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# Open Access: Current Overview and Future Prospects

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## ABSTRACT

This paper examines, with emphasis upon the United States, the current status of open access and its future prospects from a literature review of items published since 2015. The examination of sources goes beyond articles in scholarly journals to include columns in the blog *The Scholarly Kitchen* and other selected resources as needed to fill gaps. With the enormity of the literature on the subject, the analysis does not claim to be comprehensive and focuses on key issues. This author takes care to look beyond STEM (science, technology, engineering, and medicine)<sup>1</sup> fields to discuss the effect of open access in the social sciences, humanities, and fine arts. Overall, open access today looks very different from the goals of its proponents in 2002. For authors, open access has increased availability of scholarly resources and fostered distribution of their research, often after the payment of fees. Large commercial publishers have found ways to benefit from open access through author processing charges and by acquiring smaller presses. Open access overall has not allowed libraries to save money on serials subscriptions and has often increased costs through their support of institutional repositories and payment of author fees. Continued library support for open access is often more of a philosophical stance without significant cost-saving benefits.

## INTRODUCTION

This author's goal in this paper is to document the current state of open access and to provide commentary on possible future developments. The concept of open access is generally considered to have sprung from three statements that appeared in the early 2000s—the Budapest Open Access

Initiative in 2002, the Bethesda Statement on Open Access Publishing in June 2003, and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities in October 2003 (Suber 2004). The implementation of open access has changed over time, sometimes in ways that the original advocates would not have predicted. This summary of its current status will bring together research and commentary from multiple sources to offer a nuanced perspective on this important issue.

## METHODOLOGY

Since the topic of open access has produced an enormous amount of scholarly literature and opinion pieces from multiple perspectives, this author took the following steps to reduce the source material to a more manageable size. He has limited the time period to materials published from January 1, 2015, to February 15, 2018, though some of these resources provide views on the history of open access. The main resource for scholarly materials is the database Library Literature & Information Science Full Text. Published by EBSCO Information Services, this database is considered to be the definitive American index for materials in this subject area. For his search strategy, he used the term “Open Access” with the qualifier “SU Subject Terms” and the date range “2015–2018.” This search resulted in 338 entries that this author evaluated according to the criteria given below.

The second major resource is *The Scholarly Kitchen*, a blog published by the Society for Scholarly Publishing since February 2008. A group of “chefs” provide commentary each weekday, with an occasional guest “chef” and brief hiatuses for holidays. This author has followed this blog for many years and considers it one of the most important resources for the discussion of issues on scholarly communication for the following reasons. First, to quote its mission statement: “*The Scholarly Kitchen* is a moderated and independent blog aimed to help fulfill this mission by bringing together differing opinions, commentary, and ideas, and presenting them openly” (SSP 2018). Second, the chefs include representatives from the publishing, vendor, and independent research community that are less likely to publish formal papers because they are not required to do so for academic advancement. Third, *The Scholarly Kitchen* “has become both a venue folks value and find informative and also one that can spark passionate disagreement” (Michael 2018a). This “passionate disagreement” provides the multiple perspectives needed to present a multifaceted view of open access. This author examined the blog’s archives from January 1, 2015, to February 28, 2018, with the search term “open access.”

Finally, this author examined additional resources to clarify or expand topics not adequately covered in the two sources above. For example, he depended upon the British blog *Open Science* for statistics on author processing charges (APCs).

To reduce the vast amount of resources to a manageable size focused on the more important articles and columns, this author eliminated from consideration the following categories: case studies with a limited focus, individual library or consortium projects, specific company or organizational activities unless of great importance, studies in specific subject areas, and plans for future initiatives. He also gave less attention to single country studies outside the United States. He has also taken special care to include commentary on open access beyond STEM to include the social sciences and especially the humanities. While the emphasis is on open access journal articles, this author briefly describes emerging initiatives in open access book publishing.

As for the structure of this article, the first section provides a general introduction and definitions. The remaining three parts focus on the perspectives of the important players in open access: authors/researchers, publishers, and libraries. Some overlap is unavoidable.

## INTRODUCTION AND DEFINITIONS

The definition and goals of open access have changed greatly. On February 14, 2002, the Budapest Open Access Initiative gave a definition that stated its goals quite simply:

By “open access” to this literature, we mean its 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. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited. (Budapest Open Access Initiative 2002)

Suber provides a briefer definition by saying that “open-access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions” (Suber 2004). This article will use this simpler but comprehensive definition. Rick Anderson has much more to say about conflicting definitions and their importance. He gives three implications for this definitional uncertainty: 1. Can two people assume they are talking about the same thing? 2. Disagreement leads to inconsistent and misleading data. 3. The lack of certainty about what is OA publishing creates frustration (2017a).

The second level of definition is the various subtypes of open access that have appeared. The two most cited types are green and gold open access, but this author found it extremely difficult to find a concise, accurate definition of these two options in one source. Cobbling together aspects from multiple sources, he defines green open access as any scholarly publication, article, or monograph that is freely available without the payment

of fees. This item may appear in a free open access journal or a hybrid journal, be uploaded to an institutional repository, or have the necessary permissions from the publisher/copyright holder to be available in a preprint or postprint with or without an embargo period. Gold open access makes the item freely available by paying a fee to the publisher that is paid by the author, the author's institution or library, the granting agency, a crowd-funding initiative, etc. Diamond open access is a less commonly used variant defined by Robert Harington as "a form of Gold OA that does not include a requirement for authors to pay article processing charges (APCs)" (2017). Others would put this category under green open access. Piwowar et al. create "rather an under-discussed category we dub Bronze: articles made free-to-read on the publisher website, without an explicit Open license" (2018). The final category is black open access from illegal sites like Sci-Hub. It takes its name from the black pirate flag (Björk 2017).

To conclude this introduction, this author provides the following quote from Joseph Esposito that shows how many parties are interested in open access and how greatly their perspectives vary.

