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## Planet of the APCs: A decade of progress and setbacks in open access

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## COMMENTARY

# Planet of the APCs: A decade of progress and setbacks in open access

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## ABSTRACT

It has been ten years since the JLSC's publication "Bottlenecks in the Open Access System: Voices from Around the Globe," which provided a forum for researchers on four continents and of various disciplinary, political, and economic circumstances to share perspectives on open access (OA) funded by article processing charges (APCs). The authors of "Bottlenecks..." of which we are a subset (we organized the article, sought and collated coauthor input, and led analysis and drafting of discussion and conclusions), supported OA, but raised issues with APC "gold" OA, which excludes many of them from authorship opportunities. Then, and now, we propose that "diamond" (or "platinum") OA models (no payment for reading or authoring) are more equitable and appropriate. In the intervening years, however, scholarly publishing and OA have been highly dynamic, changing both for better and for worse. For example, the rhetorical arguments for OA have clearly prevailed, yet significant challenges remain, both among those observed in 2014 and newly arisen. A significant shift has occurred to APC-funded OA, which is now a deeply entrenched model. Many research funders have taken increasingly strong (and shifting) roles to promote, shape, and reform OA, and there has been a proliferation of business models and experimentation. Piracy and extra-legal solutions to access remain the elephant in the room. These evolutions take place in a context of corporate capitalism and neoliberalism. We have seen that major changes can be made in relatively short time spans (e.g., Plan S and its uptake by major publishers), and we see a dire need to consider broad impacts, especially for scholars and publishers on the peripheries of conventional scholarly publishing. In this article, we outline major events and shifts in the interconnected academic, funding, and publishing landscapes and their impacts; we identify major hurdles that readers and authors now face; we use the Adaptive Leadership Framework to briefly examine paths that we see as



the most promising; and we provide a foundation for the contributions from our peers that follow in this special issue.

## INTRODUCTION

Ten years have passed since the publication of “Bottlenecks in the Open Access System: Voices from Around the Globe” (Bonaccorso, 2014) in the *Journal of Librarianship and Scholarly Communication* (JLSC). That paper provided a platform for researchers from diverse disciplinary, political, and economic backgrounds across four continents to share their perspectives on opening access to the scholarly literature via article processing charges (APCs). As co-authors of the “Bottlenecks” paper, we acknowledge that, our international experience and focused intention notwithstanding, we inevitably represent an American perspective. The Bottlenecks paper was an attempt for us to learn from each other collectively and provide a space in which we could highlight concerns with this open access (OA) business model, which restricts authorship opportunities by requiring fees to publish, impacting diverse communities.

In Bottlenecks, we advocated for OA models that do not require payment for authoring—termed “diamond” or “platinum” OA—to promote equity for both readers and authors. In the intervening years, both OA and scholarly publishing more generally have undergone significant and expansive changes. APC-funded OA, often mistaken for the only OA publishing model, has prevailed in the Global North and West, where many of the most powerful scholarly publishers remain entrenched, with both public and private research funders playing a pivotal and evolving role in marketing, shaping, and reforming OA. Various business models and interesting experimentation regarding OA and scholarly publishing have emerged, yet piracy and the need for alternative access solutions—such as the OA Button, Unpaywall, or contacting authors to request a copy—suggest that unresolved issues remain.

These developments have unfolded within the insidious and normative contexts of late capitalism and neoliberalism. In both our 2014 paper and this one, we emphasize the need to consider broader impacts of these pathways in scholarly publishing, particularly for scholars and publishers outside traditional scholarly publishing. This article outlines key events and shifts in the academic, funding, and publishing landscapes; identifies challenges faced by readers (both academic and non-academic) and authors of scholarly articles; explores promising paths through the lens of a framework that emerges from business and communication studies (adaptive leadership); and, thus, can serve as a foundation for subsequent contributions in this special issue. It is limited, however, given that the authors of this contribution were the organizing group of the original piece, and this article is without the consultative inquiry process that our co-authors from around the world offered in the 2014 paper. We refer our readers to the other contributions in this special issue to sample a rich array of perspectives and framing of the issues collected therein.

## BACKGROUND

In the early 2000s, a small group of librarians and faculty at the University of Kansas (KU), inspired by the advocacy and leadership of its then-Provost, David Shulenburg, and its visionary then-Dean of Libraries, Lorraine Haricombe, worked towards educating campus faculty on the importance and benefits of a campus-wide OA policy, aiming to craft a faculty-driven policy, and building consensus towards adopting and implementing it (Emmett & Peterson, 2010). In 2009, by a vote of the KU Faculty Senate, KU adopted such a policy, the first public institution in the U.S. to do so, after similar policies had passed at Harvard University and MIT, and at Stanford University's School of Education. Shortly thereafter, the same KU team worked with colleagues at other institutions to propose and organize the initial formation of the Coalition of Open Access Policy Institutions (COAPI; <https://sparcopen.org/coapi/>), which was noted at the time as a game-changing development in driving free and open digital access to scholarly publications in North America (Mittel, 2013). Building on these successes and working in the context of growing optimism about a research-sector-driven OA system, the KU group endeavored to discover and elucidate paths for scaling OA processes with a position paper considering the global system of OA for both readers and producers of research (Peterson et al., 2013). The following year, via *Bottlenecks*, we explored global perspectives on APC-based gold OA to substantiate the need for an equitable OA system; *Bottlenecks* included contributions from both producers and consumers of research from more than 20 countries in Africa, Asia, Europe, North America, and South America.

In the intervening decade, much has changed in the OA landscape, not necessarily for the better. Massive-scale commercial interests ("Big Publishing") are now arguably bigger and more entrenched today than they were when OA was beginning to mature, despite industry predictions that OA would harm them (Willinsky, 2009; Peterson et al., 2019). Geopolitical conflicts and tensions, such as the Russian war on Ukraine, and limitations on scientific collaboration between China and Western European and North American countries, have posed further obstacles to bottom-up and horizontal cooperation among researchers and the institutions where they work. It seems appropriate, therefore, at this moment in time, to reconsider collectively where the global OA movement stands today by taking stock of the multiple perspectives presented in the 2014 "Bottlenecks" paper.

