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Comment 1:

Are there steps that agencies could take to grow existing and new markets related to the access and analysis of peer-reviewed publications that result from federally funded scientific research? How can policies for archiving publications and making them publically accessible be used to grow the economy and improve the productivity of the scientific enterprise? What are the relative costs and benefits of such policies? What type of access to these publications is required to maximize U.S. economic growth and improve the productivity of the American scientific enterprise?

Complete, free, and re-usable access to the collection of scholarly output resulting from publicly funded research will dramatically spur market growth and scientific productivity. Several recent studies demonstrate a causal relationship between openness and an increase in the number and diversity of active researchers, an increase in the number of citations, an increase in new research lines, and an increase in upstream and downstream research activities.[1] With free and re-usable access, individuals and institutions—private and public—will drive innovation and invention. As such, open access policy must include liberal and explicit re-use rights in order to ensure the commercial legitimacy of resulting innovations, thereby encouraging, not stifling, economic investment. Finally, earlier access facilitates a quicker development cycle; new products and services are launched faster and more often. The ultimate results of free, re-usable, and timely access to this material will be diverse economic growth and an increased and earlier return on publicly funded research.

The resulting benefits in innovation and invention of supporting and managing an open access policy far outweigh the associated costs. In biomedical research, this is easily demonstrated. A host of recent studies support such a view and the U.S. can look to the

performance of the NIH Public Access Policy and the Human Genome Project as familiar and strong proofs of concept. The NIH reports that it costs between $3.5 and $4.6 million annually to provide access to its funded research results.[2] This figure represents less than 1/100 of 1 percent of the agency's overall budget. [2] Over 500,000 users access PubMed Central daily, demonstrating the profound demand for this information. [2] Initially, nearly $4 billion was invested in the Human Genome Project. Since its inception, an entire industry has developed to support genomic research and R&D. The return on investment is dramatic; in 2010, the industry produced $67 billion in U.S. economic output, $20 billion in personal income for U.S. citizens, and 310,000 jobs. [3] A powerful and specific example can be found at our own institution, Oregon Health & Science University. Our faculty member Dr. Brian Druker and his team developed the groundbreaking cancer drug Gleevec, an endeavor intrinsically linked to the research sharing and advances the Human Genome Project fostered. Gleevec's success has inspired a growing industry of second-generation gene-targeted cancer therapies. Houghton estimates that extending an NIH style open access policy to all other U.S. science funding agencies will conservatively result in a five-fold increase in ROI over a 30-year period with gains on the order of $1.5 billion. [4] Moreover, such an extension can leverage the existing infrastructures, investments, and successful management strategies of the NIH policy and PubMed Central to minimize additional costs. It should also be recognized that openness might reduce upstream expenditures, such as the time/cost of research, unnecessary duplication, and educational outcomes/attainment, lowering the price of research execution.[4] Finally, open access to research increases accountability and enables more efficient funding and policy management. Agencies, budget drafters, and appropriators will have improved accounting on outcomes and enhanced information to assess value, identify promising research, and inform policy decisions.

Comment 2:

What specific steps can be taken to protect the intellectual property interests of publishers, scientists, Federal agencies, and other stakeholders involved with the publication and dissemination of peer-reviewed scholarly publications resulting from federally funded scientific research? Conversely, are there policies that should not be adopted with respect to public access to peer-reviewed scholarly publications so as not to undermine any intellectual property rights of publishers, scientists, Federal agencies, and other stakeholders?

We strongly believe that publishers, scientists, federal agencies, and other stakeholders should be rewarded for the value they add to the research enterprise. Openness has the potential to increase and diversify the commercial and social-good opportunities founded on publically funded research and the associated rewards. Additionally, openness has the potential to increase and diversify the people and institutions participating in the exploration and execution of these opportunities. Working within

existing copyright framework and utilizing a stepped approach can ensure realistic stakeholder protection while enabling the fullest scientific, public, and commercial benefits.

A read-only access policy will not be sufficient. In order to unlock the scientific and commercial potential of publically funded research findings, individuals, institutions, and machines must be able to mine, analyze, and re-use the information. Appropriate licensing, such as the Creative Commons CC-BY 2.0, which allows users to share, re-use, adapt and make commercial use of the publication content, can facilitate this. To balance the interests of all stakeholders, full re-use rights could be activated after an appropriate embargo period.

