

# Defining an open access resource strategy for research libraries: Part I—The coming main streamlization of open access resources?

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**Abstract** Open access (OA) resources are becoming a main part of scholarly information. The paper summarizes the fast growth of OA journals and OA repositories, the outstanding OA journal impact increase, the rise of mega-OA journals like *PLoS ONE*, the overwhelming support of research communities to open access of publicly funded research, and the quick building up of OA support structures. These forces work together to push scholarly communications toward a turning point where OA resources occupy a major and increasing share of scholarly research resources and when management of OA resources becomes a strategic, yet unfamiliar, and potentially disruptive task for research libraries. This paper is composed of two parts. The first part will focus on the development of OA resources, while the second part will analyze the challenges in management of OA resources and develop an OA resource strategy exemplified by some of NSL's initiatives.

**Keywords** Open access, Institutional repository, Information resource, Disruptive change, Research library, Strategy and policy

Open access (OA) information resources are fast becoming a major part of scholarly resources that research libraries rely on so much to support their users. However, these resources come with the ways vastly different from what libraries are used to in terms of acquisition, collection management, utilization, and preservation. In this sense, OA resources constitute a disruptive force with possible catastrophic effects to the future roles and impact of research libraries.

At the same time, OA resources still face many challenges if they will be soundly managed as part of the knowledge infrastructure for research and educational organizations. This situation gives research libraries great opportunities to devise strategies in helping their parent organizations achieve a solid and sustainable management of OA resources, and meanwhile, to compete for a leading position for libraries in the emerging open information environment.

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With the above in mind, we will investigate in the Part I of this paper the great coming-into-the-main-stream trend of OA resources. Then in the Part II we will analyze the challenges (by a challenge metrics) in managing OA resources from research organizations' point of view, and outline an integrative OA resource strategy a research library may take, with illustrative examples from the National Science Library started. We offer these as a test bed, in the hope that the issues of managing OA resources will be an important part of strategic planning for research libraries aiming for the future, before it is too late.

As we position our study from research libraries' point of view, OA resources discussed here will mainly be scholarly journals and research papers. Though scholarly monographs and textbooks are indeed important in research and learning, and in open access movement, the overwhelming share of latter in the use and library budgets merits this approach, especially when the situation of OA books is fluctuating greatly and use/impact data is yet hard to come by. However, the authors intend to carry their study of OA resource strategy into this area soon.

## 1 The growth of OA journals and OA papers

Statistics and studies indicate a strong growth trend of OA journals and OA papers. According to the Directory of Open Access Journals (DOAJ)<sup>[1]</sup>, there now it has 7,522 quality controlled scientific and scholarly open access journals by Feb. 25, 2012. In addition to these full OA journals, there were about 2% take-up rate in journals offering hybrid open access options in 2009, according to Suenjr Dallmeier-Tiessen et al<sup>[2]</sup>.

Adding the full and hybrid OA papers together, Suenjr Dallmeier-Tiessen and colleagues calculated that there were about 120,000 scholarly OA articles in full or hybrid models in 2009 (notice that they only included those OA journals published regularly, about 2,800). This, by their counts, was about 8%–10% of the yearly global scientific scholarly article output in 2009, considering the yearly scholarly article output was estimated about 1.5 million<sup>[3]</sup>.

A recent study<sup>[4]</sup> then explored the growth rate of OA journals and reached the conclusion that, from 1993 to 2009, the annual growth of OA journals was 18% and 30% for OA articles (including OA articles deposited into OA repositories). Though the increase of new OA journals may not be as dramatic now as before, the growth of OA articles may still hold on to its fast pace, considering the rise of the mega OA journals like *PLoS ONE* and increased taken-up of golden OA journals by publishers of subscription journals, both we will turn to later in this paper.



A major type of OA papers is institutional repositories with deposited articles and self-published pre-prints or reports. OpenDOAR<sup>[5]</sup> reports over 2,150 repositories world-wide by January of 2012, but we know from the inclusion of CAS repositories that this number is an under-statement (less than 30, out of 76, of CAS IRs were in the list).