### Intervening Years: Major Events and Shifts

The OA scholarly literature has grown considerably, enabling broader access to scholarly work for everyone worldwide. A wider array of publishers now exists whose portfolios are entirely OA, using an evolving variety of models to support open publishing. Legacy publishers also

host many OA titles and publish a significant volume of open articles in their traditional titles (Butler et al., 2023), albeit often via APCs and transformative agreements (discussed further below). Between 2014 and 2024, the number of titles indexed in the Directory of Open Access Journals (DOAJ) more than doubled, from “close to ten thousand” (Morrison et al., 2015, Abstract) to over twenty thousand titles (DOAJ, n.d.). According to Jisc (2024), the global proportion of gold and hybrid OA articles increased from 21% in 2014 to 46% in 2022. Publisher endorsements of OA and proclamations of the value of OA have proliferated such that, when the now relatively rare (in our recent experience) OA skeptic is encountered, one can simply refer them to any of the “Big 5” publisher OA endorsements and say, “Don’t take my word for it...” As a result, the number of OA articles has grown steadily, and this trend shows no signs of slowing.

Alongside the growth of OA, there is an increasing recognition that not everything has to be open. For example, Hudson et al. (2023, Conclusion) examine Indigenous Data Sovereignty, stating, “As the research data environment is increasingly oriented toward OA there is a need to ensure that data systems and practices operate in a manner consistent with the Indigenous aspirations for data sovereignty and research sovereignty. Indigenous Data Sovereignty provides a platform for defining Indigenous narratives and enabling Indigenous research agendas as a tangible expression of Indigenous Research Sovereignty.” Similarly, the European Commission (2016) argued in the “H2020 Programme Guidelines on FAIR Data Management in Horizon 2020” (Landi et al., 2020) that data should be “as open as possible, as closed as necessary,” such as to protect privacy. “As open as possible, as closed as necessary” provides room for more nuanced perspectives on the appropriateness of open, permitting communities and researchers to exercise more agency in this respect.

## Repositories

Repository-based (i.e., “green”) OA has also expanded, as authors take advantage of their intellectual property rights to make their work openly available, as funders have encouraged or required open or public access to funded research outputs, and as publisher sharing policies permit it. More institutional repositories, more subject/discipline repositories, and more funder repositories now exist. According to OpenDOAR (Directory of Open Access Repositories), now operated by Jisc in the UK, 2251 open repositories were indexed in March 2014 (the month in which the Bottlenecks article was published); a decade later, in March 2024, 5888 open repositories were indexed by DOAR, an increase of over 160% (Jisc, n.d.). The number of items in these repositories has also expanded, along with usage. For example, according to PubMed Central (PMC; a U.S. federally funded project of the National Institutes of Health [NIH]), in fiscal year (FY) 2014, the 3.2M articles hosted in PMC were viewed an average of 886,000 times worldwide, measured each

weekday. By FY2023, however, those numbers increased to 9.4M articles viewed an average 3.8M times per weekday, an increase of 192% (for articles) and 329% (for views) (NCBI, 2024).<sup>1</sup> In parallel, between 2014 and 2024, the contents of KU's own institutional repository, KU ScholarWorks, expanded from 12,325 items to 29,209 items (an increase of 137%), and the number of annual downloads increased from 1.6M to 2.6M, an increase of 62.5%.<sup>2</sup>

The growth of repository-based OA has been supported by two key factors. First, institutional deposit requirements, including rights retention policies, often referred to as “Harvard-style” policies, have been adopted at many universities and in university sub-units, e.g., a university, college, school, or department. According to the Registry of Open Access Repositories Mandatory Archiving Policies (ROARMAP, n.d.), which tracks these policies in Africa, Asia, the Americas, Europe, and Oceania, the number of research organizations with such policies nearly doubled from 460 in the first quarter of 2014 to 890 in the first quarter of 2024. Second, various funders of research worldwide have established OA or public access mandates. A notable example issued from the United States is the mandate resulting from the 2013 memo issued by the U.S. White House Office of Science and Technology Policy (OSTP). This memo, entitled “Increasing Access to the Results of Federally Funded Scientific Research,” and commonly known as the “Holdren Memo,” has significantly influenced OA policies (Holdren, 2013). The Holdren Memo expanded the scope of public access policies significantly, building upon the already extensive reach of the NIH Public Access Policy of 2008. It mandated numerous additional federal agencies to develop and implement their own public access plans, most of which took effect in 2015. This expansion led to substantial increases in availability of U.S. federally funded research. Millions of articles are now accessible through repositories such as PMC (NCBI, 2024). Funder actions are discussed in more detail below.

## Openness beyond articles

Openness has expanded beyond numbers of gold and green articles, as well. In scholarly publishing more generally, books and book chapters are also a growing part of the landscape via

<sup>1</sup> PMC explains: “Numbers reported below for FY13–FY21 reflect access to the PMC website in the last month of each FY (September). Beginning with FY22, the numbers reflect the weekday average for the entire FY.”

<sup>2</sup> Thanks to Marianne Reed, KU Libraries’ Digital Publishing and Repository Manager, for providing these statistics. Marianne notes that, during this 10-year period, 2757 items were removed from KU ScholarWorks (via three journals that were migrated with their articles to the Open Journal Systems [OJS] platform). She also notes that identifying bots and removing related downloads has improved, so that where the 2014 download total was likely somewhat inflated, the more recent figure should better reflect actual human usage.

programs like JSTOR's Path to Open, MIT Press Direct to Open, University of Michigan Press Fund to Mission, Knowledge Unlatched, and a growing number of presses that publish open books. For example, in the field of linguistics, the Language Science Press, founded in Germany in 2014, publishes open monographs without any processing charges ([Language Science Press, n.d.](#)). The OAPEN Foundation, a not-for-profit based in The Netherlands, provides essential infrastructure for open monographs. The OAPEN Library is a hosting and dissemination platform, and the Directory of Open Access Books (DOAB) is an indexing and discovery platform. In the joint OAPEN/DOAB Infrastructure for Open Access Books: 2023 Stakeholder Report, they show substantial growth in the number of open books, downloads, and publishers ([OAPEN Foundation, 2023](#)) that roughly corresponds with the decade examined in this article.

