JOAL Special issue on "Open Science and Data Protection" Part I Commentary:

On Not Taking Open for Granted

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Part I of this special double-issue on "Open Science and Data Protection" from the Journal of Open Access to Law (Vol 11, No 1) presents four papers that grapple with the larger picture of today's digital-era move to open science. The papers in Part II (Vol 11, No 2) will delve more specifically into the legal contexts of data protection for open science. The journal's two issues take up, in a nutshell, all that follows from the internet-enabled openness of science. This openness holds much promise for accelerating and facilitating access to the research literature, as well as to all that is involved in doing research, including earlier publications, data sets, analytical tools, publishing platforms, and the list goes on. It also poses a series of risks and challenges that range from the personal privacy risks posed by the sharing of biomedical data to the decidedly slow pace at which the agreed-upon benefits of open access to research and humankind is unfolding.

The first paper is Elena Giglia's "Open? The Only Way Forward for Science." It dramatically sets the stage for this theme by first identifying open science's role in stemming the horrors of COVID-19. For Dr. Giglia, who leads the Open Science Unit at the University of Turin, the pandemic offers a tragic natural experiment demonstrating the difference that this new spirit of openness can make in our development of vaccines, as well as in other measures taken against the disease. She sees this as clear evidence of the good to be achieved by universities to get behind open science. Certainly, open research data took center stage very early in the pandemic. On January 11, 2020, the day of the disease's first reported death, Wuhan University researchers' uploaded an initial draft of the COVID genome sequence to the Virological database (Cohen, 2020)[1]. Later that day, Kevin J. Olival tweeted a "rapid phylogenetic

[1] A copy of the genome was placed in the National Institutes of Health's GenBank, which was initiated in 1982 and is now home to 3.4 billion machine-readable sequences.

analysis" of the sequence, critically demonstrating its alignment with SARS (Olival, 2020)[2].

This rapid response to the crisis, involving both established research data deposit systems and innovative social media accounts, resulted in scientists' frictionless sharing of research on a global scale. Herein lies the reasonableness of Dr. Giglia's call for open as a moral imperative for science. What cannot be overlooked with this imperative, however, is how unevenly it is currently established across different research areas. On the one hand, researchers working in genomics have been complying with data-deposit requirements dating back to 1996 in the case of Nature publications (Promoting, 2020). On the other hand, during the pandemic only 18 percent of the vaccine clinical trials conducted at that time shared their data with other researchers, with only 12 percent of the studies providing access to their trial protocol (For Whose Benefit, 2021). It can seem that where science joins hands with commerce, in the case of big pharma, it may require more than a pandemic to see open science values placed ahead of intellectual property rights protection[3].

Yet a further lesson that Dr. Giglia introduces in her paper follows from the part played by the Virological database and GenBank in the distribution of the COVID genome sequence among researchers. These two organizations reflect the long-term commitment and investment needed to put not just databases but scientific norms in place that develop and encourage open science practices. On this question of norms, Dr. Giglia makes a compelling case to extend the emerging standard of FAIR data (Findable, Accessible, Interoperable, Reusable) across the disciplines. I know that my colleagues in the humanities, as one who works in this area, are not commonly given to thinking of data as playing a part in their scholarship, with the exception, perhaps, of those working in the digital humanities. Yet the distance between database and archive, as open resources for learning, could be productively reduced through this broader application of FAIR data principles across the disciplines. The responsibility for considering FAIR's advantages for research in different disciplines strikes me as ideally suited to the professional concerns of scholarly societies that often take up matters of research quality and strategy.

In a similar vein of fostering open science norms, Dr. Giglia points to the rapid expansion of biomedical preprints during the pandemic, through bioRxiv.org, medRxiv.org, and SciELO Preprints, as another example of the change afoot. This demonstrates how science's opening

[2] Nature expanded the data deposit requirement to earth, space, and environmental sciences 2019 (Reporting, 2023).

