



May 6, 2020

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Re: RFI Response: Public Access to Peer-Reviewed Scholarly Publications, Data and Code Resulting From Federally Funded Research

Dear Dr. Nichols:

IEEE, the Institute of Electrical and Electronics Engineers, is the world's largest technical professional organization composed of over 423,000 engineers, scientists, technologists and allied professionals dedicated to advancing technological innovation for the benefit of humanity. With over half of our membership in the United States, we serve society in the electrical, electronic, and computing fields, along with related areas of science and technology.

Founded over 130 years ago by technological pioneers including Thomas Edison and Alexander Graham Bell, IEEE develops, supports, and expands American and global technical communities. We enhance the careers of our U.S. members, advance the state-of-the-art of engineering and technology in the U.S., and lead standardization efforts with deep and long-lasting impacts on U.S. and global industry. IEEE is a driving force in organizing the U.S. technical community to disseminate cutting-edge technical information, improving the lives of all American citizens.

Our volunteers organize thousands of conferences and produce over 200 technical journals that provide forums for engineers and technologists to remain current in their fast-moving fields, network with others, and enhance their professional skills. Our volunteers contribute to their local communities through disaster relief, university accreditation, mentorship programs, student competitions, and local engagement with cities, communities, and states across the country – all coordinated through IEEE.

IEEE members have earned 27 Nobel Prizes. Countless others have made the breakthroughs, created the innovations, and built the companies that define the 21<sup>st</sup> century and upon which America's prosperity is largely based.

IEEE supports STEM students from kindergarten through graduate school and promotes lifelong learning by all engineers, scientists, and technologists. By raising public awareness of the contributions STEM makes to modern society, we encourage students to consider STEM-oriented education and careers - an essential service to maintain America's pipeline of technical professionals.

This work is sustained by the activities and revenues derived from our publications.

IEEE publications represent the most trusted sources for engineering and technology research in corporations, academia, and government, forming the foundation on which new innovation and discoveries are made by disseminating new theories and findings. These publications are the most

read and reliable channel reporting significant research advances across our diverse scientific fields. For over a century, IEEE publications have promoted mankind's greatest scientific and engineering conquests, bringing technology to humanity.

### **What are the barriers to and opportunities for change?**

IEEE is a strong supporter of Open Science – a movement to make scientific and technical information available broadly to the public. We see our Open Science efforts as well aligned with our charter: to advance technology for the benefit of humanity. We have been advancing open science in a careful and measured manner by aiding the transition for users, maintaining the sustainability of the institute and its constituent parts, and supporting innovation and evolution in research practice. IEEE has already begun addressing many of the challenges of Open Science. Today, IEEE offers over 20 fully open access (OA) journals, while all other IEEE journals are hybrid OA, meaning that they give authors the option to publish in an OA format.

IEEE has made important contributions to research reproducibility, which we have championed through partnerships with U.S. funders including the NSF.<sup>1</sup> Since 2016, we have enabled authors to share access to research artifacts such as code, algorithms, and datasets through services we have integrated with our publications processes. In partnership with commercial providers and via investments in tools we have built ourselves, IEEE has made the Code Ocean and IEEE Dataport tools freely available to our global communities. These services comprise a range of capabilities from simple repository features (including persistent DOIs for artifacts) to full runtime emulation for code and simulations.

In addition, IEEE has adopted best practices in data citation, conforming to the FORCE11 data citation principles<sup>2</sup>. We continue to encourage availability and sharing of research data. With the National Information Standards Organization (NISO), we lead community efforts to encourage and increase recognition for open and reproducible scholarly communication through the development of standards for definition and badging of research outputs.<sup>3</sup>

To IEEE and similar community-based organizations, an immediate and inflexible requirement that all articles reporting on funded research be made immediately available to the public will itself become a barrier to the desired change. Scholarly societies, including IEEE, play a key role in curating and credentialing research publications, and in building scientific integrity and communal norms among researchers. A requirement for immediate public access to technical articles reporting results from federally funded research with no embargo period will put enormous financial pressure on organizations like IEEE, imperiling our ability to continue to fulfill this vital role. Ironically, efforts to make research results public faster could result in those results being less reliable, diminishing the public's access to good research.

These changes could also do irreparable damage to scientific communities. Such a policy will likely be force the elimination of activities that are crucial to the long-term health of the scientific enterprise, including:

- Accreditation of college programs (ABET)
- STEM education support for K – 12 students and their teachers (TRYEngineering)
- Development of communities for under-represented populations, such as Women in Engineering and Young Professionals

- Launch of new journals and professional conferences in emerging technologies such as machine learning, artificial intelligence, quantum computing, and cybersecurity
- Investments in Open Science like IEEE Dataport, TechRxiv, and Code Ocean
- Projects in support of reproducibility, such badging systems, peer review, and reproducibility of non-article research artifacts
- Support for economically challenged authors to publish in open formats through article-processing charge waivers

As a researcher-led membership association, IEEE is fundamentally in sympathy with and committed to the aims of Open Science. We seek to partner with OSTP and others to achieve the desired policy goals *and* continue to offer these activities through a phased approach to implementation of new models for access to content and data/research artifacts. More aggressive proposals risk the integrity of the research system, and therefore are themselves barriers to a successful change to an open system.