Openness also encompasses a range of other practices, such as open data, open peer review, preprint sharing, and other ideas, that fall under the related and intertwined concepts of open science, open research, or open knowledge. While OA took root in scientific and medical fields, and remains strong there ([Peterson et al., 2019](#)), it is increasingly relevant among all disciplines, including the humanities. For example, the Humanities Commons (now called Knowledge Commons, <https://hcommons.org/>) was founded in 2016 to provide a place to network and collaborate, and to share articles and other digital materials openly. The Open Library of the Humanities (<https://www.openlibhums.org/>), founded in 2015, now publishes 30 diamond OA journals and developed the open publishing software Janeway. While the need for open infrastructures continues to grow, much supporting infrastructure has been put into place and adopted in the last decade ([Steinhart et al., 2024](#)), often with support and coordination from initiatives like Invest in Open Infrastructure (<https://investinopen.org/>).

## APCs

Massive OA growth, however, has not come without pain, and significant questions have been raised. Although most open journals do not charge fees to authors, OA articles are predominantly APC-funded ([Butler et al., 2023](#)), largely owing to the skewing impact of the tremendous numbers of articles published by so-called “megajournals” like *PLOS One*, *Scientific Reports* (Nature), and *BMJ Open* ([Ioannidis et al., 2023](#)). These fees (APCs) are not new, having been pioneered by PLOS and BioMed Central in 2000 ([Solomon & Björk, 2012](#)). (APCs were not the first type of author-facing fee: Page charges were introduced in physics literature in the 1930s [[Scheiding, 2009](#)]; alongside color figure charges, they continue to cost authors today.)

Nonetheless, APCs have become a dominant mode to fund open publishing, at least among the most powerful publishers, and particularly those based in North America and Northern

Europe, either in gold journals (where all articles are OA) or in hybrid journals (a mixture of subscription and open articles). APCs range from hundreds of U.S. dollars (USD) to over \$12,000 USD (*Nature*, n.d.; Peterson et al., 2024). This variation appears to be explained in large part by market forces (e.g., what the market will bear while maximizing revenue) and only in a minor way by the prestige or reputation of the journal (Budzinski et al., 2020). Indeed, decisions by individual researchers regarding where they publish their work or invest time as manuscript reviewers or editors are not directly related to APCs (Peterson et al., 2024). Butler et al. (2023) found that, between 2015 and 2018, the Big 5 publishers (Elsevier, Sage, Springer Nature, Taylor & Francis, and Wiley) charged an average APC of USD \$1989 for articles in fully OA journals and USD \$2905 for articles in hybrid journals. To a reasonably productive natural scientist based in the United States, Canada, or much of Europe, at least in fields with sufficient research funding, publishing several papers yearly at a cost of USD \$1000 or more each (Björk & Solomon, 2012) may appear completely feasible (Else, 2018), but that is far from the case for every researcher and discipline and likely impossible for many scholars based in other parts of the world. OA resulting in scholars everywhere having to pay to publish may solve the reader access issue, but it creates a new barrier to authorship. Such a system in effect assumes that privileged scholars with access to sufficient funding are the only scholars whose work is worth publishing. Northern and Western researchers, and those from well-funded organizations, might not be sufficiently considering that the term “scholars” includes researchers based outside of the Global North and West.

Despite (or perhaps because of) their prevalence, there has been a steady critical drumbeat against APCs. We (the authors) were among the early chorus (Peterson et al., 2013; Peterson et al., 2016), as in Bottlenecks, but opposition to APCs has been and remains widespread and strident (Klebel & Ross-Hellauer, 2023). The general point is that authors in lower-income countries, in less well-funded disciplines, and at institutions with fewer resources are largely excluded from participating. It is estimated that the largest five publishers were paid over \$1B USD in APCs over just a four-year period (2015–2018; Butler et al., 2023; Ansele, 2023). Alperin (2022) argues that APCs and APC-based institutional agreements exert pressure on and threaten Latin America’s diamond OA publication system (discussed further below) and should thus be abandoned completely.

APC-based OA shapes and constrains decisions that individual researchers make regarding where to publish their work. APCs are subject to increases, and little agreement exists about what constitutes a reasonable or fair cost. There is too little transparency about how prices are set and how that revenue directly relates to the actual costs of publication. Publishers promote waiver schemes, but waivers are insufficient and fail to achieve equity

(Rouhi et al., 2022). As observed by PLOS CEO Alison Mudditt, “Waivers themselves are structured to ask those most in need of systemic change to jump through hoops that more privileged communities never see” (Mudditt, 2024). APC-funded OA may also create a perverse incentive to publish more and faster, possibly compromising quality, and has given rise to so-called “predatory” publishers, who are interested in little more than charging publication fees. These quality and legitimacy issues have exacerbated OA skepticism for many researchers. In short, and viewed on a scale of multiple decades, APCs have often served to consolidate the power of large commercial publishers, who have adapted well to the changing OA landscape via a new revenue stream (Kember & Brand, 2023). The result may be a net reduction in bibliodiversity, which Kittinger and Solomon (2021, ch. 1 para. 2) state “emphasizes the diversification of voices, languages, funding models, acts of research, and publishing formats considered to be scholarly activity.” As Ma et al. (2023, para. 7) argue, “The introduction of article processing charges (APCs) and book processing charges (BPCs) privileges research and publications by researchers in high-income and Western countries and hence perpetuates the monoculture of knowledge production.”

