The future of academic publishing: disruption, opportunity and a new ecosystem

Academic publishing is on an irreversible path to change

It is not a hyperbole to say that the foundations of academic publishing are in a state of large-scale disruption. That this disruption remains largely under the surface is primarily because the main users of academic research — those who work at universities — rarely suffer the consequences of lack of access due to the substantial payments universities make for subscription journals (about $281 million in total in Australia in 2017).[1] Outside of universities, however, gaining online access to published research legally is neither easy nor affordable. Furthermore, as we move towards an interconnected digital future, it is becoming increasingly obvious that a system whose core business model rests on controlling access is an anachronism.

On the surface, the principles of publishing academic research ought to be obvious. Research is not a "nice to have" type of information. Academic research underpins health care decisions, the development of public policy, innovation, and the generation of new knowledge. In today's interconnected world, access should mean much more than just availability to read, it also means the ability to link, mine and otherwise reuse research content through open licensing practices, as defined by a series of declarations in the early 21st century, most notably by the Budapest Open Access Initiative.[2]

Changing the model of access to academic research is not simple; in fact, it is better thought of as a "wicked problem" — a complex problem that evades easy solutions.[3] Attempts to solve these problems often lead to other, more complex issues arising in unanticipated ways. Publishing's main problem is that the publication of research (particularly in high profile journals) has become intricately linked with other concerns, such as academic prestige and incentives for individuals and institutions. Publishing is, effectively, key to the flow of money and prestige through the academic system.

Publishing became so problematic largely because the current system was not purposefully designed by the people who should have the major interest in it: the research community. The predominant publishing system has therefore come to be dominated by a model that benefits those who can control access through the payment of subscriptions. This control evolved from a time when subscriptions were a good model of distribution for print-based publishing. Although publishing technology has been continuously innovating since the first journals appeared in the 17th century, and this innovation accelerated in the first decade of this century when most journals went online, it has not yet fulfilled the opportunities offered by the online environment. Furthermore, the shift to the digital world has meant that a handful of

publishers have increased their hold on the system. A seminal article shows how these publishers now own around 70% of journals globally,[4] and are increasingly now also buying publishing infrastructure. However, in the past years, it has become clear that substantial disruption of the publishing system is in sight, largely because we now have tools that could, if adopted, support a fully interconnected global scholarly ecosystem. Such an ecosystem needs to include a wide variety of open publishing models, underpinned by linked, well curated, interoperable software, data and research articles.

What are the trends that have made the disruption possible now?

The first trend is economic. The purchasers of subscriptions, mostly universities, have become increasingly unhappy with ongoing, unsustainable price rises for subscriptions.[5] These price rises have become so extreme that they affect not just people outside western universities (who have always been most affected by knowledge inequity) but now virtually every university globally, even the largest ones, such as the University of California, which in February 2019 announced it had cancelled all subscriptions with Elsevier, the world's largest publisher.[6] Put simply, the cost of accessing knowledge is both too high and not appropriate for the online model. Publishing online enables disruption of this subscription model in that it allows different models of funding publication: upfront through open access journals, supported either through individual article processing charges or wholesale consortial support of a journal, or dissemination through entirely different models, such as university and other repositories. The time is ripe for a mass change of model. However, whatever model of funding emerges must deal with the issue that managing peer review and curating articles for publication requires time, effort and expense. Moreover, academic societies that have relied on subscription charges to fund their activities do not have another obvious way to generate revenue to replace subscriptions. Groups coordinating attempts

Virginia Barbour

Queensland University of Technology, Brisbane, QLD.

Ginny.Barbour@qut.edu.au

doi: 10.5694/mja2.50265

See Editorial (Gee)

Podcast with Virginia Barbour available at https://www.mja.com.au/podcasts

to disrupt the system include the Confederation of Open Access Repositories, with its Next Generation Repositories project,[7] Open Access 2020 (https://oa2020.org), which seeks to flip all journals to open access, and cOAlition S, through Plan S (https://www.coalition-s.org), which is calling for immediate open access to all the research they publish.

The second trend is the wave of innovation in publishing that has finally begun to exploit the online environment. It is possible to look beyond just providing free access to documents in pdf format — which are, in essence, online versions of physical paper copies, with all their lack of interoperability — to increasing sophistication in the technical presentation of research. Innovations include articles that can exist in several different versions, articles that can be interrogated and commented on interactively and in public, articles that can be linked electronically to their authors via permanent identifiers, and articles that are linked to underlying data. What is key here is sophisticated linking through metadata. This trend is underpinned by principles such as the FAIR principles (https://www.fair-access.net.au); that is, the idea that data and published research should be findable, accessible, interoperable and reusable.

The third trend is an increasing unease with the quality and reproducibility of the research being published.[8] There is general agreement that the current model of dissemination of research — which rewards only the end product of publications, not all the steps that make research trustworthy — has led to a situation in which we have a system that disincentivises the production of reproducible and reliable research. Most recently, Alan Finkel, Australia's Chief Scientist, highlighted in an article this need for better quality in research,[9] which is also a focus of a new stream of work from the National Health and Medical Research Council (NHMRC).[10] There is understanding that no change will happen unless incentives for researchers (and ultimately institutions) acknowledge not just where research is published, but all aspects of accessibility, quality and integrity of research. This issue is being championed by a number of groups globally, in particular, by the San Francisco Declaration of Research Assessment initiative (https://sfdora.org).