Depending on the audience, the case for open access (OA) varies. Opponents of intellectual property, for example, may favor OA simply on principle. To a researcher you might argue for a broader dissemination of his or her own work. A funding agency may accept the dissemination premise as well and tie it to an exercise in branding, where each published OA article becomes an ambassador for the sponsor of the research. A librarian may be persuaded on the basis of cost (the money that does not have to be spent on OA material can be used elsewhere), and an established publisher may see the Gold variety simply as an additive revenue stream. (2015c)

## THE RESEARCHER/AUTHOR PERSPECTIVE

### *Discovery*

The researcher/author approaches open access from three intermingled perspectives: discovery, publication, and scholarly reputation. Research depends upon access to the published knowledge in the relevant subject area for several reasons—to build upon prior knowledge, to discover leads to other sources, and to acquire needed facts and opinions about the topic. With the increased importance of research since World War II, especially in STEM areas, scholarly communication now includes an elaborate system of indexes, abstracts, and bibliographies for the researcher to find traditionally published materials. The arrival of open access has further complicated the discovery process. Maria Bonn summarizes the discovery dilemma for OA when she states:

Much of that publication remains invisible to its potential readers. Research objects sit quietly, sometimes inertly, in the far-flung corners of the Internet. Sometimes they dwell in safe havens, such as institutional repositories (IRs), but there are few clear, well-marked paths to those

havens. Sometimes they reside upon websites, which are beautifully and engagingly designed, but which, like some lovely but remote beach in a small country, few tourists know to visit. (2015, 491)

The best discovery method for open access materials depends in part on the type of open access, the search category, and the subject area. This author concurs with Judy Luther that Google Scholar was for a long time “the primary discovery tool for OA.” She writes that “this may change with the launch of two new services: ACI, which indexes and hosts 10,000 curated scholarly blogs and 1Science, which indexes all OA peer reviewed articles wherever they are found” (quoted in Michael 2016). The Directory of Open Access Journals “is a community-curated online directory that indexes and provides access to high quality, open access, peer-reviewed journals. . . . All data is freely available.” As of March 7, 2018, it included “11,253 Journals, 8,198 searchable at Article level, 123 Countries, 2,958,181 Articles” (DOAJ 2018). In his study of gold open access journals, George Machovec discovered that “the number of Gold OA journals covered in abstracting and indexing (A&I) and aggregator databases has shown substantial penetration in these services,” though “this coverage varies widely by discipline” (Machovec 2016, 875). In other words, journals that are completely open access, whether green or gold, can be found and may have their contents included in the standard indexing and abstracting services. According to Buddy Pennington, hybrid journals, however, present more of a challenge: “There is currently a substantial body of OA scholarship embedded within hybrid journals that, for libraries, remains locked away due to reliance on tools that manage access at the journal level. Many institutions are dependent upon commercial publishers and vendors for article-level discovery and access” (2016, 309). Pennington suggests that the solution to this problem of journals where some articles are open access and others are not is to utilize “specific metadata elements to describe access and use rights around scholarly journal articles [since this step] will not just help library discovery services but can potentially benefit researchers using any discovery service for their research” (2016, 309). Elizabeth A. Lightfoot tested the links found in all the journals included in the Directory of Open Access Journals. She discovered that while “approximately 20–25 per cent of the URLs redirected to another URL, . . . this study found only 2.11 per cent of 9,073 journals to be inaccessible” (2016, 3). Thus, link rot does not currently appear to be a serious problem for discovery. In his blog post “Enhancing the Discovery of Institutional Repository Contents—6 Sources to Consider,” Aaron Tay gives a lengthy review of various search engines useful for finding open access publications. Several include subject searching (2018). In addition, the Open Access Directory wiki provides a list of disciplinary repositories (“Disciplinary Repositories” 2017).

The final discovery tool makes all materials available through illegal black open access. Sci-Hub, maintained by Alexandra Elbakyan on a Rus-

sian server, has received the most attention, though other such sites exist. To quote Elbakyan, “I developed the Sci-Hub.org website where anyone can download paywalled research papers by request. Also I uploaded at least half of more than 41 million paywalled papers to the LibGen database and worked actively to create mirrors of it” (quoted in Van Der Sar 2015). She obtains the articles by “accessing publisher platforms via ‘donated’ credentials coming from university library patrons” (Cochran 2016). According to Jon Bohannon, “everyone” is using Sci-Hub, an obvious exaggeration; but server data supplied by Elbakyan showed that “over the 6 months leading up to March [2016], Sci-Hub served up 28 million documents. . . . Use is particularly heavy in non-Western countries such as India and China” (2016). Angela Cochran worries that “a potential tragedy lurking in the background of this issue is what damage it will do to the larger open access (OA) movement. . . . But when the [OA] people who are doing things right don’t condemn the folks that want to burn the place to the ground, their message goes up in smoke right along with it” (2016). Sci-Hub may also affect the economics of journal publishing. If subscriptions drop because so many articles are available for free on Sci-Hub, Novo and Onishi predict that “the ever increasing number of pirated scientific articles could one day force publishers to set this model [gold open-access] as their only option to keep business afloat” (2017, 325). They worry, however, about the ability of authors to pay publication fees. Angela Cochran (2017) also is concerned that authors will be less likely to pay APCs if the official number of downloads decreases because of Sci-Hub and therefore reduces the appeal of gold open access to provide statistically valid visibility. Even more importantly, “why bother with the hassle and expense of OA when you can get it all free on Sci-Hub? This does not lead to the further development of sustainable open access models” (Cochran 2017).

### *Scholarly Reputation*

For authors, the choice of where to publish and the goal of acquiring a scholarly reputation are closely linked. Researchers want to have their publications accepted by journals with the highest impact factor so that they will be widely read and receive a large number of citations. Before considering why authors choose open access, Rick Anderson contends that their voices have generally not been heard in the discussion of open access because no organization represents them. They “are a widely disparate group with different priorities,” they “don’t understand the issues,” and they “are not being invited into the conversation” (2016). He also contends that some authors in the humanities are frustrated or angry with open access because the Creative Commons Attribution (CC BY) license, often part of open access, allows others to reuse their work in profit-making endeavors (2015, 16). Arguing the opposite point of view,

Joseph Esposito believes that such authors are wrong because commercial publication “means that Publisher B has added to the readership of the articles. The authors want this as a matter of course. Publisher B wants this because it makes money. Publisher A is indifferent; it has already made money when it collected the APCs” (2015a).