Another way to look into the growth of the repositories is their deposit and usage statistics. By the end of 2011, PubMed Central<sup>[6]</sup> has 2.3 million deposited articles, with full coverage of 1,017 journals and selective coverage of 1,649 journals, arXiv.org<sup>[7]</sup> has 729,000 pre-prints, and RePEC<sup>[8]</sup> has 1,135,000 pre-prints and deposited papers. The usage data from RePEC is indicative of the impact of those major repositories: 62 million downloads since 1998, and 580,000 downloads in December of 2011.

The Chinese Academy of Sciences started its institutional repository development<sup>[9]</sup> in 2008 and has 76 operational by 2011, with 125,000 full papers, and 570,000 downloads in 2011 alone.

## 2 The increasing impact of OA journals

According to various studies, impact of OA journals are increasing swiftly, measured by the commonly accepted impact indicators such as the inclusion in major citation indexes and impact factors of the journals, instead of their relative short existence (Table 1).

Table 1 Inclusion of OA journals in JCR

Inclusion source	No. of titles	Study sources
JCR 2004	239	McVeigh, 2004 <sup>[10]</sup>
JCR 2005	295	Vanoupline, 2008 <sup>[11]</sup>
JCR 2008	385	Giglia, 2010 <sup>[12]</sup>
JCR 2009	619	Wouter, 2011 <sup>[13]</sup>

According to a private communication from Thomson Reuter, there are more than 1,100 OA journals included in Science Citation Index, and over 1,400 OA journals in Web of Knowledge platform<sup>⓪</sup>. Though not all of them are in JCR (since some are too young for impact factors), visible increase of good quality OA journals is undeniable.

Another study reveals that there are 1,365 OA journals having a ScimagoJR or SNIP<sup>[14]</sup>, which is the Scimago Journal Ranking indicator of relative impact of individual journals, identifiable from Scimago database<sup>[14]</sup>. Still another reports that 41% OA journals were included in Scopus and 11% in ISI-JCR<sup>[2]</sup>.

<sup>⓪</sup> Private communication to the corresponding author by Thomson Reuter China Office, Feb.12, 2012.



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Some flagship OA journals give live examples of the increased impact. Impact factors (IF) in JCR 2010<sup>[15]</sup> for *PLoS Med* (15.6) and *PLoS Bio* (12.4) are very convincing. Even *PLoS ONE*, who “publishes all that deserve to publish”, has an encouraging 4.41 IF. Another OA publisher, BioMed Central, has 95 out its 220 titles included in JCR 2010. Its *Genome Biology* has a 6.89 IF and its *Breast Cancer Research* a 5.79 IF.

Another sign of coming-of-age for high impact OA journals is the announcement in the middle of 2011 that Max Planck Society (MPS) in Germany, Howard Hughes Medical Institute in US, and Wellcome Trust in UK announce their joint plan to publish a top-tier open access journal in biomedical and life sciences, called temporarily as *eLife*<sup>[16]</sup>. The journal will seek to publish all research considered to be highly influential in its potential to advance science understanding, to drive a field forward, or in its real-world outcomes, in a way to compete with *Nature* or *Science*. For an initial period to help establish the journal, no fees will be charged to authors. In time, it is anticipated that authors will be charged an article-processing fee to cover some of the on-going costs of publication<sup>[17]</sup>.

### **3 Increasing taken-up of OA publishing by subscription journal publishers**

Coming around from originally skeptical or even opposing altitude, many subscription journal publishers are jumping onto the bandwagon of OA publishing. According to Peter Suber, there are 530 society publishers publishing 616 full OA journals in 2011, compared to 425 publishers with 450 OA titles in 2007<sup>[18]</sup>.

Many commercial publishers now have sizable OA journal operations, such as SpringerOpen<sup>[19]</sup>, Wiley Open Access<sup>[20]</sup>, and Taylor & Francis Open Journals<sup>[21]</sup>. Even Elsevier publishes an OA journal, *International Journal of Surgery Case Reports*<sup>[22]</sup>.

Commercial publishers are extending their hybrid OA operation. A report shows that 12 large publishers (with 8,100 journals in their portfolios) offer 25% hybrid titles<sup>[2]</sup>. Table 2 is only an inconclusive list.

