The open challenge

The Open Access movement has revolutionised the way in which information is shared, with wide-ranging implications for researchers, authors, institutions and publishers alike. Here, experts outline the history of this development, and look at the challenges and opportunities to come…

A brief history

What made Open Access (OA) possible was the advent of the networked online medium. The internet, and eventually the web, empowered the authors of digital works to give them away free for all online if they wished. OA accordingly means free online access. The term 'Open Access' was first coined by the Budapest Open Access Initiative (BOAI), sponsored by the Open Society Institute (OSI) in 2001. But the idea of providing free online access – and the provision of free online access – started much earlier. The inventors of Unix and the internet – mostly computer scientists – had already been providing OA to their research papers by self-archiving them in 'anonymous FTP archives' since at least the 1980s. With the invention of the web in 1990, websites soon became the preferred way of self-archiving papers. High energy physicists – who had already been systematically sharing their papers in hard copy before the internet, and then via email when it became possible – began self-archiving them in Arxiv, a centralised physics web archive, in 1991. Many other disciplines have since followed the lead of the computer scientists and the physicists.

The 'Subversive Proposal', to make all refereed journal articles free for all by self-archiving them online, was posted in 1994. The Subversive Proposal also identified the way to

The primary targets of Open Access are refereed research journals, which are written purely for research usage and impact rather than income

cover the cost of publication if OA self-archiving eventually made subscriptions unsustainable – fees for publishing articles instead of fees for accessing published articles.

The first OA journals began appearing in 1989; most were either the online versions of subscription journals or were subsidised online-only journals. Meanwhile, the Subversive Proposal to self-archive went largely unheeded – for the following decade, the rate of author self-archiving hovered at about 15% of yearly refereed research output. The proportion of articles published in OA journals was even lower.

Providing centralised archives, like Arxiv, for other disciplines (eg. CogPrints for the cognitive sciences) likewise failed to increase the rate of OA self-archiving. In 1998, the American Scientist Open Access Forum was created to promote (what would eventually be called) OA.

In 1999, the Open Archives Initiative (OAI) developed a metadata-tagging protocol in order to make all open archives 'interoperable', which means that depositing locally in any individual archive became effectively the same as depositing centrally in one global open archive. Free software (EPrints) was designed at the University of Southampton in 2000 to make it possible for all universities to create their own OAI-compliant open archives, soon known as 'Institutional Repositories' – IRs. Many IRs were created, but they remained near-empty, because 85% of researchers were still not self-archiving.

In 2001, Steve Lawrence published a paper in 'Nature' reporting that OA articles in computer science were cited significantly more than non-OA articles. Many follow-up studies confirmed that this 'OA impact advantage' was also present in every other field tested. But even the OA advantage was not sufficient to persuade the 85% of authors who were still not self-archiving. It was accordingly proposed in the American Scientist Open Access Forum that universities and research funders should make OA self-archiving mandatory.

The School of Electronics and Computer Science at Southampton University was the first to adopt an OA self-archiving mandate, in 2003, while the first university-wide OA mandate came at Queensland University of Technology in 2004, with the first European university-wide mandate, at the University of Minho, implemented that same year. Also in 2004, the UK Parliamentary Select Committee on Science and Technology recommended that universities and research funders should mandate OA, and the US House Appropriations Committee recommended that the National Institutes of Health (NIH) should mandate OA. The Wellcome Trust became the first research funder to mandate OA in 2005. The UK government failed to act on the committee's proposal but, within a few years, all seven of the UK research councils had adopted self-archiving mandates. In 2005, NIH adopted an OA request instead, but this failed and was upgraded to a mandate in 2007.

An international, cross-disciplinary author survey by Key Perspectives in 2005 reported that, although most authors do not self-archive, over 90% would, if their funders or institutions made it compulsory, with over 80% indicating they would do so willingly. Outcome studies have since confirmed that within two years of mandate adoption, compliance rates are already over 60% and are well along the road towards 100%. ROARMAP has been tracking OA mandates since 2003, revealing that the number is

approaching 200 worldwide and now includes Harvard and MIT as well as the European Research Council and the European Commission.

A further incentive to provide OA stems from the outcome of the UK Research Assessment Exercise, in which peers review and rank the research performance of all departments of all UK universities. The rankings have proven to be highly correlated with the citation metrics that OA has been shown to increase.