This author wishes to stress that scholarly communication “rules” and traditions vary greatly according to discipline and the size of the institution so that what follows may not apply to all faculty authors. In addition, this author believes that universities have seldom admitted that they are responsible for much of the scholarly communication crisis that led to open access because of the increasing demands upon faculty members for research publications (Holley 2009).

Some authors do not have a choice because their funding source mandates that their research be open access. The National Institute of Health “requires NIH-funded researchers to deposit electronic copies of their peer-reviewed manuscripts into the National Library of Medicine’s online archive, PubMed Central” (McGuigan 2015). Furthermore, some institutions, including Harvard University and MIT, have adopted open access mandates for faculty; but one study of sixty-seven such institutions showed that the ability to opt out of these mandates reduces their effectiveness (Vincent-Lamarre et al. 2016).

*Tenure and Promotion.* Formal peer review is an assumed requirement for tenure and promotion even if some widely read publications such as *D-Lib Magazine* avoid such review, mostly in the interests of speedy publication. The lack of peer review also inhibits scholars from self-publishing or directly depositing their research in open access institutional repositories. Some who no longer have concerns about official academic rewards or who have difficulty for whatever reason, including length, to find a traditional publisher may do so. In fact, Williams E. Nwagwu and Bosire Onyancha propose bypassing traditional journals to be replaced by OA publications on the Web with open peer review (2015).

On the issue of the effect of tenure and promotion on faculty opinion of open access, the most important article encountered in research for this publication was “How Library and Information Science Faculty Perceive and Engage with Open Access,” by Wilhelm Peekhaus and Nicholas Proferes (2015). One benefit was their literature review that summarized studies from outside the 2015–2018 limited period for this article. The various studies showed that significant numbers, though perhaps not the majority, expressed concerns about open access. They concluded from their systematic survey of North American LIS faculty that

the findings suggest some serious structural issues that may inhibit a broader uptake of open-access publishing as a response to the problems associated with the contemporary scholarly publishing system. Over-

all, these findings raise important questions for open access advocates about how to surmount the perceived structural constraints embodied in tenure and promotion processes around evaluation of scholarly output and how to attract those who have not previously published in open-access journals to this modality of scholarly publishing. (661)

Yu-Wei Chang confirms the fact that, for both library science faculty and librarians, “developments in OA publishing have had little effect on most academic authors’ loyalty to traditional journals” (2017, 14).

*Green Open Access.* For authors who wish to provide open access for their publications, the main choice for traditionally peer-reviewed articles is either green or gold open access. In “It’s All the Same to Me!” Nancy Sims provides a concise, clear summary of the advantages and disadvantages of green open access. Choosing green open access is within the control of the author and most often does not have any additional costs. Since most authors must sign over their copyright, “many publishers have standing policies enabling green open access of some kind, but the specifics of these policies vary widely and can be quite confusing for authors and others trying to understand and comply” (Sims 2015, 578). The principal complication from publishers’ policies is “which version of a published piece can be shared—the formatted version distributed by the publisher, the final manuscript subsequent to editing and review, or the manuscript version submitted by the author prior to review and editing” (578). Overall, authors may not be willing to make the effort to provide green open access unless the institutional repository helps them determine the acceptable version to deposit. In a similar vein, Watson recounts the difficulties she encountered in creating open access versions of previously published works from her early academic career (2018).

*Gold Open Access.* The issue is simpler for gold open access: All you need is a whole lot of money. As stated earlier, the publisher charges a fee to allow the publication to be freely available. As will be discussed later, the general opinion is that gold open access has become the dominant form of open access. The best article on gold open access is “Imagining a Gold Open Access Future: Attitudes, Behaviors, and Funding Scenarios among Authors of Academic Scholarship,” by Carol Tenopir et al. While it is based on a limited “survey of academics at four major research institutions in North America” (Tenopir et al. 2017, 824), the conclusions were generally confirmed by other researchers. The article corroborates that “the prevailing attitude toward open access is ambivalence” and that “faculty are often conservative in their acceptance of OA” (837). Authors’ attitudes toward publisher fees is one of the most important findings of this article. “Most respondents do not wish to pay more than \$100. They are particularly reluctant to pay APCs through their personal or private



funds. This finding is especially true for those from the arts/humanities, who may have less funding from which to draw” (839). The \$100 figure is ridiculously low in comparison with what the major publishers charge. On the other hand, the article reports that academics in the STEM disciplines are more willing to pay because they have greater potential access to grant funds. The authors also support the role of libraries in providing funding for gold open access to increase their importance in the scholarly communication process (Tenopir et al. 2017).

The increasing importance of gold open access has created predatory journals whose main objective is to collect open access fees without providing the editorial and publishing services associated with legitimate journals. The vast majority of LIS authors condemn predatory journals and provide advice on how to avoid them. See, for example, Craig Arthur’s “Predatory Publishing: How Not To Fall Prey” (2015). The issue, however, is not this simple. In his article “The Rewards of Predatory Publications at a Small Business School,” Derek Pyne states that “in terms of financial compensation, these publications produce greater rewards than many non-predatory journal publications. Publications in predatory journals are also positively correlated with receiving internal research awards” (Pyne 2017, 137). In the quest to get published, both he (2017) and Margaret Ray (2016) entertain the possibility that researchers are knowingly publishing in predatory journals for the potential rewards of doing so. If predatory journals are able to mimic reliable publications well enough to fool some academics, this author finds it reasonable that some tenure/promotion committees and university administrators might also be fooled and not recognize their fraudulent nature.