Institutions, funders, and researchers, particularly in the North and West, have been complicit in the entrenchment of APC-funded OA. On the institutional side, institutions with sufficient fiscal resources have created funds to support APC payment and have entered into publisher agreements that discount them or cover entirely the contributions of their researchers (these “transformative agreements” are discussed further below). On the funder side, APCs may typically be paid from grant funding when funders allow budgeting for such expenses: for instance, in the European Union (EU), Plan S (considered further under “Funding agencies” below) was released in 2018, and it required immediate OA upon publication, with APCs as a primary vehicle for compliance (cOAlition S, 2018). Plan S opened reading access for the resulting publications globally for all, but what about the scholars in the remainder of the world and the scholarship that they might wish to publish? While Plan S provided authors with the ability to comply through non-APC models, one effect it has had has been to push the largest publishers further towards APC models, a reality that cOAlition S (2023) has acknowledged. Among researchers, authors with the ability to pay APCs often have done so, not necessarily considering or even aware of the effects of their collaboration with this exclusionary practice.

In sum, the academic community collectively has helped to build and uphold the system of APC-based OA publication. We do not point this collusion out to cast blame. Rather, we aim to acknowledge that the system is complex, and responsibility for the current state of things is diffused among participants in it, particularly among those who wield the most influence in the dominant system of scholarly publishing.

Although APCs have become a dominant model to support OA publishing, some signs point to reversal of that trend. For example, the position statement entitled “Towards responsible publishing: A proposal from cOAlition S,” also discussed later in this paper, was released in late 2023. While Plan S has resulted in a “global and irreversible” move towards full and immediate OA, the authors of that statement recognize that it contributed to growth of models that solve reader issues but create author obstacles. They propose a vision, set of principles, and mission towards changing the dominant system, placing power and control in the hands of scholars (cOAlition S, 2023). In March 2024, the Bill & Melinda Gates Foundation announced that, as of the beginning of 2025, grantees will no longer be able to use Foundation funds to pay APCs, a reversal of existing policy. Citing problems raised by APCs, the Foundation now insists on preprint sharing (Bill & Melinda Gates Foundation, 2024).

### **Transformative agreements and other new models**

Transformative agreements made between publishers and institutions hoping to access large bodies of scholarly literature combine traditional read access with coverage of publishing costs for institutional authors (Hinchliffe, 2019). Essentially, they are built upon a foundation of APCs. As more institutions broke from traditional “big deals” (SPARC, n.d.; Cooper & Rieger, 2021), transformative deals often arose in their place, at least among the institutions that can afford them (including KU). These models, however, have come under scrutiny and critique (Farley et al., 2021; Ghamandi, 2021; Rawlins, 2024). While they have resulted in more open articles, they share many of the negative attributes of APCs as described above. As transformative agreements are meant to transform (from closed to open), we are now seeing calls for assessment. Do they transform as intended? Evidence suggests not, at least on a timeline that meets reasonable expectations (Jisc, 2024; Muddit, 2024).

If the goal is to increase reader access without creating barriers to author contribution a la APCs, the optimal solution is the diamond OA publishing model, a subset of gold OA in which journals charge neither authors nor readers, typically via subsidy from an institution, philanthropic foundation, or government. In terms of number of journals, more diamond than APC-based gold journals are listed in the DOAJ (<https://www.doaj.org/>), which states that 13,578 of 20,571 journals indexed (66%) do not charge fees to authors (DOAJ, n.d.). Diamond OA has emerged as an important publishing model in Latin America, in particular, although credit for this leadership has often not been sufficient outside of Latin America. Despite appearing here under “new models,” it is not new in Latin America: SciELO (Scientific Electronic Library Online; <https://scielo.org/>) was begun in 1997, and Redalyc (Red de Revistas Científicas de América Latina y el Caribe, España y Portugal; <https://www.redalyc.org://scielo.org/>) in 2003. Both organizations aggregate more than 1000 diamond journals and hundreds of thousands of articles, in multiple languages, reaching beyond Latin America.

Building on their success, AmeliCA (<http://amelica.org/>) was founded in 2018 to advance non-profit open knowledge actions, including diamond OA, in and beyond the region. Recognized by U.S.-based Scholarly Publishing and Academic Resources Coalition (SPARC) in 2019 with the SPARC Innovator Award, AmeliCA is “the showcase of how a healthy open access system can flourish under this kind of community-driven model,” which “prioritizes the voice of the creators of information equally across all areas,” and provides an example that open advocates in the Global North should credit, according to SPARC Executive Director Heather Joseph (SPARC, 2019, para. 5).

No model for producing and distributing scholarly works, either new or established, is without its challenges. To succeed, diamond OA publishers and journals must be sustainable. This is something that researchers, publishers, and advocates acknowledge. An April 2024 report by DIAMAS (Developing Institutional Open Access Publishing Models to Advance Scholarly Communication) titled “IPSP<sup>3</sup> Sustainability Research Report” examined diamond publishers in Europe (Brun et al., 2024). The most pressing challenges they face include “the need for more financial resources, the lack of stability and permanence in personnel, and the dependence on parent organisations” (Brun et al., 2024, para. 8). Their proposed vision includes greater funding stability and longer-term funding by shoring up current support and engaging research funders more concretely. Yoon et al. (2024) came to similar conclusions, finding that “government- or national-agency-backed journals show higher sustainability, indicating the importance of stable, national-level support” (p. 2). While researchers in Latin America and elsewhere in the world are often pressured by assessment and incentive structures to publish in conventional high-impact journals (i.e., those based in the North and West), or may choose to prioritize publication in those journals for the recognition and prestige associated with them, the mature diamond OA structures in Latin America illustrate a way forward (Alperin, 2022). Because of the power and influence of the North and West, APC models may succeed at the expense of the academy-owned diamond OA models in Latin America and, by extension, in other regions where they have developed as alternatives to the dominant publishing system.

