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Toward openness and transparency to better facilitate knowledge creation

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Abstract

Changes in modes of publication over recent decades and moves to publish material freely and openly have resulted in increased amounts of research and scholarly outputs being available online. These include teaching and other material but consist mostly of research publications. There have been significant UK and European initiatives as part of the Open Agenda that facilitate and indeed mandate the move to open whether that is for educational materials, research output and data, or the mechanisms for ensuring the quality of these materials. A significant issue is that although making research outputs freely available is praiseworthy, without the data on which that research is based, reproducibility and so verification, which are fundamental principles of scholarly methodology, are not possible. When discrete datasets are linked openly and freely, are able to interact by using common standards, they become more powerful with extended possibilities for research questions that cross disciplinary divides and knowledge domains. There are always objections and resistance to new innovations, and open publication is no exception; published research, nevertheless, indicates that publishing material openly is becoming considered to be "good research practice" and that the positives of "new collaborations and higher citation" outweigh any perceived negative effects.

1 | INTRODUCTION

This article is the result of ongoing critical research into the development of open publishing within the United Kingdom, with attention on the wider European sphere, policies, and initiatives, particularly in the changing UK policy landscape. It sits within ongoing debates

concerning the wider Open Agenda (such as Else, 2018; Laakso et al., 2021; Rowley et al., 2017; Spezi et al., 2017; Suber, 2012; Wakeling et al., 2019). As well as scholarly publishing, the Open Agenda is understood here to include Open Educational Resources, Open Science, Open Data, and aspects of scholarly Peer Review which together form part of a general movement toward openness and transparency; some aspects are more mature and established than others. A recent concern within this movement is to ask how we might advance initiatives that will effectively facilitate the sharing and re-use of research data, as well as the published results, to better

enable the generation of new knowledge. Although we, who work in the information domain, have led the way in making published research available freely and openly, more is needed. Openness and transparency should be present at every stage of research, resource-development, review, whatever, and not only at the final stage of publishing. Within all areas of scholarly publishing, we need to ensure transparency and openness by making the data on which published research is built available, discoverable, and re-usable, so that the research is open to verification to ensure true scientific rigor; in this way scholarship is built on scholarship and new knowledge is created (Figure 1).

The period from the late 1990's to the current time has witnessed some of the greatest changes in publication. Changes and advances in the modes of publication are, however, nothing new with a lineage stretching back as far as recorded history. That history itself needed developments in publication to create the record, whether on animal bone, papyrus scroll, stone tablet, animal skin, paper, or now the HTML or XML rendered on our screens. Every new development in publication medium has brought affordances with it, often accompanied by objections. Plato has much to say about this in the *Phaedrus* (approximately 370 BC) where, through the words of Socrates, he attacks the new medium of his time, that of the written word which will, he says:

> [275a] produce forgetfulness in the minds of those who learn to use it, because they will not practice their memory. Their trust in writing, produced by external characters which are no part of themselves, will discourage the use of their own memory within them. You have invented an elixir not of memory, but of reminding; and you offer your pupils the appearance of wisdom, not true wisdom, for they will read many things without instruction and will therefore seem [275b] to know many

things, when they are for the most part ignorant and hard to get along with, since they are not wise, but only appear wise. (Plato in Twelve Volumes, 1925)

Plato is highly critical of writing and points to the negative effects on those who learn to use this new medium; consider these words in encounters with students discussing information retrieval and the appropriate use of sources. This is not to make a direct comparison between open publishing and advances in any publishing medium but rather to illustrate that there have always been and always will be objections to anything new.

Formalizing language into the written word allows the spread of ideas and knowledge. Europe looks back to Gutenberg in the mid-Fifteenth Century with movable type as a major phase in the publishing revolution with the ability to produce books in quantities previously unimaginable. This rapid expansion of printing facilitated the flow of ideas, access to the written word and stimulated the desire and then ability to read. Questions could be asked, and discussions based on source documents and materials—the foundations of modern scholarship based on evidence from sources. A prime example is the motto of the Royal Society (established in 1660), *Nullius in verba* "verify all statements by an appeal to facts determined by experiment" (The Royal Society, n.d.).

With the so-called European Enlightenment in the Eighteenth Century and its "emphasis on reason," education was, for the most part, no longer inextricably bound to the state and state-sanctioned religion (British Library, 2018). This allowed for the questioning of previous orthodoxy with it being replaced by knowledge constructed through rational argument and scientific rigor. This made reproducible evidence and method paramount and hence the need for documentation which would allow for scholarship to be cited and previous work to be built upon; this would facilitate reproducibility, or criticism, where arguments documented in footnotes and

reference lists, would become the standard for academic publication. Academic protocols were established such that scholarship was now built on existing scholarship and in this way new knowledge could be produced. All this was based on published works.

> Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it. When we enquire into any subject, the first thing we have to do is to know what books have treated of it. This leads us to look at catalogues, and at the backs of books in libraries. (Boswell, 1775, p. 258)

This concept of reproducibility and the requirement for the verifiability of evidence has become the cornerstone of scholarship and knowledge creation. This principle continues through Karl Popper's work on the growth of human knowledge, "in the objective or impersonal sense, in which it may be said to be contained in a book; or stored in a library; or taught in a university," and rather that statements cannot have absolute certainty but need to be open to falsification (Popper, trans Pickel, 1979, p. 286).

2 | SCHOLARLY PUBLICATION

The written word and its dissemination through print-based materials brings us to scholarly publishing which has gone through many stages of development to reach what we now recognize today. Many early digital publishing projects made use of microfilm and microfiche as photographic representations of original source documents for re-print publications, converted into digital form by OCR to allow the move to CD-ROM, and more recently to cloud servers for easier storage. Two examples following this pathway are EEBO (Early English Books Online, n.d.) and ECCO (Eighteenth Century Collections Online, n.d.). These platforms both allow the cross-searching of centuries of published material and are perhaps the most widely used scholarly sources for the English language. Indeed, the former is the most used source for new entries in the Oxford English Dictionary (OED, n.d.). Neither EEBO, ECCO, or even the OED are free at point of use but require a subscription, usually through an institution. Academic publishing can, moreover, be both commercial or non-commercial depending on the arrangements with the publishers; costs are always a component of the publishing model regardless of whether they are behind a paywall or freely and openly available.