[3] Intellectual property rights protection continues to be considered a legitimate limit on the industry's clinical trial transparency commitment (Joint Position, 2018).

offers, as a further bonus, a breaking down of the disciplinary walls that can keep beneficial innovations from spreading to other fields. The preprint has a long pre-internet tradition in particle physics, dating back to carbon copies, with licked envelopes and stamps, which then, quickly after the arrival of the internet, thanks to Paul Ginsparg's brilliant innovation of setting up a server for uploading and downloading papers, now known as arXiv.org (McKiernan, 2000). Three decades later, this expedited same-day research exchange met an acute among biomedical researchers during the pandemic, turned the fledgling preprint server medRxiv.org, launched in 2019, into a vital pandemic hub for researchers in a field that had been notably skeptical about circulating studies prior to peer review not long before[4].

Still, it needs to be recognized that the preprint is, in effect, a scholarly publishing workaround for advancing open science. The journal system, which Dr. Giglia does not hesitate to identify as plodding, expensive, and inequitable, is left relatively untouched by the growth of preprints. That is, this immediate posting of draft papers, which may or may not come to be published, is hardly a substitute for improving scholarly publishing, given the integral part played by scholarly editorial oversight and peer review in assuring the quality of research publications. The recent flourishing of preprints might well be regarded as a further provocation for creating a more open, timely, and financially sustainable publishing system commensurate with the ideals that Dr. Giglia sets out for open science.

Although the scale of change needed to address the shortcomings noted by Dr. Giglia may seem intimidating, there's something to be said for its timing. It has only been in the last few years that scholarly publishers, big and small, have come to fully endorse open access as a benefit to research and humankind. This open access consensus among scholarly publishing stakeholders, which also includes researchers, societies, libraries, and funders, provides a strong starting point for bringing about needed change. This is not to say that major differences don't still persist within this consensus. On one side, open access involves the profitability achieved through Article Processing Charges (APC) and the pursuit of "transformative agreements" that link open access to university subscriptions in what is proving to be a slow and increasingly expensive path to open access (Transformative, 2023). On the more promising side, a whole swath of journals – cutting across disciplines, languages, and regions – are now operating under what is commonly

[4] One source of that skepticism was the danger of putting out biomedical papers prior to peer review, while what happened in the first year of medRxiv.org is only 18 (0.002%) of the 7,695 preprints posted were sufficiently flawed to require removal (Krumholz et al. 2020).

referred to as Diamond Open Access, which is to say without charging readers or authors (Khanna, *et al.* 2023).

In light of this divide between paths to open access, a number of university librarians with whom I've spoken harbor hopes that researchers will see the light and redirect their work from corporate publishers to Diamond OA journals and other alternatives. While I'm drawn to this vision of a great migration, having worked for more than two decades on building the open source publishing platform through the Public Knowledge Project (used by this journal among others), I'm also attentive to how a great number of my colleagues have voted with the submission of their papers in support of the commercial publishers[5]. So while we may agree with Dr. Giglia that open science is the only way forward, the timeline, as well as the means of getting there, remain, dare I say, open questions. This has led me, at least, to back more than one horse – whether with open infrastructure, copyright reform, subscribe-to-open publishing models – in pursuit of a sustainable and universal form of this open future.

What lies behind what is currently an urgent concern with science's openness is something that David Resnik addresses in the second paper in this issue. Rather than see open science as a digital era innovation, Dr. Resnik, a bioethicist at the National Institute of Environmental Health Sciences, presents the *longue durée* of this pursuit, with its origins deep within the Western philosophical tradition beginning with the openness of Socratic questioning. Those of us touting the advantages of "open science" ignore the inherent redundancy of using the adjective open with science, which Dr. Resnik, in effect, highlights.

The practices that evolved from natural philosophy into what were characterized during the Enlightenment as "science" were always already open, relative to other cultural practices. This openness to further reasoning and questioning, evidence and analysis, is what was to set science apart from alchemy, astrology, mysticism, and religion[6]. Dr. Resnik's definition of open science – as a "commitment to publicly and freely

[5] For example, one longitudinal study has established that early career researchers have little interest in exploring how to pursue sustainable open access through their publishing practices (Harbingers II, 2023).

