing fee and having their article made freely available online, or they can elect not to pay and then only journal subscribers will have access to the article. This model seems attractive to authors, as by electing to have their article made freely available through Open Access, it has the potential to reach a larger audience. When OUP adopted the hybrid model for their Journal of Nucleic Acids, they found that a high percentage of authors elected to pay the article processing fee. Based upon this response, OUP converted the journal to full Open

Access [5]. The hybrid model offers publishers of traditional subscription-based journals a way to experiment with Open Access and allow the pace of change to be dictated by the authors themselves. Jan Velterop, former publisher of BioMed Central and currently the Director of Open Access at Springer, described how the hybrid model can work for publishers wishing to experiment with Open Access in his Guide to Open Access Publishing and Scholarly Societies [6] commissioned by OSI. Within Springer, Velterop leads the Springer Open Choice Program which allows authors who submit their articles to all Springer journals to choose the hybrid model of Open Access. Through Springer Open Choice, authors are allowed to retrain their copyright. Springer has adopted the Creative Commons Attribution License 2.0 as the Springer Open Choice License [7].

In addition to subscription-based journals which are converting to Open Access, there are many new Open Access journals which have been developed. Today the largest commercial Open Access publisher is BioMed Central which publishes over 175 titles. SciELO (the Scientific Electronic Library Online), based in Brazil, publishes over 200 Open Access titles and is supported by FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo), in partnership with BIREME (the Latin American and Caribbean Center on Health Sciences Information). Hindawi Publishing, based in Cairo, publishes over 60 titles among a wide range of fields including Engineering, Life Sciences, Mathematics, and Physical Sciences. Most importantly, Hindawi Publishing has shown that the article processing fee business model is sustainable. As Paul Peters, Head of Business Development at Hindawi explained: "Based on our experience as a publisher of both subscription-based journals and author-pays open access journals, I would not only argue that the author-pays publishing model is sustainable, but also that it has many economic advantages over the subscription model. Even though our open access journal collection is only a few years old, we have already achieved profitability for the collection as a whole. Moreover, using a business model based on publication charges has enabled us to expand our publishing program in a much more sustainable way than we were able to using a subscription model" [8].

The Public Library of Science (PLOS), launched by Nobel Laureate Harold Varmus, Mike Eisen, and Pat Brown, has demonstrated that Open Access journals can compete with the top subscription-based journals in terms of producing high quality journals. PLOS Biology is ranked as the most highly cited general biology journal with an impact factor of 14.7 [9]. And PLOS is pushing the boundaries of the traditional concept of a journal with their new PLOS ONE which represents cutting edge innovation which could fundamentally change how research is communicated.

While individual publishers are experimenting with Open Access, some of the publishers' associations continue to strongly oppose it. This was highlighted in January 2007 when Nature revealed that the Association of American Publishers (AAP) had hired a high profile public relations firm, Dezenhall Resources headed by Eric Dezenhall, to attack the Open Access movement [10]. Dezenhall's corporate clients have reportedly included Enron and Exxon Mobil. "Dezenhall told the association's professional and scholarly publishing division, he could help – in part by simplifying the industry's message to a few key phrases that even a busy senator could grasp. Phrases like: 'public access equals government censorship,' and 'government is seeking to nationalize science and be a publisher.' The publishers liked what they heard" [11].

At the grassroots level, the reaction of publishers as well as users of research material to the Open Access movement can be seen by looking at statistics from the DOAJ. As previously mentioned 2,300 titles have been added to the DOAJ since its launch in 2003, thus 2,300 journals have either converted to or been launched as Open Access journals during this time. The importance of the DOAJ can be seen by the fact that 17,800 sites link to it. The DOAJ also receive over 5 million visits per month (although this figure does include robots).