Subscribe to Open (S2O; <https://subscribetoopencommunity.org/>) is a hybrid business model that uses existing subscription procurement processes to provide OA for one year’s worth of articles at a time (Crow et al., 2019). Designed to support small-to-medium-sized publishers, in the S2O model, a subscription threshold is set for a journal by the publisher. If the threshold is met, then that annual volume of articles is made openly accessible. If the threshold is not met, however, the journal’s content for that year stays closed, with only subscribers having access and any existing author-sharing policies remaining in place (such as the right to deposit a copy in an open repository). Because S2O is based on the subscription model and processes, as the name of

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<sup>3</sup> IPSP refers to “institutional publishers and service providers.”

the model states, outcomes are predominantly driven by institutions that can subscribe, which are concentrated in the North and West. However, when the threshold is met and openness achieved, no new barrier is established for less privileged authors.

Richard Gallagher, PhD, publisher and CEO of Annual Reviews, a non-profit publisher of approximately 50 titles that has embraced S2O, sees the model as more equitable than APCs, and transformative agreements that are built upon APCs, and more aligned with diamond OA (personal communication, June 24, 2024):

Our view is that S2O is more equitable than either the APC approach or the Read & Publish approach to OA, both of which exclude low-income players, including social science and humanities researchers, in wealthy countries. S2O journals do not charge authors, removing one barrier to open publication to researchers in low- and middle-income countries.

Reflecting on the transition of Annual Reviews to S2O and the impact of that transition beyond the North and West, Gallagher further stated the following:

A very large fraction of our income comes from library subscriptions in wealthy countries. This was true when our journals were behind the paywall, and it remains true now that we are OA using S2O. We do have library customers in Latin America, Africa, and Asia and we are grateful to them for their support. A notable feature of the move to S2O was that these customers are among the most enthusiastic supporters of the change.... Without the help of all our subscribers we would not have the funds to publish OA.

Illustrating the challenge of finding consensus, we (the authors of this article) struggled to see eye to eye on this model. One of us remains skeptical towards S2O because they see too much of the status quo maintained. S2O is, after all, based on the subscription model. The power to determine whether the OA threshold is met is wielded by those with the ability to pay. Another author sees S2O as a practical way forward that does not establish new barriers and opens access to the content of many journals. All models, including S2O, should be critiqued and assessed; over time we will see how this and others play out and can adjust accordingly.

Thinking outside the box, scholarly communication librarian A. J. Boston (2021) proposed a model called “Read and Let Read,” which is not an open model but, he argues, is more equitable than APC and transformative models. Under a Read and Let Read agreement, an institution would prepay a fixed amount (USD \$0.50) per article based on licensed usage from the previous year, doubled. That is, the previous year usage, times two, would determine the fee and the

number of licensed uses for the year that follows. At the conclusion of the year, any unused downloads that remain are donated to a pool for usage by (non-institutional) other users. More such creative and innovative models will surely be suggested, critiqued, piloted, and assessed.

### **Funding agencies**

Research funding agencies, as mentioned at various points above, have been major supporters of public access or OA, and are seen as playing a pivotal role in the evolving OA landscape (European Commission, 2019). In the U.S., the White House's OSTP issued a memorandum in 2013, "Increasing Access to the Results of Federally Funded Scientific Research" (the Holdren Memo), which required public access to publications reporting on funded research within 12 months among the most resourced federal funding agencies. In 2022, the same office issued a new directive, "Ensuring Free, Immediate, and Equitable Access to Federally Funded Research," known as the Nelson Memo (Nelson, 2022), which expanded from a subset of funders to all federal funding agencies and eliminated the embargo. New policies must be in place by 2026.

In response, the American Chemical Society introduced an "article development charge" to "provide authors with a new option to satisfy funder requirements for zero-embargo green open access" (American Chemical Society, 2023, para. 1). Sally Rumsey (2023) characterized this move as "an increasingly out-of-touch and outdated position ... to prevent researchers from retaining their rights to use their own work as they choose" (para. 1). Meanwhile, in 2018, an alliance of funders primarily in the EU, styling themselves as cOAlition S, issued what they termed Plan S (for "shock"), a more assertive policy requiring immediate OA with CC-BY rights for funded research outputs (cOAlition S, 2018). It is generally accepted that these funder actions have had major impacts. Under both Plan S and the OSTP memos, APCs are permitted to be paid from funding, but signs are emerging that that may change (à la Gates Foundation).

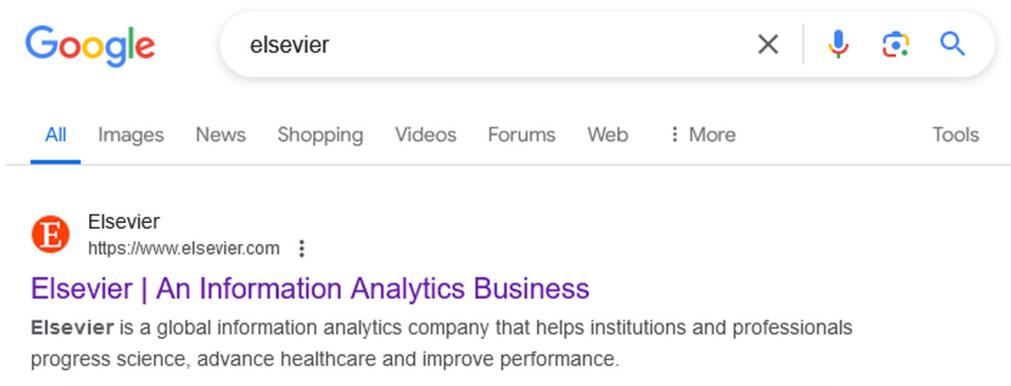
While Plan S in the EU and the Nelson Memo in the U.S. loom large as funders pushing open and public access forward, they are far from alone. According to ROARMAP (n.d.), research funding agencies in Australia, Canada, China, India, Mexico, and South Africa require open or public access as a condition of funding. While not listed in ROARMAP, the Agency for Science, Technology and Research in Singapore similarly requires public access to funded research and permits the use of funding to pay APCs (Yeo, 2022).

