The future is open: opportunities for publishers and institutions

Updated from a paper presented by Damian Pattinson at the UKSG One-Day Conference, 'Open Access Realities', London, November 2013

The growth of open access (OA) has created a unique opportunity for publishers and institutions to collaborate and deliver real change to the way science is disseminated and built upon. OA allows institutions to share and evaluate the research performed by their researchers as never before. Through OA, research can now reach readers from all walks of life, from all countries of the world. Combined with article-level metrics, authors and institutions are able to see the full reach of their research, beyond the traditional channels of citations and journal impact factors (IFs). However, the drive by policymakers to implement OA presents significant challenges to institutions and publishers. These challenges mean that the future of OA is by no means certain, and it is now up to funders, institutions and authors to work together to ensure the potential of OA is fully realized.

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Open access (OA) publishing has shown extraordinary growth over the past few years and is now firmly on the agenda of researchers, institutions, publishers, funders and governments[1]. Last year, almost 90,000 journal articles were published OA, and there were estimates that almost half of all peer-reviewed papers were free to read[2]: that number will be much higher this year. Many say we have now passed the tipping point[3,4], and that it is only a matter of time before all academic articles are published open access.

This growth represents enormous potential for increased access to science, and a unique opportunity for institutions and publishers to collaborate and deliver real change to the way science is disseminated and built upon. But open access is not just about increasing public access to research or making articles free to read. Its potential is rooted in how we enable that material to be reused, whether by other scientists or commercially by industry and business. A key challenge for institutions and OA publishers therefore is to change the mindset around scholarly communication from one based on protectionism to one that embraces openness. Being open is ensuring that as many people as possible can access the work – maximizing its 'reach' – whilst minimizing the difficulties or 'friction' that individuals have in using that work once they have access[5,6]. Doing both increases the chance that *all* those who are interested in reusing the research can actually do so.

Open access publishers are beginning to provide institutions with the tools, services and platforms that will ensure the research outputs they fund and support have a worldwide reach and impact. Being open also has consequences for how we evaluate research and measure its impact. Here we discuss some of the opportunities that have been made possible by open access and through new models of publishing. We draw on examples and the experience we have at PLOS, and specifically on *PLOS ONE,* to illustrate how we can embrace these opportunities and meet the challenges we face in this changing environment.

> "… we can embrace these opportunities and meet the challenges …"

PLOS ONE: a revolution in publishing

PLOS ONE, the first multidisciplinary journal to be published by PLOS, was launched in 2006. It boasts all the attributes of a traditional journal. Peer

review is handled by academics with administrative and editorial support from PLOS staff, and the journal is indexed and archived. In addition, like all PLOS journals, the content is open access, with copyright assigned to the authors who license their work for reuse as long as it is appropriately attributed (using a Creative Commons Attribution licence[7]). That, however, is where the similarity ends. The journal launched with one superficially small, yet radically disruptive, innovation. We specifically ask editors and reviewers *not* to make any subjective assessment of the importance or novelty of an article[8,9]. This immediately means that studies publishing negative results, or small studies that might contribute to larger systematic reviews or meta-analyses – but not necessarily to the journal's impact factor (IF)(see below) – can be embraced and published. If they are technically sound and the conclusions are supported by the data, PLOS believes they deserve to be published and made available as soon as possible. As such, *PLOS ONE*'s editorial model significantly reduces the friction for authors commonly associated with getting a paper published. The success of the journal speaks for itself; it has been almost doubling in size each year since its launch (Figure 1) and numerous other 'megajournals' have been launched that include similar criteria (e.g. Nature's *Scientific Reports*[10,11]). In 2013 alone, *PLOS ONE* published more than 30,000 articles.

