Response to Request for feedback on the draft UNESCO Recommendation on Open Science

December 31, 2020

To Whom It May Concern,

We write in response to the recent call for input on the draft UNESCO Recommendation on Open Science. We would like to thank you for your diligence on this important topic and for pushing forward on the next steps to evolve towards a more open scientific enterprise.

We are an informal group of progressive nonprofit publishers that have come together to help forge a path forward to fundamentally improve the way we communicate research results. We appreciate your thoughtful draft and provide you here with what we believe to be a path toward a more open and effective research communication enterprise.

We collectively publish over 600 research journals, including journals from 287 research societies spanning the sciences. We hope that our input will assist you in making informed decisions on forthcoming drafts. We stand ready to support you through this process and want to be clear that we are not espousing any particular policy position, but that we see real value for our societies, organizations, and the larger scientific enterprise in the options outlined below.

While we have made important and significant progress towards an open science enterprise, there remain tremendous opportunities to accelerate science, improve research productivity, and improve scientific reproducibility and efficiency through open science. We believe that the most effective of these opportunities lie in increasing access to data and code, as well as addressing the critical need to modernize the way we communicate research methods. Below we outline what we see as the critical problems that could be addressed through sound policy and sustainable policy options that collectively take us further toward a more open research ecosystem.

Access to Publications

Each of the organizations represented in this group has made a clear commitment to open science. We are all at different stages toward achieving those goals, and the different needs of different research communities have become increasingly clear. We understand the desire to rapidly reach the goal of immediate open access (OA) to research publications, but strongly suggest that the route to such a change needs to be carefully considered so it does not have unintended consequences.

We believe that implementing open access to research articles in a stepped manner is the best route for a number of reasons. First, we are in the middle of an extraordinary transition in the publishing industry. Open access journals are the fastest growing sector of scholarly publishing. That movement is forcing a wholesale reimagining of business models

and it is taking time for publishers to adjust to the changes. Current business models do not work across all fields for all communities or publication types, and further experimentation, support, and guidance are needed to find new ways to improve the publication of research.

It is important to recognize that we are not faced with choosing between subscription or an author-pays APC (Article Processing Charge) model—rather, we envision a broad range of models that can be applied in different contexts and that are appropriate for each community and research field. We believe there is a need to support new business model development and experimentation to demonstrate the applicability of a diversity of models.

Research societies remain vital to the scientific enterprise, and the work they do on behalf of the community and scientific progress is largely funded through journal revenues. For many scientific society journals, a rapid abolishment of the subscription model would be financially devastating and potentially cause them to fold. One of the key benefits research societies offer to paying members is access to their journal(s). Without the ability to offer this incentive, society membership will likely wane, further endangering their existence. For most selective journals the APC model is inadequate, because it forces authors of accepted papers to pay for the work done on rejected papers.

The only alternatives under this model are charging authors significantly higher APC rates than are currently seen in the market, or, as we hope to develop in collaboration with UNESCO, diversifying the available business models for research publishing. The APC model also favors larger publishers who can offer economies of scale that outcompete society journals and smaller publishers.

Innovative models such as institutional or individual membership schemes and submission fees have largely proven untenable due to intense competition and market forces. Library budgets are under intense pressure and voluntary spending is not an option for most universities. OA models will need to prove cost-effective to exist in a level playing field with other approaches before the industry can sustainably adjust to more open models.

Without a variety of new business models, we are concerned that scientific rigor will no longer be supported and that small publishers and scientific societies will be driven to either sell off their journals, or move their publishing operations to partnerships with larger commercial publishers who can provide economies of scale (a trend that is ongoing). Consolidation in this manner would reduce choice for authors and reduce competition in the market, leading to dominant market positions closer to monopoly. We are concerned that actions leading to further consolidation would result in more of the research literature being governed by organizations who are motivated by profit, rather than solely by scientific advances and the benefit of the research community.

For these reasons, we propose the following potential activities that could help drive access to scientific publications:

1) Allow universal access to author manuscripts. The United States has implemented a 12-month embargo on all peer reviewed scientific publications describing federally funded scientific research[1]. At which point, either an author manuscript or the version of record is made freely available. We believe that this model should be expanded to other nations as a starting point for moving scientific publications toward open access. This will allow for the continued evolution of business models that allow for more immediate access to publications.