Key concerns still need to be addressed before we can get to an ideal future state for dissemination of research. Some questions to inform discussions include:

- How might we purposely consider what should come next, or even what should a far distant perfect future look like?
- Who should be involved in designing this system?
- What principles should inform this redesign?
- How might the current players fit in?
- What are the gaps?

The 2019 global Open Access week sought to explore some of these ideas with its theme of "Building the equitable foundations of open knowledge". In Australia, open access discussions are being driven by a variety of groups, such as the Council of Australian University Librarians,[11] the Australasian Open Access Strategy Group (https://aoasg.org.au) and Creative Commons Australia (https://creativecommons.org.au). There is an overarching need for high level thinking on strategy for open scholarship in Australia that includes infrastructure, policy and practices, as noted in Recommendation 12 from a 2018 Australian House of Representatives Committee inquiry into research funding, the Australian Government Funding Arrangements for non-NHMRC Research.[1] This recent recommendation is a welcome development; the need for open access policies was previously highlighted in a 2016 Productivity Commission Inquiry into Intellectual Property; however, the Australian Government accepted but did not implement the recommendations.[12]

But probably the most urgent question for many people who read and publish in journals is where do these journals, especially journals that operate under the subscription model, fit into this future? Crucially, any ideal future system will need to encompass a diverse range of possible solutions, technically and financially. Journals of all types will have their place, as will pre-print servers, data repositories, registries of trials and other studies, and repository systems maintained by libraries and other organisations. Essentially, the entire set of current components can be fitted into a remodelled system, provided they are able to support specific principles — maybe the FAIR principles, but perhaps other community-agreed principles will arise. The onus at this time is for publishers to look carefully at each of their journals and to develop plans that will support open scholarship now and into the future. However, at the same time as journals and publishers respond to the changing world, there needs to be a concerted program of education and support for everyone involved in publishing, especially readers and authors, on the wholesale changes now occurring.

Academic publishing is on an irreversible path to change. How quickly we get to a system that will better serve everyone's best interests depends, to a large extent, on whether we are able to inform and include all stakeholders' voices in the next stages of the debate.

Competing interests: Virginia Barbour is member of the NHMRC Research Quality Steering Committee and is employed by the Australasian Open Access Strategy Group. She was previously employed by PLOS, was Chair of the Committee on Publication Ethics, and is currently Chair of the DORA international advisory committee and a Plan S ambassador.

Provenance: Commissioned; externally peer reviewed. ■

References are available online.

1 Parliament of Australia. Australian Government funding arrangements for non-NHMRC research [website]. Canberra: Commonwealth of Australia, 2018. https://www.aph.gov.au/Parliamentary_Business/Committees/House/Employment_Education_and_Training/FundingResearch/Report (viewed Apr 2019).

2 Budapest Open Access Initiative. Read the Budapest Open Access Initiative [website]. https://www.budapestopenaccessinitiative.org/read (viewed Mar 2019).

3 Australian Public Service Commission. Tackling wicked problems : a public policy perspective [website]. Canberra: Australian Public Service Commission, 2018. https://www.apsc.gov.au/tackling-wicked-problems-public-policy-perspective (viewed Mar 2019).

4 Larivière V, Haustein S, Mongeon P. The oligopoly of academic publishers in the digital era. *PLoS ONE* 2015; 10: e0127502.

5 SPARC. Big deal cancellation tracking [website]. https://sparcopen.org/our-work/big-deal-cancellation-tracking (viewed Apr 2019).

6 University of California Office of Scholarly Communication. UC and Elsevier — open statement: why UC terminated journal negotiations with Elsevier [website]. UC OSC, 2019. https://osc.universityofcalifornia.edu/open-access-at-uc/publisher-negotiations/uc-and-elsevier (viewed Mar 2019).

7 Confederation of Open Access Repositories. Next generation repositories [website]. COAR, 2017. https://www.coar-repositories.org/activities/advocacy-leadership/working-group-next-generation-repositories (viewed Mar 2019).

8 Baker M. 1,500 scientists lift the lid on reproducibility. *Nature* 2016; 533: 452–454.

9 Finkel A. To move research from quantity to quality, go beyond good intentions. *Nature* 2019; 566: 297.

10 National Health and Medical Research Council. Research quality [website]. Canberra: NHMRC. https://nhmrc.gov.au/research-quality (viewed Mar 2019).

11 Council of Australian University Librarians. Fair, affordable and open access to knowledge [website]. Canberra: CAUL, 2017. https://www.caul.edu.au/programs-projects/fair-affordable-open-access-knowledge (viewed Mar 2019).

12 Department of Industry Innovation and Science. Government response: Productivity Commission Inquiry into intellectual property arrangements [website]. Canberra: Department of Industry, 2017. https://www.industry.gov.au/data-and-publications/government-response-productivity-commission-inquiry-into-intellectual-property-arrangements (viewed Mar 2019). ■