"… PLOS ONE's editorial model significantly reduces the friction for authors …"

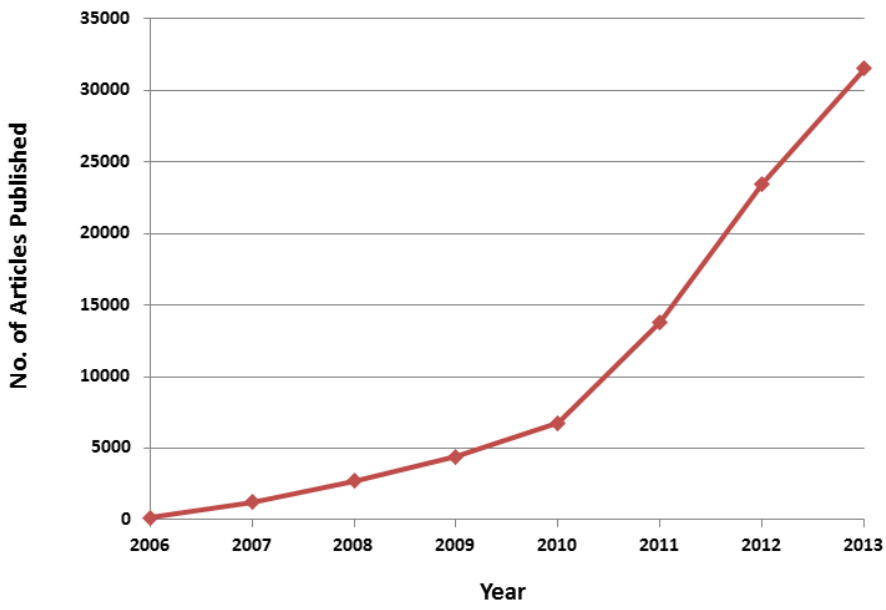

Figure 1. Growth of *PLOS ONE* since its launch in 2006

With such success and size come challenges. Although we do not select for novelty or importance, our main priority is to ensure the scientific and technical rigour of published articles. We have a very large editorial board (currently almost 5,000 academics[12]), who handle the peer review of all the papers and underwrite the scientific validity of the work. However, we also perform a number of internal checks when a manuscript is submitted[13] to ensure each article adheres to our high standards of reporting before being given to an academic editor. These include checking for language quality, conflicts of interest and financial disclosures, and adherence to subject-specific reporting guidelines, such as CONSORT[14]. We also pay particular attention to research ethics, making sure that experiments are performed to the appropriate ethical standards, and have received all necessary approvals

Because of the size of the journal, managing the peer-review process efficiently presents an additional challenge to *PLOS ONE*. We now receive 2,000 referee reports per week, yet for each we receive, many editors' invitations to review are declined. This is not just an issue

for *PLOS ONE*. There is a common perception of reviewer fatigue, partly because papers can go through numerous rounds of peer review at different journals only to be rejected when they are deemed not sufficiently important, despite being technically sound. Because the review process at *PLOS ONE* excludes *subjective* criteria, which is often the basis of rejection by traditional journals, any appropriately qualified expert can potentially review our papers independently of the journal brand. As a result, we are in trials with other journals to share referee reports, and also with third-party peer-review services, to see whether the review of manuscripts can be shared across publishers with less redundancy. This represents yet another way to reduce friction and helps to put the power back in the hands of the author.

"There is a common perception of reviewer fatigue …"

Opportunities for institutions

Institutions stand to gain enormously from the growth of OA. The most obvious benefit is in increasing the visibility – or reach – of their articles, but there are also opportunities for institutions to help change the mindset around how research is evaluated.

Increased reach

If your researchers are publishing in OA journals, for example with a Creative Commons Attribution licence, or depositing similarly licensed articles in an institutional repository, their research is available to a far wider audience than those publishing in traditional journals, where readership is often constrained to academic institutions and large companies whose libraries can afford subscription fees.

Increased visibility does not only mean increased readership, however. It also means more bloggers writing about your research, more tweets, and, certainly in our experience, greater media attention. *PLOS ONE* features in the international news on an almost daily basis, and the breadth of this coverage far exceeds what our press office can produce itself. A key stimulus for this is that, with OA, journalists and bloggers can find, access and reuse material (for example the figures) from the stories they want to write about, rather than being fed only what journals think they will find interesting.

Open access also increases readership in countries that have historically had trouble accessing the literature. From an institutional perspective, this increased research reach can translate into more usage and greater opportunities for academic collaboration beyond the usual network.