[6] The philosopher Karl Popper went so far as to make science's openness, which he saw as firmly rooted in its willing susceptibility or openness to new ideas, the basis of a more enlightened "open society", representing an "evolutionary epistemology" (Popper, 1984) in which "the rights of the individual to criticize administrative policies will be safeguarded and upheld, undesirable policies will be eliminated in a manner analogous to the elimination of falsified scientific theories, and political differences will be resolved by critical discussion and argument rather than by coercion" (Thornton, 2022).

sharing the products and means of scientific investigation" – works well with this historical approach, even as he also introduces a check on open science as an unmitigated good, given how it may, at times, place human interests and national security at risk.

I would pick up on Dr. Resnik's reference to the early journals as it again reveals openness' uneven history (rather than a steady march of progress across the sciences). The great leap forward in Dr. Resnik's "publicly and freely sharing the products and means of scientific investigation" took place in 1665. It was then that the emergence of a flourishing periodical market convinced Denis de Sallo that it made sense to launch the *Journal des sçavans* in Paris, followed three months later by Henry Oldenburg's Philosophical Transactions in London. It was not long before these new sources of developments in research and scholarship were to be found in European bookshops and coffeehouses. Oldenburg, in particular, made clear at the outset his lofty scientific aims and public service aspirations in sharing "the knowledge of what this Kingdom, or other parts of the World, do, from time to time, afford," while keeping private his (largely unsuccessful) pecuniary interests in the Transactions (Oldenburg, 1665) (Hall, 2002). Oldenburg's commitment to sharing, however, was not a particular priority of the Royal Society of London, which employed him as secretary and was willing to permit him to report on the work of its members. The Society took more than a century to decide that it had an interest and responsibility in seeing its work made public, at which point it became the journal's publisher[7]. Nor in those early years of the Transactions did the Society's scientific star Isaac Newton feel any sort of commitment to openness. Oldenburg was able to convince Newton only once in 1672 to place a paper on light and color in the journal, with Newton soon becoming fed up having to respond to the queries about it that followed (Willinsky, 2019). The birth of the scholarly journal offers a Kuhnian instance of how this openness proceeds in fits and starts here and there, with its innovators facing resistance and reluctance. Dr. Resnik's perspective on these historical moments of science opening might serve, then, to stir those who have yet to see the value of today's initiatives to not linger and dawdle before considering its advantages for science.

Yet Dr. Resnik also finds that this historical perspective provides reason enough to balance our approach to open science with warranted checks on the sharing of research data. Reason enough to restrict access,

[7] On the other hand, the Society also showed little interest in registering the Transactions for copyright protection when that became available to periodicals in 1842 (Fyfe, 2020). It would be another century before the commodity value of this intellectual property started to become the center of a thriving scholarly publishing economy (Monboit, 2011).

he argues, is found in the benefits to be had by respecting the business interests of pharmaceuticals and the cultural rights of communities, as well as by protecting endangered species and national security. Yet he also admirably advises researchers, who are feeling protective of their data, to consider an open science approach that involves not giving away one's hard-earned data, but collaborating with those interested in it on further analysis, with credit to all. A related approach, and a further encouragement for those contemplating making their data available, is an emerging standard for data citation, which credits the original data work (Silvello, 2018) (Buneman *et al.*, 2020). In both cases, data re-use may offer economic savings as well as a further quality check on the original study, while providing a basis for replication studies.

Yet in this context, it is also important to consider the grimmer historical chapters behind Dr. Resnik's concerns over an unqualified embrace of openness. Too often, the past demonstrates, it takes a scientific travesty to institute protections of those subject to scientific inquiry. Let me note three instances, which, if all too familiar to readers, deserve a place in a double special issue devoted to open science and data protection, as reminders of scientists' susceptibility to the state-sanctioned racism of their times:

1. The Nuremberg Code (1947) consisting of the "standards to which physicians must conform when carrying out experiments on human subjects", issued by the International Military Tribunal investigating the Holocaust.