Universities in the United Kingdom have various arrangements with publishers, a university press, in-house or external mechanisms for publishing. They have for several decades had institutional repositories for e-prints or pre-print publications: the text of a journal
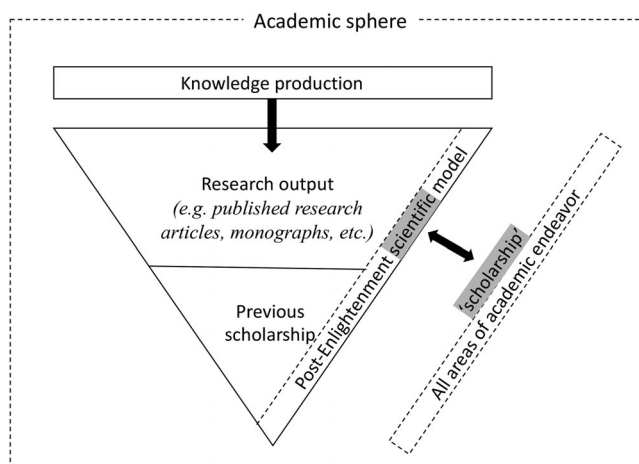

FIGURE 2 Knowledge production in the academic sphere

article or a book chapter as sent to the publishers but before receiving the layout and pagination with copyright then claimed by the publisher. Knowledge production in the academic sphere is directly linked to the publication of staff research output with scholarship building on previous scholarship following the post-Enlightenment scientific model (Figure 2). Here, the use of the term "scientific" (from the Latin *scientia* meaning "knowledge") is analogous with "scholarship" in the widest terms to include the full spectrum of humanities, social sciences, and all areas of academic endeavor.

Academic output is not limited to published research articles, and monographs but includes much more. The movement toward openness includes teaching material, and datasets as well as how we evaluate these; all these aspects are interlinked in the move toward greater openness and transparency.

The movement toward open teaching materials looks back to the UNESCO (United Nations *Educational*, Scientific and Cultural Organization—author's emphasis) conference of 2000, and their move to make education openly and freely available to all as a fundamental right (UNESCO, n.d.). This was followed in 2001 with the Massachusetts Institute of Technology (MIT) making almost all of its teaching material available as OpenCourseWare (MIT OCW, n.d.). The term Open Educational Resources (OER) was adopted in the following year at the First Global OER Forum organized by UNESCO (note that "research materials" are also included here as UNESCO does not make a distinction).

> Open Educational Resources (OER) are learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others. (UNESCO OER, n.d.)
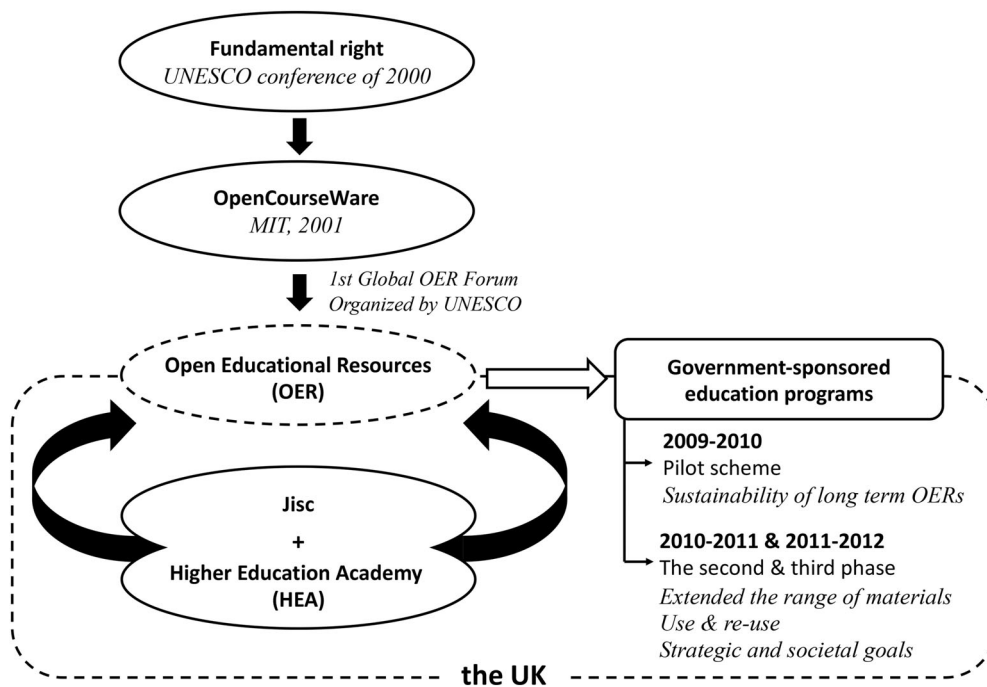
As a part of this movement, in the United Kingdom, Jisc and the Higher Education Academy (HEA) backed the incorporation of OERs into all government-sponsored education programs (Jisc, 2010). The pilot scheme (2009–2010) focused on demonstrating the sustainability of long term OERs as a routine part of curriculum development. The second and third phase (2010–2011 and 2011–2012) extended the range of materials and looked ahead to the use and re-use of sharable teaching material released under an open license, as well as how OER approaches could work toward strategic and societal goals. See Figure 3.

There is a conceptual difference between the OpenCourseWare of MIT and the OERs released under the Jisc/HEA funded strands. Both are released under Creative Commons licenses to be used and shared freely. The former, however, comprises complete programs that can be downloaded, unpacked, re-used, and further developed as needed. The OERs are far more granular and consist of individual presentations, examples, reading lists, assignment examples etc. They are "learning objects" that can be searched for and incorporated into class teaching rather than full programs of study. The OER repository developed at UCL was a joint initiative between Library Services and ISD (Information Services Division) to support engaging students in the curriculum and enabling staff to freely disseminate their educational practice as part of the long-term strategy for the Open Agenda (UCL 2034, n.d.). This repository was funded as both pilot and proof of concept but, unfortunately, not for the final institution wide rollout due to budget cuts.

3 | MORE OPEN INITIATIVES

The development of OERs is only one of many open initiatives. All UK universities are required to have repositories to collect, preserve and publish the research output of their staff (Finch, 2012). Publishing research output, or any other material freely online, allows it to be disseminated and spread more widely and at a faster rate; this has been particularly noticeable during the current pandemic (Fraser et al., 2021; Waltman et al., 2021). Indeed, "the pandemic has illustrated the importance of openness—open access, open data, and open science more widely" (Waltman et al., 2021, p. 6). Download metrics can be collected and analyzed but this does not mean, however, that the book or article has been read or made use of in any way; metrics alone are not a reliable indicator. Nevertheless, the spread and reach of research output is increased and the growth of knowledge built on that research is hopefully accelerated.

