

Briefing paper: Open Access

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Open Access, disseminating research information for free on the Web, brings benefits to researchers, their institutions and funders, and to the wider public. It is not without cost, but the principal issue is that costs do not fall on the readers.

Why is Open Access necessary?

Conservative estimates put the number of peer-reviewed journals at around 30,000, and the number of articles published in those journals at around 3 million per year. University libraries subscribe to as many journals as they can afford, but even the wealthiest libraries can manage to buy access to only a fraction of the total. Indeed, Harvard University library, the richest in the world, recently announced that it needed to change the way it buys journals because the large publishers charge too much, and price increases are too high¹.

Yet the internet provides the means for researchers to make their research results available to anyone, anywhere, at any time. However, most publishers own the rights to the articles in their journals and strictly control what can be done with those articles. Anyone who wants to read the articles must pay to access them. Anyone who wants to re-use the articles in any way must obtain permission from the publisher and is often required to pay an additional fee.

Although many researchers can access the journals they need via their institutional library and think that their access is free, in reality it is not. The institution has often been involved in lengthy negotiations around the price of their site license and re-use of this content is limited. This whole model of academic publishing is out-of-date and part of the print-on-paper era. The internet offers the chance to do things much better, fitting research communication to the age of the Web.

“*Open access...ensure[s] that knowledge is available to the public, not hidden behind pay walls. And sharing actual data sets – whether created by scientists or enthusiasts – is key part of the movement toward open knowledge.*²”

Dr Caren Cooper
Assistant Director of Biodiversity Research Lab,
North Carolina Museum of Natural Sciences

What is Open Access?

Open access is making the research literature freely available on the internet. Formally, the Budapest Open Access Initiative (www.soros.org/openaccess/) defines Open Access as:

"By 'open access' to this literature we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for

¹ The Harvard Library: Major periodical subscriptions cannot be sustained (memo to faculty members, 17 April 2012):

<http://isites.harvard.edu/icb/icb.do?keyword=k77982&tabgroupid=icb.tabgroup143448>

² <http://scistarter.com/blog/2013/11/open-science-resources-sharing-publishing-citizen-science-research/>

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."

There are two main ways to ensure Open Access to research:

1. A researcher can place a copy of each article in an Open Access repository (known as 'self-archiving')
2. A researcher can publish articles in Open Access journals

"...maximising the distribution of these publications - by providing free, online access - is the most effective way of ensuring that the research we fund can be accessed, read and built upon. In turn, this will foster a richer research culture.³"

The Wellcome Trust - Position statement in support of open and unrestricted access to published research

What are the advantages of Open Access?

Open Access improves the speed, efficiency and efficacy of research because researchers no longer need to spend time seeking out papers that their library does not subscribe to, nor waste time going into cul-de-sacs or duplicating research of which they are unaware because they cannot access the right journals.

Open Access also increases the visibility, usage and impact of research and allows the professional, practitioner and business communities, and the interested public, to benefit from research.

Why are governments in favour of Open Access?

The details of the academic communication system may seem a rather arcane issue for governments to take an interest in. Yet the truth is that modern knowledge societies benefit from an efficient system for transferring knowledge from the basic research process to the innovation community. Innovation underpins wealth-creation in their economies and the diffusion of knowledge benefits the scientific and cultural life of their societies.

The PACE survey of large European firms showed that such firms rely heavily on scientific publications as a source of information about publicly-funded research⁴ and that for over half of high-technology companies public science is the most important source of technical knowledge for innovation⁵. A study of innovative SMEs in Denmark, carried out on behalf of the Danish Government, confirmed that smaller innovative companies, too, need access to publicly-funded basic research, with 64% of those in research roles rating research articles as very or extremely important⁶.

