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Publication of Government-Funded Research, Open Access, and the Public Interest

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Publication of Government-Funded Research, Open Access, and the Public Interest

*Julie L. Kimbrough**

*Laura N. Gasaway***

ABSTRACT

Public access to government-funded research is an issue of tremendous importance to researchers, librarians, and ordinary citizens around the world. Based on the notion that taxpayers finance research through their tax dollars, research data should be available to them. Rapid, unfettered access to research publications provides access to medical research to patients, encourages further exploration and inquiry by other researchers, informs citizens, and advances scientific research.

Scientists typically write articles that divulge the results of their government-funded research. Prior to the open access movement, these articles were published in commercially produced journals. Subscriptions to these journals are expensive, and cost alone denied

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access to many people interested in the research results revealed in these articles. The open access movement does not prevent commercial publication, but instead provides access immediately or following a specific embargo period. There are both open access journals and commercially published journals that have implemented open access mechanisms.

Open access may also be provided through an institutional repository that makes available scholarly output and research data from members of the institution. The open access movement is not limited to government-funded research, and several foundations and other institutions provide research funding to publish results in open access journals. Although the open access movement continues to gain momentum, federal and state legislation may be required to ensure public access to all unclassified government-funded research.

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I. INTRODUCTION

The publication of government-funded research in open archives permits worldwide access to articles and papers that reveal and describe this research. An understanding of open access (OA) is key to a discussion of the publication of government-funded research so that it is freely available and free of charge. Open access is a movement that has been critically important for the last two decades. Although OA was discussed for several years prior to being well defined, most would say that it really began in the late 1980s with the publication of the first free online journals;¹ OA is made possible because of the Internet and wide availability of network access. OA is not limited to government-funded research, however. There are private publishers that produce OA literature, private foundations, such as the Bill and Melinda Gates Foundation,² as well as universities. Many foreign governments also require open access for publicly funded research.³

Access to government information is often described as the hallmark of a democracy—only an informed citizenry can participate wisely in the democratic process.⁴ Typically, one thinks about this information as data about the government itself produced by federal agencies that permits citizens to participate meaningfully in government. There is also an enormous amount of research funded by the federal government but performed at universities and other research institutions around the world. For years, government funding put no restriction on the publication of articles and books that were produced and commercially published as a result of this funding. With the development of OA, however, demand arose for government-funded information available to the public free of charge, since the public had paid for both the research and the development of

1. See Peter Suber, *Timeline of the Open Access Movement*, EARLHAM COLL. (Feb. 9, 2009), <http://legacy.earlham.edu/~peters/fos/timeline.htm> [<http://perma.cc/UDF3-GH2R>].

2. See *Bill & Melinda Gates Foundation Open Access Policy*, BILL & MELINDA GATES FOUND., <http://www.gatesfoundation.org/how-we-work/general-information/open-access-policy> [<http://perma.cc/GZ3P-ATN3>].

3. See Peter Suber, *Open Access Overview*, EARLHAM COLL. (Feb. 9, 2009), <http://legacy.earlham.edu/~peters/fos/overview.htm> [<http://perma.cc/898J-TRTW>]; see also REGISTRY OF OPEN ACCESS REPOSITORIES MANDATORY ARCHIVING POLICIES (ROARMAP), <http://roarmap.eprints.org/> [<http://perma.cc/F78M-Y3AX>] (listing the current open access mandates for open access around the world).

4. See *Government Information*, AM. LIBRARY ASS'N, <http://www.ala.org/advocacy/govinfo> [<http://perma.cc/N9WW-3ETD>].

the information through tax dollars. These early demands for OA to government-funded information focused on scientific, technical, and medical information, which traditionally has been published by commercial publishers.

A. *Open Access Defined*

The first generally accepted definition of OA came from the Budapest Open Access Initiative (BOAI) developed in 2002. According to the BOAI, OA means:

free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself.⁵

BOAI is based on the idea that the only constraint on the role of copyright for this material should be: (1) the author's right to control the integrity of the work, (2) the right to attribution, and (3) the right to be cited.⁶ The following year, the Bethesda Statement on Open Access Publishing was published, and the Berlin Declaration followed a few months later.⁷ These statements highlight the importance of OA to international researchers and demonstrate that the problem is not solely a US-based issue. Both of these statements declare that for a work to be considered OA, the copyright holder must consent in advance to let users "copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship"⁸

There is great upside to OA publishing. The main benefits are free access to scholarly journal literature and the cost reduction of scholarly publishing. Many studies have indicated that OA, regardless of the business model used, would be cheaper to produce and purchase than commercially published journals because of efficiencies, such as ease of sharing research data, reducing duplicative research, limiting blind alley research, and reducing

5. *Read the Budapest Open Access Initiative*, BUDAPEST OPEN ACCESS INITIATIVE, <http://www.budapestopenaccessinitiative.org/read> [<http://perma.cc/2NFY-QT96>].

6. *See id.*

7. *See* Peter Suber, et al., *Bethesda Statement on Open Access Publishing*, EARLHAM COLL. (June 20, 2003) <http://legacy.earlham.edu/~peters/fos/bethesda.htm> [<http://perma.cc/5WEZ-JLK8>]; *see also* Max Planck, *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities*, OPEN ACCESS, <http://openaccess.mpg.de/Berlin-Declaration> [<http://perma.cc/S9WJ-YAZZ>].

8. Suber, et al., *supra* note 7; Planck, *supra* note 7.

operation costs in research institutions.⁹ Further, OA allows uses far beyond those permitted as fair use under the copyright law.¹⁰ However, achieving the desired level of OA is not necessarily easy because of the wide range of stakeholders: academics, for-profit publishers, university press publishers, scholarly societies, and librarians, all of whom have different—and often competing—interests.¹¹

B. Overview of Article

This Article focuses on public access to US government-funded research. It discusses open access generally, federally-mandated open access publication, state policies, and the problems caused for commercial publishers. Part I defines open access. Part II discusses the public availability of government information, and Part III addresses open access generally, including its importance to libraries, researchers, and the general public. Part IV discusses institutional repositories and their roles in the OA movement. Part V highlights current developments including recent government mandates for OA. Part VI examines the impact of OA on traditional publishers and new models for OA publishing. The Article concludes with a proposal about how open access publishing mandates should best be handled in this country.

II. HISTORY OF PUBLIC AVAILABILITY OF GOVERNMENT INFORMATION AND RESEARCH

The US government is one of the greatest funders of research, but it also produces massive amounts of information and research products. Reflecting the Founders' view that an informed public was essential for successful self-government, public printing of government information has existed in a variety of formats dating back to colonial

9. See Alma Swan, *Policy Guidelines for the Development and Promotion of Open Access*, at 35, UNESCO (Apr. 6, 2012), <http://unesdoc.unesco.org/images/0021/002158/215863e.pdf> [<http://perma.cc/H4LA-KNVQ>] (citing a number of economic studies mentioning these efficiencies, which point out that a variety of studies have shown cost savings by using open access regardless of the mechanism used); see also Christopher J. Ryan, Jr., *Not-So-Open Access to Legal Scholarship: Balancing Stakeholder Interests with Copyright Principles*, 20 RICH. J.L. & TECH. 1, 8 (2014) (citing Timothy K. Armstrong, *Crowdsourcing and Open Access: Collaborative Techniques for Disseminating Legal Materials and Scholarship*, 26 SANTA CLARA COMPUT. & HIGH TECH. L.J. 591, 593, 597 (2010)).

10. See MARTIN PAUL EVE, *OPEN ACCESS AND THE HUMANITIES: CONTEXTS, CONTROVERSIES AND THE FUTURE* 1–2 (2014).

11. See *id.* at 30.

times.¹² For most of the country's history, public access to governmental information sources has depended on decisions made by individual government entities and statutory mandates that either help or hinder public access. The US Government Publishing Office was known as the US Government Printing Office (GPO) until 2014, when it requested legislative approval for a name change to reflect its changing mission.¹³ With the establishment of the GPO in 1861, the United States took a major step toward ending a long history of privately printed government documents.¹⁴ Additionally, the Printing Act of 1895 created the Federal Depository Library Program (FDLP).¹⁵ Copies of many published documents from all three branches of government are widely available through more than 1,200 public libraries that participate in the FDLP. In order to understand the current state of public access to US government-funded research, it is important to review the history of public availability of government information sources from all three branches of the federal government.

The legislative branch provided public access to congressional proceedings as early as 1774 with the publication of records of the Continental Congress.¹⁶ The *House Journal* and *Senate Journal* continued that mandate beginning with the first session of Congress and continuing today.¹⁷ The *United States Congressional Serial Set*, dating back to 1817, contains consecutively numbered documents that represent a significant portion of the historical record of Congress.¹⁸ At over fifteen thousand volumes, the *Serial Set* provides researchers with a wealth of information, including congressional committee reports and documents, treaties, presidential messages, certain executive branch documents (such as the annual *Budget of the United States Government*), and even some non-governmental publications (such as the annual reports from organizations such as the Boy Scouts

12. See generally US GOV'T PRINTING OFFICE, KEEPING AMERICA INFORMED: THE U.S. GOVERNMENT PRINTING OFFICE: 150 YEARS OF SERVICE TO THE NATION (2011), <http://www.gpo.gov/fdsys/pkg/GPO-KEEPINGAMERICAINFORMED/pdf/GPO-KEEPINGAMERICAINFORMED.pdf> [<http://perma.cc/3FTV-8NQ4>] [hereinafter KEEPING AMERICA INFORMED].

13. See Bridget Bowman, *From 'Printing' to 'Publishing': The GPO Has a New Name*, ROLL CALL (Dec. 17, 2014, 11:57 AM), <http://blogs.rollcall.com/hill-blotter/from-printing-to-publishing-the-gpo-has-a-new-name/?dcz=> [<http://perma.cc/KL6B-X4BB>].

14. See KEEPING AMERICA INFORMED, *supra* note 12 (describing the official history of the US Government Printing Office).

15. See *id.*

16. See *A Century of Lawmaking for a New Nation*, LIBRARY OF CONGRESS (May 1, 2003), <http://memory.loc.gov/ammem/amlaw/> [<http://perma.cc/6V65-4KNY>].

17. See *id.*

18. See Virginia Saunders, *U.S. Congressional Serial Set: What It Is and Its History*, US GOV'T PRINTING OFFICE (Sept. 6, 2000), http://www.access.gpo.gov/su_docs/fdplp/history/ssset/index.html [<http://perma.cc/TQ2A-DFPC>].

of America and the Daughters of the American Revolution).¹⁹ The *Serial Set* is arguably the single most important source for researchers seeking access to historical US government information.