2. The Institutional Review Boards established by an act of the U.S. Congress in 1974 for protecting research subjects' rights established, following the scandalous forty-year "Tuskegee Study of Untreated Syphilis in the Negro Male" (Brawley, 1998).

3. The National Institutes of Health agreement with the family of Henrietta Lacks ensuring their continuing consent in the use of the "immortal" HeLa cell line obtained in the 1950s without the consent of the fatally ill Ms. Lacks or her family (Callaway, 2013).

Given the outsized role of innovation and transgression in the history behind this issue's theme of open science and data protection, we might consider how the regard for open access, given this journal's eponymous embrace of the concept, has shifted between these two poles over the last two decades. In the early 2000s, the scholarly publishing community initially portrayed the internet innovation of open access as a transgression of publishing norms that threatened the future of science. As late as 2012, the largest of scholarly publishers, Elseiver, underwrote a

bill before the U.S. Congress to outlaw the NIH Public Access policy. Putting an end to this new form of open science was necessary, the ultimately unsuccessful bill insisted, to ensure "the continued publication and integrity of peer-reviewed research works" (Peterson, 2013).

A decade later, having found that article processing charges (APC) can make open access no less profitable than subscriptions, Elsevier has joined the consensus among scholarly publishing stakeholders on the value of open access in advancing research. The humbling truth is that science is not exempt from the cultural exercise of human values, whether this involves economic values or the value we place on others' lives.

In seeking to balance the opening and protecting of research data in this legal context, we may want to consider copyright's concept of "limitations and exceptions" as a guide for research practices. In a variation on the FAIR data point cited by Dr. Giglia – "as open as possible, as closed as necessary" – the default standard for publishing research could be open data, unless one or more factors applied (e.g., impossible to protect participant anonymity). Such factors would qualify the data for an exception to the open data policy, much as judges use four factors[8] in deciding "fair use" cases in U.S. copyright law. These exceptions would be subject to interpretation, and thus, for example, further limited by new technologies that increase protection of human subjects, as Hammam Abu Attieh and colleagues' paper demonstrates in Part II of this special issue, just as limitations could be increased if new vulnerabilities are identified[9].

One source of growing insight into respecting people's autonomy is, according to philosopher Carissa Véliz, the tech industry's evolving ethics codes and management strategies (2019). Véliz regards a raising of personal autonomy standards, whether for tech or research, as an exercise in "privacy as power" (2020). She believes that such powers can subvert surveillance capitalism. In the case of research participants, however, the power at issue can end up influencing what gets studied. This was the hard-won achievement of the AIDS Coalition to Unleash Power (ACT UP) in the decades before the turn of the century. ACT UP changed U.S. federal research protocols, disrupting another instance

[8] See: `https://fairuse.stanford.edu/overview/fair-use/four-factors/`.

[9] Sue Halpern writes of the recent rise of data-trafficking threats in the field of health: "Pharmacies sell their customers' prescription information to data brokers; those data brokers know who has HIV and who has searched the Internet for abortion services. (That information may be used to take legal action against people in states with most restrictive abortion laws.)" (Halpern, 2023). Seung-min Park's development of a smart toilet capable of analyzing individual biodata with eye to clinical-trial implementations raises risks of data-hacking and other misuses (Armitage, 2023).

of science acting prejudicially, in this case, against gay men (Schulman, 2021).