Finally, open access makes articles visible beyond the traditional academic channels. For example, *PLOS ONE* papers are regularly listed in the social networking news site, reddit. (A search in reddit currently lists 700 *PLOS ONE* papers being discussed[15].) When papers hit the 'front page' of reddit, huge spikes in traffic to the articles are generated. And these visitors are usually not scientists; they are people who have a basic interest in science and who, for the first time, can read the primary scientific literature without facing a paywall. We know this because what makes reddit particularly exciting is that we can view the comments readers make on the articles. These comments not only demonstrate the diverse backgrounds of the readers, but also that they are reading the papers in detail, not simply viewing the cover page and then leaving. This offers an opportunity for institutions and scientists to demonstrate how their research is engaging the public.

"When papers hit the 'front page' of reddit, huge spikes in traffic to the articles are generated."

Research evaluation

Another, perhaps more practical, advantage offered by OA to institutions is the ability to measure a range of metrics on how their individual articles are being used. Traditionally, research assessment by governments or institutions has relied on journal-level metrics, such as the impact factor, to assess the work of individuals or departments. The IF is a measure

of the average number of citations that all the articles in a journal receives, and therefore provides little useful information about any single piece of research[16–18]. PLOS has pushed hard in recent years for a move towards measuring usage at the article level, as opposed to the journal level. Our article-level metric (ALM) program[19–23] covers not only downloads and citations, but also tweets, Facebook likes, reference manager downloads, Wikipedia citations, F1000 Prime citations and more. These tools – available through PLOS's open application programming interface (API)[24] – allow measurement of a far broader spectrum of usage and potential impact than is currently possible with subscription journals[25]. Together, they highlight that the influence of an article goes beyond simple citation in the scholarly literature. Such information is extremely useful for an institution in understanding how its research is received, shared and used by different stakeholders across the world.

"… the influence of an article goes beyond simple citation in the scholarly literature."

We have also recently launched a new application that aims to bring the ALMs together into useful summary reports for institutions, funders and individuals. ALM Reports[26] allow users to select groups of papers by author, funder, institution and so on, and to compare their metrics side-by-side. All the data can be downloaded and the application also provides different ways of visualizing the data. Figure 2, for example, shows the number of views and citations of papers from University College London since they were published in 2009. The graph differentiates between journal titles by colour.