Comment 3:

What are the pros and cons of centralized and decentralized approaches to managing public access to peer-reviewed scholarly publications that result from federally funded research in terms of interoperability, search, development of analytic tools, and other scientific and commercial opportunities? Are there reasons why a Federal agency (or agencies) should maintain custody of all published content, and are there ways that the government can ensure long-term stewardship if content is distributed across multiple private sources?

Access, technical operability, legal operability, and long-term preservation standards must guide the stewardship framework and its management. Third parties could maintain repositories that meet and demonstrate these conditions, presenting opportunities for partnerships and commercialization. Over the last twenty years, universities, academic libraries, and research institutions have built a network of institutional repositories, including PubMed Central. In the U.S, 235 repositories are currently cited in the Registry of Open Access Repositories. Standards to ensure these databases support human and machine based discovery, access, re-use, and innovation have been developed and continue to evolve. Hundreds of repositories and open access publishers utilize the Open Access Initiative's metadata harvesting protocols, for example. Additionally, a modest commercial sector has developed to support this work. This experience and infrastructure can and should be leveraged.

While access to publically funded research results can be supported through third-party partnerships, the federal government is the appropriate entity to provide ultimate stewardship. It should, at minimum, maintain an accessible mirrored version of all content, and public access policy must address standards and enforcement protocols for third party participation. A government maintained archive, its accessibility, and use is necessary to ensure research investment leverage and preservation. Moreover, as PubMed Central has demonstrated, this stewardship is cost-effective: PMC represents less than 1% of the overall NIH budget.

Comment 4:

Are there models or new ideas for public-private partnerships that take advantage of existing publisher archives and encourage innovation in accessibility and interoperability, while ensuring long- term stewardship of the results of federally funded research?

Yes, there are numerous opportunities for public-private partnerships. The private sectors, and specifically publishers, bring to the table beneficial experience, funding, and technology. We support the creation of private-public partnerships as long as there are sufficient access, operability, and preservation standards and enforcement protocols. A broad view of public-private partnerships is ideal, one that not only recognizes opportunities related to publishers and other private entities as content repositories, but also as discovery experts, technology providers, content re-packagers, and business strategists.

It must be emphasized, however, that a healthy, successful access and preservation policy cannot be tied to a single site access point. Therefore, all associated public-private partnerships should be non-exclusive. As mentioned above, academic libraries, universities, and research institutions have extensive repository experience. This knowledge and infrastructure should also be mined for partnership opportunities with the same broad approach outlined above.

Comment 5:

What steps can be taken by Federal agencies, publishers, and/or scholarly and professional societies to encourage interoperable search, discovery, and analysis capacity across disciplines and archives? What are the minimum core metadata for scholarly publications that must be made available to the public to allow such capabilities? How should Federal agencies make certain that such minimum core metadata associated with peer-reviewed publications resulting from federally funded scientific research are publicly available to ensure that these publications can be easily found and linked to Federal science funding?

Metadata, like the content it describes, has inherent value. In this view, metadata should be seen as facilitating specific actions, not merely as item description. It will be the foundation for discovery, powerful tools, and derivative products. As such, it is important that technical standards guide its definitions, expression, and communication in order to facilitate use, re-use, and analysis.

There are existing practices and standards that can inform these efforts. As mentioned above, the Open Archives Initiative's Protocol for Metadata Harvesting is in wide use

across the archives, repository, and open access publishing communities. The Dublin Core Metadata Initiative and its associated schema have done much to advance the creation and use of interoperable metadata standards for smarter discovery. Additionally, organizations like the National Information Standards Organization (NISO), DataCite, and the Library of Congress are working to ensure more intelligent, flexible discovery especially within the emerging context of the Semantic Web.

Comment 6:

How can Federal agencies that fund science maximize the benefit of public access policies to U.S. taxpayers, and their investment in the peer-reviewed literature, while minimizing burden and costs for stakeholders, including awardee institutions, scientists, publishers, Federal agencies, and libraries?