Such powerful instances of citizen science can be viewed as another chapter in science's opening, with the changes achieved in national policies offering a transition to Roxanne Missingham's contribution to this issue "Policy and Legislation Challenges for Open Science: Developments in Australia". Ms. Missingham, Australian National University's Chief Information Officer, provides a guide to the country's open science policies, beginning with the Australian Partnership for Sustainable Repositories in 2003. After more than a decade of particle physicists posting draft papers in arXiv.org, others were asking by the time of the Australian repository policy, why not enable faculty to, on having a paper accepted for publication, simply upload a draft to an online repository maintained by their university library (Harnad, 2001). This would enable open access with little disruption of publishing. It was, as Harnad liked to point out, merely a matter of keystrokes. The Australian government was also persuaded to fund open source repositories for university libraries across Australia, which appeared to offer a ready check on the commercial sector's takeover of scholarly communication.

Yet, as Ms. Missingham observes, the proportion of published papers that ended up having a draft in the repositories was "smaller" than hoped. She concludes that "a guidance and policy-based approach that did not include legislative reform resulted in only part of the scholarly communications system changing to deliver open science to the world". The part of the system that changed around repository depositing has remained narrow, limited to a number of fields, such as particle physicists, computer science, and then far more recently, as noted, the pandemic biomedical surge in preprint deposits, raised by Dr. Giglia.

As well, smaller-than-hoped applies to many open access fronts (including, beyond repository drafts, open access in hybrid journals, open access journals, rogue copies, etc.). The last two decades have seen steady if still limited growth of open access to the research literature. A comprehensive 2018 study found only 28 percent of the literature was currently open access, while in 2021 that the scholarly publishing industry was still deriving 88 percent of its revenue from closed subscriptions (Piwowar, 2018) (Open Access, 2022)[10]. Despite the best efforts of some of us to offer researchers a viable open access alternative, based on open source software hosted by the academy, I think we need to accept that during the twenty-first century the corporate sector has

[10] As best I can tell, the few researchers uploading their drafts to repositories account for six to ten percent of the literature, based on this form of Green open access calculated to be 15-20 percent share of open access generally (Björk, 2017).

only strengthened its hold on scholarly publishing's prestige economy. This is understandable insofar as such publications continue to determine faculty members' career paths, especially in the Global North (including Australia and New Zealand)[11]. With the corporate sector now (finally) embracing open access, what we are learning from those who might be termed "sector-defectors" – that is, editors and editorial board members who are resigning *en masse* from, or being fired by, corporate publishers – is an intense pressure to increase article numbers and pump up APC rates to ensure that open access is another means of maximizing profitability (Quinn, 2023) (Weinberg, 2023) (Mackenzie, 2019).

When it comes to the open research data question, Ms. Missingham points to more recent Australian legislation that sets out data requirements in terms of both archival preservation and privacy protection. While this attention to data is welcomed, she notes that these new measures, both legislatively and from research funders, also introduce new levels of regulatory complexity that can in itself limit the pursuit of open science. Yet she remains hopeful that Australia's current review of its Copyright Act will lead to gains in open science on two points. The first concerns modifying how, with fair dealing, Australian law requires authors to seek permission to quote another's work, which is definitely a deterrent to open science. Here she sees the way forward through an alignment of Australian copyright with the Berne Convention on permitting such reasonable uses without permission. The second issue she identifies is copyright's failure to address orphan works, which in the case of research, would permit the reuse of deidentified or anonymized data for which a copyright holder is not known, without having to wait until copyright's expiration seventy years after the death of the author.

While both measures will advance open science in Australia, I'm one who feels that what is called for is a far more extensive reform of copyright. We need, I hold, copyright reform that is tailored to ensuring that the law serves open access in scholarly publishing (and not just the subscription economy as it does today). Oddly enough, the Berne Convention, which dates back to the late nineteenth century, can be seen to point a way forward. The Convention supports both "the normal exploitation of the work" and "the legitimate interests of the author"

[11] In the Global South, on the other hand, open access and open infrastructure was simply the way that digital publishing unfolded over the course of the twenty-first century, flowing naturally out of the previous print regime involving the bartering and donation of journals among institutions (Cetto and Alonso-Gamboa, 1998). The extent of scholarly activity in this region continues to be underrepresented in a North that perpetuates a colonial division between center and periphery (Khanna *et al.*, 2023).