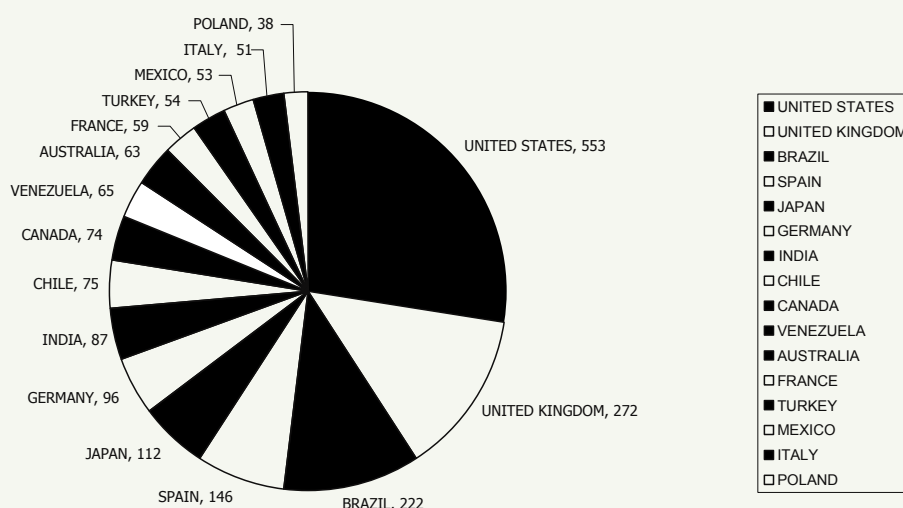


Figure 1. Journals per Country in DOAJ (top 15)

By examining the countries where journals in the DOAJ are based (see Figure 1) it is clear that while many journals are based in the United States and the United Kingdom, Open Access has been adopted by publishers throughout the world, including those based in many developing countries.

	February 2007				December 2006			
1	1582079	37.32%	.com	Commercial	1234542	37.58%	.com	Commercial
2	381159	18.10%		unresolved numerical addresses	365680	23.31%		unresolved numerical addresses
3	145734	6.36%	.net	Networks	189425	9.08%	.net	Networks
4	227688	6.21%	.za	South Africa	160363	5.77%	.za	South Africa
5	73271	3.85%	.edu	USA Higher Education	50301	2.39%	.br	Brazil
6	93426	3.61%	.org	Non Profits	42332	2.03%	.edu	USA Higher Education
7	8678	3.28%	.bg	Bulgaria	16593	1.89%	.org	Non Profits
8	77620	3.15%	.ch	Switzerland	44513	1.88%	.ch	Switzerland
9	55465	1.75%	.br	Brazil	34474	1.58%	.uk	United Kingdom
10	44309	1.68%	.de	Germany	15913	1.44%	.de	Germany
11	38913	1.38%	.uk	United Kingdom	24092	0.84%	.fr	France
12	22442	0.80%	.ca	Canada	15505	0.71%	.it	Italy
13	23282	0.73%	.fr	France	9933	0.61%	.in	India
14	18516	0.73%	.my	Malaysia	8485	0.59%	.jp	Japan
15	15142	0.61%	.se	Sweden	10227	0.54%	.tr	Turkey
16	11221	0.61%	.in	India	9997	0.50%	.ca	Canada
17	14596	0.57%	.mx	Mexico	8553	0.47%	.pl	Poland
18	15897	0.54%	.it	Italy	9999	0.45%	.se	Sweden
19	7332	0.45%	.jp	Japan	10889	0.44%	.gr	Greece
20	10317	0.43%	.nl	Netherlands	8329	0.41%	.mx	Mexico
21	10485	0.41%	.tr	Turkey	8584	0.40%	.be	Belgium
22	4753	0.38%	.dk	Denmark	6726	0.40%	.es	Spain

	February 2007				December 2006			
23	9422	0.38%	.au	Australia	7104	0.39%	.nl	Netherlands
24	7384	0.36%	.es	Spain	7727	0.36%	.pt	Portugal
25	7944	0.36%	.pl	Poland	6114	0.33%	.fi	Finland

Figure 2 Hits to DOAJ based upon country (top25).

The high global appeal of Open Access journals is also seen by examining the hits to the DOAJ based upon country (see Figure 2). While the wealthy research countries are represented, many developing countries also make the top 25, thus demonstrating that Open Access journals have been promoted widely and deely to the global research community. The high percentage of hits coming from unresolved domains could be due to the fact that many users in developing countries access the DOAJ through internet cafes and other third party access points.