There is good evidence on how making scientific information easily available **spurs innovation**. The Human Genome Project (HUGO) results were made openly accessible in 2003. By 2010, every dollar invested from federal funds in the US in the HUGO research had generated economic activity worth 141 dollars: the total value of the economic activity is so far USD 796 billion, from an investment in the original research of USD 3.8 billion. In 2010 alone, 310,000 jobs were created in the US. Overall, 3.8 million job-years of employment

3 <http://www.wellcome.ac.uk/About-us/Policy/Policy-and-position-statements/WTD002766.htm>

4 Martin, B.R., Salter, A., Hicks, D., Pavitt, K., Senker, J., Sharp, M. and von Tunzelmann, N. (1996)

The Relationship between Publicly Funded Basic Research and Economic Performance, A SPRU Review, HM Treasury, London.

5 Arundel, A. and Geuna, A. (2004) 'Proximity and the use of public science by innovative European firms', *Economics of Innovation and New Technology* 13(6), pp559-580.

6 Houghton, J., Swan, A. and Brown, S. 2011. Access to research and technical information in Denmark. Technical Report, School of Electronics & Computer Science, University of Southampton. <http://eprints.ecs.soton.ac.uk/22603/>

“Open access is important because it can give power and resources back to academics and universities; because it rightly makes research more widely and publicly available; and because, like it or not, it’s beginning and this is our brief chance to shape its future so that it benefits all of us in the humanities and social sciences.”⁸

Robert Eaglestone
Professor of Contemporary Literature and Thought, Royal Holloway, University of London

have been created, with an average of \$63,700 personal income per job-year⁷. The conclusion is that **Open Access for scientific results will spur innovation, generate jobs and create wealth.**

What infrastructure is needed to achieve Open Access?

Open Access can be provided through open repositories or through open journals.

Most research-based institutions now have a repository and there are a number of large, discipline-based repositories, too, such as Europe PubMed Central. These repositories all work to the same basic technical standards, forming an interoperable network of freely available research

information. They are indexed by Web search engines, so a simple Web search locates relevant articles for the reader. There is a registry of repositories worldwide, OpenDOAR⁹.

An umbrella organisation, COAR (Confederation of Open Access Repositories¹⁰), provides coordination and support for repositories across the world.

Many Open Access journals are international in scope. To date (September 2015), there are some 10,500 Open Access journals listed in the Directory of Open Access Journals¹¹. They cover all disciplines and fields and between them have published over 2 million articles.

Do we need policy?

Studies around the world have shown that without a well-implemented mandatory policy, levels of Open Access remain low, yet with a well-designed policy they are boosted to approaching 90%.

Many European countries (including the UK, Portugal, Denmark, Ireland, Norway, Finland, Sweden, Hungary) have Open Access policies from their national research funders. Further afield, a national policy in the US covers all the large federal funding agencies, and there are policies in Australia, Brazil, India, Japan and more¹².

7 [http://www.battelle.org/media/press-releases/\\$3.8b-investment-in-human-genome-project-drove-\\$796b-in-economic-impact-creating-310-000-jobs-and-launching-the-genomic-revolution](http://www.battelle.org/media/press-releases/$3.8b-investment-in-human-genome-project-drove-$796b-in-economic-impact-creating-310-000-jobs-and-launching-the-genomic-revolution)