*Citation Counts and Journal Impact Factors.* One way to compare the value of open access and traditional articles for scholarly reputations is to look at citation counts and journal impact factors. Several studies appeared during 2015–2018. Zhang and Watson compare citation counts for articles published by physical science researchers funded by the Canadian Institutes of Health Research. Their conclusion was that “after controlling for publication year, citation rates of gold, green, and non-open access articles were comparable” (2017, 337). Mohammadamin Erfanmanesh “investigated the coverage of the Scopus [*sic*] with regard to the OA journals and compared the quality of OA with non-OA journals in 27 research areas” (2017, 159). The results included an analysis of citation rates and concluded that “although OA publishing improves the visibility of scholarly journals, this increase is not always coupled with increase in journals’ impact and quality” (155). Salisbury, Chowdhury, and Smith examined publications from one institution, the University of Arkansas, with the result that “the average citation (i.e., the total number of citations/number of years) is higher for non-OA papers. When the data were examined by

year of publication, average citations were higher for non-OA papers for six of the eleven years under study. The other years show no citation advantage” (2017, 198). They also reported that, while non-OA papers were much more numerous, open access publications increased from 2005–2015 (197). Atchison and Bull tested the hypothesis “that OA articles will be cited at higher rates than articles that are toll access (TA), which means available only to paying customers. We test this hypothesis by analyzing the mean citation rates of OA and TA articles from eight top-ranked political science journals. We find that OA publication results in a clear citation advantage in political science publishing” (2014, 129). Piwowar et al. used three samples of one hundred thousand articles to come to the conclusions that “at least 28% of the scholarly literature is OA” and that “accounting for age and discipline, OA articles receive 18% more citations than average, an effect driven primarily by Green and Hybrid OA” (2018). To conclude this section, Barbaro et al. looked at the impact factor for open access STEM journals. From their analysis of 955 open access journals, they concluded that “although OA journals are on average less prominent than conventional journals, high-quality open access options for publication are available in nearly half of the Journal Citation Reports (JCR) Science edition 2013 categories. A large proportion of them require article processing charges, and funding agencies must take this into account in designing policies to promote open access publishing” (2015, 71).

In the opinion of this author, the studies above do not give a definitive answer as to whether paywalled articles or open access articles of any type are more valuable in achieving a positive scholarly reputation. While some of the studies above give the advantage to one or the other choice, the differences are not great enough to declare a victory for either paywalled or open access articles. An interesting subject for future research is whether scholars have any explicit preferences for either type.

### THE PUBLISHER PERSPECTIVE

The publisher perspective is even more complex than the relationship of authors and open access. Any generalizations are difficult because of the variety of publishers (large commercial, small commercial, scholarly societies) and the varying circumstances of diverse disciplines (STEM, social science, humanities, fine arts). Finally, the more centralized control of higher education by European governments has fostered national open access initiatives that are less possible in North America where many universities are private and states have responsibility for public institutions. *The Scholarly Kitchen* provides much of the source material for this section because of the blog’s focus on publishing. The section will conclude with an overall review of open access monographic publishing.

Three major conclusions emerge from a study of the source materials for the 2015–2018 period. First, commercial publishers have success-

fully appropriated gold open access as a way to retain revenues. Second, traditional paywalled publication will not disappear anytime soon. Third, libraries have not realized the financial benefits that they hoped for with the increasing importance of open access. (This author treats this topic in the next section on libraries.)

### *Co-opting Open Access*

The consensus is that commercial publishers have been successful in co-opting open access and in turning gold open access into a significant revenue stream. Kent Anderson comments that this outcome was unexpected, both on the part of publishers and the advocates of open access. “Commercial publishers, after a period of resistance and uncertainty, have embraced the new revenues Gold OA can provide—so much so that there are now concerns that large, commercial publishers have themselves appropriated the OA movement via Gold OA, eliminating some paywalls while solidifying their place in the world” (K. Anderson 2017a). “Initially viewed by some as a counterweight to commercialism and consolidation in the scholarly publishing space, open access (OA) publishing has proven to be just the opposite, as its dependence on volume and the concomitant benefits of economies of scale drive consolidation and further the commercialization of papers” (K. Anderson 2017c). Heather Morrison provides statistical evidence in her research that shows that Elsevier, often considered one of the worst commercial “villains,” is now, as the subtitle of her article suggests, “Among the World’s Largest Open Access Publishers as of 2016” (2017). Her conclusion gives the number of titles and also supports the fact that the commercialization of open access is a recent development: “With 511 fully OA journals, Elsevier is now among the world’s largest OA journal publishers in terms of number of OA journals available. This is a recent development. In 2011 Elsevier did not even register on the radar for a major study of fully OA publishing, and as recently as 2013 there were only 46 OA journals” (57). Leslie Chan, one of the original signatories of the Budapest Open Access Initiative, provides a substantive critique of this development in an interview conducted by Becky Hillyer. He is concerned that “the problem with this model is that it is simply re-solidifying the status quo, even more restrictively . . . because only the rich institutions are able to pay to publish!” While he had high hopes for open access, he states that “one of my confessions is that I have been giving a lot of advice around Open Access that has turned out to be bad” and that “many of the policies I was originally in favor of turned out to support the existing holders of power and so turned out to entrench their power rather than challenge it” (Hillyer [2017?]). In other words, the power structures and elites of the publishing world have monetized an initiative that was intended to make information freely available and to reduce their power.

The experts give various intertwined reasons for this increasing dominance of commercial publishers in gold open access. Converting a journal to open access is not all that easy. Alice Meadows gives advice on which journals are suitable for the transition and how to do it. The risk is that “it’s impossible to predict how successful (or not) any one journal’s conversion to OA will be and, for most journals, it will be several years before you can evaluate this” (Meadows 2015). While he is in favor of making the transition to open access, Joseph Esposito does not underrate the complexity of the decision making connected with the switch (2016c). Kent Anderson then makes the astute observation that the diversity of business models and the risks in making the transition end up “leaving smaller and society publishers wondering about the future of their publishing programs. Some will survive, but many more will contract with larger publishers to remain viable, feeding market consolidation” since the large publishers have the resources to weather periods of uncertainty (2017b). A second reason is that larger publishers are able to better market their journals. Kent Anderson believes that “Google, Facebook, Twitter, and others with click-based advertising models and infrastructure-level presences” have fundamentally changed the internet in recent years (2017a). Because of this change, “passive information purveyance faces tough odds when pitted against active information placement by technology-savvy commercial entities working 24/7 to gain any advantage they can.” Larger publishers have the resources to hire staff to take advantage of the new intermediaries and publicize their products, including open access publications (K. Anderson 2017a). Joseph Esposito makes a similar point about the need for marketing (2015a).

### *Megajournals*

Another alternative for STEM research is to publish in a megajournal, a publishing option that is a product of the twenty-first century. A definition by Ben Mudrak includes five elements:

1. Editorial criteria that judge articles only on scientific soundness, not perceived importance or impact;
2. A very broad subject scope;
3. An open access model, often involving article processing charges;
4. A large editorial board of academic editors (as opposed to a staff of professional editors);
5. An elastic capacity to publish any and all articles that are appropriate. (n.d.)