	2004 Feb	2004 Nov	2005 Feb	2005 Nov	2006 Feb	2006 Nov	2007 Feb
Successful requests:	264,931	1,318,720	1,225,736	1,945,841	2,632,710	2,607,935	3,062,684
Redirected requests	57,660	513,306	395,886	328,585	525,862	1,745,736	2,318,193
Distinct files requested:	33,016	171,181	272,397	280,800	487,478	738,879	776,702
Distinct hosts served:	33,107	120,320	81,189	171,378	138,900	231,663	175,055
Data transferred MB:	1,570	12,960	11,440	20,420	27,330	23,900	25,990
Link to journal						750,677	836,151
Explanation:							
Successful requests	Each time a user prompts the server to show a file it is a request						
Redirected requests	A redirected request can be either a redirection within DOAJ (i.e. from a bibliographic record to an abstract) or from DOAJ to an external server (i.e. from an abstract in DOAJ to the full-text on a publisher's site).						
Distinct files requested:	Indicates how many different files in the DOAJ have been requested during one month.						
Distinct hosts served:	Indicates how many different registered IP-addresses have consulted the DOAJ during one month.						
Data transferred MB:	Indicates how much data has been transferred (downloaded) from DOAJ during one month. Take in consideration that one metadata record is only a very small number of bytes - 1000 Megabytes= 1 Gigabyte.						
Link to journal	Indicates how many times users have used the DOAJ to go to an abstract or full-text on the publishers sites during one month.						

Figure 3. DOAJ requests.

And finally, the high use of the Open Access journals in the DOAJ (see Figure 3) is seen in the growing number of requests which the DOAJ has received over the past three years.

5. Mandating Open Access – the Role of the Funding Agencies

The role of the research funders within the Open Access movement is extremely important. By 2003 the Open Access movement was advocating for Open Access to research supported by both governmental and private research funders. The research funders have begun to adopt mandates for Open Access (or Public Access in the case of government-supported research as this research is supported by tax dollars). The message that research funders (and taxpayers) are essentially paying twice for the same information has resonated with funders. In the case of government funded research, the public supports the research itself through grants from the federal research agencies and then the public (through libraries, hospitals, etc.) must purchase the journals in which the publicly funded research is published to access the research results.

In 2003 the Wellcome Trust published an economic analysis of scientific publishing [12]. Based upon this report, the Trust decided to pursue an Open Access policy for the research which it funds. This ultimately led to the Trust becoming the first funder to mandate Open Access to all of the research it funds in September 2006 [13].

The Science and Technology Committee of the House of Commons launched an Inquiry into the state of Scientific Publishing in 2004. Its final report concluded that “the current model of scientific publishing is unsatisfactory” and “recommends that the Research Councils and other Government funders mandate their funded researchers to deposit a copy of all articles in repositories.” [14]. Although the report was released in 2004 it took some time for the Research Councils in the UK to adopt policies mandating Open Access. Today five out of the seven Research Councils [15] mandate Open Access to the research which they fund. Of particular significance, among the five which mandate Open Access is the Medical Research Council. This coupled with the mandate from the Wellcome Trust insures that the bulk of medical research funded in the UK will be available through Open Access.

A 2006 study by the European Commission on the Economic and Technical Evolution of the Scientific Publication Markets of Europe recommended public access to publicly-funded results [16]. This study was discussed at a meeting organized by the Commission on Scientific Publishing in the European Research Area in February 2007 in Brussels. As a result of the meeting, the Commission will now include the costs of Open Access publishing as an eligible cost in Community funded projects and will begin discussions with the European Parliament and the Council regarding mandating Open Access [17].

In the U.S., the Federal Research Public Access Act (FRPAA) will be re-introduced this spring. FRPAA would mandate Public Access to research funded by the eleven largest government departments and agencies (i.e. National Institute of Health, National Science Foundation, Department of Energy, etc.). FRPAA would require that every federal agency with an annual research budget of \$100 million or more implement a public access policy which would require researchers who receive full or partial support from the agency to deposit a copy of their article in a stable digital repository maintained by that agency or in another suitable repository that permits free public access, interoperability, and long-term preservation no later than six months after the article has been published in a peer-reviewed journal. This would be a huge improvement over the current NIH

Public Access Policy which “requests” NIH funded authors to deposit a copy of their article in PubMed Central and has seen a very low compliance rate on the part of the authors [18].