8 <http://futureofscholarship.org/>

9 <http://www.opendoar.org>

10 <https://www.coar-repositories.org/>

11 Directory of Open Access Journals <http://www.doaj.org>

12 Registry of Open Access Repository Mandates and Policies <http://roarmap.eprints.org/>

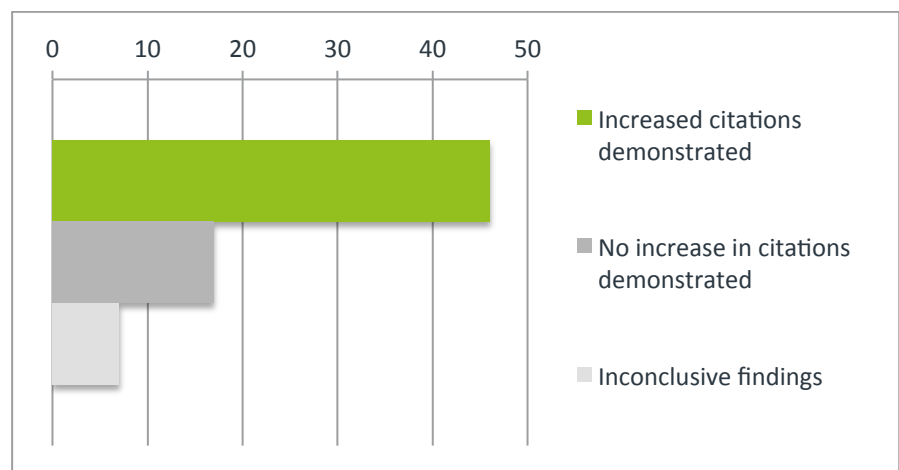
What do Green and Gold mean?

This is a way to define the method and avenue of publication (e.g. journals and repositories).

Green OA	‘Green’ Open Access is a way of self-archiving. The researcher decides to submit the results of his/her research in a selected repository that is open, which means that anyone has access to it, and that the materials in it are <i>free to view and download</i> . To access the contents of these archives you can use Google, Google Scholar or other Web search engines. These search engines systematically harvest the contents of the archives worldwide, forming a database of current global research. There are many variants of self-archiving which depend upon what kind of licenses are used by authors for their papers, and what rights to the articles have been retained by the publisher. Authors are usually permitted to archive the final version of their article before it is published in their chosen journal.
Gold OA	‘Gold’ Open Access means that the author publishes a paper in an Open Access publication. The publication does not charge the reader but instead <i>assigns the costs to the author (known as APCs or Article Processing Charges)</i> or makes no charge at all, supporting covering the costs through sponsorship, subsidy or advertising. The articles are peer-reviewed in the same way as in traditional publishing, except that the published paper is freely available to the public, without the need for a journal subscription.

There is also an additional term in use, ‘**hybrid Open Access**’, which refers to a specific subset of Gold Open Access. This term is used for papers that are published in otherwise subscription-access journals and are made Open Access in those journals in return for a publication fee.

“ Forty six out of 70 studies found that Open Access brings increased citations for research papers (17 studies showed no such advantage and 7 were inconclusive) ¹³ ”



Results of a meta-analysis of studies on the putative Open Access citation advantage: does Open Access bring greater impact in terms of increased citations? (see footnote 12 for link to original data)

¹³ <http://sparceurope.org/oaca/>

What do Gratis and Libre Open Access mean?

These two terms are defined as follows.

'Gratis'	<i>Gratis</i> Open Access means free of charge. This means that price barriers alone are removed from access to the publication. It allows no uses beyond what is considered legitimate under copyright and fair use.
'Libre'	<i>Libre</i> Open Access means free of charge <u>and</u> free of at least some permission barriers. This means that the article is <i>free for some kinds of further use and reuse</i> , and presupposes some kind of open licence that allows types of uses that are not permitted by default.

In Summary

Open access literature is digital, online, free of charge, and free of most copyright and licensing restrictions. It makes research easier to find, retrieve, copy, share, reuse, search, crawl, mine, and preserve.

This benefits everyone, inside and outside the academic world, such as researchers, teachers, students, librarians, doctors, patients, journalists, non-profits, businesses, policy-makers, voters, and curious minds. It enhances discovery, widens scrutiny and discussion, and maximises the return on our investment in research.

By accelerating research, it also accelerates the development of all the goods that depend on research, from new medicines and useful technologies to informed decisions, solved problems, and improved public policies.

“Ladies and gentlemen, from publications, to data, to software, to educational resources: opening up can help in all fields of research! Helping us into a new era of open science: one that is good for citizens, good for scientists and good for society.”¹⁴

Neelie Kroes
Vice-President of the European Commission responsible for the Digital Agenda

¹⁴ http://europa.eu/rapid/press-release_SPEECH-13-941_en.htm



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