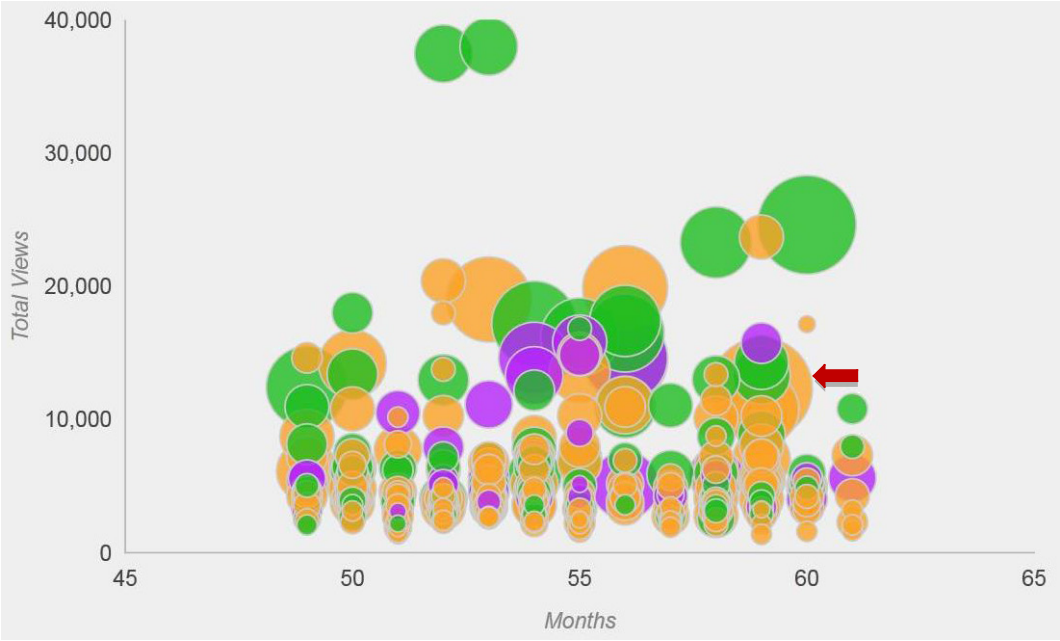

Figure 2. Bubble graph of article usage and citations as a function of age for papers published in any PLOS Journal in 2009 where an author's affiliation is University College London (N=332). Total usage includes page views and downloads from PLOS and PMC. Bubble size correlates with Scopus citations and bubble colour with the PLOS journal: orange, *PLOS ONE*; green, *PLOS Biology/Genetics/Computational Biology*; purple, *PLOS Medicine/Pathogens/Neglected Tropical Diseases*. The red arrow points to an article in *PLOS ONE* which has received 258 citations and has a total usage of 12343 (at time of writing on 20 January 2014). The data and graphs for this search are available at: http://almreports.plos.org/reports/visualizations/11211

Such 'bubble graphs' demonstrate the problem with using journal metrics such as the IF to learn anything about individual papers. In the plots, you can immediately distinguish which papers are highly viewed, or highly cited, or both, regardless of whether they appear in a journal that selects for novelty and importance, such as *PLOS Biology*, or one that eschews subjective measures of importance, such as *PLOS ONE*. It also differentiates between papers that are highly viewed but not cited. These may be of more general public interest or important for policymakers.

The reports also show which subject areas are most highly represented amongst a group of papers, and can map where all the authors and co-authors are from, providing an easy visual grasp of collaboration between institutions.

Although our understanding of what these metrics mean is still limited, the potential power of such a tool for institutions, funders and researchers is clear. You no longer have to rely on pointing to articles in *Nature*, *Science* or *PLOS Biology* as being the big hitters, just because they are in those journals. Now you can point to the potential impact of specific articles regardless of the journal. Any single metric, of course, should be treated with caution and usage varies for different fields, but the possibilities are endless, and endlessly exciting.

"… the possibilities are endless, and endlessly exciting."

Challenges for institutions and publishers

Libraries and institutions are faced with the immediate challenge of ensuring their researchers comply with the many OA mandates imposed by funders and governments (for example, by the Research Councils in the UK[27] or most recently in the US, the Omnibus Bill[28]), whilst at the same time safeguarding the academic freedom to submit to a journal of choice. Institutions are in a unique position to help manage that process by encouraging authors to submit their article to an OA journal or to deposit articles from traditional journals into an institutional repository (assuming there is liberal licensing and limited, if any, embargoes).

Equally important is publisher compliance. This goes beyond ensuring that articles are made available for reuse and archived in a secure, stable and public repository. It also requires that publishers adhere to high standards of publishing practice (such as the principles outlined by the Open Access Scholarly Publishers Association, the Committee on Publication Ethics and the World Association of Medical Editors[29]), and are committed to creating a free and competitive market where the pricing of article processing charges (APCs) for OA publications is made clear (such as at PLOS). Institutions and publishers have an opportunity to work together to ensure, for example, that big 'non-disclosure' deals for subscriptions are not replaced with equivalent deals for APCs.

There is also a strong need for direct competition amongst publishers and other open access providers for the services they are offering. The world cannot live on *PLOS ONE* alone and we therefore welcome the entry of new platforms and services such as PeerJ[30], figshare[31], Frontiers[32] and others. Such competition drives innovation and will help increase the reach of articles while reducing the friction around their use. Competition will also serve to drive the costs down for authors and institutions.

The balance of power in the scholarly communications market is shifting from publishers to institutions and funders. In such an environment, publishers need to collaborate to provide institutions and funders with the information and services required to monitor how their articles are being accessed and used. To some extent this is happening already, with the emergence of proposals for metadata standards by the National Information Standards Organization[33] and other cross-publisher organizations that provide interoperable services around the content (e.g. CrossRef[34]) or data (e.g. PLOS has collaborations with Dryad[35] and figshare[36]) .

The future is open

"The larger challenge … is changing this mindset and the culture."

The future of academic publishing is by no means set in stone. While there is clear momentum behind open access, it is not yet the dominant mode of dissemination. And as John Wilbanks from Creative Commons noted[37], we are in the 'And then they fight' stage, where OA is being increasingly targeted and undermined, often by those who are protecting untenable profit margins and revenue streams at the expense of access. The larger challenge, therefore, is changing this mindset and the culture. Mandates are not enough.