Funding agencies in developing and transition countries are also considering mandating Open Access to the research which they fund. In Ukraine, a Parliamentary Inquiry on Harmonization of Governmental Educational Policies was launched in December 2005 and concluded that the Ministry of Education and Science should encourage the development of Open Access resources in science, technology and education with Open Access a condition of state funded research. Subsequently, an Open Access Working Group was formed in Ukraine with representatives of the Parliamentary Committee on Science and Education, the State Fund for Fundamental Research, the Scientific and Publishing Council of the National Academy of Science of Ukraine, the Ministry of Science and Education, the National Library of Ukraine, the State Department of Intellectual Property, the Kyiv public administration, and the International Renaissance Foundation (Soros Foundation–Ukraine) [19]. In South Africa, the South African National Research Foundation has pledged to support all costs associated with their grantees publishing in Open Access journals. And the Library of the Chinese Academy of Sciences held

the first Open Access meeting in China in June 2005 and is working with other government funding bodies to support Open Access.

6. Lessons Learned

As mentioned earlier, OSI initially pledged \$3 million to support the Open Access movement when the BOAI was launched in 2002. Since then OSI has seen that the transition to Open Access will require a longer time commitment on our part and more funding than initially pledged. In 2002 it was hoped that other foundations would join in supporting Open Access. With the exception of the Gordon and Betty Moore Foundation and the Sandler Family Supporting Foundation which have provided generous support to PLoS, other foundations have not embraced Open Access, although some of the leading American foundations provide substantial support to other open content issues such as Intellectual Property Rights reform and the development of open source software. More philanthropic support directed at advocating for the adoption of Open Access mandates by government and research funding institutions would be extremely helpful in countering the lobbying efforts of the large publishers' associations.

From OSI's experience with the BOAI it is clear that it was important to first define Open Access and develop specific strategies for achieving it. This allowed the key stakeholders to develop communities and subsequently a movement to support Open Access. This could serve as an example for the development of other movements around open content issues, such as open educational resources.

7. Directions for the Future

While the developments over the past five years are encouraging, much still remains to be done for Open Access to meet its full potential. Among the top priorities for the movement are:

1. Mandates from governments/funding agencies: Europe appears to be leading the way in terms of adopting significant mandates with the leadership of the Wellcome Trust and the five Research Council in the UK which have adopted mandates. In the U.S., while the FRPAA will be re-introduced this year in the Senate, strong opposition to it, led by AAP, poses a real obstacle to its adoption and increased support for public access advocacy will be needed.
2. Mandates from universities for deposit of material in repositories: In addition to developing repositories, more universities must adopt mandates for the deposit of all research written by those affiliated with the university in the institutional repositories. This will require continued advocacy at many levels of the university administration and faculty.
3. The development of more Open Access journals: Some estimate that there are 24,000 peer-reviewed journals, thus this would mean that just over 10% are Open Access if one considers that the DOAJ lists 2,622 Open Access titles. More Open Access journals must be developed so that authors can have a choice to publish in an Open Access journal as opposed to a subscription-based journal. In addition to the numbers, it is important that the quality of the Open Access journals is high so that authors will elect to publish in them.
4. Continued unity of the Open Access movement: The Open Access movement (the Open Access publishing and the self-archiving/repositories communities) must remain united behind the common goal of making peer-reviewed content freely available and not allow differing mandates directed at journals or repositories to divide the movement.

8. Conclusion

The impact of the BOAI is clearly seen when one considers that before the meeting in Budapest, there was not even a term or definition for Open Access. Now Open Access is being debated by governments and publishers and mandated by funding bodies and universities. Much still remains to be achieved, but it is clear that Open Access has permanently changed the field of scholarly communication.

Acknowledgements

I would like to thank Leslie Chan, Program Supervisor for the Joint Program in New Media Studies and the International Studies Program at the University of Toronto at Scarborough for his guidance in the development of this paper as well as Lars Bjørnshauge, Director of Lund University Libraries, for providing a wealth of data on the DOAJ.

Notes and References

[1] The BOAI defines Open Access as the free availability of peer-reviewed literature on the public internet, permitting any user to read, download, copy, distribute, print, search, or link to the full texts of the articles. See <http://www.soros.org/openaccess/>.

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pdf_06/communication-022007_en.pdf.

[18] See The Alliance for Taxpayer Access site: FRPAA: <http://www.taxpayeraccess.org/frpaa/index.html#issue>

[19] See Access to Knowledge, Ukraine site. Open Access Working Group formed in Ukraine: <http://www.a2k.org.ua/news.php?id=1172&lng=en>