### **4 Progress in SCOAP<sup>3</sup>'s transferring subscription journals into OA**

SCOAP<sup>3</sup><sup>[23]</sup> is an initiative of high energy physics community to transfer subscription journals into open access ones. The consortium comprises funding agencies, research and learning institutes, laboratories, national and international libraries, and library consortia heavy in High-Energy Physics (HEP) fields. The members commit to



**Table 2 Hybrid OA policy by publishers**

Publisher	Hybrid OA operation	Reference
Springer	Open Choice	<a href="http://www.springer.com/open+access/open+choice?SGWID=0-40359-0-0-0">http://www.springer.com/open+access/open+choice?SGWID=0-40359-0-0-0</a>
Wiley and Blackwell	OnlineOpen	<a href="http://authorservices.wiley.com/bauthor/onlineopen.asp">http://authorservices.wiley.com/bauthor/onlineopen.asp</a>
Taylor & Francis	Open Select	<a href="http://journalauthors.tandf.co.uk/preparation/OpenAccess.asp">http://journalauthors.tandf.co.uk/preparation/OpenAccess.asp</a>
ACS	Author Choice	<a href="http://pubs.acs.org/page/policy/authorchoice/press-release.html">http://pubs.acs.org/page/policy/authorchoice/press-release.html</a>
IEEE	Open Access	<a href="http://www.ieee.org/documents/ieee_open_access_faq_2011.pdf">http://www.ieee.org/documents/ieee_open_access_faq_2011.pdf</a>
OUP	OXFORD OPEN	<a href="http://www.oxfordjournals.org/oxfordopen/">http://www.oxfordjournals.org/oxfordopen/</a>
APS	Open Access Articles	<a href="http://publish.aps.org/OpenAccessAnnounce.html">http://publish.aps.org/OpenAccessAnnounce.html</a>
AIP	Author Select	<a href="http://journals.aip.org/au_select.html">http://journals.aip.org/au_select.html</a>
Portland Press	Opt <sup>2</sup> Pay	<a href="http://www.portlandpress.com/pp/opt2pay_faq_pp.asp">http://www.portlandpress.com/pp/opt2pay_faq_pp.asp</a>
Elsevier	Sponsored Articles	<a href="http://www.elsevier.com/wps/find/authors.authors/sponsoredarticles">http://www.elsevier.com/wps/find/authors.authors/sponsoredarticles</a>
Nature Communication RSP	Open Access Option EXiS Open Choice	<a href="http://www.nature.com/ncomms/open_access/index.html">http://www.nature.com/ncomms/open_access/index.html</a> <a href="http://royalsocietypublishing.org/site/authors/EXiS.xhtml">http://royalsocietypublishing.org/site/authors/EXiS.xhtml</a>

collective funding of transformation of major subscription journals in HEP into full OA journals, covering titles as *Physical Review D* (published by APS), *Physics Letters B* (Elsevier), *Nuclear Physics B* (Elsevier), *Journal of High Energy Physics* (IOP), *European Physical Journal C* (Springer), *Physical Review Letters* (for HEP papers, APS), *Nuclear Instruments and Methods in Physics Research A* (for HEP papers, Elsevier). Almost all the major institutes in HEP research joined the consortium.

Contrary to many pessimistic predictions, SCOAP<sup>3</sup> moves very close to its realization. In a recent market survey<sup>[24]</sup>, a number of high-quality peer-review journal publishers showed their interest to “accompany SCOAP<sup>3</sup> in the implementation of its Open Access initiative”. The publishers include American Physical Society, Elsevier, Europhysics Letters Association, Hindawi Publishing Corporation, Nature Publishing Group, The Physical Society of Japan/Oxford University Press, Springer, and World Scientific.

All the publishers agreed to the SCOAP<sup>3</sup> principles: SCOAP<sup>3</sup> content will be made open access in perpetuity, with wide re-use licenses. Subscription fees to journals carrying SCOAP<sup>3</sup> content will be reduced (or eliminated if the journals become entirely open access) to allow libraries to re-direct these funds to SCOAP<sup>3</sup>, and package prices will be adjusted accordingly.

According to SCOAP<sup>3</sup>, Invitation to Tender will be sent to publishers soon and the contract will be made in the course of 2012, services will be commencing from Jan. 1, 2013.



## 5 The rise of mega OA journals

*PLoS ONE* is published not just as an open access journal, but as a bold effort to re-invent the prevailing system of scientific communication. According to its founders<sup>[25]</sup>, the journal aims to publish all that deserves to be published with no size limit, and the quality of papers will be judged, guided by objective editorial criteria, by scientific rigor, ethical soundness, properly reporting, and data-supported conclusions. The ‘impact’ of the paper would then be decided by the readers (after publication, with multiple article-level metrics for evidence), not by editors and reviewers before publication.