Ingrained feelings about the journal impact factor remain a critical barrier. Until institutions and funders stop using this blunt instrument for research assessment, scientists will keep focusing on it (and the traditional journals that prop it up) as their primary incentive

in choosing a journal and gaining grant funding and promotion. Funders, institutions, publishers and scholarly societies are beginning to take action (like the San Francisco Declaration of Research Assessment, DORA[38–40]) yet some governments continue to rank their institutions and researchers by where, rather than what, they have published .

Researchers, institutions, publishers, scholarly societies, funders and governments all have an opportunity to change the cultural balance. Disruption relies on the emergence of new publishing models like *PLOS ONE*, as well as the emerging field of article-level metrics, but can only be effective if there is also real competition between publishers, and platform and service providers, and genuine collaboration with institutions and funders. We can grasp this opportunity together; being open need not be an aspiration.

"We can grasp this opportunity together; being open need not be an aspiration."

References

1. Joseph, H, The Open Access Movement Grows Up: Taking Stock of a Revolution, *PLOS Biology*, 2013, 11(10), e1001686.
2. Archambault, E et al, *Proportion of Open Access Peer-Reviewed Papers at the European and World Levels.* (European Commission DG Research & Innovation, 2013): http://www.science-metrix.com/pdf/SM_EC_OA_Availability_2004-2011.pdf (accessed 3 February 2014).
3. Kaiser, J, Free Papers Have Reached a Tipping Point, Study Claims | Science/AAAS | News, *ScienceInsider*: http://news.sciencemag.org/scientific-community/2013/08/free-papers-have-reached-tipping-point-study-claims (accessed 3 February 2014).
4. Van Noorden, R, Half of 2011 papers now free to read, *Nature,* 2013, 500(7463), 386–387.
5. Neylon, C, Architecting the Future of Research Communication: Building the Models and Analytics for an Open Access Future. *PLOS Biology*, 2013, 11(10), e1001691.
6. Neylon, C, More Than Just Access: Delivering on a Network-Enabled Literature, *PLOS Biology*, 2012, 10(10), e1001417.
7. 'Prometheus', PLOS Welcomes CC v4.0 Licenses | PLOS, 1013: http://www.plos.org/plos-welcomes-cc-v4-0-licenses/ (accessed 3 February 2014).
8. About *PLOS ONE*: http://www.plosone.org/static/reviewerGuidelines#about (accessed 3 February 2014).
9. MacCallum, C J, ONE for All: The Next Step for PLOS, *PLOS Biology*, 2006, 4(11) e401.
10. *Scientific Reports*, Nature Publishing Group: http://www.nature.com/srep/about/index.html (accessed 3 February 2014).
11. *Scientific Reports*, ref. 10: http://www.nature.com/srep/marketing/index.html (accessed 3 February 2014).
12. *PLOS ONE* Editorial Board: http://www.plosone.org/static/edboard.action (accessed 3 February 2014).
13. *PLOS ONE* Editors, 17 October 2013, Editorial Highlight: Reporting Standards at *PLOS ONE*, EveryONE, *PLOS ONE* community blog (PLOS Blogs): http://blogs.plos.org/everyone/2013/10/17/editorial-highlight-reporting-standards-at-plos-one/ (accessed 3 February 2014).
14. Hopewell, S et al, CONSORT for Reporting Randomized Controlled Trials in Journal and Conference Abstracts: Explanation and Elaboration, *PLOS Medicine*, 2008, 5(1), e20.
15. reddit.com: search results for *PLOS ONE*: http://www.reddit.com/search?q=%22PLOS+ONE%22 (accessed 3 February 2014).
16. The PLOS Medicine Editors, The Impact Factor Game. *PLOS Medicine, 2006,* 3(6), e291.
17. Smith, R, Beware the tyranny of impact factors, *Journal of Bone & Joint Surgery (British),* 2008, 90-B(2), 125–126.
18. Simons, K, The misused impact factor, *Science*, 2008, 322(5899), 165.
19. Allen, L, 7 May 2013, Providing context to Article-Level Metrics, The Official PLOS Blog (PLOS Blogs): http://blogs.plos.org/plos/2013/05/providing-context-to-article-level-metrics/ (accessed 3 February 2014).
20. Lin, J and Fenner, M, Altmetrics in Evolution: Defining and Redefining the Ontology of Article-Level Metrics, *Information Standards Quarterly, 2013,* 25(2), 20.
21. Chamberlain, S, Consuming Article-Level Metrics: Observations and Lessons, *Information Standards Quarterly*, 2013, 25(2), 4.
22. Yan, K-K and Gerstein, M, The Spread of Scientific Information: Insights from the Web Usage Statistics in PLOS Article-Level Metrics, *PLOS ONE*, 2011, 6(5), e19917.
23. Neylon, C and Wu, S, Article-Level Metrics and the Evolution of Scientific Impact, *PLOS Biology*, 2009, 7(11), e1000242.
24. Fenner, M, 22 August 2013, Eat your own dogfood: lessons learned from building an API, *PLOS Tech* (PLOS Blogs): http://blogs.plos.org/tech/eat-your-own-dogfood-lessons-learned-from-building-an-api/ (accessed 3 February 2014).
25. Kwok, R, Research impact: Altmetrics make their mark, *Nature*, 2013, 500, 491–493.