While legislative proceedings and other records of the federal legislative branch are widely available to the public via federal depository libraries, research conducted by the Congressional Research Service (CRS) remains accessible only through a direct request to a Member of Congress or through third parties, including nonprofit organizations that post reports on the Internet and for-profit companies that charge for retrieval services or access to a database.²⁰ This nonprofit model of access is faltering, however. Within the last year, one of the largest free websites for CRS Reports, the non-profit OpenCRS, shut down without notice, citing a lack of resources and time to continue posting reports.²¹ In contrast, two other agencies that provide research to the legislative branch, the Government Accountability Office (GAO) and the Congressional Budget Office (CBO), post their non-confidential reports on publicly accessible websites.²²

The CRS is a division of the Library of Congress that employs attorneys, political analysts, librarians, and other subject-matter experts to produce nonpartisan reports and documents requested by members of Congress. At a cost to taxpayers of more than \$100 million each year, CRS Reports provide clearly written explanations of complex policy issues as well as citations to sources of law; they are widely respected and often cited by judges, legal scholars, and the media.²³ While Congress originally directed that all CRS Reports remain unavailable to the public, legislation has been introduced in recent years that would require the legislative branch to create and maintain a free public online database of CRS materials.²⁴ Indeed, Congressman Mike Quigley (D-IL), a cosponsor of the most recent resolution, stated in a press release: “By making these taxpayer-funded reports more accessible to the public, we can increase

19. See Richard J. McKinney, *An Overview of the U.S. Congressional Serial Set*, LAW LIBRARIANS' SOC'Y OF WASH., D.C. (Sept. 2012), <http://www.llsdc.org/serial-set-volumes-guide#Overview> [<http://perma.cc/L6PS-4JQA>].

20. See Colby Itkowitz, *Public Pays for Congressional Reports It Can't See*, WASH. POST (Jan. 14, 2015), <http://www.washingtonpost.com/blogs/in-the-loop/wp/2015/01/14/public-pays-for-congressional-reports-it-cant-see/> [<http://perma.cc/QT2W-NR97>].

21. See *id.*

22. See *About GAO Reports*, GOV'T ACCOUNTABILITY OFFICE, <http://www.gao.gov/about/products/about-gao-reports.html> [<http://perma.cc/A4D2-LXC4>].

23. See Matthew Rumsey, *It's Time to Give the Public Access to CRS Reports*, SUNLIGHT FOUND. (Mar. 7, 2013, 12:42 PM), <http://sunlightfoundation.com/blog/2013/03/07/its-time-to-give-the-public-access-to-crs-reports/> [<http://perma.cc/XL4C-LVM2>].

24. See *id.*

transparency and empower every day citizens to continue being the government's best watchdog."²⁵

In the executive branch, availability of government-funded research has generally depended on the individual agency's approach to public accessibility. Some federal agencies that conduct and fund scientific research are among the leaders in providing free public access to that research.²⁶ The Environmental Protection Agency, for example, established an agency website in 1994 and soon began posting full-text versions of scientific and technical reports and data online.²⁷

In contrast, Securities and Exchange Commission (SEC) filings and US Patent and Trademark Office (USPTO) filings were only available either for a fee or required a visit to the agency's Washington headquarters until the 1990s. For the SEC and USPTO, the catalyst for change came in the form of open-government activist Carl Malamud. In 1993, the SEC announced the creation of the Electronic Data Gathering, Analysis, and Retrieval System (EDGAR), a database of SEC filings. Direct access to EDGAR data was available to Internet users through file transfer protocol.²⁸ Open-government advocates feared the SEC would follow the pattern of other early federal government databases by contracting with a private company to repackage and sell the database at an exorbitant cost.²⁹ With support from Rep. Edward Markey (D-Mass.), the Internet Multicasting Service (Malamud's nonprofit), and the New York University Stern School of Business, Malamud received a National Science Foundation (NSF) grant to develop EDGAR as a freely available keyword searchable database.³⁰ The free EDGAR database proved extremely popular. Eighteen months later, the NSF grant funds ran out, and Malamud announced the database would be taken offline.³¹

25. Press Release, Rep. Mike Quigley Quigley, Lance Lead Bipartisan Push to Grant Public Access to Congressional Research (Mar. 7, 2013), <http://quigley.house.gov/media-center/press-releases/quigley-lance-lead-bipartisan-push-to-grant-public-access-to> [<http://perma.cc/5LTK-JCMR>].

26. See Suber, *supra* note 1.

27. See, *EPA History*, U.S. ENVTL. PROT. AGENCY <http://www2.epa.gov/aboutepa/epa-history> [<http://perma.cc/Z86Q-9UEB>].

28. See Laurie Flynn, *The Executive Computer; Need Timely S.E.C. Corporate Filings? Look on Internet*, N.Y. TIMES (Jun. 19, 1994), <http://www.nytimes.com/1994/06/19/business/the-executive-computer-need-timely-sec-corporate-filings-look-on-internet.html> (last visited Nov. 4, 2015).

29. See GRAEME BROWNING, *ELECTRONIC DEMOCRACY: USING THE INTERNET TO TRANSFORM AMERICAN POLITICS*, 40–41 (2d ed. 2002).

30. See *id.*

31. See *id.*

Similarly, free online access to USPTO filings came about as the result of public pressure by nonprofit groups, including Carl Malamud's Internet Multicasting Service, which had posted filings from the USPTO database along with SEC EDGAR filings.³² For many years, the USPTO charged a fee to retrieve patent and trademark filings.³³ Even after the advent of the Internet, patent searching was available only through paid databases provided by Lexis or Dialog or by visiting the USPTO in Washington and paying the \$40 hourly fee to search the database at a dedicated computer terminal.³⁴ Until 1998, the USPTO maintained that the agency's funding model would not permit free access to patent and trademark filings because this toll was a source of \$20 million in annual revenue.³⁵ Malamud's public pressure on the USPTO commissioner included a letter to Vice President Al Gore that was copied to the *New York Times*.³⁶ In the letter, Malamud noted that the free Internet Multicasting Service database of USPTO and SEC filings had fifty thousand users per day and that he had posted the database's source code and cost estimates online in an effort to persuade the agencies to create their own freely accessible databases.³⁷ Eventually, both the SEC and the USPTO began hosting their own databases and providing free public access as a result of this activism.

From a database development perspective, Extensible Markup Language (XML) has important implications for interoperability of systems among federal agencies, metadata, and other underlying descriptive information.³⁸ XML is a "flexible, nonproprietary set of standards for annotating or 'tagging' information so that it can be transmitted over a network such as the Internet and readily interpreted by disparate computer systems."³⁹ Public access advocates including the American Association of Law Libraries (AALL) and nonprofit open-government groups have pushed federal agencies to provide free access to XML versions of government information

32. Letter from Carl Malamud, President & CEO, Internet Multicasting Serv., to Al Gore, Vice President, US (Apr. 27, 1998), <https://public.resource.org/letter.html> [<https://perma.cc/PA54-M27Z>].

33. James Gleick, *Fast Forward; Washington Unplugged*, N.Y. TIMES MAG. (Aug. 6, 1995), <http://www.nytimes.com/1995/08/06/magazine/fast-forward-washington-unplugged.html> (last visited Nov. 9, 2015).

34. *Id.*

35. Malamud, *supra* note 32.

36. *Id.*

37. *Id.*

38. DAVID L. MCCLURE, US GEN. ACCOUNTING OFFICE, GAO-02-327, ELECTRONIC GOVERNMENT: CHALLENGES TO EFFECTIVE ADOPTION OF THE EXTENSIBLE MARKUP LANGUAGE 2 (2002).

39. *Id.*

sources.⁴⁰ This is an important step for innovation since developers need access to the underlying source code in order to create new research databases. In 2009, access to the source code and the ability to bulk download data for the *Federal Register* cost \$17,000; the same access for patent grant data cost \$39,000.⁴¹ Thanks to the work of public access advocates, the bulk XML data for the Federal Register is now freely available on the GPO's FDsys website.⁴² The USPTO still charges for some bulk versions of trademark data and patent grant data, but others are freely available for download on the USPTO website.⁴³

In comparison to the executive and legislative branches, the federal judicial system receives a relatively small amount of research funding.⁴⁴ It does, however, have a research and education agency called the Federal Judicial Center (FJC) that was established by statute in 1967.⁴⁵ Many FJC publications are freely available on the Center's website.⁴⁶ Of greater significance for legal researchers and citizens, the federal judiciary has prioritized free online publication of judicial opinions via court websites. US Supreme Court opinions, for example, are available on the Supreme Court website minutes after they are handed down by the Court.⁴⁷ Generally, individual federal courts have posted judicial opinions on each court's own website; thus, availability of archived opinions varies. While this piecemeal

40. Mary Alice Baish & Emily Feltren, *White House, GPO and NARA Collaborate on Release of XML Version of Federal Register*, AM. ASS'N L. LIBR. WASH. BLAWG (Oct. 6, 2009), <https://aallwash.wordpress.com/2009/10/> [<https://perma.cc/CY8Q-TD4D>].

41. Letter from Carl Malamud, President & CEO, Public.Resource.Org., to Vivek Kundra, Chief Info. Officer, Office of Mgmt. and Budget, and Ansh Chopra, Chief Tech. Officer, Office of Sci. & Tech. Pol'y, Exec. Office of the President (July 14, 2009), <https://public.resource.org/scribd/17329782.pdf> [<https://perma.cc/D6C2-PHLQ>].

42. *Federal Register Bulk Data*, US GOV'T PUBLISHING OFFICE, <http://www.gpo.gov/fdsys/bulkdata/FR> [<http://perma.cc/AY64-QCAY>].

43. *Electronic and Bulk Data Products*, US PAT. & TRADEMARK OFFICE, <http://www.uspto.gov/learning-and-resources/electronic-bulk-data-products> [<http://perma.cc/6MEK-T4GR>].

44. JOHN F. SARGENT, JR., CONG. RESEARCH SERV., R43944, FEDERAL RESEARCH AND DEVELOPMENT FUNDING: FY2016 4 (2015), <https://www.fas.org/sgp/crs/misc/R43944.pdf> [<https://perma.cc/4SM4-LF73>] ("Under President Obama's FY2016 budget request, seven federal agencies would receive more than 95% of total federal R&D funding: the Department of Defense (DOD), 49.5%; Department of Health and Human Services (HHS) (primarily the National Institutes of Health (NIH)), 21.3%; Department of Energy (DOE), 8.6%; National Aeronautics and Space Administration (NASA), 8.4%; National Science Foundation (NSF), 4.3%; Department of Agriculture (USDA), 2.0%; and Department of Commerce (DOC), 1.5%.")