Open access publishing is now required by major funders of academic research in the United Kingdom, such as UK Research and Innovation (UKRI) and The Wellcome Trust (see UKRI, 2021a, and The Wellcome Trust, n.d.). UKRI brings together the seven disciplinary research councils (formerly Research Councils UK) together with Innovate UK which supports businesses (UKRI, 2021b), and Research England, supporting grant funding for university research and "overseeing the sustainability of the Higher Education research base in England" (UKRI, 2021c). In partnership with UK Higher Education funding bodies, Research England also has

FIGURE 4 Open Access publishing in the United Kingdom
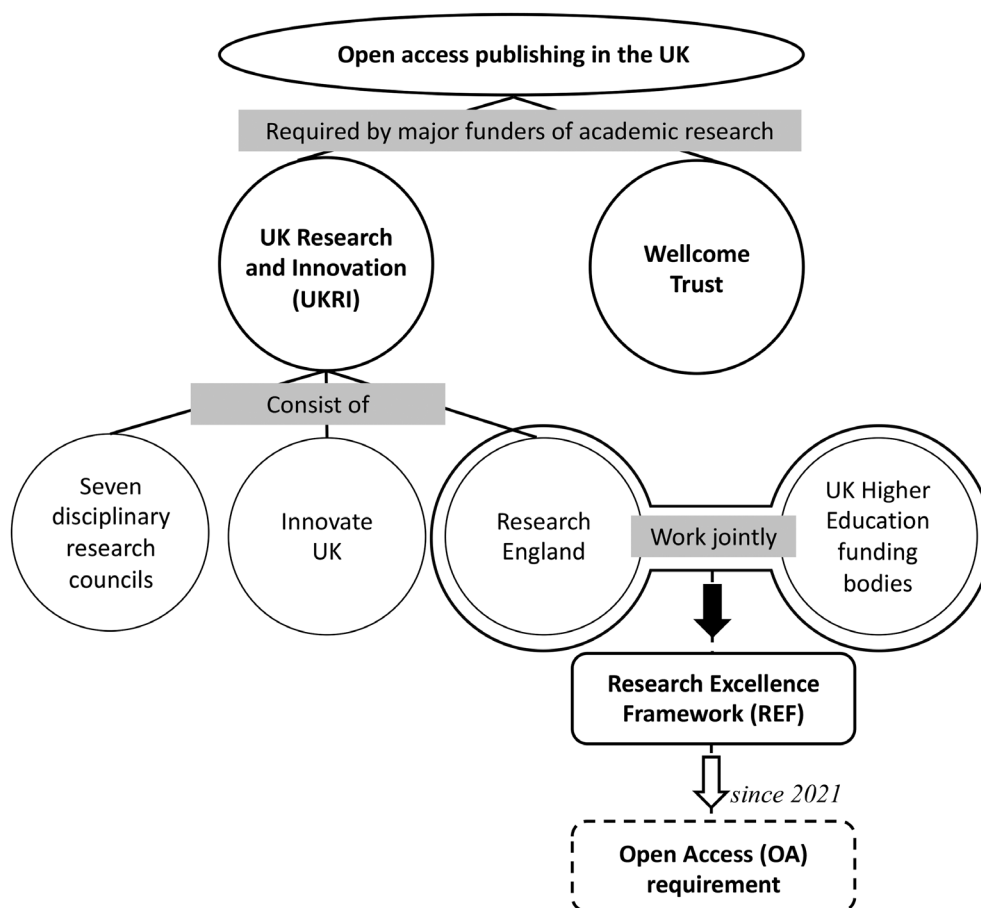
responsibility for the Research Excellence Framework (REF), which assesses the quality of research outputs of all UK universities. Since 2021 the REF has had an Open Access (OA) requirement (REF, 2021) and only OA publications are included to determine the level of government funding that each UK institution receives to support their research programs. These points are pulled together for clarity in Figure 4. Note that UKRI operates across the whole United Kingdom with other partners, such as the Arts and Humanities Research Council for the devolved nations as they have independent education systems.[1]

It is important to remember that these policies are under constant evaluation and the latest UKRI policy statement, following 3 years of review and consultation, was published at the time of writing and replaces the earlier 2013 version which followed the Finch Report. The opening statement of purpose says that it "will increase opportunity for the findings of publicly funded research to be accessed, shared and reused" (UKRI, 2021d). This latest policy version appears to pull together the earlier strands with fixed dates for implementation: immediate OA for peer-reviewed research articles from April 2022, and monographs, book chapters and edited volumes published from January 2024 are to be OA within a year of publication (UKRI, 2021e). Deposits in institutional

repositories are acceptable for both and, with OA required after 12 months for monographs, the publisher or author's embargo period would still work.

Nevertheless, this "new" policy only applies to research required to "acknowledge funding from UKRI or any of its constituent councils," with increased funding from UKRI to support this with guidance, engagement, and OA agreements (UKRI, 2021d). It applies to journal articles that have been peer-reviewed but currently with no specific requirements about the extent of the review and no mention of "review" for monographs. Publication and scholarly review are inextricably linked in the academic sphere. Interesting also is the statement from the UKRI Chief Executive pointing to their "vision of a more open and *transparent* research culture" (author's emphasis) and echoing DORA (see below), that research should be recognized for its merit rather than place of publication (UKRI, 2021e). This transparency, however, is not expanded on in the current document and with no mention of how these points would be implemented.

So-called hybrid OA publishing where some articles are open in a subscription journal is currently excluded from UKRI funding unless part of an agreed transitional arrangement. UKRI funding is presumably then not

permitted to be used for paying the Article Processing Charge (APC) for a hybrid journal which would seem to exclude many if not most of the (SSCI) Web of Science (Clarivate Analytics) indexed journals. This along with other details of the new policy still need greater clarification. As for copyright, UKRI funded research now specifies a CC-BY license with exceptions for Crown Copyright (Open Government License) and allowing a more restrictive No-Derivatives license for monographs on a case-by-case basis. Overall, the documentation is complex and will take some digestion; appendices containing "additional information on policy definitions and scope" and the glossary of terms are considerably longer than the policy document itself—9 out of the 14 pages, including the cover sheet (UKRI, 2021f).

