16 March 2020

Response to the Office of Science and Technology Policy regarding Public Access to Peer-Reviewed Scholarly Publications, Data and Code Resulting From Federally Funded Research

What current limitations exist to the effective communication of research outputs (publications, data, and code) and how might communications evolve to accelerate public access while advancing the quality of scientific research? What are the barriers to and opportunities for change?

The present-day research communication landscape has many strengths and also several areas of weakness that provide exciting opportunities for improvement.

Amongst the strengths that should be protected are:

- A high-quality academic record – that is, the ideas, assertions and facts that are most likely to be worth sharing and preserving – has been built up over time. The academic record provides a solid platform for further scientific research and development.

- Well-proven processes, including peer-review, provide critical quality control gates to help researchers identify credible advances that are worth scrutinizing and building upon.

- A highly interconnected set of shared infrastructure underpins the creation, preservation and utility of the academic record, from the submission of new research for publication through to dissemination, long-term preservation, and integration of research publications with underlying data.

The diverse and active community of participants in research communication is leading to substantial innovation in all parts of the research communication landscape, such as new forms of rapid early publication (preprints), open peer-review, and new ways to better link research publications to their underlying data. In particular, we note:

- There has been widespread experimentation in recent years in new business models for publishing, particularly models to support open access publishing. None have yet become as widespread and stable as subscriptions and other forms of payments based on readership, particularly for books, but the research communications industry is working to move away from reader-based financial models for many types of research outputs.

- New approaches and standards in open research are emerging. Most focus has been on preprints, journals and data, but books and other modes of communication are also receiving attention. A few examples are increasingly strong journal policies for transparency around code and data sharing (evidenced in data availability statements); stronger and more enforced journal policies around ethical research practices (such as declaring competing interests and research participant consent); and new approaches to highlight the contributions of authors and reviewers and to add transparency to publishing decisions.

All this said, there are some areas where publishers and other stakeholders in research communication must work together and strive for improvement:

- *Greater efficiency in publishing.* High quality publishing takes effort, time, and money. It can become more efficient (faster and lower cost). As well as improvements to existing publishing venues, greater efficiency can come from new modes of publication, such as platforms for collaborative working and rapid communication.

- *Better balanced incentives in research evaluation.* Researchers and their institutes are not properly incentivized to communicate their research as widely and effectively as it should be communicated. In particular, research is evaluated through a heavy focus on journal articles and crude journal metrics. Researchers have little practical support for data and code sharing, and sharing these research outputs is undervalued and poorly rewarded.

- *Treating data and code as first-class research outputs.* Types of research outputs that have traditionally not been properly rewarded, such as data and code, are valuable. The infrastructure supporting the sharing of data and code needs to be dramatically improved, and this involves many parts of the research lifecycle, from researcher training and research practices, funder and journal policies, the availability of suitable repositories, and so on.

- *Sustainable approaches to open research publishing.* Business models that support high quality publishing can introduce inequalities. Paywalls prevent poorly funded researchers (including, but not limited to, those in low or middle income countries) reading content. This inequality is relatively easy to mitigate, and publishers work together through organisations such as Research4Life to provide free or low cost access to subscription. Open Access models that are based upon researchers (or their funders or institutes) paying to publish can introduce inequalities that are harder to mitigate for researchers without access to fund to pay for OA publishing. All things considered, new ways to give more readers immediate access to all research, while continuing to sustain equitable, high quality publishing, are needed.

What more can Federal agencies do to make tax-payer funded research results, including peer-reviewed author manuscripts, data, and code funded by the Federal Government, freely and publicly accessible in a way that minimizes delay, maximizes access, and enhances usability? How can the Federal Government engage with other sectors to achieve these goals?

We suggest a number of specific activities that Federal agencies could undertake that would have a strong positive impact on the accessibility and usability of research:

- *Develop strong, clear and consistent polices across all federal agencies*. This will enable all stakeholders to develop their understanding of what they need to do to make publicly federally funded research open.