45. *See About the FJC*, US FED. JUDICIAL CTR., <http://www.fjc.gov/> [<http://perma.cc/9DLA-RLZC>].

46. *Publications and Video Catalog*, US FED. JUDICIAL CTR., http://www.fjc.gov/library/fjc_catalog.nsf [<http://perma.cc/FL6D-KPWB>].

47. *Slip Opinions*, US SUPREME COURT, <http://www.supremecourt.gov/opinions/slipopinions.aspx> [<http://perma.cc/4XZJ-7U3D>].

approach to official posting of federal judicial opinions does create challenges for users, many free websites provide full-text judicial opinions. Notably, Google Scholar has taken the lead in creating an OA collection of US federal and state case law that includes a citatory and advanced search features.⁴⁸

In 1988, the Judicial Conference of the United States established a centralized electronic service, Public Access to Court Electronic Records (PACER), which has evolved into a robust online site that provides case and docket information and filings for federal appellate, district, and bankruptcy courts.⁴⁹ For OA advocates, PACER poses some challenges since there is a per-page charge for users to download filings. Library organizations and advocacy groups, including AALL, have urged both Congress and the Administrative Office of the Courts to fund no-fee access to PACER through the FDLP.⁵⁰

III. OPEN ACCESS GENERALLY

A. *Open Access and Copyright*

Scientific, technical, and medical (STM) information generally is published first in a journal. While there are certainly STM books produced, the need for timely distribution of research in STM fields traditionally has meant publication in journals, particularly commercially produced journals. The authors of these articles own the copyright in the articles they produce. Authors typically transfer that copyright (or only the rights of reproduction and distribution) to the publisher of the journal. At a minimum, publishers must have those two rights in order to publish the work in print. In order to publish the work online, the publisher also needs the display right to cover display of the work on the computer screen repeatedly. This online display may be considered a public display, one of the exclusive rights of the copyright owner. Academic institutions and the terms of federal grants have allowed the authors to retain copyright in any articles produced from funded research.

48. Thomas Bruce, *Caselaw is Set Free, What Next?*, GOOGLE SCHOLAR BLOG (Oct. 20, 2014), <http://googlescholar.blogspot.com/2014/10/caselaw-is-set-free-what-next.html> [http://perma.cc/ULJ4-5CNS].

49. PUB. ACCESS TO COURT ELEC. RECORDS, <https://www.pacer.gov/> [https://perma.cc/V6Q8-CKQ6].

50. *Public Access to Court Electronic Records (PACER)*, AM. ASS'N L. LIBR. (Nov. 20, 2011), <http://aallnet.org/Documents/Government-Relations/Issue-Briefs-and-Reports/2011/PACERonepager.pdf> [http://perma.cc/JHL3-MQQS].

Overly restrictive copyright assignments are one of the phenomena that led to the call for OA publishing. Certainly, publishers have a variety of approaches to copyright assignment, and some do require a complete transfer of copyright from the author to the publisher. Other publishers instead ask for an exclusive license to publish.⁵¹ It is easy to understand why a publisher might seek a copyright transfer since that gives total control to the publisher for new geographical markets or in forms not covered in the license to publish.⁵² For authors, however, the problem is that he or she must seek permission to reproduce his or her own work for classes, to use the article as a chapter in a later book, or other uses falling outside the scope of the journal's publication agreement. Faculty authors often need to publish in the most prestigious journal in their fields that will accept their articles in order to improve their status for tenure and promotion and to generate invitations to participate in scholarly societies and conferences. Therefore, academic institutions have found it extremely important but also challenging to educate faculty about copyright law and the importance of negotiating publishing agreements. Many faculty members who transfer their copyrights to publishers likely have little awareness about the cost of those journals to their university libraries.⁵³ Campuses have offered workshops and published guides for faculty to explain copyright law and publishing contracts.⁵⁴

Once such a transfer of copyright is executed, the author may not later change his or her mind and place the work in an OA repository. While commercial publishers traditionally required transfer of the entire copyright in order to exploit the work, at their discretion, however, some publishers increasingly allow the author to post the article on his or her own website, use it for classes, or place the item in an institutional repository.⁵⁵ This is important to faculty members who may later want to update the article and publish a new edition, use the article as a chapter in a later-written book, as well as use the work for students in their classes. Further, permitting greater author use of his or her article creates a less adversarial relationship between the author and the publisher. Most STM journal publishers are profit driven, and they expect payment through journal

51. EVE, *supra* note 10, at 87.

52. *Id.* at 88.

53. *Id.* at 37–38.

54. See, e.g., *Statement on Publishing Agreement*, COMM. ON INSTITUTIONAL COOPERATION (Aug. 19, 2013), <http://www.cic.net/docs/default-source/library/authorsrights.pdf> [<http://perma.cc/FN2T-RZT6>].

55. EVE, *supra* note 10, at 88.

subscriptions, reprints, and other royalties for reproduction of articles from their journals. Few authors are paid for their contributions to STM journals; moreover, authors often must pay page charges in order to be published.⁵⁶ Page charges or author fees are paid per article to cover certain costs of publication. One study from Outsell of Burlingame, California, indicates that STM publishing generated \$9.4 billion in revenue in 2011.⁵⁷ The actual cost of publishing an article ranges between \$3,500 and \$4,000, which includes an estimated profit margin of 20 to 30 percent.⁵⁸

The OA movement focused first on literature that authors made available to the world with no expectation of payment. There are generally two types of OA: self-archiving and OA journals. Self-archiving OA is often called “green access”;⁵⁹ it was reported in 2009 that about 12 percent of the scientific journal literature was available as green access.⁶⁰ OA journals represent so-called “gold access,” which attempts to make this literature available in open format from the time of first publication. These journals are supported by page charges, which typically means that either the author or the author’s institution is paying fees to publish the article or that contributions fund the author’s publishing cost.⁶¹ It is estimated that page charges range from \$1,000 to \$5,000 per article or contribution.⁶² The overwhelming majority of these fees are paid by the author’s institution.⁶³ Author-pay OA journals are not the only model, however. In fact, most OA journals are not author-pay.⁶⁴

OA publishing of scholarly articles in the social sciences and humanities has lagged behind STM. One significant difference in

56. Suber, *supra* note 3. Page charges are defined as fees the author is required to pay the publisher to underwrite the cost of publication.

57. Richard Van Noorden, *The True Cost of Science Publishing: Cheap Open-Access Journals Raise Questions about the Value Publishers Add for Their Money*, 495 NATURE 426, 427 (2013) <http://www.nature.com/news/open-access-the-true-cost-of-science-publishing-1.12676> [<http://perma.cc/7MVZ-GYYY>].

58. *Id.*

59. See Part IV of this Article for a discussion of self-archiving.

60. Bo-Christer Bjork, et al., *Open Access to the Scientific Journal Literature: Situation 2009*, 5 PLOS ONE 6 (2010) <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0011273> [<http://perma.cc/7MHP-P6GU>].

61. Jorge L. Contreras, *Confronting the Crisis in Scientific Publishing: Latency, Licensing, and Access*, 53 SANTA CLARA L. REV. 492, 528–29 (2013).

62. See Maria Leptin, *Open Access—Pass the Buck*, 335 SCIENCE 1279 (2012), <https://www.sciencemag.org/content/335/6074/1279.full> (last visited Nov. 9, 2015).

63. See Suber, *supra* note 3.

64. Stuart Shiebe, *What Percentage of Open-Access Journals Charge Publication Fees*, HARV. L. BLOG: OCCASIONAL PAMPHLET (May 29, 2009), <http://blogs.law.harvard.edu/pamphlet/2009/05/29/what-percentage-of-open-access-journals-charge-publication-fees/> [<http://perma.cc/BY5M-37MZ>].

these subject fields is the lack of availability of federal grant funding in the social sciences and humanities (with the exception of psychology). Another reason may be that the OA movement was initiated in the sciences. Additionally, scholarly society publishers in the social sciences and humanities traditionally considered their publications to be a primary benefit of membership in that society.⁶⁵ However, this is changing as scholarly societies themselves begin to do OA publishing.⁶⁶ The *Catalog of Societies and Open Access Research* lists 891 societies that published 856 OA journals; 692 of which are in STM and engineering, ninety-five are in social science, fifty-one are in the humanities, and six are in the arts. Additionally, ten journals cover multiple disciplines.⁶⁷

OA is not incompatible with copyright or peer reviewing of journal literature. In fact, most of the major OA journals utilize peer reviewing just as commercially produced journals do. OA is neither a business model nor a license; it not limited to type of content. Instead, it is a kind of access. To illustrate, OA is not synonymous with universal access as there can still be censorship, language barriers, connectivity problems, and access to disabled users barriers.⁶⁸

Although OA was first available for journal literature, it is now being used for research monographs. OA could apply to any digital content, including video, audio, multimedia, and software.⁶⁹ One of the major thrusts of OA is the licenses offered through the Creative Commons (CC). “Creative Commons . . . is a nonprofit organization that enables the sharing and use of creativity and knowledge through free legal tools.”⁷⁰ CC has developed a series of easy-to-use licenses that provide various types of OA at the author’s choice;⁷¹ the number of works licensed with CC licenses totaled 882 million by the end of

65. REBECCA KENNISON & LISA NORBERG, A SCALABLE AND SUSTAINABLE APPROACH TO OPEN ACCESS PUBLISHING AND ARCHIVING FOR HUMANITIES AND SOCIAL SCIENCES: A WHITE PAPER (2014), http://knconsultants.org/wp-content/uploads/2014/01/OA_Proposal_White_Paper_Final.pdf [<http://perma.cc/QG9U-Q7N2>].

66. EVE, *supra* note 10, at 38–39. The Linguistic Society of America began OA publishing in 2007 with the journal SEMANTICS & PRAGMATICS. A scholarly society is a membership organization that promotes an academic discipline; examples include the Association of American Law Schools, the American Physical Society, and the Modern Language Association.

67. *Societies and Open Access Research*, HARV. OPEN ACCESS PROJECT, http://cyber.law.harvard.edu/hoap/Societies_and_Open_Access_Research [<http://perma.cc/G6Z9-3U89>].