2) Support for the development of a broad array of open access business models. We feel that the evolution of new models and a diverse ecosystem of models is essential for a successful and sustainable transition to timely and full open access to research publications. This can be supported through:

- Providing support/incentives for experimentation with new business models that help maintain high standards of rigorous editorial review. Funds for trials of new business models should be offered in order to determine whether they are able to overcome the market forces that, to date, have prevented their adoption;
- Providing support for models and infrastructure necessary to shift current subscription spending to open access. UNESCO member nations are well placed to bring together research community stakeholders to build standard approaches supporting the shifting of library budgets toward the support of publishing openly accessible materials. Reducing the complexity of these models and the necessary negotiations will greatly benefit the smaller and independent organizations, which lack the capacity of larger publishers.

Access to Data, Code, and Research Methodologies

In addition to the steps that could be taken to increase access to publications, we believe that there is an enormous potential for benefit to the scientific enterprise and society through increasing access to data and code, and innovation around the reporting of scientific methods. While access to the written publications that describe research findings is important, the real game-changer for the larger scientific enterprise will come when we fundamentally improve how we describe scientific research. Here we will address three clear opportunities.

Data and Code Sharing. Access to research data sets and software can accelerate economic growth and discovery by allowing researchers to focus resources and efforts on understanding and fully exploiting discoveries. For example, making human genome sequences publicly available drove tremendous growth in the biotechnology industry and fundamentally transformed biological research. Going forward, wider availability of scientific data and code will create innovative economic markets for services related to data curation, preservation, analysis, and visualization, among others.

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[1]https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf

However, right now, the majority of scientific research data that are being drawn upon for the conclusions of research papers, are not widely available. When they are available, they are often presented in a non-reusable manner in article's supplementary information, or, in hard to find and non-permanent storage solutions. We have little doubt that the continued practice of limiting access to research data has been a major contributing factor to the reproducibility and replicability challenges in the sciences today.

We believe there is a need for additional directives, incentives, and timelines for opening access to research data and code that is relevant to the findings reported in research articles at the time of publication. (Acknowledgment, citation, and attribution of the source of the data is essential.) There is little evidence that policies that "encourage" data and code sharing have driven an appreciable increase in sharing. Where journals have required authors to make data publicly available, there has been no appreciable decline in submission or publication.[2] We believe there is an important opportunity to maximize the value of research funding and enhance scientific reproducibility through the transparency offered by requiring data sharing and believe that UNESCO can play an important role in taking the bold steps necessary to drive data and code sharing.

We believe that the only way that the scientific enterprise will fully embrace open data is if funds are provided to support the cultural shift necessary to ensure the deposition and immediate access of data underlying the conclusions in scientific publications at the time of publication. Further, we believe that such policies should include requirements that data sharing adhere to FAIR data principles[3]. Reaching these goals will require a funded program of researcher training, education, standards creation, and full support for data curation, storage, and long-term preservation costs.

The advantage of such a policy is that it describes the parameters of which data need to be made available and leaves control of when data is made available in the hands of the researchers who produced it. Researchers will retain the ability to refrain from publishing until such time that they are comfortable releasing their data. Each field of research differs in the types of data that is generated and necessary to support the conclusions reached in a research paper. Field-specific standards will be an important aspect of a successful policy that makes clear to researchers what is required. Research societies are the ideal partner for developing these standards.

Doing so will directly address one major aspect of the reproducibility challenge and, with sufficient ramp-up time, we believe there is an opportunity nations to work toward the development of an International Research Data Commons that links storage solutions

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[2] As an example, PLOS introduced data requirements for authors in 2014 and has now published over 130,000 articles with the underlying data available. Over the past 12 months, these datasets have received over 30M views and downloads.

[3] https://www.go-fair.org/fair-principles/

together and provides a seamless mechanism for crediting scientists for their data and publications.

International Research Data Commons. There are excellent examples, across the sciences, of publicly available databases for the storage of highly structured monotypic data (e.g., GenBank, the Protein Data Bank in the biological sciences). These databases are of enormous value to the scientific community and we should seek to establish similar databases where clear opportunities for research acceleration arise. But while the lessons learned from these repositories are important, it is unrealistic to think that the increasingly broad array of data-types will be well-served solely by monotypic databases.

There remains an extraordinary opportunity to liberate the large amounts of heterogeneous data that do not fit neatly into existing monotypic databases. Moving toward open, machine readable, interoperable, and publicly accessible standards as the norms for all scientific research data will require a scalable effort to establish mechanisms for storing, sharing, finding, and using data. We feel that research societies are ideally placed to develop standards for field-specific common data types, and the creation of these standards should be encouraged and funded.

We believe that a combination of publicly-funded, not-for-profit, and commercial databases, all following the same standards and policies, will be critical for the open availability of research data and code.