26. Allen, L, 18 June 2013, Announcing ALM Reports - a new tool for analyzing Article Impact, The Official PLOS Blog (PLOS Blogs): http://blogs.plos.org/plos/2013/06/announcing-alm-reports-a-new-tool-for-analyzing-article-impact/ (accessed 3 February 2014).
27. RCUK publishes revised guidance on Open Access: http://www.rcuk.ac.uk/media/news/130305/ (accessed 4 February 2014).
28. Omnibus Appropriations Bill Codifies White House Directive, SPARC, *2014:* http://www.sparc.arl.org/news/omnibus-appropriations-bill-codifies-white-house-directive (accessed 3 February 2014).
29. Open Access Scholarly Publishers Association, Principles of Transparency and Best Practice in Scholarly Publishing, 2013: http://oaspa.org/principles-of-transparency-and-best-practice-in-scholarly-publishing/ (accessed 3 February 2014).
30. PeerJ: https://peerj.com/ (accessed 3 February 2014).
31. figshare: http://figshare.com/ (accessed 3 February 2014).
32. Frontiers: http://www.frontiersin.org/ (accessed 3 February 2014).
33. The National Information Standards Organization, NISO Publishes Recommended Practice and Technical Report on Improving OpenURLs Through Analytics – National Information Standards Organization: http://www.niso.org/news/pr/view?item_key=fe8b912cba59e733b9af26960fa9389fbb74b8db (accessed 3 February 2014).
34. CrossRef: http://www.crossref.org/ (accessed 3 February 2014).
35. Haggie, E, 18 September 2013, PLOS Genetics partners with Dryad, PLOS Biologue (PLOS Blogs): http://blogs.plos.org/biologue/2013/09/18/plos-genetics-partners-with-dryad/ (accessed 3 February 2014).
36. Kishor, P, 31 Jan 2013, PLOS and figshare make open science publishing more open - Commons News, 2013: https://creativecommons.org/weblog/entry/36504 (accessed 4 February 2014).
37. Wilbanks, J, Officially Entering 'And Then They Fight' Phase of Open Access, *Del-Fi* (2013): http://del-fi.org/post/50918775743/officially-entering-and-then-they-fight-phase-of-open (accessed 3 February 2014)
38. San Francisco Declaration on Research Assessment (DORA): http://am.ascb.org/dora/ (accessed 3 February 2014).
39. Van Noorden, R, 16 May 2013, Scientists join journal editors to fight impact-factor abuse, *Nature* newsblog: http://blogs.nature.com/news/2013/05/scientists-join-journal-editors-to-fight-impact-factor-abuse.html (accessed 3 February 2014).
40. Curry, S, 16 May 2013, Impact factors declared unfit for duty, Reciprocal Space: http://occamstypewriter.org/scurry/2013/05/16/impact-factors-declared-unfit-for-duty/ (accessed 3 February 2014).

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