The first such journal was *PLOS ONE*, but many competitors have entered the marketplace, including several from well-known commercial publishers. In fact, *Scientific Reports*, from the publishers of *Nature*, “overtook *PLOS ONE* as the world’s largest scientific journal in 2017” (Davis 2018). In 2011, Peter Binfield, then publisher of *PLOS ONE*, predicted that “in 2016, almost 50% of the STM literature could be published in approximately 100 mega journals” (quoted in Davis 2018). Such consolidation, however, did

not come to pass, because in 2017, “taken together the OA megajournal market accounts for about 3% of STM output, far from the 50% he claimed” (Davis 2018). If past trends continue, megajournals will continue to decline in importance as a publishing venue for STEM open access articles as traditional commercial publishers increase their dominance in the open access marketplace.

*Small Publishers and Society Journals*

Ann Michael gives hope to small publishers who wish to have open access journals in “Open Access Technology Options.” Her overall conclusion is that “publishers have options, even smaller publishers with limited budgets. . . . Competition is increasing. It all becomes a question of understanding your needs and which solutions best align with them.” Without naming specific organizations in this article, she makes the following major points: “Open source solutions are on the rise. . . . Modular is in. . . . New or expanded services are surfacing. . . . Coalitions and co-operatives are being discussed. . . . Open Access publication has given rise to open access specialists.” She even considers self-publishing to be a viable choice (2018b). In the opinion of this author, this is one of the most exciting developments for increased open access because these changes reduce the barriers to entry.

In “Traditional versus Open Access Scholarly Journal Publishing,” Frankland and Ray provide a detailed, if somewhat confusing, economic analysis of the two types of publishing. For them, “reducing production costs, lowering barriers to entry, and promoting competition are potential benefits of open access publishing” (2017, 7). For the negatives, “open access publishing introduces an added cost of evaluating an ever-increasing number of published sources and the potential for misinformation” (5). This author has some difficulty with this analysis since the advantages are associated with the publication of open access materials while the negatives appear to be more of a societal cost for researchers and libraries (Frankland and Ray 2017). Martin Paul Eve focuses on the production of scholarly articles and contends that “while the technological underpinnings of open access imply an abundance, it is also the case that the labour that remains necessary in publishing processes is based on a set of economics that are scarce: the availability of human time, effort, and expertise” (2017, 26). He then goes on to add that “we are unlikely to realize the transformations of an abundant proliferation of scholarship without a substantial change and redistribution of labour functions to authors, which is unlikely to be socially accepted” (26). Any such redistribution to academic authors would reduce the amount of time available for research or increase the costs of scholarly authorship if these functions are commercially outsourced. In “Decline and Fall of the Editor,” Joseph Esposito worries that, because of the efforts to lower APCs, “in a dystopian future

where Gold OA dominates, there will be insufficient revenue to cover the high editorial costs of the most distinguished editorial operations.” He places much of the blame upon funding agencies because they have set rates from reports that are “financially illiterate, accounting only for marginal costs and leaving out fixed costs and overhead” with “the practical effect, whatever the intentions of the agencies, of making more robust editorial operations seem terribly overpriced” (2017). In other words, some gold open access articles run the risk of lower quality in comparison with paywall publications.

Two quotes provide a fitting summary of the economics of open access. First, “If anything, OA publishing has created an explosion of titles, most of which seem to be competing for a small slice of a fixed pie. *PLOS ONE* created a commodity model where indicators like Impact Factor, speed to publication, and price compete for a finite manuscript market” (Davis 2018). Second, “OA was supposed to decrease the money, but 15 years in we haven’t seen that happen at all. The money is the same if not more, it’s just being paid from a slightly different bucket” (Cochran 2017).

#### *Author Processing Charges*

Looking at author processing charges is the major remaining issue for journal open access. Much to this author’s surprise, he found little discussion of this topic in the 2015–2018 period under review. To remedy this lack, he examined all the articles in the blog *Open Science* for the same period and discovered many items of interest. A negative is that they were mostly from a UK perspective.

The first major question is how many authors pay APCs. Unfortunately, explaining the nuanced arguments by David Crotty in “Is it True that Most Open Access Journals Do Not Charge an APC? Sort of. It Depends” would take several pages, and the findings from 2015 may already be out of date. His final conclusions are as follows:

- The majority of fully gold OA journals listed by the DOAJ do not charge authors an APC.
- The majority of journals offering OA publication to authors charge APCs.
- The majority of OA papers are published via paying an APC.

Since he excludes OA journals not included in the Directory of Open Access Journals, “their inclusion would likely only push things further in the direction of APC required OA” (Crotty 2015). Witold Kienc agrees and attributes the increase in fees to the rise of the megajournals: “According to some estimations, Article Processing Charges (APCs) were paid for more than half of newly published open access papers, which is probably the result of the spectacular success of several open access mega-journals operating in the field of Life Sciences” (2016a). Kienc, however, expressed a different opinion in 2015 when he opined that “the majority of open

access journals are at this time free for both authors and readers (because the cost of publishing is covered by the association who owns the journal, or by a commercial publisher who is not in a hurry to introduce fees)” but then goes on to provide “a step by step guide” for authors to get other sources to pay the APCs (2015). Finally, Piwowar et al. theorize from their small sample that many articles appear as open access in paywalled journals because they are “delayed OA from toll-access publishers” that became available after an embargo period (2018).