(Summary, 1886). When it comes to researchers' legitimate interests in the normal exploitation of their work, I hold that nothing will work better, now that we are living in the digital era, than open access. Where other culture industries, from video games to music streaming, have seen copyright law remade to better serve their online endeavors, it should now be science's turn to benefit from an updated law, as I have argued elsewhere[12]. Without minimizing the concerted effort it will take to bring about such reforms in different jurisdictions and on an international scale, we can at least start with the stakeholder consensus on the value of open access in scholarly publishing. We can also be encouraged by the voices assembled in this volume that make the case for open science on so many levels and within reasonable limits.

Moving, then, from the first two papers on the view from within the scientific community, and the third paper on national science policies, let me turn now to the broader economic and political forces that are influencing the European Union's approach to open science. In "Reconciling Open Science with Technological Sovereignty: Can the European Union do it?" Luc Soete and Jean-Claude Burgelman, Dean and Professor, respectively, at the Free University of Brussels, begin where Dr. Resnik left off with another chapter in the earlier spirit of scientific cooperation. This time it is the famous eighteenth-century mobilization of amateurs and professionals in various parts of the world who were to track the transit of Venus and share their measurements of the planet passing before the sun. This earlier collaborative spirit, if taking place within the scope of European imperialism at the time, provides a context for what Profs. Soete and Burgelman see as today's challenges for this common pursuit of knowledge. In particular, they are alarmed by how the European Union's earlier championing of open science is now succumbing to geopolitical pressures, as timely as Russia's invasion of Ukraine, as pervasive as U.S. global technological dominance, and as mighty as China's incredible economic growth (up until very recently). They would remind us that open science's fate, especially in the policy realm, is subject to the larger economic forces, with their focus on the EU.

Initially, digital-era open science appeared to fit neatly within the EU's pursuit of, in Profs. Soete and Burgelman's terms, "a free and open market for goods and services, capital and labor, and ultimately

[12] In a nutshell, I propose introducing "research publications" into copyright law as a category of work subject to its own measures, principally a statutory licensing that would require publishers to provide immediate open access to research publications for which they would be fairly compensated (by borrowing the music industry's judicial price-setting process) by universities and funders (Willinsky, 2023).

for knowledge"[13]. Yet this form of neo-liberal globalization has not worn well over the last few decades. It has arguably empowered authoritarian regimes in China, Russia, and elsewhere, while rather recklessly exacerbating climate change and social inequality. The recent turning away from the neo-liberal pattern, Profs. Soete and Burgelman point out, is reflected in the EU's current policy language of "strategic autonomy" and "technological sovereignty." The EU is seeking to reduce its international dependencies, whether on Russia for fossil fuels or the U.S. for cloud computing. It is part of a larger shift in international trade patterns that is being characterized as "deglobalization," even if it represents more of a slowdown than an actual reversal (James, 2018). Still, Profs. Soete and Burgelman point to how, as a result, the EU is pulling back internationally on multiple fronts, from energy to immigration. It is reinforcing a "fortress Europe" sensibility that includes a new host or concerns with "knowledge security", reflecting interests in protecting IP that places competition over cooperation. This obviously does not not bode well for open science initiatives[14].

More than that, as we have seen in the U.S., such concerns can have a chilling effect on the scientific community as a whole. During the presidency of Donald Trump, the FBI began to pursue what it characterized as the "China threat" by investigating thousands of researchers, leading to few arrests while furthering anti-Asian sentiment in the country (Kolata, 2023). Since 2020, the National Academies notes, "the US research community has seen an extraordinary increase" in knowledge security measures which "limit the exchange of ideas, participation by others, and international collaboration, slowing the pace of research" (Maintaining, 2022). And while the Justice Department suspended this initiative in early 2022, political figures have continued a public call "to weigh the national-security implications of scientific research" in media outlets, replete with critiques of the U.S. government's "open-science agencies," such as the National Institutes of Health (Benner, 2022) (Dabbar, 2023).