The new UKRI policy document links to the *Concordat on Open Research Data* (2016) which requires funded research articles to have a statement making clear where the underlying materials on which the research is based can be found and how they can be accessed. This can include code and software too and forms, they say, "the next step in achieving the UK's open science ambitions" (UKRI, 2016). Publishing research data openly follows on from the open publishing of research output whether that is in the form of articles, monographs, or teaching materials.

The latest UKRI OA policy update coincided with Open Access Week 2021 with a statement on their ongoing activities, particularly their work to support implementation of their OA policy, following further consultation "with stakeholder groups to understand their perspectives and practical considerations" (UKRI, 2021a). What is clear from the documents available is that consultation with various stakeholders is (at the time of writing) still ongoing and so how this will work in practice still needs to be finalized, particularly in the areas of exceptions for research articles and monographs, along with appropriate guidance for metadata requirements, and engagement with stakeholders and researchers (UKRI, 2021f).

These open initiatives are, of course, not limited to the United Kingdom. The European Commission has coordinated moves toward OA mandate policies across the European Union. The *Excellent Science in the Digital Age* (2015) brochure takes OA publishing a step further and advocates OA to both "data and publications" (European Union, 2015). This, they say, would "boost the visibility of European research," specifically by allowing access not only to the latest research results but also to the source data; this initiative not only publishes the results of research openly but more importantly also the *data* on which that research is based. This brings us back to where method and experimentation can truly be reproducible and hence verifiable, correctly fitting the scientific and scholarly model. This position is further supported by

OpenAIRE (n.d.), the European Open Access infrastructure with the European Open Science Cloud for Research and forms part of the European Commission's Digital Single Market Strategy (EU4Digital, n.d.).

Publishing research and data openly is not an end in itself as there are well documented problems and concerns over significant issues surrounding the long-term preservation of electronic and more particularly OA publications to ensure the accessibility and usability of the material over time (Laakso et al., 2021). The long-term preservation of digital material has been of concern within the library domain since the advent of the medium (Evidence Base, 2021; Greenhall, 2019). Similarly, preservation over time and ensuring continued access to digital resources are key issues for UNESCO's guidelines on OA (Swan, 2012).

4 | OPEN SCIENCE AND OPEN DATA

Beyond the open publication of research output and looking back to the principles of post-Enlightenment scholarship, making outputs freely available is laudable but without the data on which that research is based, reproducibility and so verification are not possible. Institutional repositories have been developed as a publishing medium for articles and book chapters rather than datasets; it is often possible to host small collections there but not large and extensive research data. There are already possibilities for personal repositories on platforms such as GitHub, but what is suggested here are institutional repositories for the publication of research data generated by staff to sit alongside and link to the existing repositories for published research output. It is only with the publication of the data on which research is built, available openly and freely, using common community developed standards such as TEI XML, RDF, consistent URIs and metadata standards, so that they can be discovered and linked to, that reproducibility, fundamental to scientific (or any other scholarly) methodology, is possible. That is when the data become more powerful, when it is linked together so that one dataset can interact with another, and research questions can reach across different disciplines and domains.

Arguably, what are needed are fully open research data repositories to enable the long-term preservation and curation of the data that underpins published research, making it available for interrogation to verify that research as well as repurposing for future projects. Having the datasets themselves available OA must necessarily exclude sensitive, medical, or otherwise personal and identifiable data which should be held separately in
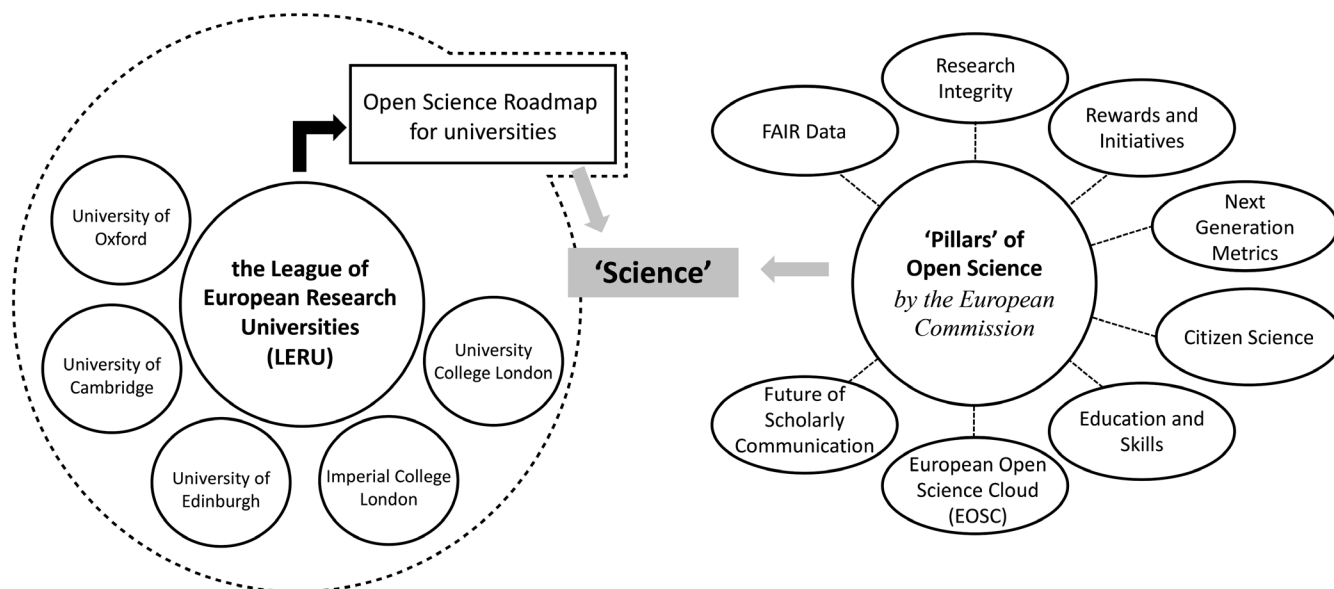
FIGURE 5 Open Science, LERU and the European Commission

a secure *Data Safe Haven*. Examples of such repositories used by this author are found at both UCL and Peking University (PKU).[2] The UNESCO Global Open Access Portal maintains a listing by Region and Country with the UK page noting the leadership of UK universities making OA and institutional repositories "a mainstream issue for UK researchers [...] and [that] awareness is extremely high" (UNESCO GOAP, n.d.).