68. See Suber, *supra* note 3.

69. *Id.*

70. CREATIVE COMMONS, <http://creativecommons.org/about> [<http://perma.cc/UFT4-5GVB>].

71. *Id.*

2014.⁷² The most common type of CC license is the attribution license by which the author offers the work in OA with the only restriction being that he or she be given credit for the work should someone else use it. This license even permits commercial use. Other types of CC licenses are: (1) *attribution-sharealike*, which permits use by others, even for commercial purposes, as long as they credit the author and license new creations using the work under the same terms; (2) *attribution-no derivative works*, which permits the distribution with attribution but no derivative works; (3) *attribution-noncommercial* is the same as number one above, but with no commercial use; (4) *attribution-noncommercial-sharealike* combines numbers one and two above with no commercial use; and (5) *attribution-noncommercial-no derivatives* is the most restrictive of the CC licenses. One may download, use, and share the work if credit is given, but no changes may be made in the work and commercial use is prohibited. CC also provides a form for putting a work in the public domain.⁷³

Along with the many benefits of OA, there are also some disadvantages. Even though the end user does not pay to read an article, there are still publication costs that must be covered, either by private grant, donation, publication fees, or by research grant. Although this will not be a problem with reputable OA publishers, the incentive to publish more articles could lead to less quality control if peer reviewing is not retained and well managed. For example, a hoax article by an editor of the journal *Science* was accepted by many OA journals. There is also concern about the sustainability of OA in the long run, such as the ability to sustain the research infrastructure because it requires considerable institution support.⁷⁴

B. Importance of Open Access to Libraries

OA publishing is extremely important to libraries. Certainly, OA means greater availability of works to all types of libraries. It also means that more people can benefit from the scholarly endeavors of university faculty members, allowing faculty research to have greater impact on the world. OA also helps to reduce library costs by reducing the need to subscribe to expensive journals, the annual cost of which

72. *Id.*

73. *CC0*, CREATIVE COMMONS, <https://creativecommons.org/choose/zero/> [<https://perma.cc/YWQ8-5AF4>].

74. Adam Geib, *Advantages and Disadvantages of Open Access*, EDANZ, (Oct. 25, 2013), http://www.edanzediting.com/blog/advantages_and_disadvantages_open_access [<http://perma.cc/89QH-TSXF>].

can be more than \$20,000 for a single title.⁷⁵ Further, it increases the “prospects for long-term preservation of scholarly works.”⁷⁶ According to the Association of Research Libraries, library expenditures for serials increased 456 percent from 1986 to 2012.⁷⁷ This enormous increase is one of the major factors that led to the call for OA journal literature.

C. Importance to Researchers

Many science and biomedical researchers, especially those who work in corporations and well-funded universities, were comfortable with the old publishing regime because their organizations could afford high subscription costs or royalties for individual articles. Researchers who worked in other institutions and companies found it difficult to access the literature that they needed to complete their work—primarily due to cost constraints. Further, researchers in other countries, especially those in developing countries, have not had access to this literature due to lack of access and cost. Especially with medical information, the ability to develop cures for disease, new drugs to treat diseases, and new medical techniques demands that medical information be widely available free of charge. Ingrid Daubechies, President of the International Mathematical Union, not only signed onto a boycott of commercial publishing, but also resigned her position as an unpaid Elsevier editor. She stated that “[w]e feel that the social compact is broken at present by some publishing houses, of which we feel Elsevier is the most extreme.”⁷⁸

Further, many STM authors are university faculty members, and they want to help their institutions deal with the prices of expensive academic journals. The price of STM journals has increased more over the last thirty-five years than the price of journals in other fields, and the trend is continuing.⁷⁹ Authors are also depositing manuscripts and papers in institutional repositories (discussed below)

75. *Open Access: Why Open Access Is Important*, EMORY LIBRARIES & INFO. TECH, <http://guides.main.library.emory.edu/c.php?g=50081&p=324335> [<http://perma.cc/XH3B-8DQE>].

76. Edward M. Corrado, *The Importance of Open Access, Open Source, and Open Standards for Libraries*, ISSUES IN SCI. & TECH. LIBRARIANSHIP, (Spring 2005), <http://www.istl.org/05-spring/article2.html> [<http://perma.cc/HF2C-YTY4>].

77. *ARL Statistics 2009*, ASS'N RESEARCH LIBRARIES, <http://www.arl.org/storage/documents/expenditure-trends.pdf> [<http://perma.cc/ZG3E-ZZB7>].

78. Thomas Lin, *Mathematicians Organize Boycott of a Publisher*, N.Y. TIMES (Feb. 13, 2012), http://www.nytimes.com/2012/02/14/science/researchers-boycott-elsevier-journal-publisher.html?_r=0 (last visited Nov. 12, 2015).

79. Contreras, *supra* note 61, at 495.

as a way to increase the availability of their works. Some even are publishing with Creative Commons licenses, which are OA.⁸⁰

There are also additional large repositories of OA that are not associated with any particular academic institution. The Social Science Research Network (SSRN) is comprised of a number of social science research networks and is dedicated to the worldwide dissemination of social science research. SSRN encourages early dispensation of research results by distributing abstracts. The SSRN eLibrary has both an abstract database with over 581,800 scholarly working papers and forthcoming papers as well as an electronic paper collection currently containing over 526,300 downloadable full-text documents in Portable Document Format (PDF).⁸¹

D. Importance to the General Public

OA is important to others in addition to librarians and researchers. It gives authors a worldwide audience and increased visibility for their work, gives readers barrier-free access to literature, and particularly helps both people in developing countries and those in less wealthy institutions. OA helps teachers by permitting them to bring current research into their classrooms.⁸² It benefits universities by increasing the visibility of their researchers and the scholarly work they produce. For the general public, OA provides taxpayers with free access to the research they helped to fund,⁸³ and to persons around the world, OA provides access to essential life-saving research that could lead to the development of new medicines and other potential benefits.

“At its core, open access, particularly public access to scholarly research, is grounded in considerations of transparency, accountability, democratic legitimacy, and fulfillment of perhaps the most fundamental function of academia—providing educational service to the public.”⁸⁴ The primary educational service enabled by OA is public availability of research results. The Association of Research Libraries identifies three advantages to the public of OA publishing. It provides: (1) access to material in broad areas of

80. See Creative Commons discussion in Section III.A.

81. SOC. SCI RESEARCH NETWORK, <http://www.ssrn.com/en/> [<http://perma.cc/4KWC-EETG>].

82. Moreover, there are open educational resources, which are extremely useful to schools. See *Open Education*, SPARC, <http://www.sparc.arl.org/issues/oer> [<http://perma.cc/UR4E-YVA4>] for a discussion of open education resources. An example is the OER COMMONS, <https://www.oercommons.org/> [<https://perma.cc/C39T-5CXL>].

83. *Why Is Open Access Important*, N.D. STATE UNIV. LIBRARY, <https://library.ndsu.edu/tutorials/open-access-basics/why-open-access-important> [<https://perma.cc/L4HN-Y4AS>].

84. Ryan, *supra* note 9.

interest that has not been previously available, (2) a better-educated citizenry, and (3) citizen engagement in scientific development while encouraging the support of science generally and scientific research.⁸⁵ When such literature is widely available, its usage increases.⁸⁶

Much of this literature is not available in public libraries, and availability to peer-reviewed scholarly literature is of tremendous benefit to members of the public. Even if the public does not read or study the literature directly, it benefits indirectly from researchers' access, which will result in new scientific discoveries, medicines, and other useful technological developments.⁸⁷ Serious hobbyists are more than capable of not only following the scientific literature, but are also capable of contributing to the advancement of knowledge. For example, there are many serious amateur astronomers, and some are very likely to report new events in the heavens even before professional astronomers do so.⁸⁸ There are also indirect benefits to the public. Access to this literature can assist journalists in investigating problems and, perhaps, in proposing solutions. Further, journalists can translate medical discoveries to the general public through their reporting. OA can also help to stimulate public support for universities by making scholarly research generally available.⁸⁹

In addition to OA, a similar push for open data is occurring. Open data is defined as data that may be freely used and redistributed by anyone. Open data does not require that the data be free of charge, but simply that any charge be no more than a reasonable reproduction cost. Presumably, this would be accomplished via downloading from the Internet. Such data should also be "available in a convenient and modifiable form." Redistribution should include the ability to intermix the data with other datasets. The only restrictions on the use of open data would be attribution-sharealike, which means that commercial use could not be prohibited.⁹⁰

85. *Why Open Access?*, SPARC, www.sparc.arl.org/resources/open-access/why-oa [<http://perma.cc/TA97-7LVG>].

86. Swan, *supra* note 9.

87. Suber, *supra* note 3.

88. Calla Cofield, *Mysterious Mars Plume Discovery Is Amateur Astronomy at Its Best*, SPACE.COM (Mar. 3, 2015), <http://www.space.com/28670-mystery-mars-plumes-amateur-astronomy.html> [<http://perma.cc/A98G-QSLM>].

89. Heather Morrison, *The Direct and Indirect Benefits of Open Access for the Public*, IMAGINARY J. OF POETIC ECON., (Apr. 22, 2010) <http://poeticeconomics.blogspot.com/2010/04/direct-and-indirect-benefits-of-open.html> [<http://perma.cc/7LWX-Q5MX>].

90. OPEN DATA HANDBOOK, <http://opendatahandbook.org/en/what-is-open-data/> [<http://perma.cc/633Y-MDYA>].

E. SPARC and PubMed

In the United States and around the world, libraries and library organizations have played a critical role in the advancement of public access to government-funded research. The Scholarly Publishing and Academic Resources Coalition (SPARC) was created by the Association of Research Libraries in 1998.⁹¹ With more than eight hundred member institutions, SPARC is an international coalition of academic and research libraries focused on “advancing the understanding and implementation of policies and practices that ensure Open Access to scholarly research outputs.”⁹² SPARC’s advocacy efforts focus on many issues of importance to libraries throughout the world, including an emphasis on expanding and creating ways to disseminate scholarly research, thus alleviating some of the tremendous financial pressures for libraries.⁹³

One of SPARC’s earliest major initiatives was the creation of a new model for academic journals published in direct partnership with a scholarly society with the goal of increasing access to research through a reduction in prices of STM journals.⁹⁴ SPARC’s first journal, *Organic Letters*, was published in collaboration with the American Chemical Society in 1999.⁹⁵ Other SPARC co-sponsored journals include *Evolutionary Ecology Research* and the *New Journal of Physics*. In addition, SPARC’s partnership with American Institute of Biological Sciences led to the creation of BioOne, a web-based aggregation of research published in peer-reviewed journals in the biological, ecological, and environmental sciences.⁹⁶

In recent years, SPARC has turned its focus to OA advocacy related to scholarly research articles, open data, and open educational resources. While this Article focuses primarily on articles as the output of research, open data initiatives are an increasingly important part of the public access discourse. In 2013, President Obama issued

91. *Governance*, SPARC, <http://www.sparc.arl.org/about/governance> [http://perma.cc/X3QK-G2G5].