### **Mergers and acquisitions**

Reverberating through this evolving system is a sustained pattern of mergers and acquisitions. Large publishers have merged, such as the SpringerNature merger in 2015. Big publishers

have acquired smaller ones, as seen in the recent (2024) acquisition of the OA publisher PeerJ by the far-larger Taylor and Francis. In some cases, adjacent infrastructure has been acquired. For example, in 2017, Elsevier acquired the institutional repository hosting platform bepress; the previous year, Elsevier acquired SSRN, the social science preprint server. In late 2021, Wiley announced it had acquired Knowledge Unlatched. This handful of examples is the tip of the iceberg.

Any sufficiently successful or useful for-profit startup is likely to be acquired and turned towards the most profitable end, regardless of the possibly good intentions of the founders. When a sufficient amount of vertical and horizontal integration occurs, there is a concurrent shift in emphasis away from content and towards data analytics (Aspesi & SPARC, 2019). Elsevier, the largest scientific publisher in the world, does not describe itself as such. Rather, it is “an information analytics business” (Figure 1), with a reach extending far beyond scholarly publishing or even higher education, raising significant questions about data ownership, privacy, and surveillance (Lamdan, 2019; Lamdan, 2023).



**Figure 1.** Screen capture of a Google search for “elsevier” demonstrates an instance of the company’s shift in identity from publisher to information analytics.

## Shadow/pirate libraries

Finally, at least in the major events we have space to examine herein, online repositories dubbed “shadow libraries” or “pirate libraries” have emerged as a major disruption to the established scholarly communication system. Prominent sites like Sci-Hub, Library Genesis, and Z-Lib host and provide free access to millions of copyrighted academic books and journal articles. These massive repositories enable fast, unlimited access to a

substantial portion of scholarly literature, serving as major access gateways for users in both low-resource countries and affluent regions (Bohannon, 2016; Himmelstein et al., 2018).

Advocates and users contend that shadow libraries democratize access to knowledge and promote free exchange of scholarly ideas, both of which are core academic principles. They argue that these libraries fulfill an urgent global need that legal OA channels still cannot fulfill, in spite of recent gains (Oxenham, 2016; Anderson, 2019). In contrast, major for-profit publishers and some scholarly societies view shadow libraries as existential threats to their business models and intellectual property rights. Still others are concerned with the perception of them as deeply unethical (Asim & Sorooshian, 2017). Among OA proponents, opinions are mixed. Some praise shadow libraries' intentions but caution they are not reliable long-term solutions or worry that such initiatives diminish the urgency for advancing legitimate OA through institutional frameworks and policies (Anderson, 2019). It is also important to note that shadow libraries address the "access to read" issue but not the "access to publish" issue—that is, piracy does not address any of the APC-related issues discussed above.

Regardless of one's stance, the widespread popularity and usage of Sci-Hub and other shadow libraries is indisputable. A 2016 article in *Science* reporting on data provided by Sci-Hub found that it was receiving over 200,000 requests per day at one point in the six-month period examined, illustrating the immense demand for access globally that goes unmet by the legal system (Bohannon, 2016). Other studies document similar findings about the growth of Sci-Hub and Library Genesis worldwide (Bodó, 2018; Bodó, 2019; Till et al., 2019; Behboudi et al., 2021; Wan, 2022). Sci-Hub's founder, Alexandra Elbakyan, has been hailed by supporters as a hero for enabling access to research, especially for low-resource regions (Murphy, 2016). In 2016, *Nature* included Elbakyan on their annual list of "ten people who mattered this year," citing praise from several prominent scientists who see Sci-Hub pushing publishers to move to OA models (*Nature*, 2016). Elbakyan received the 2023 Electronic Frontier Foundation award for "vital work in helping to ensure that technology supports freedom, justice, and innovation for all people" (Electronic Frontier Foundation, 2023). At the National Autonomous University of Mexico (UNAM), students installed a mural at the Faculty of Sciences honoring Sci-Hub, driving home Elbakyan's folk-hero status among students and researchers (Figure 2). In 2021, Elbakyan agreed to cease adding new papers to the vast corpus in order to contest an infringement lawsuit in India (Bartlett, 2021). At the time of writing, that case is still pending. Sci-Hub is becoming less comprehensive as a result, but still has a vast collection of published work and many fans and users.



**Figure 2.** Sci-Hub Mural created by students at UNAM. Photograph by Txdgtl is licensed CC BY-SA 4.0.

The persistent supply-and-demand divide in academic publishing stems from multiple artificial constraints, such as exorbitant subscription costs, publisher paywalls, growing student populations, proliferating digital access, and increasingly globalized research networks (Karaganis, 2018). These forces collectively intensify demand for OA, outpacing the ability of scholarly publishers and the OA movement to provide comprehensive solutions. In this context, piracy emerges as an interim solution, filling reading access gaps during this transformative period until new publishing models better aligned with the changing landscape can take hold (Bodó, 2011).

Pirate sites have expanded awareness and discussion of OA inequities beyond academia, exposing deep-rooted conflicts within the current scholarly publishing system. As one publishing consultant put it in 2017, “Sci-Hub has moved to the center of the ecosystem of scholarly publishing” (Esposito, 2017, para. 1). The very existence of pirate sites raises fundamental questions about the ethics, economics, and future of scholarly communication, and how publishers, libraries, and individual scholars might respond (Bendezú-Quispe et al., 2016; Crissinger, 2017; González-Solar & Fernández-Marcial, 2019; Dulong de Rosnay, 2021; Pastor-Ramon et al., 2023). However, piracy alone appears insufficient to drive meaningful change in publishing practices. Rather, significant external pressure from institutions, governments, and researchers will be necessary to instigate meaningful, systematic, and sustainable transformation of the scholarly communication landscape.