[13] This meant that although the continent had become home to the corporate headquarters of four out of the last half-century's Big Five scholarly publishers, the EU still managed to pioneer a number of open science initiatives, among them OpenAIRE and cOAltition S. As if not to disturb the EU's peaceful coexistence, for example, Elsevier launched copyright infringement suits against Sci-Hub (the illegal open research repository located in Russia) first of all in 2015 in the United States, where the company succeeded in winning, if not collecting, damages, and then five years later, in a case that has yet to be decided as I write, in India (Prasad, 2023).

[14] The ironies come through in European Commission statements such as "The European Union will not remain competitive at the global level unless it promotes Open Science" (2018), cited by (Paseri, 2021).

Ultimately, Profs. Soete and Burgelman believe that the EU's earlier leadership with open science will prevail. In spirit and practice, open science initiatives continue to fit well with "Europe's vision and support for human rights,... open debate... [and] for independence in research". They also hold out a critical hope, as many of us do, that open science is exactly what's needed to address "the urgency of out-of-control climate change and declining biodiversity." Still, their paper illustrates how attentive we must remain to open science's fit with larger economics and policy contexts, much as Dr. Giglia cautions us on a similar dampening effect arising from EU's research assessment exercises. Those making the case for open science (note to self and others) would do well to constantly recalibrate their rhetoric, as well as the research they undertake and draw upon around open science's contributions, so that we are effectively competing for attention in making the case for research's priorities.

To take a further example, the pandemic not only demonstrated open science's value in accelerating life-saving responses, it brought to the fore the extent to which the public distrusts science and harbors an appetite for misinformation. How we can begin to address these distressing attitudes among the public is now being recognized as far more of a direct responsibility of science education programs (Osborne *et al.*, 2022). As well, those of us involved in research and development intended to advance scholarly communication are starting initiatives directed toward preparing and equipping the public to engage with what open science has to offer as a reliable information source (Willinsky, 2022). If open science practices will always be of more immediate value to research and scholarship than to the public sphere, we have still to consider their potential broader impact within what we might think of as the democratic qualities of public life.

This has been addressed by Ludovica Paseri, editor of this special double-issue (Paseri, 2021). Dr. Paseri cautions that it does not serve science well within the public sphere to encourage a sense of it offering a determinate and definitive truth, as if to say trust us, we're scientists. Rather, she cautions that science needs to be realistically portrayed as itself engaged in an ongoing deliberative process, with parallels to the political deliberative processes of healthy democracies. With that in place, the current state of scientific findings on viruses, climate change, or economic inequality all have a role to play in democracy's deliberative processes. But not, she cautions, as simply a matter of "data-driven decisions", as if assembling the relevant data could provide a basis for governments formulating policies, while sidelining deliberative consultations, including with those affected. As well, we have work to do, Dr. Paseri cautions, in further refining a legal framework for effectively

reconciling the handling of human research data within the scope of what she identifies as Janez Potočnik's concept of "a fifth European freedom, the 'freedom of knowledge'".

One lesson running through these four papers in Part I concerns how little can be taken for granted in pursuing openness as a standard for research and scholarship. We must continue checking in on this open science concept, as this special double-issue of JOAL does, on its shortcomings, its unintended consequences, its still-to-be-realized promises, its lack of safeguards, as well as its achievements. We need to compare the open science principles and practices of governments, funders, publishers, institutions, and researchers. We need to consider how well the public at large is being served. We are all potential beneficiaries of open science, as we have seen during the pandemic. Yet as we also know some are capable of posing impediments to this opening of science, exploiting the opportunities it affords, and sidestepping the consultation and deliberation that can keep the science grounded in the well-being of the planet. We would do well, then, to follow the example set by the authors of these papers in addressing the historical and ethical questions, and pursuing the policy and legislative initiatives that will facilitate a responsible and sustainable open science in the times ahead of health crises and climate catastrophes. It is comforting to think that, as a result of their efforts, we will be able to honor their cautions while continuing to advance the goals and values that open science represents.

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