92. *About Us*, SPARC, <http://www.sparc.arl.org/about> [http://perma.cc/WLE7-6BGW].

93. *Id.*

94. Suzanne E. Thorin, *Global Changes in Scholarly Communication*, LIBRARIES’ & LIBRARIANS’ PUBL’NS. 7 (2003), <http://surface.syr.edu/cgi/viewcontent.cgi?article=1019&context=sul> [http://perma.cc/FTX7-U86A].

95. Mary E. Case, *Capitalizing on Competition: The Economic Underpinnings of SPARC*, SPARC, <http://www.sparc.arl.org/resources/papers-guides/case-capitalizing> [http://perma.cc/CM92-AU42].

96. *Id.*

an Executive Order requiring all government-funded data to be open and machine readable.⁹⁷

In 2005, the National Institutes of Health (NIH) became the first federal agency to require publication of agency-funded research in a freely available online database—the National Library of Medicine’s groundbreaking digital archive, PubMed Central (PMC).⁹⁸ NIH is the largest funder of medical research in the world, and the NIH Public Access Policy represented a significant step forward for OA to government-funded medical research.⁹⁹ The Fiscal Year 2009 Omnibus Appropriations Act codified the existing NIH Public Access Policy, thus ensuring public access to publications resulting from NIH-funded research.¹⁰⁰

Since its founding in 1999, PMC has grown to include more than 3.3 million full-text articles.¹⁰¹ All articles deposited into PMC are archived as XML files, thus rendering all the files both human and machine readable without any dependence on a specific type of technology that may become obsolete.¹⁰² PMC was designed to serve not only as a repository providing enhanced metadata and interoperability with other databases, but also as an archive that preserves access to its content in perpetuity.¹⁰³

97. Making Open & Machine Readable The New Default For Government Information, 3 C.F.R. § 13642 (2013).

98. PubMed Central is operated by the National Center for Biotechnology Information (NCBI), a division of the National Library of Medicine (NLM) at the US National Institutes of Health (NIH). *PMC FAQs*, NAT’L CTR. BIOTECH. INFO., <http://www.ncbi.nlm.nih.gov/pmc/about/faq/> [https://perma.cc/P4FE-EFES?type=source].

99. *About NIH*, NAT’L INSTS. OF HEALTH, <http://www.nih.gov/about/> [http://perma.cc/DPE4-5Q22]; see Ray English, *RFI Comments Results: Public Access Request for Information*, NAT’L INSTS. OF HEALTH (May 31, 2008), http://publicaccess.nih.gov/comments2/comments_web_listing.htm?display2=all&sort=date [http://perma.cc/RYSV-F6WJ].

100.

The Director of the National Institutes of Health (“NIH”) shall require in the current fiscal year and thereafter that all investigators funded by the NIH submit or have submitted for them to the National Library of Medicine’s PubMed Central an electronic version of their final, peer-reviewed manuscripts upon acceptance for publication, to be made publicly available no later than 12 months after the official date of publication: Provided, that the NIH shall implement the public access policy in a manner consistent with copyright law.

Omnibus Appropriations Act, Pub. L. No. 111-8, § 217, 123 Stat. 524, 782 (2009).

101. See *PMC FAQs: What is PubMed Central (PMC)?*, NAT’L CTR. BIOTECH. INFO., <http://www.ncbi.nlm.nih.gov/pmc/> [http://perma.cc/P4FE-EFES]; NCBI, *PMC FAQs: What is the Difference Between PMC and PubMed*, NAT’L CTR. BIOTECH. INFO., <http://www.ncbi.nlm.nih.gov/pmc> [https://perma.cc/P4FE-EFES].

102. Chris Maloney et al., *PubMed Central*, in *THE NCBI HANDBOOK* (Jeffrey Beck et al. eds., 2d ed. 2013), <http://www.ncbi.nlm.nih.gov/books/NBK153388/> [http://perma.cc/8NAQ-KKF9].

103. Ryan, *supra* note 9.

F. Measurements of Success

OA journals currently represent about one-quarter of all peer-reviewed journals.¹⁰⁴ As of January 2015, the Directory of Open Access Journals, currently the most authoritative index of OA journals and the only one limited to peer-reviewed journals, listed 10,190 OA journals in 136 countries, with more than 1.8 million articles.¹⁰⁵ To measure the progress of green OA, it is also useful to track the growth of repositories. The Registry of Open Access Repositories, hosted by the University of Southampton in the United Kingdom, harvests repository information and currently lists 3,924 repositories, up from only 128 at the end of 2005.¹⁰⁶

Because the OA movement is only a couple decades old, it can be somewhat challenging to find a single measure of success. Martin Eve, a well-known humanities scholar and OA advocate in the United Kingdom, says:

[T]he economic challenges of the shifts to both green and gold open access are amplified by the fact that there is no unified global response, despite the international collaborative nature of the original declarations. This creates a problem because academia and the publishing industry are clearly global in their natures.¹⁰⁷

There are, however, ways to measure the economic impact as well as the positive impact on academic scholarship. Many studies that measure this impact have taken place outside the United States, primarily in Europe and the United Kingdom. John Houghton and Peter Sheehan, researchers at the Victoria Institute of Strategic Economic Studies, conducted the first major economic impact study in 2006. Using gross expenditure on research and development as a measure, Houghton and Sheehan concluded that transitioning to OA would add \$16 billion per year to the US economy and \$1.7 billion per year to that of the United Kingdom.¹⁰⁸

104. *Id.* at 144.

105. *Frequently Asked Questions*, DIR.Y. OF OPEN ACCESS JOURNALS, <http://doaj.org/faq> [<https://perma.cc/DW49-845M>].

106. Stephen Pinfield et al., *Open-Access Repositories Worldwide, 2005–12: Past Growth, Current Characteristics and Future Possibilities*, 65 J. AM. SOC'Y INFO. SCI. & TECH. 2404 (2014); see *Welcome to the Registry of Open Access Repositories*, REGISTRY OF OPEN ACCESS REPOSITORIES, <http://roar.eprints.org/> [<https://perma.cc/NUX6-HMDS>].

107. EVE, *supra* note 10, at 76–77.

108. PETER SUBER, OPEN ACCESS 213 (2012) (*citing* John Houghton & Peter Sheehan, *The Economic Impact of Enhanced Access to Research Findings*, Ctr. for Strategic Econ. Studies, Victoria Univ., Working Paper No. 23, July 2006).

IV. INSTITUTIONAL REPOSITORIES

A. *Types of Repositories*

A short definition of institutional repository is “an online archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution.”¹⁰⁹ The goal of institutional repositories is to collect articles, essays, and other academic materials produced by faculty, students, and staff to make them available as OA. They use an international set of standards for the metadata that makes them interoperable; the common protocol they use is the Open Archives Initiative Protocol for Metadata Harvesting. One can search across repositories through Google, Google Scholar, and other search engines.

OA advocates generally refer to repositories as green OA, while journals are known as gold OA.¹¹⁰ Journals and repositories are by far the dominant methods of disseminating OA content. While there continues to be great debate over which method of OA offers the best outcome for authors, publishers, and readers, repositories have some distinct advantages from an archival perspective.

The most common types of repositories are disciplinary and institutional. Disciplinary repositories (also known as subject repositories) generally attempt to include all the research in a particular field of study.¹¹¹ Institutional repositories seek to provide access to all the research created at a given institution. While disciplinary repositories are subject-specific and institutional repositories highlight the work of affiliated scholars, both types of repositories enhance access to scholarship and provide platforms for scholars who wish to share their work with a wider audience.¹¹²

109. Clifford A. Lynch, *Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age*, ARL, (2003) <http://www.arl.org/storage/documents/publications/arl-br-226.pdf> [<http://perma.cc/6WLB-6CKY>].

110. Suber, *supra* note 3, at 5.

111. See *Disciplinary Repositories*, OPEN ACCESS DIR'Y., http://oad.simmons.edu/oadwiki/Disciplinary_repositories [<http://perma.cc/G26H-7B52>].

112. Philip M. Davis & Matthew J.L. Connolly, *Institutional Repositories: Evaluating the Reasons for Non-use of Cornell University's Installation of DSpace*, 13 D-LIB MAG. 3, 4 (2007), <http://www.dlib.org/dlib/march07/davis/03davis.html> [<http://perma.cc/7WZV-ZPYR>].

V. CURRENT DEVELOPMENTS AND MANDATES

A. *White House Policy*

According to the National Science Foundation, the US government budget for Fiscal Year 2011 included \$61.2 billion for non-defense-related Research and Development (R&D).¹¹³ A 2014 NSF report notes that the nondefense categories include R&D in the areas of “health, space research and technology, energy, general science, natural resources and environment, transportation, agriculture, education, international affairs, veterans benefits, and a number of other small categories related to economic and governance matters.”¹¹⁴ In 2013, the White House Office of Science and Technology Policy (OSTP) issued an executive directive that represents an important step forward in US OA policy. The *Executive Directive on Increasing Access to the Results of Federally Funded Scientific Research* requires federal agencies with more than \$100 million in annual R&D expenditures to make the published, peer-reviewed articles and the data that result from that research freely available on the Internet.¹¹⁵ According to the directive:

Scientific research supported by the Federal Government catalyzes innovative breakthroughs that drive our economy. The results of that research become the grist for new insights and are assets for progress in areas such as health, energy, the environment, agriculture, and national security.¹¹⁶

While the new policy has the potential to greatly enhance access to the results of federally funded research, it also includes some limitations intended to balance the interests of authors and publishers by mirroring the twelve-month maximum embargo implemented at the NIH.¹¹⁷ As required under the directive, within one year all

113. Defense related R&D accounted for about \$83.2 billion, or 58 percent, of the budget in FY2011. NAT'L SCI. FOUND., RESEARCH AND DEVELOPMENT: NATIONAL TRENDS AND INTERNATIONAL COMPARISONS, SCI. ENGINEERING INDICATORS 2014 4–32 (Feb. 2014), <http://www.nsf.gov/statistics/seind14/index.cfm/chapter-4/c4s6.htm> [https://perma.cc/ZY5Y-RU5B].