## Hurdles faced by authors and readers

Researchers continue to face challenges both accessing and contributing to scholarly literature. Universal access has not been (legally) achieved, though substantial progress has been made. Piracy is popular, at least in part, because the legal systems of access are often less user-friendly or accessible than illicit ones, which do not have to deal with user authentication. The earliest thinking about OA to the scholarly literature focused on reading access to the literature as a key barrier in delaying full and open global participation in scholarly communication. The authors of this paper recall conversations in the early 2000's in which we, in effect, argued that we just needed to get the literature open to *readers*, and that later we would work out which is the optimal path to that openness. This allowed for experimentation in the pathways, but in retrospect, this idea was perhaps naïve. In the end, the business model on which such systemic revolutions are based is crucial. The present contribution is motivated by that mistaken path: the solution by which openness was achieved (in large part, and in growing magnitude) ended up bringing along with it considerable collateral damage.

In an era in which large-scale efforts are being made (and unmade) to increase diversity, equity, and inclusion in the academy, APC-based OA models (and transformative models based on APCs) are decidedly negative, even taking into account their positive feature of creating OA literature resources. That is, the effects of erasing diversity, equity, and inclusivity are pronounced, with negative effects of low resources being exacerbated in the most economically disadvantaged countries and communities (Demeter & Istratii, 2020; Klebel & Ross-Hellauer, 2023). In effect, the picture is one in which APC-based OA publishing is closing opportunities to contribute to the scholarly literature for many sectors of the community that would otherwise publish interesting, useful, and informative research, slowing progress toward a more diverse academy (Beasley, 2016). Although more readers can access the literature, bibliodiversity in the scholarship being published is reduced markedly as a result of barriers to authors who wish to publish their research in journals they perceive as prestigious (Smith et al., 2022).

Authors today must navigate a complex and ever-changing publishing environment. If just choosing a journal with an appropriate scope and readership in an ever-expanding range of options were not confusing enough, more complexity awaits. How does a researcher know if a journal or publisher is legitimate and not predatory? Even among the most trusted journals and publishers, publishers' author sharing policies typically establish different versions (e.g., preprint, accepted manuscript, version of record) and when and where the work can be shared openly. What, if any, transformative agreements might apply, and how does one take advantage of them? Which open license does one choose, and why? An April 2024 webinar hosted by California Digital Library outlined how authors might be pulled in

different directions by competing funder, journal, and institutional policies ([University of California & Authors Alliance, 2024](#)).

### **Most Promising Paths**

As discussed above, much has changed in the decade since *Bottlenecks* was published. OA has grown and become routine, to the point that in some respects it is now unremarkable. OA has also been commodified and made exclusive in some applications. Yet so far, we have failed to achieve universal, legal OA for readers, and we have made things harder for researchers wishing to publish their research, particularly researchers based in lower-resourced situations.

Still, we are not convinced that the OA movement has failed entirely, as some have suggested ([Anderson, 2023](#)). OA was and remains an ambitious goal, well worth striving towards and fighting for. The OA movement has adapted and responded to developments both within and outside of our control and influence in a system under tension and in constant flux. But how do we as a community continue to progress, especially given deeply entrenched players and powers, competing visions, multiple stakeholders, and a complex global and networked system of scholarly publishing and communication? How can we avoid a never-ending and alternating chorus of “no, not like that” ([Boston, 2023](#))?

The adaptive leadership framework, a concept from business and leadership studies ([Heifetz et al., 2009](#)), might provide a useful structure for examining our challenges in a new light. Adaptive leadership uses biological evolution as an example that can be extended to other kinds of change. Adaptive changes retain what is useful and shed what is no longer useful or has become harmful. What is left is better adapted to the challenge of succeeding. Proponents of the adaptive leadership model argue that no social, cultural, or organizational system is broken, but rather “is perfectly aligned to achieve the results it currently gets.... Enough important people like the situation exactly as it is ... or it would not be the way it is” ([Heifetz et al., 2009](#)). Adaptive leadership distinguishes between technical and adaptive problems, as well as between authority and leadership. Leadership is an activity, not a role, which is helpful because leadership can and must occur at every level rather than solely at the top of a hierarchy.

Within adaptive leadership, technical problems are those that have a clearly defined problem, have a clear solution, and can be managed from a position of authority. That is, for these problems, if the right people apply the right methods and/or use existing appropriate data, the problem can be solved. Adaptive problems lack clear definition, where the solution requires learning, and must be managed across stakeholders. The two categories are not mutually exclusive: some problems are both technical and adaptive. In those cases, we might agree on the problem, but learning is required to arrive at a solution and achieve cooperation

between authority and stakeholders. Responding to adaptive challenges requires accepting and managing disequilibrium and can be disruptive. There are cycles of observation, interpretation, and intervention in which we experiment, and sometimes fail, but learn. Adaptive leadership must connect to purpose and engage both the heart and the mind.

The challenges towards achieving a more open and equitable system of scholarly publishing and communication comprise, in the terminology of adaptive leadership, a complex mixture of technical and adaptive problems. Can we find consensus on what should be retained (creating and sharing knowledge) versus what should be rejected (paywalls, barriers, incentive structures that distort the creation and sharing of knowledge) and what should be adapted (peer review models, how to fund OA)? The global scholarly community needs to examine how we uphold and enable the systems that we label as dysfunctional, such as by ignored professed values in pursuit of prestige and reputational gains. Communities with the most power in the research landscape, namely those in the global West and North, might consider how ideas and approaches from other contexts may suggest solutions, or at least other ways to understand and approach our challenges. We need to consider which problems are technical and which are adaptive: which can be solved with authority, and which require leadership (in the adaptive sense). We also need to experiment, but carefully, considering the impacts, and taking responsibility when we fail, by acknowledging the negative and working with those impacted to adapt forward together. Finally, purpose must be front and center so that we can marshal hearts along with the significant intelligence that we wield as a community.