The following section discusses APCs by discipline, fee amount, academic level of the author(s), and sources of funding. Unfortunately, many of the more recent surveys had a small sample size even when the queried audience was large. For example, the De Gruyter Open Author’s Survey 2016 was “sent to 107,296 scholars listed on De Gruyter’s Open mailing lists in a period from December 2015 to January 2016. . . . We received 1012 responses to the survey, so the response rate was 0.94%” (“Key Challenges” 2016). The good news is that this author found the general conclusions to be consistent across multiple sources. The following discussion is based upon the De Gruyter Survey. The data come mostly from European authors (90.2%), This author still considers them to be worth reporting since they appear to be consistent with general comments about North American open access. Overall, the number of authors who paid at least one APC in recent three years was 49.3% for the medical and life sciences; 40.2% for sciences, mathematics, and engineering; 11.9% for arts and humanities; and 10.3% for social sciences (Kienic 2016c). “The mean of the most recent APCs paid by the respondents is 722.9 euros. The median is 500 euros. . . . The lower mean of APCs paid by our respondents than may be found in other work, is a result of the overrepresentation of humanists in our sample. Higher amounts of APCs are widely accepted in Medical and Life Sciences but not in Arts and Humanities” (Kienic 2016c). “Amount and frequency of APCs vary also according to career level. Frequency of paying APCs decreases with career level, while its average amount increases” (Klienc 2016c). Students are most likely to pay APCs followed by early career researchers. “Established researchers are the group who pay publication fees less frequently, but at the same time spend the biggest amounts on this goal” (Kienic 2016a). One interesting side topic is how much various top publishers charge for open access. In an article posted on April 20, 2017, Beata Socha provides the average APCs for nine top publishers that she gathered from their Web sites. They range from a low of slightly over 500 euros for MDPI to over 2000 euros for PLOS. Her more detailed analysis shows that some publishers are known to waive their charges or support a “pay as you want” model (Socha and Markin 2017).

The possibilities for who pays the APCs are limited, but getting any reliable statistics about these options is difficult. Once again, the only sta-

tistics that this author found appeared initially in the De Gruyter Open Author's Survey as reported in the 2016 blog post "Who Pays the Bill." (Kienc 2016d): Overall, "26.8% of academic authors predicted that they will have access to some money to cover Article Processing Charges in the year 2016." The most popular source is the institution that employs the authors—13.1% of all authors and 48.9% of authors who expect to get funding. "For 4.2% it is the only source of funding." Since the source of the funding is often the library, this topic will be discussed in the next section. The second option is funding from grant money for publication costs, 13.1% of all authors and 48.9% with expected funding. For 3.6%, this was the only funding source. Other researchers expect to be able to use grant money for an unspecified goal that could include publication. The category includes 10% of all authors and 37.3% with expected funding with 2.2% having this option as their only funding possibility. Later on in the column, Kienc gives the following statistics for access to grant funds.

5.9% of researchers in Arts and Humanities have access to publication grants, while it is as much as 18.7% in Medical and Life Sciences and 16.2% among researchers from the fields of Science, Mathematics and Engineering and 9.1% among those dealing with Social Sciences. Among humanists, only 5.3% have access to grant money for unspecified goals, while it is 15.3% of researchers dealing with Medical and Life Science, and for 13.7% of these dealing with Science, Mathematics and Engineering and only for 7.8% of these from Social Sciences. (2016d)

These figures reflect the fact that grant funding is much harder to obtain in the humanities, and that any such grants tend to be smaller than those in STEM disciplines.

According to Joseph Esposito, grant funding agencies often cause problems for publishers because of the difficulty with "managing compliance with various open access (OA) mandates." He gives the example of "a paper by three authors, who reside at three different institutions, located in three different countries, and whose research was partly funded by three different entities. The institutions may have different mandates, the funders may have different mandates, there may be local regulatory requirements, and even the individual authors may have the audacity to have some ideas as to how their work should be made public." He believes that, because of these multiple rules, "consolidation is the inevitable outcome because organizations seek scale to keep administrative costs down" (2016a).

The next option is for academic researchers to pay the APCs with their own money. From the survey, 8.9% of all authors (33.2% with expected funding) plan to use this option; it is the only one for 2.2%. This option is easier for researchers with higher salaries, most likely because they are in a STEM discipline or are more advanced in their careers. The other pos-



sibility is for these authors to choose journals with lower APCs even if these journals do not have the same prestige and benefits for their academic careers. The final choice is to have access to money from a national funding body (5.1% for all authors, 19% of those who expect funding, and .33% for whom this is the only option) (Kienc 2016d). Such funding is much more likely in countries with centralized management of higher education and is unlikely to occur in countries like the United States where higher education is a state, local, or private responsibility. David Crotty discusses one such deal between the Netherlands and Wiley in “What Should We Make of Secret Open Access Deals?” (2016). In conclusion, some funding for APCs is available; but researchers in STEM areas are much more likely to receive it since they receive more grants with higher funding amounts. In addition, they can use funds from their generally higher salaries to personally pay the charges.

#### *Open Access for Monographs*

Open access for monographs is not as well developed as it is for journal articles. During the review period, 2015–2018, most comments discussed future projects or analyzed the difficulties that such open access poses. Monographs are very different from journal articles. To quote Bulcock and Watkinson on both points: “OA book publishing is still in a phase of experimentation. Many of the existing journal models would be difficult to translate to monographs” (2017, 153). The first difference is that readers and libraries purchase monographs individually rather than by subscribing to a journal. The monographic series was intended to induce libraries to automatically purchase all the monographs in the series, but this method of acquisitions has fallen out of favor with the current budget crunch. Second, the individual monograph is much more costly to produce than the journal article. The problems with funding open access for monographs “are rooted in the high cost of book publishing, which is substantially higher than in the case of research papers. The labour intensive editing of text increases disproportionately to its length, so the cost of editing book is bigger than the cost of editing several papers” (Kienc 2016b). Third, simplification by going completely digital for monographs is less possible because of “the preference many people have for print, which almost 10 years after the launch of the Kindle still controls about 75% of the overall book market and a higher percentage for academic titles. (It gives one pause to contemplate how different the ecosystems are for books and journals)” (Esposito 2016b).

Several authors contend that no crisis exists for monograph publishing either in the United States or Great Britain. Though he is speaking from the UK perspective, Geoffrey Cossick states that “when I said that I couldn’t find evidence that the monograph was in crisis in the UK, I insisted that that didn’t mean that all was rosy. The data we obtained from publishers is, however, compelling: the four largest UK monograph publishers have

doubled their monograph output compared with ten years ago” (Mudditt 2015). Kienc would counter this argument by saying that “some titles are still bought eagerly by both libraries and individuals, but it is much harder to sell even a small amount of niche titles. This results in a spreading belief that only potential best-sellers may be published” (2016b). In other words, for some scholars, especially in the humanities, the issue may not be the quality of their research but its sales potential.