114. *Id.*

115. OFFICE OF SCI. & TECH. POL'Y., EXEC. OFFICE OF THE PRESIDENT, MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES ON INCREASING ACCESS TO THE RESULTS OF FEDERALLY FUNDED SCIENTIFIC RESEARCH (Feb. 22, 2013), https://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf [https://perma.cc/T92V-2MGC].

116. *Id.* at 1.

117. *NIH Public Access Policy Details*, US DEPT. OF HEALTH & HUM. SERVS., <http://publicaccess.nih.gov/policy.htm> [http://perma.cc/Y9HC-G492].

affected federal agencies submitted draft plans to the OSTP.¹¹⁸ In August 2014, the Department of Energy (DOE) became the first federal agency to announce a final plan in response to the directive.¹¹⁹ The DOE Public Access Plan will increase public access to unclassified and otherwise unrestricted publications and datasets that result from DOE funding.¹²⁰

B. Proposed Legislation

In recent years, several pieces of federal OA legislation have been introduced, starting with the Federal Research Public Access Act in the 112th Congress.¹²¹ After that bill failed to pass, the Fair Access to Science and Technology Research Act (FASTR Act) was introduced during the 113th Congress.¹²² With bipartisan sponsorship and identical bills introduced in both the House and Senate, the FASTR Act included broad requirements for OA at all federal agencies with annual “extramural research expenditures” of at least \$100 million.¹²³ Each included agency would be required to develop a “federal research public access policy” consistent with the agency’s own practices for collection and dissemination of the results of research funded by that agency.¹²⁴ Further, the FASTR Act required articles to be posted in a centralized online database with a maximum six-month embargo period after publication.

While the FASTR Act did not pass the 113th Congress, the bill has served as a model for state legislation in New York and California, and some of its provisions were included in the Fiscal Year 2014 Omnibus Appropriations Act (“FY 2014 Omnibus”). The FASTR Act was again introduced in the 114th Congress.¹²⁵ The companion House and Senate bills have both been favorably reported by their assigned

118. OFFICE OF SCI. AND TECH. POL’Y, LETTER ON JOINT EXPLANATORY STATEMENT FOR 2014 OMNIBUS (Mar. 24, 2014), https://www.whitehouse.gov/sites/default/files/microsites/ostp/OpenAccess_March-2014.pdf [<https://perma.cc/GB62-LNC4>].

119. *U.S. Department of Energy Increases Access to Results of DOE-funded Scientific Research*, US DEPT. OF ENERGY (Aug. 4, 2015), <http://www.energy.gov/articles/us-department-energy-increases-access-results-doe-funded-scientific-research> [<https://perma.cc/PZ5H-7828>].

120. US DEPT. OF ENERGY, PUBLIC ACCESS PLAN (July 24, 2014), http://www.energy.gov/sites/prod/files/2014/08/f18/DOE_Public_AccessPlan_FINAL.pdf [<http://perma.cc/GPP7-KZDV>].

121. H.R. 4004, 112th Congress, <https://www.congress.gov/bill/112th-congress/house-bill/4004> [<https://perma.cc/G2NH-KKKZ>].

122. H.R. 708, 113th Congress, <https://www.congress.gov/bill/113th-congress/house-bill/708> [<http://perma.cc/7MS9-D8FD>]; S. 350, 113th Congress, <https://www.congress.gov/bill/113th-congress/senate-bill/350> [<https://perma.cc/BL9E-Q6SG>].

123. *Id.*

124. *Id.*

125. S. 779, 114th Cong. (1st Sess. 2015); H.R. 1477, 114th Cong. (1st Sess. 2015).

committees. The FY 2014 Omnibus also codified language from the White House Executive Directive requiring:

federal agencies under the Labor, Health and Human Services, and Education portion of the Omnibus bill with research budgets of \$100 million or more to provide the public with online access to articles reporting on federally-funded research no later than 12 months after publication in a peer-reviewed journal.¹²⁶

The passage of the appropriations bill brought the total of federally-funded research covered by the open access mandate to just over \$31 billion out of \$61 billion in annual federal funding for scientific research.¹²⁷ While this OA expansion represents significant progress for access to federally funded research, important research from smaller agencies is not included. With each step toward expanding public access to government-funded research, there are issues that remain unresolved. The embargo period is a major source of division between publishers and OA advocates because embargoes restrict availability of scholarly articles for a specified period of time determined by the publisher. Publisher advocacy groups, including the Association of American Publishers, cite studies that show “many published journals are used by more than half their subscribers long after [twelve] months from publication.”¹²⁸ OA advocates generally favor immediate, barrier-free access to scholarly articles. According to a 2014 statement signed by SPARC and several international scholarly associations, “embargo periods dilute the benefits of open access policies” and should only be used during a transitional period to develop support for OA with a preference for no more than six months in life sciences and twelve months in the humanities.¹²⁹

Some important federally funded scientific research still remains outside the OA requirement because it is funded by agencies with research budgets below the \$100 million mark.¹³⁰ The NSF and the National Aeronautics and Space Administration are two notable examples. Both agencies, however, have publicly expressed support for OA goals and announced their intent to collaborate with other

126. FY Omnibus Appropriations Bill, SPARC, <http://www.sparc.arl.org/advocacy/national/2014omnibusbill> [<https://perma.cc/HE3H-898E>].

127. Ian Chant, *Federal Spending Bill Expands Research Funding With Open Access Mandate, Restores IMLS Funding*, LIBRARY J. (Jan. 23, 2014), <http://lj.libraryjournal.com/2014/01/budgets-funding/federal-spending-bill-expands-research-funding-with-open-access-mandate/> [<https://perma.cc/7FGV-QECF>].

128. Chant, *supra* note 127.

129. *SPARC Joins Major International Associations in Support of Immediate Access to Research Articles*, SPARC (May 14, 2014), <http://www.sparc.arl.org/news/sparc-joins-major-international-associations-support-immediate-open-access-research-articles> [<http://perma.cc/6CCZ-ULU6>].

130. Chant, *supra* note 127.

agencies to meet the requirements of the White House Directive.¹³¹ The NSF has a strong track record of expanding public access to scientific research, and its current director stated:

Full public access will require changes in policies, procedures and practices from the many stakeholders who participate in NSF's broad research portfolio spanning all scientific and engineering disciplines. We stand with our federal science colleagues, as well as our non-governmental partners, to collaborate in accomplishing this transition on behalf of science and our nation's future.¹³²

C. State Law Developments and Policies

At the state level, OA policy implementation is still in its infancy. Only three states, California, Illinois, and New York, have introduced or enacted OA-related legislation. In 2014, the California Assembly passed the California Taxpayer Access to Publicly Funded Research Act, which applies to some state-funded research.¹³³ The California Act is an important first step in state-level OA policy implementation. The law does have some limitations, however; it applies only to research funded by the state's Department of Public Health.¹³⁴ The law also includes a twelve-month embargo that reflects the current policy of the NIH. Researchers whose work is accepted by a peer-reviewed journal also have the option to make their work available in a variety of publicly accessible databases.¹³⁵

The Illinois legislature considered and passed a different kind of OA legislation in 2013.¹³⁶ As introduced, the bill required public colleges and universities to develop OA policies within one year.¹³⁷ After several amendments, the final version of the bill required each university to create an "Open Access to Research Task Force" that will make recommendations on developing a campus-wide OA policy.¹³⁸ In New York, a bill was introduced during the 2013–14 legislative

131. Press Release, Nat'l Science Found., National Science Foundation Collaborates with Federal Partners to Plan for Comprehensive Public Access to Research Results (Feb. 22, 2013), http://www.nsf.gov/news/news_summ.jsp?cntn_id=127043 [<https://perma.cc/J8MR-UQFZ>].

132. *Id.*

133. Assemb. B. 609, 2013–14 Assemb., (Cal. 2014) http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB609&search_keywords= [<http://perma.cc/7QQH-EMFK>].

134. *Id.*

135. Lisa Peet, *AB 609: California Leads on Open Access to Publicly Funded Research*, LIBRARY J. (Jan. 20, 2015), <http://lj.libraryjournal.com/2014/11/legislation/ab-609-california-leads-on-open-access-to-publicly-funded-research/> [<http://perma.cc/R8YZ-WAWR>].

136. S.B. 1900, 98th Gen. Assemb., (Ill. 2013), <http://www.ilga.gov/legislation/billstatus.asp?DocNum=1900&GAID=12&GA=98&DocTypeID=SB&LegID=73096&SessionID=85> [<http://perma.cc/EZ8F-BDNY>].

137. *Id.*

138. *Id.*

session that would have required most state-funded research to be deposited in a freely available online database with a six-month embargo.¹³⁹ However, the legislature did not act on this bill during the 2013–14 legislative session. A similar bill has been introduced in the 2015–16 legislative session.¹⁴⁰

VI. IMPACT OF OA ON PUBLISHERS AND NEW MODELS FOR OA PUBLISHING

“It is the histories of academic publishing that shape current practice and determine the possibilities for academic discourse and, therefore, communication.”¹⁴¹ Clearly, publication is a valuable part of the business of knowledge making.¹⁴² Publishers provide a number of important services in the process of publishing scholarly articles and making them available, whether available only in print, only electronically, or in both formats. Publishers posit that only they have the ability and “capacity to program and support the production process utilizing economies of scale to create the underlying knowledge management structures that allow effective database searching and delivery of quality products,” all done in a timely manner.¹⁴³ After selecting the articles through an expensive peer review process, publishers incur both direct and indirect expenses. Direct expenses include editorial services, such as content editing, citation checking, and clearing permissions. Preparing the article for publication is also a direct cost; these activities include copy editing, getting approvals from authors, preparing the pages, indexing, proofreading, adding images, and final composition.¹⁴⁴ Indirect costs incurred include marketing, developing and maintaining online systems (both internal and for external access), sales and licensing, investment in software and hardware for linking, archiving and tracking, and participation in publishing industry activities, such as

139. S. 4050, 2013–14 Sess. (N.Y. 2013), <http://open.nysenate.gov/legislation/api/1.0/lrs-print/bill/S4050-2013> [<http://perma.cc/8FUE-R6NT>].

140. S. 3952, 2015–16 Sess. (N.Y. 2015), <https://www.nysenate.gov/legislation/bills/2015/S3952> [<http://perma.cc/TN4C-M72D>].