These open initiatives for research and teaching materials feed into wider-scale ones such as the Digital Agenda for Europe (2020 Initiative) with the launch of the League of European Research Universities in June 2018 and its Open Science Roadmap for universities (LERU, 2018). Here, as above, "Science" refers to all scholarship, including arts and humanities, and is not limited to any specific disciplines but extends to any systematic and intellectual activity. The European Commission identified eight "pillars" of Open Science: FAIR Data, Research Integrity, Next Generation Metrics, Future of Scholarly Communication, Citizen Science, Education and Skills, Rewards and Initiatives, and the European Open Science Cloud (UCL Library, 2018) (Figure 5). The European Open Science Cloud (EOSC) is a cloud-based platform for the open publication of research data from participating institutions. Signatories to the EOSC declaration are required to have correct infrastructures and an appropriate policy for research data management; the data must also conform to FAIR data principles (EOSC, 2017). Where access is for some reason restricted, participants must provide free access to the metadata. The FAIR framework ensures that the data can be effectively re-used: it must be Findable, Accessible, Interoperable, and Re-usable (Jisc, 2018). Here, as the next initiative in the open movement, the data on which the published scholarly articles and papers are based are being made available freely and openly. This is opening up the research outputs for re-use but, importantly, publishing the datasets also ensures transparency, allowing reproducibility of methods, repeatability of the research outcomes, and verifiability of results, the cornerstones of scholarship. Publishing data and/or research output openly has little value if it cannot be found. The FAIR guidelines accept that opening up all the data is not always possible and so, as above with Data Safe Havens, it should be "as open as possible, as closed as necessary" where there are issues over sensitive or confidential datasets, commercial interests, or restrictions according to Data Protection Acts legislation (H2020, 2016).

There have been concerns over the continued UK involvement in LERU and EOSC since leaving the EU. At the time of writing, LERU has five participating UK universities: Oxford, Cambridge, Edinburgh, Imperial College London, and University College London (Figure 5).[3] In addition there are several UK-based organizations as members of the EOSC General Assembly.[4] Nevertheless, participation remains under the cloud of Brexit and despite UK involvement through UKRI and Jisc, demonstrating willingness to participate in post-Brexit affiliations with EU research partners, participation in the longer term is still uncertain (Jisc, 2021a). Details of the EU–UK Trade and Cooperation Agreement (European Commission, 2021) still need "greater clarity" regarding research and development relationships with EU partners (Jisc, 2021b). We shall have to see how things progress.

In further moves to openness, cOAlition S, an international consortium of the major public research funders from several European counties (including UKRI), supported by the European Commission and the European Research Council (ERC), was launched in 2018 as an initiative "to make full and immediate Open Access to research publications a reality" (Plan S, 2018).

> With effect from 2021, all scholarly publications on the results from research funded by public or private grants provided by national, regional and international research councils and funding bodies, must be published in Open Access Journals, on Open Access Platforms, or made immediately available through Open Access Repositories without embargo. (Plan S, 2018)

The difference here is that this initiative requires participants to have their research output *immediately* available on publication without any embargo period (which is required by some publishers). Outputs should be published in compliant OA journals or platforms and be permanently accessible under an open license allowing for re-use for any purpose—a license that is more free than previous requirements—subject to proper attribution of authorship. They also require full transparency on publication costs and fees. This may raise concerns over the implication for less well-funded institutions and junior scholars who may be excluded from accessing the funds needed for APCs and hence the ability to publish fully OA.

5 | PEER REVIEW

As above, reproducibility, facilitated by recording method and citing sources so that the results of research can be replicated and hence verified, is the cornerstone of academic scholarship as well as ensuring that the process is transparent. How then do we validate the research itself as being appropriate for publication? This is achieved by scholarly peer review which allows for quality control by having referees assess the suitability of the paper for publication, read and comment on work, and suggest ways in which it could be improved prior to publication. This involves drafts of the manuscript being circulated before copyediting and typesetting for print or online publication. This has become the standard for journal articles as well as for the abstracts and proposals submitted for conference presentations and workshops. In these cases, a pool of experts is identified by the journal editor(s) or conference organizers and who have expressed a willingness to act in this capacity; articles and proposals are usually subject to two or three reviewers as well as editorial review, resulting in a lengthy and time-consuming process. In the academic sphere, this work is all done pro-bono as part of a commitment to maintain scholarly standards within the discipline, regardless of whether or not this is for a commercial publisher requiring a subscription for the end user. It is also done in the knowledge that one's own work would need to go through a similar process prior to being accepted for publication or for a conference.

This academically rigorous process comes at a cost; not a financial one but rather one of time and commitment. In many scholarly areas time dependency and currency are not important so long as research is made available within a reasonable timeframe. OA publishing can accelerate this process but what is "reasonable" varies according to the discipline. The timescale for a treatise on philosophy or classical literature would not have the same urgency as, for example, cutting edge medical research or COVID-19 vaccine results during the current pandemic. OA publication allows free access to that research but, if it is in a journal linked to a print publication, release may still follow the timeframe for the journal publication with perhaps a limited number of issues each year. The time element is not the only potential difficulty, and the other is transparency. In almost all print and online journals, the article reviewers are not identified, and their comments not made available to the end user. Having these data would make the academic rigor clear and could be potentially useful when considering whether the article was suitable to read or to cite. Furthermore, reviewer anonymity does not allow for any academic credit or recognition for their work. The dominance of the traditional peer review model as the foundation for the validation of scientific work has been called more and more into question (Cheeseman, 2018).

> Over the last 50 years, journal-conducted peer review has become the foundation of how scientific work is evaluated and validated. With an interest in fairness and transparency, mounting concerns about rigor and reproducibility, and opportunities provided by the internet, we feel that the time is ripe to discuss how peer review might be advanced. (ASAPbio, 2018)

There are also indications of bias where the identity of the author is known but not that of the reviewer, although this may be a more specific issue where there is a limited pool of reviewers and where they work in the same field as the author (Wolfram et al., 2020). We need

to be aware of the weaknesses in the current system and consider ways in which it can be advanced to benefit the overall academic community (for more on this see, e.g., Carroll, 2018).