We do not imagine that we have resolved the remaining dilemmas, and it is beyond the scope of this article to do so. From our perspective, a more desirable system would be more non-profit than commercial, resulting in outputs that are openly shared without cost to creators, that prioritize open over proprietary infrastructure, and that are consumable without barriers beyond access to the internet. At the discretion of creators, open licensing to permit reuse and adaptation would be the default. As the creators, editors, reviewers, and often primary consumers, researchers would drive the system. To the extent that profit-seeking continues to exist, it should be fair and limited, with appropriate investment into the scholarly community that it services. While the existing system is deeply entrenched, there is movement in the direction of such desirable outcomes.

At the September 2023 Geneva Workshop on Innovations in Scholarly Communication, Claudio Aspesi (2023) presented a four-part test developed with Amy Brand and Jean Claude Guedon that we might use to evaluate experiments and proposed models, as a guide towards knowing which ideas and models to support. They propose that desirable scholarly publishing systems (1) provide that registration, certification, dissemination, and preservation are equitably available to all quality research contributions; (2) distinguish certification from assessment and

support the “record of versions” construct; (3) enable research agendas to be driven by global or regional relevance rather than journal visibility; and (4) allow equitable OA to research results for purposes of reading, mining, and reuse without undermining sustainability of mission-aligned OA publishing enterprises. Aspesi et al. identify several existing models that fit these principles, including diamond OA, S2O, preprint rapid reviews, and open repositories.

In late 2023, cOAlition S released a relatively radical proposal to advance OA in the EU (primarily). This proposal, entitled “Towards responsible publishing: A proposal from cOAlition S,” acknowledges that Plan S advanced the “global and irreversible” move towards full and immediate OA in scholarly publishing (as briefly discussed in the APCs section above), but that it did so via transformative agreements and APC models, creating significant equity issues among authors. They point to the diamond OA system of Latin America (discussed above) as an example of a scholar-led system. They propose a vision for “a community-based scholarly communication system fit for open science in the 21st century. This system empowers scholars to share the full range of their research outputs and to participate in new quality control mechanisms and evaluation standards for these outputs. This approach will ensure rapid, transparent dissemination of high-quality scientific knowledge” (cOAlition S, 2023, p. 4),

To advance the cOAlition S vision, a set of principles was proposed: (1) authors are responsible for the dissemination of their findings; (2) all scholarly outputs are shared immediately and openly; (3) quality-control processes are community-based and open to ensure trustworthiness of research findings; (4) all scholarly outputs are eligible for consideration in research assessment; and (5) stakeholders commit to supporting the sustainability and diversity of the scholar-led publishing ecosystem. Building on the vision and principles, the mission of this proposal “is to facilitate the transition to an open, scholar-led communication ecosystem” (cOAlition S, 2023, p. 6), via partnership with the research community and by leveraging their position as funders through requirements and assessment processes. Funders should increase spending on entities that advance these initiatives and decrease spending on those that do not.

If successful, much power and control could shift towards authors, and publishers will primarily provide services to support the system. The authors of “Towards Responsible Publishing” (cOAlition S, 2023) suggest the Publish Review Curate model (Rich, 2021) as a promising one, and they briefly describe the model in the report’s annex. We see our desired vision largely reflected in the proposals by Aspesi (2023, with Brand and Guedon), and by the recent cOAlition S (2023) proposal. Clearly, cultural change is a formidable challenge. We do not know exactly what will work, nor are we sure that currently promising models will continue to serve; however, experimentation, multiplicity of models, and honest assessment are crucial to working towards a more ideal scholarly communication system.

## CONCLUSIONS

We were honored to be asked to contribute a piece to a 10-year retrospective on our 2014 *Bottlenecks* article. As described above, that original work brought together authors from around the world, with our local Kansas group serving as organizers and initial editors. In this 2024 article, our original Kansas group (plus one new member, JB) reunited to reflect on the progress made and the setbacks and roadblocks encountered. We recognize our positionality—we are five scholars and librarians from Kansas, whose Global North and West perspectives are limiting factors in our assessment. Although we have had deep and extended experience working, researching, and publishing with scholars in the global East and South, our lived experience is solidly one of privilege in the academic world. With the aforementioned limitations noted, in this article we have outlined important historical changes and markers in the OA landscape, pointed out issues faced by readers and authors as the new OA “order” (for lack of a better term) takes shape, and signaled promising paths forward that stand out to us, in this transitional moment in the evolving scholarly publishing world.

As we worked through this piece, more questions arose, even as we used the adaptive leadership framework to identify challenges and ways forward. We recognize that several key elements or core principles exist that, when present, offer the best chance for an equitable system, as well as various litmus tests for projects and experiments as they continue to evolve. Still, even within our small and tightly knit working group, differences of perception and opinion arose, such as in the discussion of S2O above.

A key point is that the paths to openness matter, the ways and the means by which openness is achieved are interconnected, and intended or unintended downstream effects are not always considered carefully, as we are now seeing with the manifold concerns about APC-based OA publishing and the concurrent reduction in bibliodiversity. Similar concerns revolve around the alternative models that are now being explored. Questions that stand out to us when reviewing paths and projects, initiatives and movements forward include these: Is it open, inclusive, and fully equitable both to readers and to authors? Is it sustainable? Who or what is funding it? Is it vulnerable to corporate/commercial takeover, as we have seen in many cases? Is it scholar-owned and scholar-controlled? What downstream effects may privilege one group or region more than the other, or may create unexpected inequities in the future? How do we balance the fact that change is inevitably disruptive with the absolute need to evolve? These types of adaptive problems require sophisticated forms of cooperation, consideration for all scholars and readers of scholarship, and a deep awareness of the communities that scholarship is intended to advance and uplift.

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