141. EVE, *supra* note 10, at 138.

142. Bill Cope & Mary Kalantzis, *Signs of Epistemic Disruption: Transformations in the Knowledge System of the Academic Journal*, in *THE FUTURE OF THE ACADEMIC JOURNAL* 13, 13 (Bill Cope & Angus Phillips eds., 2009).

143. Andrew Jakubowicz, *Beyond the Static Text: Multimedia Interactivity in Academic Journal Publishing in the Humanities and Social Sciences (Not)*, in *THE FUTURE OF THE ACADEMIC JOURNAL*, *supra* note 142 at 361, 363.

144. *Learn More About Scholarly Information*, ASS’N AM. PUBLISHERS, <http://publishers.org/our-markets/professional-scholarly-publishing/learn-more-about-scholarly-information> [<http://perma.cc/CF4W-A4UP>].

the development of standards.¹⁴⁵ All of these actions are aimed at making a profit or generating income to support other activities of the publisher.

Journals traditionally have been a very profitable arm of the publishing industry due to the fact that they are funded on a subscription basis and have a degree of predictability for income. Further, journals have proven to be less price sensitive than other forms of publishing.¹⁴⁶ The publishing industry estimates the output of STM journals are 64 percent by commercial publishers, 30 percent by learned societies, 4 percent by university presses, and 2 percent by other entities.¹⁴⁷ About half of all STM journals are nonprofit publishers, although it is somewhat difficult to estimate since a number of commercial publishers distribute learned society journals.¹⁴⁸ There were approximately twenty-eight thousand active scholarly, peer-reviewed journals in 2012, which collectively publish 1.8 to 1.9 million articles annually.¹⁴⁹

A. Effect on Traditional Publishers

OA has doubtlessly impacted commercial publishers but also university presses and society publishers. They have had little choice but to become engaged in OA, however, because of both reader demand and mandates from federal agencies for OA publishing. Failure to comply with mandates “means that researchers, their institutions and ultimately publishers are putting their future funding at risk.”¹⁵⁰

Starting a new journal is an expensive proposition for a publisher. A publisher anticipates that it will lose money during the first three to five years after the journal is introduced. Over seven years, the publisher hopes only to cover the cumulative loss.¹⁵¹ The more a publisher invests in each paper it publishes, and the more

145. *Id.*

146. Angus Phillips, *Business Models in Journal Publishing*, in *THE FUTURE OF THE ACADEMIC JOURNAL*, *supra* note 142, at 87–88.

147. MARK WARE CONSULTING, *THE STM REPORT* (2013), <http://www.markwareconsulting.com/the-stm-report/> <http://perma.cc/X4NK-RSEU>].

148. ASS'N AM. PUBLISHERS, *supra* note 144 (MARK WARE CONSULTING, *SCIENTIFIC PUBLISHING IN TRANSITION: AN OVERVIEW OF CURRENT DEVELOPMENTS*, (2006), www.stm-assoc.org/2006_09_01_Scientific_Publishing_in_Transition_White_Paper.pdf [<http://perma.cc/ME5L-RQYL>]).

149. WARE, *supra* note 147.

150. Jennifer Goodrich, *Foreword* to ROB JOHNSON, *MAKING OPEN ACCESS WORK FOR AUTHORS, INSTITUTIONS AND PUBLISHERS: A REPORT ON AN OPEN ACCESS ROUNDTABLE HOSTED BY COPYRIGHT CLEARANCE CENTER, INC.* 3 (2015).

151. ASS'N AM. PUBLISHERS, *supra* note 144.

articles it rejects after the peer review process, the more expensive the journal is likely to be.¹⁵² Some advocate post-publication reviewing as an alternative process, but that method does not provide the same quality control as peer reviewing prior to publication.¹⁵³ Further, electronic publishing has not reduced the costs for publishers because most of the direct and indirect costs are incurred before the journal is ever published. In fact, some commentators posit that the costs are actually higher because of the higher-level technical experts who are needed.¹⁵⁴ It is estimated that 60 to 80 percent of the costs incurred by publishers are fixed costs regardless of the business model used.¹⁵⁵ One author estimates that the production cost for a journal article is \$3,400 for publication in a commercial journal and \$730 for an OA article,¹⁵⁶ but others disagree and believe that the total costs for OA journals are underestimated.¹⁵⁷

B. Publishers' New Business Models

There are a number of alternative models used by publishers of scholarly journals in lieu of, or in addition to, subscriptions. Pay-for-view involves searching for the article on Google, locating it, and then paying per article. This system, however, rarely makes up more than 10 percent of a publisher's income.¹⁵⁸ Other alternatives involve reliance on advertising income, sponsorship, and grants in addition to OA.¹⁵⁹

Over 90 percent of STM journals are now available online, and digitization of back issues continues at a rapid pace. Subscription income, much of it in the form of license fees, makes up 90 percent of journal income.¹⁶⁰ Large commercial publishers appear to advocate the status quo subscription or license fee model. They have increased subscription costs at unprecedented rates from 1984 to 2001: 393 percent in economics, 479 percent in physics, and 615 percent in chemistry.¹⁶¹ These price increases point to large publishers' affinity

152. Van Noorden, *supra* note 57, at 428.

153. ASS'N AM. PUBLISHERS, *supra* note 144.

154. *Id.*

155. Phillips, *supra* note 146, at 93.

156. Cope & Kalantzis, *supra* note 142, at 30–31 (citing Roger Clarke, *The Cost Profiles of Alternative Approaches to Journal Publishing*, FIRST MONDAY (Dec. 3, 2007), <http://firstmonday.org/ojs/index.php/fm/article/view/2048/1906> [<http://perma.cc/7VJG-W2WE>]).

157. Van Noorden, *supra* note 57.

158. Cope & Kalantzis, *supra* note 142, at 13.

159. Phillips, *supra* note 146, at 95–96.

160. *Id.*

161. Cope & Kalantzis, *supra* note 142, at 23.

for the status quo. “The fact that large publishers have used the reader-pays model when they were free to choose an author-pays or other alternative model suggests that the reader-pays model has been judged to be the most profitable.”¹⁶² While some players in the pay-to-use model are small publishers or societies, the majority of entities are large publishers.¹⁶³

Traditional journal publishers are moving into OA despite their quite negative initial reactions and their view that the shift could be a major threat to their businesses. As was predicted, most of the stakeholders want OA: authors, funders, librarians, the research community, and members of the public who are aware of the problem.¹⁶⁴ It appears likely that both this widespread support and government mandates have led to the adoption of OA by both nonprofit and commercial publishers. It was estimated that in 2011, 12 percent of the published scholarly articles were available via OA, with a further 5 percent available via delayed access and about 10 to 12 percent available via open repositories.¹⁶⁵

Concerns remain about the sustainability of OA by commercial publishers with newer models of OA, which some commentators say are yet untested.¹⁶⁶ One size does not fit all, however. Publishers provide a variety of distribution models and initiatives. Sources of funding include author pay (typically through his or her institution), private foundation contributions, and licensing journal contents to third parties.¹⁶⁷

One model used by commercial publishers is the so-called hybrid model whereby they offer journals that possess some aspects of OA,¹⁶⁸ having OA articles appearing alongside ones that are not so available. In the hybrid model, the author may pay a fee for OA, but that fee may be discounted for authors whose institutions subscribe to the journal.¹⁶⁹ The hybrid journals may be simply a transitional model on the way to OA, and some experts believe that more than

162. Mark J. McCabe & Christopher M. Snyder, *The Best Business Model for Scholarly Journals: An Economists Perspective*, NATURE (July 16, 2004), <http://www.nature.com/nature/focus/accessdebate/28.html> [<http://perma.cc/Y98Z-8QTH>].

163. Cope & Kalantzis, *supra* note 142, at 23.

164. See EVE, *supra* note 10, at 22.

165. MARK WARE CONSULTING, *supra* note 149.

166. EVE, *supra* note 10, at 34–35.

167. ASS'N AM. PUBLISHERS, *supra* note 144.

168. See *id.*; see also Phillips, *supra* note 146, at 101.

169. Phillips, *supra* note 146, at 97.

likely these journals will become gold OA journals over the next ten to fifteen years.¹⁷⁰

Not all stakeholders in the academic research and scholarship process are negative about the role of commercial publishers. “Publishers perform necessary labour that must be compensated and any new system of dissemination such as open access, will require an entity to perform this labour, even if that labour takes a different form at different levels of compensation.”¹⁷¹ A few publishers have been creative in developing new features and tools to conform to the new working patterns of scholars. One example is open peer reviewing, where readers can comment on an article posted on the publisher’s own website. Linking to and from deposited data is also becoming more prevalent.¹⁷² At the same time, however, traditional publishers have not been much involved with common tools adopted by researchers, such as blogs and wikis. Small publishers and societies may lack the financial resources to experiment with these new methods of scholarly communication.¹⁷³ In addition to management of the most important functions of publishing, there are also publishers that add additional value with editorial commentary. Some critics of these publishers question whether these efforts are worth the cost.¹⁷⁴ But if scholars continue to want the filtering, extra features, and other services provided by publishers, someone will have to perform these services—even if this burden falls upon the author.¹⁷⁵

Even if the publisher does not allow OA, one study indicates that 45 percent of publishers, including some of the largest commercial publishers that publish a huge percentage of the STM journals, do allow author archiving in institutional repositories of both pre-prints and accepted journal articles.¹⁷⁶ The world’s largest STM publishers offer some journals or articles via OA, although

170. Santiago Chumbe, *Are Hybrid Journals Here to Stay for Many Years to Come?*, JEMO (Mar. 27, 2014), <https://openjemo.wordpress.com/2014/03/27/are-hybrid-journals-here-to-stay-for-many-years-to-come/> [<https://perma.cc/CB94-UHZK>].

171. EVE, *supra* note 10, at 151.

172. Phillips, *supra* note 146, at 93.

173. Sally Morris, “*The Tiger in the Corner*”: *Will Journals Matter to Tomorrow’s Scholars?*, in *THE FUTURE OF THE ACADEMIC JOURNAL*, *supra* note 142, at 382–83.

174. Van Noorden, *supra* note 57, at 427.

175. See EVE, *supra* note 10, at 151.

176. ASS’N AM. PUBLISHERS, *supra* note 144 (citing STM, *SCIENTIFIC PUBLISHING IN TRANSITION: AN OVERVIEW OF CURRENT DEVELOPMENTS* 23 (Sept. 2006), http://www.stm-assoc.org/2006_09_01_Scientific_Publishing_in_Transition_White_Paper.pdf [<http://perma.cc/PU5B-EMJ3>]).

subscription support is likely to continue as the predominant model for many years to come.¹⁷⁷

C. Commercial Publishers Engaged in OA

Regardless of the reason, commercial publishers have begun to offer OA journals. Some of these journals are new, and some are available in both print and digital versions. The difficulty for these publishers is determining how to offer OA while still remaining profitable.