Alternative modes of review are beginning to appear. Open peer review (OPR) is one as is the scholarly megajournal, used in combination or separately. OPR has full disclosure of the review process, although there seems to be no clear consensus yet as to how it might be defined (Ross-Hellauer, 2017). The main characteristics are where the identities of both author and reviewer(s) are made known and/or that the reviews are published alongside the article or book chapter. Criticisms of the traditional peer review model include lack of transparency, inconsistency and the potential for bias, but also the time delay. Any lack of incentive for the reviewer would be mitigated, to an extent, by the open publication of the reviews for which they could claim academic credit, as well as the benefit of otherwise unavailable but potentially useful information. It may, however, also inhibit the frankness of the reviewer who would presumably work in the same academic area as the author in the knowledge that their positions (author/reviewer) may, sometime in the future, be reversed; there may also be some conflict of interest if their research were of a similar nature (Wolfram et al., 2020). It may ensure, nevertheless, that reviewers take responsibility for what they write, knowing that it would be made public.

Another possible version may be open participation or "crowdsourced peer review." Here the article would be published online in its unfinished form and the community invited to comment on it to help "editors make better, quicker decisions" (List, 2017). This could be used to complement the traditional peer review or to widen the pool of potential reviewers. It may, however, raise questions about the authority of the reviewers, the validity of their comments, and their motivation for doing so; the former issue may be resolved or at least mitigated to an extent if their credentials were declared (Ross-Hellauer, 2017).

It seems clear that all methods of review come with problems and criticism. "Although OPR may help address some of them, it will not solve them all or suit every community." (Schmidt et al., 2018, p. 5). This is particularly so for some cultures where there is a very rigid academic hierarchy such as East Asian ones based on Confucianism where this may cultivate widespread bias and inequality between well-known prestigious scholars and junior colleagues. Nevertheless, both approaches would make reviewers accountable for accepting, rejecting, or suggesting changes to articles and gain recognition and possible academic credit for doing so. There is much to be said for both arguments and it will be interesting to see how things progress.

An innovative alternative is the scholarly megajournal where the major drivers are to significantly reduce publication times so that articles are available freely much sooner; also, when combined with open peer review, to publish the reviewers' comments and suggestions alongside the article itself to aid transparency and help to eliminate bias. This is also part of a more general move away from the dominance of the subscription model where only well-funded institutions that can afford the APC fees are able to make published research available as OA. Under the traditional system, the university pays the academic to do the research which is then given to the publisher who claims copyright on the layout and the university then has to buy the material back through subscription charges despite, in some cases, also having to pay an APC; this situation is arguably untenable (Ayris, 2018). The megajournal with open peer review model was piloted at UCL, initially using material from the Environmental Science domain, and now deployed more widely as the UCL Open Environment (UCL, 2018, 2020).

The workflow for the UCL megajournal/Open Environment takes a transparent pathway (Figure 6). Once submitted the editor checks the manuscript for suitability and, if it fits the necessary criteria, it is uploaded to an online pre-print server for peer review; at this stage it is released under an open Creative Commons (CC) license and assigned a DOI (Digital Object Identifier) as a unique and permanent identifier. While on the pre-print server, reviewer reports are posted alongside the manuscript, also with a CC license and their own unique DOI. The author(s) of the article can post their own comments and response/rebuttal to the reviewers' comments together with subsequent revisions of the paper. Based on the reviews and responses, once the editor decides that the paper is acceptable, the comments and peer review reports are summarized, including the revisions and recommendations, with the final version copyedited and typeset for publication. Once complete the paper is assigned a journal DOI with links to the previous versions and reviewer comments and published in a rolling fashion (UCL, 2019). The model is open, transparent, accountable, and significantly shortens the time from research to publication of the output for universal and unrestricted dissemination (UCL, 2020). It does, of course, require significant institutional support and a willingness to fund such a publication model.

There are other megajournal models with the two largest being *PLoS One* and Nature's *Scientific Reports*. Both use an editorial approach to quality assessment that limits peer review to cover technical or scientific "soundness" only (Wakeling et al., 2019), which is an issue that has been hotly debated (Spezi et al., 2017), particularly that the research should not only be sound but also
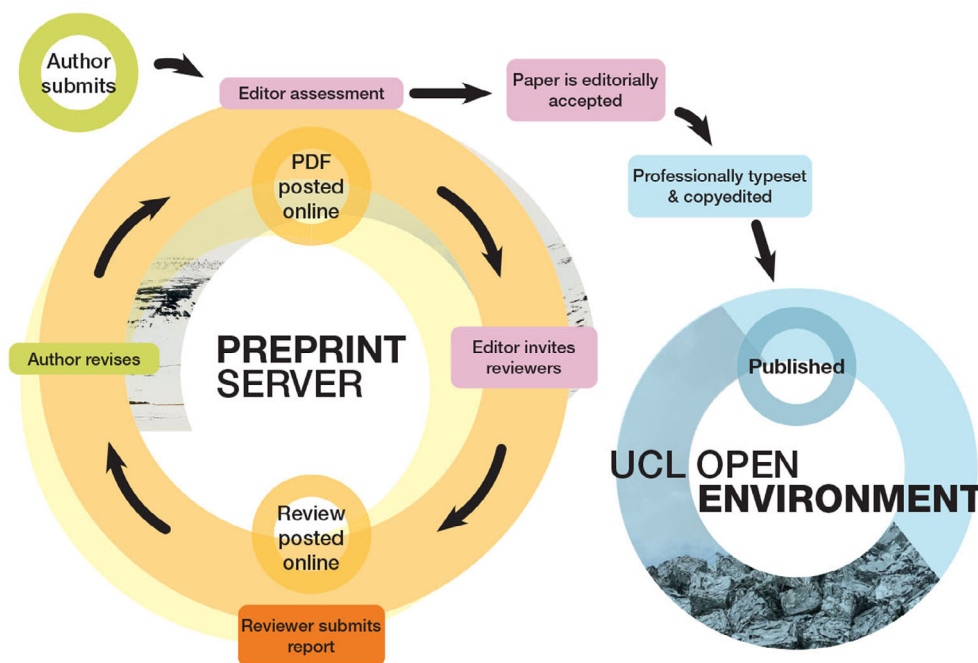
advance the field of study (Heneberg, 2019). This soundness-only criterion has, arguably, resulted in lower rejection rates for these megajournals, particularly in the early days of their deployment, resulting in the perception that they are of lower value and somewhere for articles rejected by the traditional peer reviewed journals (Spezi et al., 2017; Ware & Mabe, 2015). Nevertheless, despite this, megajournal publishers have argued strongly for soundness-only peer review (Spezi et al., 2017). Regardless, the different models for review do not represent a uniform group and researchers appear to value high-quality peer review as a means of refining and improving their work.