In defiance of the common wisdom from the traditional publishing, the radical and innovative approach brought great success to the journal itself and game changes to the publishing industry. In addition to its huge popularity and publication output (Table 3).

Table 3 PLoS statistics (Adopted from Peter Binfield’s Presentation)<sup>[26]</sup>

Year	Submissions	Publications	PubMed content (%)
2007	2,497	1,231	0.16
2008	4,401	2,723	0.34
2009	6,734	4,310	0.52
2010	13,567	6,784	0.70
2011	>22,000*	13,798 <sup>[27]</sup>	≈1.50*

Note: \*, Projections for 2011.

With its 13,000+ published articles, *PLoS ONE* counts for 3% scientific and medical publications in 2012<sup>[26]</sup>, with a convincing impact factor of 4.41, ranked 12 in 85 biology journals in JCR 2010.

Other publishers got the message, starting their own mega OA journals (Table 4).

Table 4 Proposed mega-OA journals from publishers

Publisher	Title	URL
AIP	AIP Advances	<a href="http://aipadvances.aip.org/">http://aipadvances.aip.org/</a>
BMJ	BMJ Open	<a href="http://bmjopen.bmj.com/">http://bmjopen.bmj.com/</a>
GSA	G3: Genes, Genomes, Genetics	<a href="http://www.g3journal.org/mission.html">http://www.g3journal.org/mission.html</a>
APS	Physical Review X	<a href="http://prx.aps.org/">http://prx.aps.org/</a>
Sage	Sage Open	<a href="http://sgo.sagepub.com/">http://sgo.sagepub.com/</a>
NPG	Scientific Reports	<a href="http://www.nature.com/srep/index.html">http://www.nature.com/srep/index.html</a>
Company of Biologists	Biology Open	<a href="http://bio.biologists.org/">http://bio.biologists.org/</a>
Royal Society	Open Biology	<a href="http://rsob.royalsocietypublishing.org/">http://rsob.royalsocietypublishing.org/</a>
Elsevier/Cell Press	Cell Reports	<a href="http://cellreports.cell.com/">http://cellreports.cell.com/</a>

It will be very interesting to see how those journals develop and what the effects will be on the publishing industry. Peter Binfield predicts<sup>[26]</sup> that most of these will form around large disciplines and attempt to ‘own’ entire fields, and collectively,

“in 2016, almost 50% of the STM literature could be published in approximately 100 OA mega journals, complemented by 100 high quality journals”.

## 6 Positive altitude shifts and strong policy support toward OA resources

What gives confidence in the further development of OA resources, in addition to the trends summarized above, is the fact that researchers, funding agencies, and research institutes, are all embracing OA in an ever increasingly positive way.

Several recent surveys provided evidence. European project SOAP reported<sup>[28]</sup> on its survey of more than 38,000 researchers, finding 89% agreed with “research will benefit from OA journals” and more than 85% agreed with “publicly funded research should be open access”. The members of European Association of Cancer Research also gave an 88% agreement with “publicly funded research should be open access”<sup>[29]</sup>. In EU’s Survey on Scientific Information in the Digital Age<sup>[30]</sup>, the result is again a very positive 90% support for “publications resulting from publicly funded research should, as a matter of principle, be in open access”. Another vivid display of this support<sup>[31]</sup> is the boycott of Elsevier by more than 7,000 researchers (not to publish, referee, or do editorial work for Elsevier journals) in protest against its support of the proposed Research Work Act which wants to ban governmental mandates for public access to publicly funded research results. The effect is so much that Elsevier had to withdraw its support of the support, and the sponsor of the Act issued a statement that the bill will not move forward.

Many funding agencies have worked hard to promote open access to research output in general and publicly funded research in particular. National Institute of Health, Research Councils UK, European Research Council, Wellcome Trusts, Canadian National Institute of Health, Howard Hughes Medical Institute, German Research Foundation, among many others, established policies mandating deposit and public sharing of research publications funded by them, or will provide funding to support publishing in OA journals<sup>[32]</sup>. The White House Office for Science and Technology Policies, United States, started two rounds of public consultation on public access to the federally funded research, putting the issue squarely on the public policy agenda<sup>[33]</sup>.