For publishers that have hybrid or OA journals, managing author fees has been a major issue. Many STM publishers rely on the Copyright Clearance Center (CCC) to manage author-processing fees through its RightsLink for Open Access, a platform for managing author charges. The CCC describes RightsLink for Open Access as streamlining “the entire author fee transaction by seamlessly integrating with editorial and production workflows, including Aries Systems’ Editorial Manager®.”¹⁷⁸ The goal is to provide greater consistency and automation to achieve efficiencies.¹⁷⁹ Managing these processing charges is complicated due to multiple authors and payment arrangements, specific funder requirements, discounts based on the author’s country of origin, institutional memberships, and discounts based on society membership.¹⁸⁰ The list of publishers that have adopted RightsLink continues to grow and includes the largest STM publishers.¹⁸¹

177. The world’s largest STM publishers offer some journals or articles via OA, although subscription support is likely to continue as the predominant model for many years to come. *Open Science*, ELSEVIER, <http://www.elsevier.com/about/open-science> [<http://perma.cc/Y3D4-DJ8V>]. Thompson-Reuters provides a linked list of OA journals on its website. *Open Access Journal Title List—Science*, THOMPSON-REUTERS, <http://science.thomsonreuters.com/cgi-bin/linksj/opensearch.cgi> [<http://perma.cc/3GYD-C3QG>]. Springer has been a leader in commercial publisher OA. *Open Access*, SPRINGER, <http://www.springer.com/open+access?SGWID=0-169302-0-0-0>; [<http://perma.cc/GSL2-NBCA>]. John Wiley has a wide range of OA journals. *Wiley Open Access*, JOHN WILEY, <http://www.wileyopenaccess.com/view/index.html> [<http://perma.cc/6HCZ-H675>].

178. *RightsLink for Open Access*, COPYRIGHT CLEARANCE CTR., <http://www.copyright.com/content/cc3/en/toolbar/productsAndSolutions/open-access.html> [<http://perma.cc/ZLR6-Y533>].

179. ROB JOHNSON, MAKING OPEN ACCESS WORK FOR AUTHORS, INSTITUTIONS AND PUBLISHERS: A REPORT ON AN OPEN ACCESS ROUNDTABLE HOSTED BY COPYRIGHT CLEARANCE CENTER, INC. 4 (2015), <http://www.copyright.com/content/dam/cc3/marketing/documents/pdfs/Report-Making-Open-Access-Work.pdf> [<https://perma.cc/Q2JA-E2F8>].

180. *Id.* at 11.

181. *See Rights Central*, COPYRIGHT CLEARANCE CTR., https://rightscentral.copyright.com/content/rightscentral/en/toolbar_main_content/products-and-services/rightslink/rightslink-enabled.html [<https://perma.cc/B5KD-MN6K>].

VII. CONCLUSION

The mission of scholarly journals remains the same, whether published in print, electronically, or in both formats: to disseminate scholarship, further knowledge in the discipline, and establish communities for exchange of information and ideas. In many disciplines, journals form the fundamental repository of knowledge and are the repository of information about the development of theories and history in a field.¹⁸² Scholarly communication is rapidly developing, however:

[T]he possibilities are rapidly becoming probabilities with every sign that we will soon be tracking the memes and tropes of individual authors through some combination of attribute tags, link-back trails, and other identifiers that can generate quantitative data and map a scholar's active life.¹⁸³

OA and open data enhance the ways researchers can work together. Scholars are now working in new ways to collaborate with other scholars in real time and around the world. Data can be collected and processed by these diverse scholars located in distant lands, and they can easily communicate with one another. One drawback might be the difficulty in tracking individual contributions, but it may be that this will be less important in a more collaborative environment. Options used to be limited to discussion with one's own colleagues in the same location, presenting ideas at conferences (perhaps first as a poster and later as a written paper), and conversing with other attendees at the conference. The author would then convert the paper into an article, share preprints with other scholars upon request, and finally publish the paper or article in a peer-reviewed journal.

Scholars increasingly are relying on chats via blogs, and these can make a tremendous difference in the production of the final paper. It is possible that formal means of scholarly communications (journal publication) are being replaced by informal means to some extent. Many peer-reviewed journals will not continue to be static documents in the future. Instead, published articles may be amended and

182. COUNCIL OF EDITORS OF LEARNED JOURNALS, THE CONTRIBUTIONS OF JOURNAL AND EDITORS TO THE SCHOLARLY COMMUNITY AND THE RESPONSIBILITY OF UNIVERSITIES TO FOSTER ACADEMIC COMMUNICATION THROUGH SCHOLARLY AND CREATIVE JOURNALS 1 (2011), <http://www.celj.org/sites/default/files/CELJ%20Letter%20of%20Support%20for%20Editors.pdf> [<http://perma.cc/29X9-5DNM>].

183. Johanna Drucker, *Scholarly Publishing: Micro Units and the Macro Scale*, 1 AMODERN: THE FUTURE OF SCHOLARLY PUBLISHING 1, 1 (2015), <http://amodern.net/article/scholarly-publishing-micro-units-and-the-macro-scale/> [<http://perma.cc/EA59-WDXS>].

updated with the results of new research.¹⁸⁴ The role of editor may be on its way to being replaced by that of a group as a whole, which may mean that the formal role of the journal is in question.¹⁸⁵

A. Does the United States Have a Duty to the Rest of the World?

According to the NSF, in 2011, the United States was the largest producer of R&D in the world, and “the top three R&D-performing countries—United States, China, and Japan—accounted for over half of the estimated \$1.435 trillion in global R&D”¹⁸⁶ While the United States may be the largest producer of scholarly research, it has lagged behind other nations in providing free public access to government-funded research. According to the Sunlight Foundation, parliaments in 85 percent of G-20 countries provide public access to reports created by their legislative research groups.¹⁸⁷ Meanwhile, in the United States, outdated statutory language constrains the CRS from spending any government funds to provide public access to its own reports.¹⁸⁸

Medical research provides OA advocates with their strongest case that the United States has a duty to share government-funded research with the rest of the world. Medical research can be difficult and expensive to access, and economically disadvantaged populations here and around the world are generally unable to access the results of research that could be lifesaving innovations. During many recent world health crises, including the 2014 Ebola outbreak, organizations, such as the NIH, have made previously embargoed articles available to healthcare workers involved in treating patients for a specific disease.¹⁸⁹ These limited arrangements provide critical and timely access to new research when it is desperately needed, but they should not be considered “open access.”

184. Morris, *supra* note 173, at 380–81.

185. *Id.* at 381. Examples cited include the fact that in computer science, the publication of conference reports are more important than journals and in economics, top authors are moving away from top journals.

186. NAT’L SCI. FOUND., *supra* note 113, at 4.

187. Rumsey, *supra* note 23.

188. Letter from Am. Ass’n Law Libraries to Ben Nelson, Chairman, Senate Comm. on Appropriations, Subcomm. on Legislative Branch (Apr. 5, 2011), <http://aallnet.org/Documents/Government-Relations/FormalStatements/2011/t040511Nelson.pdf> [<http://perma.cc/P3AE-SH7E>].

189. See *Emergency Access Initiative*, NAT’L INSTS. OF HEALTH, [http://eai.nlm.nih.gov/docs/captcha/test.pl?url=\[http://perma.cc/AQH8-HGB8\]](http://eai.nlm.nih.gov/docs/captcha/test.pl?url=[http://perma.cc/AQH8-HGB8]).

B. A Proposal

At the federal level, we support passage of the FASTR Act, which has been introduced in the 114th Congress. While the White House Directive and the codification of some portions of the FASTR Act are important steps forward, there are many agencies in all branches of government that are not yet required to participate in OA mandates. We also suggest that Congress eliminate obsolete statutory requirements that keep some federal departments, such as the CRS, from moving forward with free public access to their research products. Grant funding is another area that must be addressed for all types of government-funded research. If the federal government requires recipients of grant funds to publish in OA publications without embargo periods, it could immediately shift the landscape of publishing, particularly in the scientific community. Scientific journals without embargoes facilitate discovery and ensure that research results reach a wide audience while those results are still relevant. The embargo problem greatly affects availability of research articles for those without access to university libraries and for most researchers in the developing world.¹⁹⁰

The Uniform Electronic Legal Material Act (UELMA) provides a good model for future OA legislation at the state level. From the Uniform Law Commission:

The Uniform Electronic Legal Material Act establishes an outcomes-based, technology-neutral framework for providing online legal material with the same level of trustworthiness traditionally provided by publication in a law book. The Act requires that official electronic legal material be: (1) authenticated, by providing a method to determine that it is unaltered; (2) preserved, either in electronic or print form; and (3) accessible, for use by the public on a permanent basis.¹⁹¹

The American Association of Law Libraries played a major role in the development of UELMA and continues to advocate for adoption of the Act.¹⁹² While UELMA focuses on digital authentication, permanent preservation, and public access to online legal materials at the state level, there are some important parallels for OA to state government-funded research.

190. See PHILIP YOUNG, THE SERIALS CRISIS AND OPEN ACCESS: A WHITE PAPER FOR THE VIRGINIA TECH COMMISSION ON RESEARCH, VIRGINIA TECH UNIVERSITY LIBRARIES 4–6 (2009), http://scholar.lib.vt.edu/faculty_archives/YoungP/OAwhitepaper.pdf [<http://perma.cc/HK3E-FHAQ>].

191. *Electronic Legal Materials Act*, UNIF. LAW COMM'N, <http://www.uniformlawcommission.com/Act.aspx?title=Electronic%20Legal%20Material%20Act> [<http://perma.cc/C9M4-PSF9>].

192. See *UELMA Resources*, AM. ASS'N LAW LIBRARIES, <http://www.aallnet.org/Documents/Government-Relations/UELMA> [<http://perma.cc/G33P-M5L6>].

A guarantee of free permanent public access should come from the governing body, whether state or federal, that funds scholarly research. While nonprofits and even commercial entities have played a critical role in providing public access to government-funded research online, it is difficult to imagine those groups having the resources or even the motivation to maintain OA in perpetuity. A uniform OA law can provide both technological guidance and flexibility for state implementation of OA mandates.