**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?**

To address this question, we must consider the facts of the current Open Science landscape:

- Peer-reviewed publication of articles is a single part of a complex ecosystem
- Maintaining high quality, community-based selection and publication of important research findings is a time-consuming process which demands ongoing investment
- Reproducibility and reliability of research findings will be improved by greater availability of artifacts such as data, code, and algorithms associated with the published articles
- Technical challenges exist around the curation, classification, discovery, and preservation of those artifacts; solving them will be a community effort
- Behavior and incentives applying to individual researchers, institutions, and funders are necessary for achieving OSTP's stated aims

IEEE has made progress in all the above categories, but suggests that greater support and partnership with both OSTP and funding agencies can accelerate that progress. Change on the scale envisioned will happen fastest if embraced by multiple constituencies, including researchers, agencies, and publishers, not just the federal government. In its role as a global publishing organization, IEEE has played founding or leadership roles in the establishment of key infrastructure providers such as Crossref<sup>4</sup> and CHORUS<sup>5</sup>, which seek to simplify and enable underlying linking, metadata, and grant-compliance functions for authors, readers, and research institutions. In addition to our contributions to the scholarly communication community via these organizations, we are a member of the STM Association, which in 2020 is promoting the STM Research Data Year.<sup>6</sup>

From our experience with the above organizations and the dynamics of the scholarly communications community, we see the following cross-sector opportunities:

- Defining standards and enabling tools/technology for stakeholders to adopt will be important and can be achieved through organizations such as those named above ✓

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- Providing incentives to researchers and their institutions to encourage desired behaviors (e.g., making additional artifacts available in addition to article publication) is an important complement to policy that such organizations can facilitate
- Achieving consensus and commitment to progress could take place via an engagement process similar to the Scholarly Publishing Roundtable approach that led to the creation of CHORUS and subsequent widespread facilitation by publishers of OSTP's 2013 policy.<sup>7</sup>

All of these opportunities will require collaborative efforts from all stakeholders to permit the research community to successfully navigate these dramatic changes.

We believe OSTP could facilitate public access to taxpayer-funded research results by:

- Mandating that U.S.-funded researchers post pre-peer reviewed versions of their articles on institutional repositories or preprint servers such as arXiv, TechRxiv, or engrXiv, thus making the products of research grants publicly available at the earliest possible date
- Considering extending mandates to datasets and other artifacts, using not-for-profit community-developed tools such as IEEE Dataport, Zenodo, and Dryad
- Piloting studies with individual representative communities to ascertain how best to implement future Open Science behaviors or goals
- Enabling organizations like IEEE to develop and test alternative economic models for greater openness (these models will vary for different research fields)

### **How would American science leadership and American competitiveness benefit from immediate access to these resources?**

Benefits of immediate access will not be limited to American business or researchers but will flow to all of American society. However, there is a possible unintended consequence to an approach that damages the scientific ecosystem. IEEE is concerned about the effects of additional government policy on the important role IEEE and other U.S.-based not-for-profit organizations play in organizing and certifying the outputs of funded research. IEEE believes we contribute significantly to the U.S. (as well as the global) scientific community and sets standards for quality in curation and discovery of research through its investments in our people, processes, and technology. Those investments accrue to the benefit of the U.S. economy as well as to the technical communities we support. If we, and organizations like us, are unable to fulfill this role, government actors who do not share U.S. values and interests could insert themselves in the researcher workflow to fill the gap. The benefits will go to others outside the U.S., thus creating an undesirable influence over the certification and publication of U.S.-funded science.

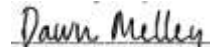
### **In Conclusion**

Today, federal agencies require that peer-reviewed manuscripts reporting the results of research funded by a U.S. government grant be made freely available online within one year of publication. This policy balances our shared goals of providing broad access with the need for substantial investments in activities supporting Open Science and in the peer-review, editing, publication, distribution, and long-term preservation of technical articles. Current policy also reflects Congress' guidance that the Administration consider the role of scientific/technical publishers in ensuring the integrity of the scientific record and the investments they make in adding value for the research community.<sup>8</sup>

Reducing or eliminating the embargo period would significantly jeopardize IEEE’s ability to invest in the activities undertaken to create, maintain, and enhance our publications program and to drive forward the principles of Open Science. This would be counterproductive and prevent us from effectively pursuing our mission to advance technological innovation and excellence for the benefit of humanity.

IEEE appreciates the opportunity to engage in this dialogue and looks forward to working with OSTP to identify solutions that advance the goals of open science without risking the integrity of the research system.

Sincerely,



Dawn Melley

Acting Managing Director, IEEE Publications

### References

- 1 [Report on the First IEEE Workshop on the Future of Research Curation and Research Reproducibility](#)
- 2 [Joint Declaration of Data Citation Principles - FINAL](#)
- 3 [Taxonomy, Definitions, and Recognition Badging Scheme Working Group](#)
- 4 CrossRef [About us](#)
- 5 <https://www.chorusaccess.org/about/about-chorus/>
- 6 <https://www.stm-assoc.org/standards-technology/2020-stm-research-data-year/>
- 7 <https://www.aau.edu/sites/default/files/AAU%20Files/Key%20Issues/Intellectual%20Property/Scholarly%20Publishing%20Roundtable%20Report%20and%20Recommendations%20-%2012-10.pdf>
- 8 [America Competes Reauthorization Act of 2010](#)

### Background on the IEEE Publications Program

Five million readers from industry, academia, and government visit the IEEE Xplore Digital Library every month to read articles published in over 200 peer-reviewed journals and magazines, and other types of publications. IEEE publications drive innovation and create economic prosperity: U.S. patents filed by the world’s 50 top patenting organizations cite IEEE 3 times more than any other scientific/technical publisher. Fields in which IEEE dominates USPTO citations include AI, autonomous vehicles, blockchain, cybersecurity, and virtual and augmented reality.

IEEE Publication output in 2019 (with growth over 2018)		
Conference Articles	+ 4.0%	192,098
Journal Articles	+ 10.8%	57,442*
Magazine Articles	+ 36.6%	2,470
Standards & Book Chapters	(871 + 614)	1,485
<b>TOTAL</b>		<b>253,495</b>

\* Over 50,000 articles/year without fees to authors