Inter-institutional requirements and compliance standards for the deposit and delivery of peer-reviewed articles will keep implementation and long-term management costs low. Existing experience, like that of the NIH, can be utilized and improved upon as a cost model. Researchers and institutions rely on and must manage funding from multiple agencies. Standardization will generate better compliance, as stakeholders will be able to better navigate the necessary workflows. Standardization will also reduce the compliance burden on researchers and other content generators: it is absolutely essential that the compliance standards developed do not add to the considerable and ever-increasing regulatory burden that researchers already face. Whatever processes can be automatized should be made so.

Such consistency will also enable responsibility distribution across agencies, awardee organizations, publishers, and other stakeholders. As we have seen with the NIH Public Access Policy and PubMed Central, publishers will be attracted to low-cost, automatic and immediate deposit procedures. Awardee organizations will be better able to build management procedures around compliance. And, deposit and delivery standards will ease the participation of existing and new third-party contributors. This networking of responsibility will reduce costs and influence new market creation.

Finally, inter-institutional standards can serve as the foundation for new tools and services. For example, article deposit could be integrated into the grant management process; funding agencies would benefit from tools that revealed cross agency partnership opportunities; university's would profit from tools that highlight research output; and, researchers would gain from tools that created enhanced bibliographies and investigator profiles.

Comment 7:

Besides scholarly journal articles, should other types of peer- reviewed publications resulting from federally funded research, such as book chapters and conference proceedings, be covered by these public access policies?

Yes, other types of peer-reviewed materials resulting from publically funded research should be made readily accessible to the public. A successful and relevant public access policy must address all of the primary modes of communication for the funded disciplines. Access across these varied modes, will facilitate maximum impact and interdisciplinary discovery. However, the policies governing deposit compliancy should not create additional burdens for researchers and institutions. As mentioned above, policy must address practical and manageable compliance workflows.

Comment 8:

What is the appropriate embargo period after publication before the public is granted free access to the full content of peer-reviewed scholarly publications resulting from federally funded research? Please describe the empirical basis for the recommended embargo period. Analyses that weigh public and private benefits and account for external market factors, such as competition, price changes, library budgets, and other factors, will be particularly useful. Are there evidence-based arguments that can be made that the delay period should be different for specific disciplines or types of publications?

In the ideal world, there would be no delay. Free, immediate access will optimize scientific and commercial use. Faster access will facilitate more cutting edge science, derivative commercial services and market creation. For example, Houghton et al estimate that in contrast to a six-month embargo period, a zero embargo would increase incremental returns in R&D by $120 million (NPV).[4] Overall, studies investigating the citation advantage of open access articles, demonstrate at least a 25% lead.[5]

However, we acknowledge the position of those stakeholders, specifically publishers, who continue to rely on a subscription income. In these cases, limited embargo periods of no longer than 12 months have proven successful. The NIH relies on this timeframe, as do numerous international funders. At this time, we know of no studies or data demonstrating destructive consequences related to these polices.

To date the NIH open access policy has not altered Oregon Health & Science University's journal subscription buying patterns. It is not likely that a significantly reduced embargo period would change this trend, as our researchers need immediate access to this literature. Extending an NIH public access policy to all federal agencies and reducing the embargo period would significantly enhance our community's access to research results not covered by our Library's collection development scope and activities. This enhanced

access could bolster established interdisciplinary research and inspire new interdisciplinary opportunities.

1. Stern, S., Kolev, J., Dewatripont, M., Aghion, P., & Murray, F. (2009). Of Mice and Academics: Examining the Effect of Openness on Innovation. Research Paper or Report. Retrieved December 13, 2011, from http://dash.harvard.edu/handle/1/4554220

2. Battelle Technology Partnership Practice. (2011). Economic Impact of the Human Genome Project. Retrieved December 13, 2011, from http://www.battelle.org/spotlight/5-11-11_genome.aspx

3. ASL. (n.d.). Public Access to Federally-Funded Research. Retrieved December 13, 2011, from http://www.hhs.gov/asl/testify/2010/07/t20100729c.html

4. Houghton, J. (2010). Economic and Social Returns on Investment in Open Archiving Publicly Funded Research Outputs (SPARC). Retrieved December 13, 2011, from http://www.arl.org/sparc/publications/papers/vuFRPAA/index.shtml

5. Wagner, A.B. (2010). Open access citation advantage: An annotated bibliography. Retrieved December 22, 2011 from http://www.istl.org/10-winter/article2.html