Joseph Esposito presents three possible models that might support open access monographs. The first is “some variant of Gold OA.” The issue here is the high cost of publication, from \$10,000–35,000, a difficult amount to support by APCs from research grants or the author. While he gives the provost as a potential funding source, he asks “why a provost, who may simultaneously be cutting the budget of the conventional university press, would pay for books that the librarian on the other side of the quad will not” (2016b). He next considers other remote possibilities—national funding or philanthropy. The first might be more likely within the UK/European context (Kienc 2016b). Second, he suggests “the tip jar” where authors would seek individual contributions like National Public Radio does. Finally, he proposes getting revenue for “value-added services,” such as free digital coupled with purchase of the print version (since some find long digital works hard to read) or purchase of an enriched digital version with “audio and video enhancement” (Esposito 2016b). In those cases where academic reward through peer review is not necessary, this author would add that depositing the monograph in an institutional repository (green open access), posting it on a Web site, or making it available through booksellers like Amazon at no cost are additional open access options.

### THE LIBRARY PERSPECTIVE

Many of the issues of importance for the library perspective have already been introduced in this paper. This author highly recommends two articles for their summaries of the state of open in access in academic libraries. The first is Cheryl LaGuardia’s “An Interview with Peter Suber on Open Access,” where Suber, based at Harvard University but with multiple responsibilities for open access, manages to bring up most of the key points in less than two pages. One of them is that “money already spent on journals by academic libraries is more than enough to pay for high-quality OA journals in every scholarly niche. We don’t need new money, we just need to redirect the money we already spend” (2015, 19). Adelia Grabowsky does the same for collection development in an open access environment in her somewhat longer article “The Impact of Open Access on Collection Management,” with the concluding observation that “although some envision a future where OA dominates, today is still a time of transition and unfortunately, it seems that collection management activities related to OA materials are being added to current responsibilities rather than replacing some of them (2015, 20).

*Institutional Repositories*

While institutional repositories (IRs) are not necessarily housed in libraries, many are, so it is worthwhile to examine their role in fostering green open access. Overall, the literature focuses more on the difficulties than the successes. To start, the local nature of IRs complicates their effectiveness. In “Delivering Open,” Chris Bullock deals with the issue of finding open access materials and delivering them to academic users, a topic already discussed earlier in this article in the section on discovery. The desire for success is simple to state, but “this goal is difficult to achieve. No single tool, be it a link resolver, discovery tool, or browser plug-in, is up to the task on its own,” though he expresses hope in future success “if existing projects grow and continue to be maintained, and especially if all partners pursue more consistent implementation of metadata standards, there is great potential to meet the challenges of delivery across this complex network” (2017, 270). In a second publication, Bullock supports discipline-driven subject repositories to implement sharing across institutions. “While IRs are likely to serve important institutional goals for years to come, a greater level of cross-institution collaboration could have a much larger influence on access to research publications” (2016, 313).

The library may not find it simple to manage an institutional repository. A major issue is the amount of staff time needed for its operation. Having the library handle the process for those who wish to include their research is the best way to encourage participation but is also labor intensive. Making researchers deposit their materials requires providing clear instructions on how to do so (Grabowsky 2015). In addition, “for teaching faculty, it is time consuming and takes a steep learning curve to understand the copyright issues involved in posting materials in a repository and seeking permissions from a publisher” (Dawson and Yang 2016, 290). The less help the library provides, the more unlikely it will be for busy researchers to deposit their materials. If the library, however, takes over the vetting process, the library will similarly be caught up in the difficulties of interpreting and meeting publisher requirements (Sterman 2017). In addition, this author believes that the choice to support an institutional repository is especially difficult because doing so is based more upon a philosophical commitment to green open access than upon direct benefit to the institution beyond helping faculty enhance their scholarly reputations.

*Gold Open Access*

The influence of gold open access on libraries is potentially even more profound. With the shift to gold open access, someone has to pay the fees. One possibility is taking the money from the library budget to give it directly to faculty or other campus researchers or to have the library be responsible for supporting campus authors. Alison Scott strongly objects to this diversion of funds for the philosophical reason that the primary goal of the academic library should be to support learning. “Library-backed

APC mechanisms for attaining the greater good of open access mean that, practically speaking, the attention of libraries and librarians must be turned from meeting the needs of our academic communities' learners, teachers, and researchers toward the functional support of article producers" (2018). On a more practical level, the Mellon Foundation commissioned a study, *Pay It Forward*, that looked at the possible effect of gold open access charges on the University of California Libraries plus a few others, including Harvard University and Ohio State University. The study reached three major conclusions worth citing in their entirety:

1. For the most research-intensive North American research institutions, the total cost to publish in a fully article processing charge-funded journal market will exceed current library journal budgets;
2. This cost difference could be covered by grant funds, already a major source of funding for publishing fees; but
3. Ultimately, author-controlled discretionary funds that incentivize authors to act as informed consumers of publishing services are necessary to introduce both real competition and pricing pressures into the journal publishing system. Discretionary funds for authors exist today, in the form of research grants, personal research accounts, endowed chair funds, and departmental funds, but the consistent application of these funds for this purpose would, in some cases, require new funding from the institution. (Mellon Foundation 2016, 7)

This study, therefore, supports the concern that gold open access is potentially more costly to large research institutions than the current subscription model. Even in the best case, the third point indicates that authors would need to divert funds from other valid uses. In a later interview with Allison Mudditt, the two coprincipal investigators, MacKenzie Smith and Ivy Anderson, are more positive in noting that "it appears that authors might be willing to pay high fees to publish their best papers in the best journals. But in other cases they might be more interested in finding alternatives—publishing fewer, better papers, or choosing low-cost options for the majority of their papers—and generally more conscious of what it costs to publish and what benefit they get from their choice" (Mudditt 2016). In other words, gold open access may bring about a significant change in scholarly communication. Nonetheless, this author would add the corollary that smaller institutions and independent researchers would be the prime beneficiaries of increased gold open access and that the current mixed model of gold open access and paywalled subscriptions may, in the long term, be the more sustainable model.