6 | LATEST DEVELOPMENTS

To recap and pull these themes together, Open Access is mandated by UK universities and major funding bodies such as UKRI and The Wellcome Trust; Open Education and alternatives to the traditional peer review model are gaining momentum. There are moves by the European Commission and signatories of LERU to make the research data that academic output is based on openly available, where possible, too. cOAlition S, has the requirement that all funded research "must be published in compliant Open Access Journals or on Compliant Open Access Platforms" (Plan S, 2018). A major consideration for UK universities is the REF, Research Excellence Framework; the system for assessing the quality of research of UK higher education institutions. This

assessment is conducted by the four UK higher education funding bodies and used to distribute research funding on the basis of the quality it determines judged in the specified categories: research outputs, research impact beyond academia, and research environment. It is important not only for research income but also for the overall university ratings which are published openly and may be used as a benchmark for future funders as well as affecting the reputation of the institution. A major component of the REF evaluation procedure is to assess the impact of the institution's research beyond the academic sphere and hence provide a measure of accountability for publicly funded research.

Plan S, an initiative of and an integral part of cOAlition S, "aims for full and immediate Open Access to publications from publicly funded research" (cOAlition S, 2019; Figure 7). This will impact considerably on the possible publication venues available to have output included in the UK REF assessment and for academic credit, which leads to advancement and promotion for staff. Linked to Plan S, many universities have signed up to DORA, the San Francisco Declaration on Research Assessment.[5] DORA seeks to change the way in which scholarly research is evaluated as traditionally much weight has been attached to the publication venue with their metrics being used to evaluate performance. With the widely used *Journal Impact Factor* (published by Clarivate Analytics) "originally created as a tool to help librarians identify journals to purchase, not as a measure of the scientific quality of research in an article," there are concerns of it being open to "manipulation by
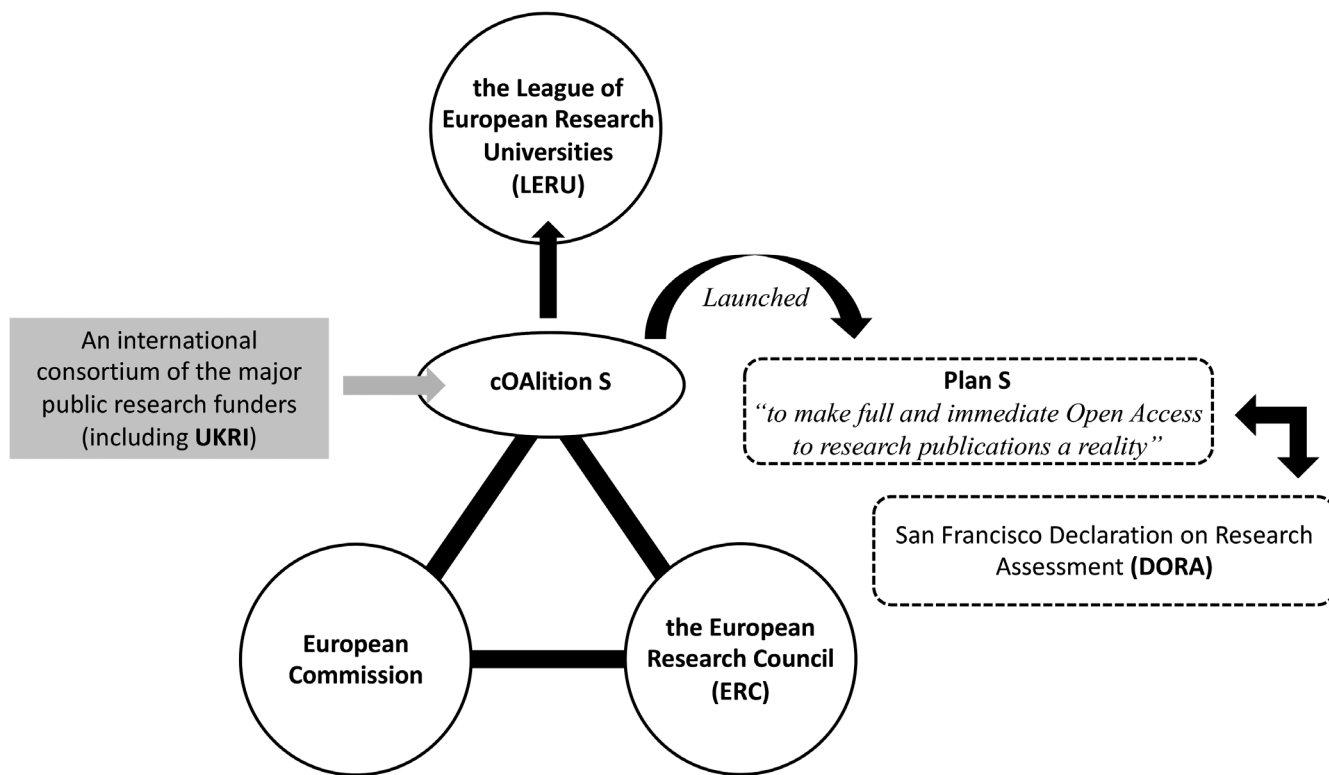
FIGURE 7 cOAlition S and Plan S

editorial policy" (DORA, n.d.-a, n.d.-b). The point here is that research should be evaluated and assessed according to its own merits rather than based on where it is published. This would open up significant OA publication options for those without access to funding. In addition, the overreliance on publication metrics has resulted in a skewed and biased system which significantly disadvantages early career researchers and academics from less well-funded institutions who do not have access to funds for APCs to ensure compliance with the REF and funder requirements. It favors more established academics, and particularly those in prestigious and well-funded institutions, at the expense of junior staff and Early Career Researchers.

Another significant issue with a system based on metrics is the bias toward favored languages of publication. Many of the highest rated international journals only publish in English (see e.g., Nature, 2021). The pressure for publication citations, the impact of research and its assessment, leads to the hegemony of language if you wish the work to be read widely. To have your work widely circulated and read so that it will lead to more citations, it is generally necessary to publish in English, regardless of your native language (Mahony, 2020). The same is often true of major international conferences. We are, however, seeing a realization of the bias toward the English language both in publications and conferences.