- *That said, acknowledge that different communities have different needs*. Different research communities, because of the nature of their work, have different needs and conventions. The transformation to fully open research means different things to different communities. Federal policies should allow all communities to benefit from open research, while allowing them to transition to open in ways that reflect their needs.

- *Coordinate internationally.* Research is an international endeavour – researchers in one country benefit from the research in another. Therefore, Federal agencies should coordinate with their international counterparts, encouraging them to adopt strong and sustainable open research policies as needed, and benefiting from any experience they might have in making their policies more effective.

- *Fund open access*. Approaches to open access that depend on a continuation of paid-for readership (particularly, journal subscriptions) are paradoxical and unsustainable. Federal agencies should support models that directly fund open access publishing. Funding models should also support the intermediary steps that must be taken on the community's journey to full open access.

- *Fund high quality, authoritative open content*. Peer-review is one of the many quality control checks on which high quality publishing depends. It is imperative that publishing this high quality content can be sustained. While pre-final versions of content can have value to readers, financial support for research communications should allow the authoritative published versions to be open access.

- *Fund new and alternative publishing modes and venues* that support collaborative working and rapid communication. These can pre-publication collaborative working spaces, preprint servers and data repositories, and entirely new concepts that will no doubt be conceived in the future.

- Implement board changes in research culture to improve how research is conducted, and to recalibrate how research and researchers are evaluated. The San Francisco Declaration on Research Assessment (DORA) is one good example of how some of this can be achieved in practice. All stakeholders, publishers included, will be better incentivized to improve open access to research, data and code if researchers are more fairly and more comprehensively appraised on the basis of their full contribution to research and society more broadly. Reinventing how research is assessed is a complex task that requires the commitment of the whole community. Federal agencies can provide the strong leadership needed to bring the community together to tackle the task.

- *Strengthen mandates for the sharing of data and code and monitor compliance.* This goal is to embed an approach of 'as open as possible, as closed as necessary' for all publicly funded research findings. This will improve the availability and reproducibility of research communications, thereby making research programmes more efficient, effective and impactful.

- *Fund data and code sharing infrastructures on a long-term basis*. There are many community resources such as databases which are highly valued by their communities but which have short-term, unstable funding. Often this funding is predicated on new developments rather than maintenance of key services.

- *Engage closely with the community.* Cambridge University Press would welcome a discussion about how we and the community can pull together to deliver the open research agenda. We partner with a wide range of communities around the world, and their many varied voices must be heard if the promises of open research are to be realized.

How would American science leadership and American competitiveness benefit from immediate access to these resources? What are potential challenges and effective approaches for overcoming them? Analyses that weigh the trade-offs of different approaches and models, especially those that provide data, will be particularly helpful.

America is a world-leading research country. It also leads the world in putting that research to practical use in medicine, technology and other areas. Cambridge University Press partners with many leading American societies, and we have invested significantly in their publishing programs. We are working to make the American research academy even stronger. Because open research makes research more impactful, America will benefit from it. Specifically:

- Open access publishing, along with data and code sharing and other open research improvements, will allow research to have greater impact, in turn supporting ever better re-use of that research. Open research will, therefore, increase the competitive advantage that America already has through its research and development activities.

- American leadership in open research will encourage other countries to follow suit. With America's strong ability to turn research into development, America will benefit from more open research around the world.

- Many American organizations, both commercial and non-profits, do not have sufficient access to research funded by American tax payers. Open access will particularly benefit them, allowing them to become more competitive globally.

- The benefits of funding open access will more than compensate for relatively modest cost increases. There will need to be cost increases, because the move to sustainable open access models requires the costs of high quality publishing to move from readers to research organizations. America is a large producer of research and therefore the publication of America's research output has been, to some extent, subsidized by subscriptions paid by the rest of the world. The move to open access will require America to pay the full costs of its research publishing. However, the costs of publishing are a tiny part of the costs of research, and therefore the costs of moving to open access publishing will be a tiny part of the economic gain that America gets from transitioning to open research.