Improving Scientific Methods Reporting. While open availability of data is important, the quality of that data cannot be determined without a clear picture of how that data was obtained. The information contained in the methods section of the overwhelming majority of research publications is insufficient to definitively evaluate research practices, let alone reproduce the work. Further, the reuse of detailed research methodologies has enormous potential for both time and cost savings, as well as accelerating the pace of research. The lack of detailed methodology reporting has been the case for decades, largely driven by a print-dominant publication model aimed at reducing the number of pages in journal issues and a lack of incentives to improve methods reporting. We believe that in a digital era, this is an anachronism that could be reasonably addressed if the right incentives were established through public policy.

Over the past two decades publishers have launched a series of methods and protocols publications that aim to capture the critical details of experimental science. Such publications have generally done well in the marketplace, but, in reality, were never designed to solve the larger issue that most scientific publications insufficiently document the experimental method. Other efforts by individual publishers or journals to increase disclosure of methods and protocols have led to incremental improvements in reporting, but, similarly, are not intended to address the systemic failures.

We see this as an urgently important opportunity. Resolving this problem will require policies that create incentives for researchers and publishers. Requiring and recognizing the reporting of detailed experimental methodologies as valuable research outputs creates

incentives for scientists through additional recognition of their work. For publishers, this recognition and requirement would create potential business opportunities for new services that could be offered to the research community.

We believe the first step toward accelerating progress in this area would be for nations to work with the research community and publishers to develop new standards for reporting and crediting methodologies. Common standards are proving invaluable for the recognition and reuse of open data, and the same principles could be applied to open methods. Collective action will reduce confusion and effort by scientists, and place all publishers on an equal playing field (and at an advantage over those publishers who choose not to participate). Without a level playing field, collective action will be stymied by differences between publishers that confuse authors and create disincentives to engage in better practices.

Incentives and Recognition. The scholarly publishing ecosystem is built around the need for researchers to communicate and receive credit for their work. The Journal Impact Factor (JIF) has become a dominant metric in this ecosystem, but is regularly misused as a means to evaluate the relative contribution of researchers to their field. Measuring researcher impact via metrics such as JIF has many drawbacks. As we move towards a more open science ecosystem, there is an opportunity to evolve research assessment and evaluation. Science funders, research administrators, researchers, and community-driven scholarly societies should be part of developing more effective research assessment and evaluation tools and we believe that UNESCO should help drive this conversation to help create the incentives necessary for the evolution of hiring, tenure, and promotion systems that better reflect the value of research contributions.

We sincerely hope that you will include such directives as described above in your recommendation. We are ready to discuss what these processes could look like and believe that the outcome of such activities could drive research progress and positively transform science toward a more open state.

Summary

We believe that appropriate public policy should drive an increase in access, reproducibility, and interoperability of scientific communications, research data, and methods. However, we are concerned that policies that require immediate access to the version of record of research publications will have devastating financial impacts on scientific societies and the journals they publish. It is vital that any such transformation for publications, data, code, and research methods must be carefully assessed so as to be sustainable and not overly burdensome for the researchers who will be asked to comply with these changes.

There are immediate, productive activities that could be taken to broaden access to research results, including better enforcement of current policies, and the development of a broad array of approaches to support access to research results, methodologies, and data.

In a world moving toward open science, there is great value in focusing on the research itself, rather than just the articles written about the research. Requiring open access to research data, software code, and detailed research methodologies as described above will greatly improve reproducibility and accelerate progress.

We believe that UNESCO members should work to drive the development of standards and policies requiring the data underlying the conclusions for scientific research publications to be made freely available in databases that conform to archival standards and that conform with FAIR data principles. This will require a ramp-up period for the development of infrastructure, coordination between nations, the development of standards for different fields and data types, and additional training and education for researchers.

Publishers are ready to require and enable data sharing requirements if nations are able to work with us to develop standards for which data are required to be shared, develop standards for what constitutes a sufficient archival solution, and provide ramp-up time for the requirement to begin, but there is also a need to make data useful and findable. A data commons platform that allows for seamless search, retrieval, and interlinking of data and content is necessary to create a robust data sharing ecosystem. We are prepared to work with nations to ensure that such an ecosystem can be developed, but it will require UNESCO nations to work together to create a commons platform and standards in support of data sharing.

The publishing community is ready to embrace and adopt new standards for describing research methods and improve their openness and transparency, but there is no effective mechanism for collective action. By working with publishers and scientific societies to develop new standards and require researchers to conform with such standards once in place member nations can fundamentally improve the way research is understood. We believe that open methods are one of the most important ways to improve efficiency and reproducibility in research reporting.

We are ready to work with you and discuss these ideas further including presenting more detailed options for implementation. Please feel free to contact us at

Sincerely,

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