The over-representation of US and UK Humanities titles as counted in major indices such as Scopus and Web of Science will always support arguments in favor of using English as the lingua franca, and the misrepresentation of knowledge production and geopolitical imbalance will continue to thrive. (Fiormonte, 2015)

As a result of this bias in language, there is a strong movement toward being more inclusive, to plan conferences and encourage presentations in more languages than English (e.g., the 2018 ADHO conference held in Mexico City and the 2021 iConference hosted in Beijing but held online), and to encourage funders to make money available for translation to widen their potential readership (Mahony, 2018; Mahony & Fu, 2021). Restricting our linguistic perspective is restricting our field and diversity in the language of research publications benefits us all. Without this, it is those native English speakers who have no other language that stand to lose the most (Crane, 2015). Moving away from metrics based on publication venues will support greater linguistic diversity and DORA will help to facilitate the move away from overreliance on a narrow range of prestigious journals as favored publication venues, helping to advance the movement toward openness and transparency.

7 | CONCLUSION

We have come a long way since the so-called Enlightenment but the principles for knowledge production are the same. We need an emphasis on open scholarly method with transparency, for reproducible documented research and experimentation as the cornerstones of scholarship and knowledge production. In this way scholarship is built on scholarship and knowledge creation is better facilitated. Academic research in all areas needs to be shared as openly and as widely as possible, with other "researchers, educators, students, policymakers, partners and members of the public [so] its benefits to humanity can be maximized." (Price, 2020).

Advances in publishing technology have led to advances in the modes of publication and we are again witnessing a time of change. OA is becoming a normal mode of publication with all the advantages that brings for discoverability and currency. Open publishing is informing curriculum development with "research-led teaching" which itself is often now open. OA is now supported with both national and international initiatives for the open publication of the data that published research is built on; in this way, with access to the underlying data, along with any dedicated software, protocols, or other necessary components, research can be replicated and hence validated. We have mandates from funders to push the OA agenda with European universities coming together under LERU and cOAlition S. Under these initiatives the outputs must be "as open as possible, as closed as necessary" and adhere to the FAIR principles where they should be Findable, with unique identifiers, rich metadata, and indexed in a searchable resource; Accessible, retrievable by their identifier, openly licensed, with the metadata accessible even if the data are unavailable; Interoperable, in an appropriate format for sharing, using vocabularies that also adhere to FAIR principles; Re-usable, released with a clear and accessible data usage license and meet relevant standards for the area in which they are used (GO-FAIR, n.d.). The megajournal protocol significantly reduces the time from submission to publication and in combination with open peer review enhances transparency by making the reviewer comments and author responses available to the end user. Scholarship is built on scholarship, and we need platforms to drive forward the open agenda and allow the maximum use of research by linking disparate datasets together to avoid them dying in discrete silos.

Building on the Open Agenda, using technologies and common, community developed, open standards such as TEI XML, RDF, SPARQL, we can move toward publishing Open Linked Data with mechanisms for sharable data exchange via automated and interoperable systems;

arguably the next iteration of the web but one very much anticipated by its inventor, Tim Berners-Lee (Berners-Lee, 2003). What is essential here is not only OA and Open Data, to achieve the aims of reproducible scholarship in as transparent as possible a manner to reach the widest possible audience, but also the use and further development of open standards for interoperability and the use of persistent identifiers in conjunction with the open licensing of content—open licensing alone is not enough. The bias in the language of publication is a wider issue that cannot be covered here but something that must be taken seriously if we are to share in an international and truly global scholarly community.

Overall and resulting from these open initiatives, we can see an impact on the behavior of individual researchers, academics, and policy makers. The Open Agenda is being actively advanced by both UKRI and the European Commission which, as above, has opened up new opportunities for the publication of research output and teaching materials, and more recently with advances in the availability of open data. Research by The Wellcome Trust notes funder requirements as a driver for the open publication of full or limited datasets but also that it is "considered good research practice, to facilitate collaborations, and to enable validation and replication of research" (Van den Eynden et al., 2016, p. 4). They acknowledge some reluctance with concerns about misuse or misinterpretation, but their findings show that "very few people have actually had bad experiences from data sharing [which] shows that these fears are largely unfounded" and that the positives of "new collaborations and higher citation rates" are significant motivating factors (Van den Eynden et al., 2016, p. 5). Nevertheless, just as with access for funds to publish articles OA, much here is dependent on institutional support, as well as the seniority and discipline of the researcher.

An unanswered question is whether or not project funders can be persuaded to cover the additional costs of preparing the datasets in an appropriate way to be shared openly, with all the incumbent issues around ethics and anonymity. This needs to be raised within the context of the open agenda, particularly within the ever-limited resources of the Arts and Humanities and Social Sciences. It may be that we should be seeking partnerships for interdisciplinary projects with better funded areas within the academy and linking our datasets together openly may provide the opportunity for us to do so.

Finally, this article lays the groundwork for further research to take account of the growing number of empirical studies on the effects of OA publishing and open data. Of particular interest for future research is how this UK/EU model of the open agenda plays out in East Asian academic cultures. What are the similarities and

differences and how might the variations reflect local academic culture and expectation? More broadly, this needs to be part of a wider global discussion of the open agenda to include OA publications, open data, OERs, open software, and so on to make access to knowledge as open as possible; to promote basic principles such as equality and fairness, diversity, and inclusiveness (UNESCO, 2021).

8 | CODA

Just as Plato took a negative view on the new media of his day, the written word, we are facing major changes and technological advances in our publishing mechanisms. We have new formats, initiatives, and affordances which raise concerns and objections in some areas (with many noted above). Just like Plato, however, with his anxieties over the possible negative effects of writing, we may not yet be fully aware of nor appreciate the potential benefits of, for example, our new advances in publishing data both freely and openly for re-use and the possible avenues for advancement that they open up. The possibilities are constantly evolving.

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ENDNOTES

[1] For full details of the UKRI parameters and relationships with other bodies, see UKRI Framework Document online at: https://www.ukri.org/wp-content/uploads/2020/10/UKRI-111020-UKRIFrameworkDocument.pdf

[2] For example: UCL Research Data Repository https://www.ucl.ac.uk/library/open-science-research-support/research-data-management/ucl-research-data-repository (UCL Research Data Repository, n.d.) and UCL Data Safe Haven https://www.ucl.ac.uk/isd/services/file-storage-sharing/data-safe-haven-dsh

[3] LERU members: https://www.leru.org/members

[4] EOSCO General Assembly: https://eosc.eu/general-assembly

[5] DORA https://sfdora.org

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