The fact that hybrid journals are already collecting APCs from authors poses the question of whether these journals should reduce their subscription prices to reflect the proportion of free content. This author found it difficult to determine the extent of any reductions, if any, for libraries. Kai, in the ESAC blog, states the issue succinctly: "Since publishers have introduced the hybrid open access option, there is a constant debate on

the ‘double dipping’ issue, meaning publishers charging fees for opening up individual articles despite selling the respective journal as part of a subscription bundle” (2016). This author found little evidence that individual libraries, however large, have had much success in reducing their subscription costs. Even the following negative comment by Peter Suber may be too positive. “Unfortunately, most hybrid OA journals don’t lower their subscription prices in proportion to the uptake of the OA option. Hence, they’re being paid twice for the OA articles, once by subscriptions and again by APCs” (LaGuardia 2015, 18). One response to an email request for information on two major discussion lists suggested that publishers may be adding more paywalled content to justify not giving any money back to libraries. If the journal is part of a big deal, this factor further complicates any savings calculations. Overall, this author discovered no firm evidence that any American research library has benefitted from significant subscription cost reductions for hybrid journals.

The efforts to maintain or reduce subscription costs for hybrid journals has had more success in Europe. The centralized structure of higher education has led to agreements between national library bodies and publishers in Austria, Netherlands, and the UK, plus “European countries, such as Norway, Denmark, Sweden, and Finland have currently developed or enlarged their open access policies. They will, therefore, most likely consider including offset deals in their future strategies” (Kai 2016). Even here, David Crotty has concerns about these agreements adding costs to the publication system, the lack of transparency, problems of administrative burdens and compliance costs, the absence of a clear vision of the goals of such agreements, and the continuing importance of big deals. Furthermore, he states that he has “yet to see any mention of how, or if, those increases will be reflected in reduced subscription prices for everyone else” and that, “if the strongest proponents of OA have indeed shifted to a ‘me-first’ mindset, then global collusion requiring sacrifice from so many self-interested entities seems increasingly unlikely” (2016).

To conclude this section on the library perspective, if the goal of open access is to provide more research for faculty and students, both green and gold have achieved some success. To achieve this limited success, however, faculty and other researchers must know about open access both as consumers and producers of research. Librarians must frame any discussions in ways that show faculty how they will benefit. Jill Cirasella says it well: “Remember that the goal is not OA in and of itself but rather the opportunities OA presents for individuals, universities, fields of study, and global publics” (2017, 326). If the goal is for libraries to save money, the results are less impressive. Having a new open access journal in any field does not reduce library costs, as Rick Anderson states very well: “The emergence of a new Gold OA journal is a good thing, because it adds to the fund of publicly-available science—not because it saves the library any money.”

One of his key takeaways is that “if OA doesn’t make subscriptions unnecessary, then what exactly is the point of OA?” (2017b).

## CONCLUSION

Open access in 2018 looks very different from what its proponents expected in 2002. Many factors played their part in hampering the achievement of the goals of the 2002 Budapest Open Access Initiative: “The new technology is the internet. The public good they make possible is the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds” (Budapest Open Access Initiative 2002). As has been reported in this article, perhaps the most important reason for the lack of success in achieving this lofty goal was underestimating the amount of money and time needed to create publications, assure their quality and reliability, and make them accessible. The following paragraphs summarize this author’s thoughts on the role of open access for authors, publishers, and libraries. These generalizations are obviously not universally true and omit many nuances, but he believes that they reflect reasonably accurately the current situation.

The overall goal of authors is to share their knowledge and to have successful academic careers. For them, open access is a tool to help them acquire scholarly resources and to distribute the results of their research. Open access has increased the amount of knowledge by fostering the publication of more research. This is not an unalloyed benefit because even an increase in high-quality articles and books adds to the information glut and the amount of time authors must spend in reviewing the prior literature. The appearance of predatory journals where all that is needed to publish is paying the fee has also required authors to take on added responsibilities to evaluate the quality and reliability of published information. The ability of researchers to publish their research, even in so-called predatory journals, can positively influence their academic careers. Green open access requires them to make the effort to deposit their articles in open access repositories and usually to take greater responsibility in green open access journals for publication mechanics. The main issue with gold open access is finding a way to pay the publication fees through institutional/library support, grant funding, personal payment, or other means. Since some open access articles are not indexed and abstracted by the traditional tools, effective ways to discover them are a requirement for researchers to find these scholarly resources and to receive the recognition needed for their careers when others use them.

The most important development in publishing has been the ability of large commercial publishers to find ways to profit from open access. While the original intent of open access was to limit or destroy their monopoly, the exact opposite has happened. They have created a new revenue stream

from gold APCs while still mostly retaining their subscriptions for paywalled publications even in hybrid journals. The complexity of adding open access to the scholarly communication system has induced many smaller scholarly and other publishers to agree to be acquired by these large publishers, which has only increased their competitive dominance. Without some major unexpected change, open access, paywalled, and hybrid journals will coexist for the foreseeable future. Open access for monographs is not yet clearly defined. Some believe that a book crisis does not exist and that university presses will find ways to survive. In addition, open access for monographs would require more support because of their length and because the humanities and social science researchers who write them have much less access to grant funding and fewer personal resources.

Libraries hoped that open access would help them save money by reducing serials costs. Overall, this author found little evidence that this has happened. Open access has increased the number of journals and articles. Even a free open access journal has associated maintenance costs. Paywalled journals have not disappeared, and hybrid journals mostly cost the same. Maintaining an institutional repository in support of green open access and paying faculty APCs impose additional financial burdens. This author noted in his readings that, with a few exceptions, support for open access by libraries and librarians is more a philosophical stance that does not always make practical sense. Perhaps these efforts will lead to reduced costs in the future, but this outcome is not assured. This author will introduce a more serious concern with a quote from Joseph Esposito: “I find it hard to understand why so many librarians support open access publishing because its practical effect is to make libraries less central to scholarly communications” (2015b). If the goal of “completely free and unrestricted access” were to be achieved, this open access would remove one of the main reasons why academic libraries exist—to provide information resources to faculty and students that they could otherwise not afford. While faculty and students might still need help in navigating the new structures, this free availability would lessen their dependence on the digital library in the same way that digital resources have reduced the need to come to the physical library. Getting what you wish for sometimes has negative unintended consequences.

## NOTE

1. Throughout this article, “STEM” refers to science, technology, engineering, and *medicine*.

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