At the same time, the increasing number of major research and educational organizations instituted their open access policies and mechanisms. To name a few: In North America, 22 influential universities, led by Harvard, Stanford, Duke, MIT, Caltech, and UC Berkeley, established their faculty open access policies requiring faculty members withholding their copyright when publishing and deposit the published papers for open access in institutional repositories. These universities in



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2011 formed the Coalition of Open Access Policy Institutions<sup>[34]</sup>, to “collaborate and share implementation strategies and advocate on a national level for institutions with open access policies”. 16 universities led by Harvard, Cornell, and MIT, established the Compact for Open Access Publishing Equity<sup>[35]</sup> whose members “commit to the timely establishment of durable mechanisms for underwriting reasonable publication charges for articles written by its faculty and published in fee-based open access journals and for which other institutes would not be expected to provide funds”. Telethon Italy, FWF Austrian Science Fund, and Max Planck Society (MPS) signed agreements with Wiley-Blackwell, where the two funders will pay for researchers they funded to publish OA articles in Wiley-Blackwell journals, and MPS will pay for those published in full OA journals in Wiley<sup>[36]</sup>. In the United Kingdom, a similar coalition, UK Open Access Implementation Group<sup>[37]</sup>, strives for more effective and regular coordination between research and higher education organizations aiming at a significantly increased rate of movement toward OA in UK. In Europe, 34 partners joined forces in OpenAIRE<sup>[38]</sup> to build support structures, community of practices and expertise, and coordination of national open access efforts.

## 7 Conclusions: Preparing for disruptive changes

Though the data summarized in this paper may not be exhaustive, the trend is clear:

- OA journals are quality scholarly resources and a proved business model;
- OA repositories are recognized management structures for institutional research assets and public access of publicly funded research;
- OA resources are getting increasingly strong support from funders, institutes, research communities, and even from subscription publishers;
- OA resources are an increasingly major part of scholarly communications, and with a high potential to become the main stream research resources in the near future;
- Developments such as mega-OA journals and FRPAA<sup>[39]</sup>, though still with uncertainties, will really push OA over the turning point, if they become reality as many predict.

What would happen when 50% or more research publications are open access? Fig. 1, given by Peter Burnhill<sup>[40]</sup>, is illustrative. The marginalization of the traditional scholarly communication chain will definitely rock the boat on which libraries sit squarely. This will be disruptive for the positions of research libraries that are so used to acquisition, organization, search and retrieval, and preservation in the context of subscription resources. The library model relying so much on the





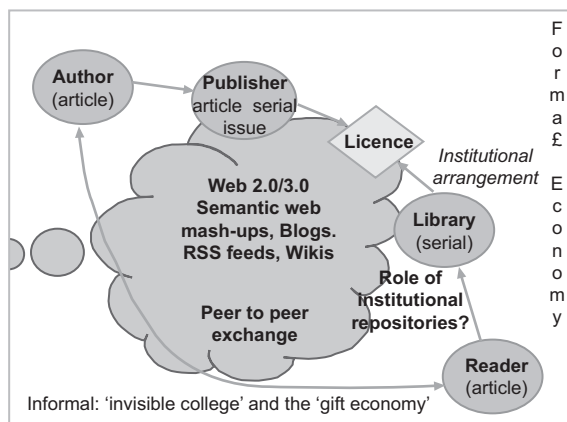


Fig. 1. The changing resource context<sup>[40]</sup>.

subscription of publications may no longer be valid. A whole set of new policies, services, mechanisms, and techniques, foreign to today's research libraries, will be needed for the effective support of research and learning in such an open information world. A re-defining of, or competing for, roles in this may be inevitable. If research libraries do not want to be irrelevant or incompetent then, they should ask themselves hard with respect to the coming dominance of OA resources:

- What would be the key challenges to R&D&E institutes?
- What would be the key challenges to their libraries?
- What are needed to meet these challenges?
- Who is going to organize the responses, and how?
- What can libraries do? And what they need to act now? Or are they irrelevant?

The second part of this paper, to be published in the next issue of the Journal, will try to address them with a challenge metric analysis, a discussion of the key issues in the metrics and the related current practices, an outline of a multi-faceted OA resource strategy, and an introduction to a number of OA resource initiatives implemented by the National Science Library, Chinese Academy of Sciences.

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