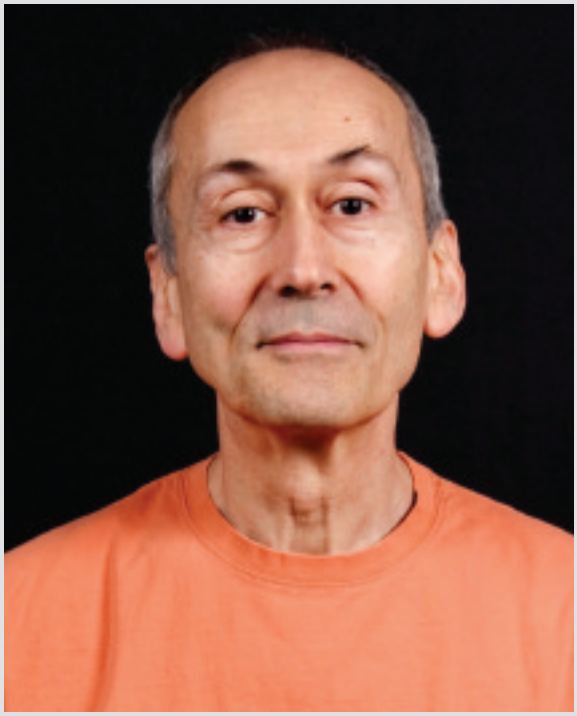
OA self-archiving has come to be called the 'green' road to OA (or 'Green OA'). OA journal publishing, meanwhile, is known as the 'gold' road to OA ('Gold OA'). The most frequent misconception about OA is that the process only refers to Gold OA (publishing). In fact, the fastest and surest road to OA is the green road of OA self-archiving, because it is entirely in the hands (and interests) of the global research community, and can be mandated, whereas gold OA is in the hands of the publishing community. Moreover, the potential institutional funds to pay for gold OA are currently still tied up in paying for institutional subscriptions, which cannot be cancelled until green OA is at or near 100%. Hence green OA needs to come first, and it needs to be made universally mandatory, by institutions as well as funders.

Institutional and funder OA mandates need to be convergent and collaborative, rather than divergent and competitive: institutional deposit followed by central harvesting (as opposed to direct central deposit for funder mandates and institutional deposit for institutional mandates). Copyright is not an obstacle to universal OA self-archiving mandates, and copyright reform will come as a consequence, not a precondition, of universal green OA. The majority of journals (including almost all the top journals) already endorse OA self-archiving of the author's refereed final draft immediately upon acceptance for publication.

For the articles in the minority of journals that do not yet endorse immediate OA self-archiving, the paper can be deposited in the IR immediately upon acceptance anyway – if the author wishes to honour the publisher embargo. Access to it can be set as Closed Access instead of OA. IRs have a semi-automated 'email eprint request button' that allows any user to request – and the author to provide – an individual copy of a Closed Access deposit for research purposes through just one click each.

Aside from the green and gold methods of providing OA, there are also two forms or degrees of OA – 'gratis' OA is free online access and 'libre' OA is free online access plus certain further reuse rights (which may include republication or remixing in derivative works). Both gold OA and libre OA are premature and cannot be mandated, but universal green, gratis OA will prepare the ground for universal gold OA and increasingly widespread libre OA.

OA's primary targets are refereed research journal articles – 2.5 million articles per year, published in the planet's 25,000 peer review journals, across all disciplines, languages and nations – because every one of those articles is, without exception, an author give-away, written solely for research uptake, usage and impact, not for income from sales.



Professor Harnad believes that the "green road" of self-archiving offers the fastest and surest route to OA

The same cannot be said of other forms of digital content – books, textbooks, magazine/newspaper articles, music, video, software. However, there too, the growth of OA to refereed research articles is likely to encourage the provision of greater OA to these further forms of content. Another increasingly important form of content is research data – but providing immediate OA to this cannot be mandated because researchers must be allowed a fair period of exclusive time to analyse the data they have gathered. Researchers can also be encouraged – but not required – to provide OA to their pre-refereeing preprints. This must remain a matter of author choice, however.

According to the Houghton report (an economic analysis of publishing costs), universal gold OA publishing will eventually save institutions money; but by far the biggest benefit/cost ratio can be gained from mandating green OA today. The optimal green OA self-archiving mandate is the 'Liege model', which designates depositing papers accepted for publication in the IR as the (sole) mechanism for submitting publications for institutional performance review and for national research assessment.

Policy guidance for institutions and funders worldwide about mandating OA is being provided by three organisations: Enabling Open Scholarship (EOS), the Open Access Scholarly Information Sourcebook (OASIS), and SPARC Campus Open Access Policies.

For the full OA Timeline, see: http://oad.simmons.edu/oadwiki/Timeline

Professor Stevan Harnad
Canada Research Chair in Cognitive Sciences,
Université du Québec à Montréal
School of Electronics and Computer Science,
University of Southampton