Nicola Cavalli (ed.)

CURRENT TRENDS IN OPEN SCIENCE

Will Open Science change the world?

Ledizioni
The Innovative LEDIpublishing Company

Nicola Cavalli ed.

CURRENT TRENDS IN OPEN SCIENCE

Will Open Science change the world?

Ledizioni

Via Boselli, 10 – 20136 Milano – Italy
www.ledizioni.it
info@ledizioni.it

Nicola Cavalli ed., *Current Trends in Open Science. Will Open Science change the world?*

Print ISBN 9791256003679
eBook ISBN 9791256003686

Cover: Photo by omid armin su Unsplash

Catalogue and reprints information: www.ledizioni.it

TABLE OF CONTENTS

PREFACE

NICOLA CAVALLI
https://orcid.org/0000-0001-8606-7756
Università di Milano Bicocca - Dipartimento di Scienze della Formazione
and Ledizioni-Ledipublishing
nicola.cavalli@unimib.it

The papers below represent a range of perspectives concerning both opportunities and challenges in Open Science and Open Access to scientific research. Together, they shed some light in the current landscape of academic publishing and research, trying to grasp the huge changes that are underway.

Beyond 'No Fee': Why Diamond Open Access Is Much More Than A Business Model, emphasizing that it is more than just the absence of fees for authors and readers. The article discusses the historical shift in academic publishing from being managed by academic communities to being controlled by large commercial publishers. It underscores the necessity of reclaiming autonomy through community-run publication models, even if, as the authors writes: "This nuanced understanding is crucial for understanding the complex dynamics at play in Diamond OA as well. While Diamond OA cannot be reduced to a mere 'no-fee' economic model, it should not be equated with 'institutional publishing' either. Reality is far more intricate." Examining the complex relationships between institutions, publishers, and research communities, it highlights the role of infrastructure and platforms in shaping academic networks. The idea of 'community ownership' of journals is central to this discussion, along with the importance of creating formal structures that ensure control remains within scholarly communities. The paper ends with a review of European and global initiatives that promote Diamond Open Access.

Fostering an Open Science Culture through Incentive Frameworks, Lifelong Learning, and Education focuses on the role of education, continuous learning, and incentives in fostering an Open Science culture. The paper asserts that such a culture cannot develop in isolation but requires collaboration between academic institutions, research infrastructures, policymakers,

and funders. It stresses the need to bridge the gap between grassroots initiatives and high-level policies by integrating Open Science and FAIR principles into educational curricula. The role of data stewards and data managers is explored, along with the importance of continuous learning for researchers. Additionally, the paper examines how research infrastructures provide technical support and training for Open Science adoption. It concludes by advocating for reforms in research incentive and evaluation systems to recognize contributions beyond traditional publications.

Italy and Open Science offers an analysis of Italy's engagement with Open Science, highlighting both challenges and missed opportunities. Despite early commitments such as the 2004 Messina Declaration, Italy has struggled to implement sustainable policies. The paper discusses how national policies have remained fragmented and underfunded, while institutional initiatives often lack the structural support necessary for long-term success. It covers topics such as 'read and publish' policies, the need for greater transparency in publication costs, and the role of training in establishing Open Science practices as the norm. Additionally, it highlights the importance of the Diamond Open Access model and argues for a research evaluation system that moves beyond a reliance on quantitative metrics.

To Publish or to Republish: Is the Right of Republication Merely Palliative Care? poses a provocative question: If a 'right of republication' is necessary for scientific authors, what does that say about the initial publication itself? This paper critiques the traditional scientific journal model, arguing that it often obstructs rather than facilitates public access to research. Drawing comparisons with platforms such as ArXiv, which provide direct access to research, the discussion highlights how the reliance on commercial journals for research evaluation has distorted the fundamental purpose of publication. The paper ultimately calls for a rethinking of scientific publishing, urging the academic community to regain control over research dissemination and move beyond the traditional commercial journal model.

COMMON THREADS AND OVERARCHING THEMES

These discussions converge on several key themes. One recurring critique is of the traditional academic publishing system, particularly the dominant role of commercial publishers. The papers argue that these publishers

have monopolized academic publishing, limiting public access and exerting significant control over scholarly communities. The journal-based system has become deeply tied to research evaluation and career progression, leading to high costs and restrictive copyright policies. Resistance to change is largely due to the vested economic interests of major market players.

Another major theme concerns the role of market forces and regulation. There is an evident tension between private, profit-driven publishing models and the broader public interest in open knowledge. The ability of the market to self-regulate is questioned, as economic motivations often obstruct meaningful reform. In contrast, Diamond Open Access is presented as an alternative that prioritizes autonomy and community-led management, allowing public institutions greater financial control over scientific research funding.

Beyond critiquing the current system, the papers emphasize the need for significant cultural and structural changes in how research is evaluated, disseminated, and funded. The 'publish or perish' culture, along with an overreliance on quantitative metrics, has distorted research priorities. Reforming incentive and evaluation systems is essential to ensure that contributions such as data sharing, software development, community engagement, and educational activities receive appropriate recognition.

A further theme is the empowerment of scientific communities. These papers highlight the crucial role of scientific communities in fostering a more open and equitable publishing system. The importance of community ownership of journals and research infrastructures is emphasized, along with the necessity of governance structures that enable meaningful participation and control. Scientific communities are seen as self-organizing entities capable of defining their own rules and priorities.

Education, infrastructure, and policy coordination also emerge as essential factors in the transition to Open Science. Open Science principles must be integrated into educational programs, institutional policies, and national research strategies. Research infrastructures are not just tools but active participants in shaping research practices and scientific communities. The papers stress the need for participatory governance of these infrastructures and call for coordinated national and international policies to support Open Science. They warn against fragmented initiatives and instead advocate for a systemic, holistic approach.

Finally, an inclusive approach to stakeholder engagement is crucial. The transition to Open Science requires the involvement of all actors in the research ecosystem, including researchers, librarians, publishing professionals, technologists, policymakers, and funders. Broad participation ensures not only the widespread adoption of Open Science practices but also their long-term sustainability.

Taken together, these papers underscore the urgent need for a fundamental transformation in academic publishing to ensure that scientific knowledge is truly accessible, transparent, and beneficial to society. Rather than simply critiquing traditional publishing models, they offer concrete strategies for reforming publication practices, funding mechanisms, and evaluation systems. By fostering community-driven publication models, enhancing educational initiatives, and advocating for coherent policy frameworks, these contributions lay the groundwork for a more equitable and sustainable Open Science ecosystem.

BEYOND 'NO FEE': WHY DIAMOND OPEN ACCESS IS MUCH MORE THAN A BUSINESS MODEL

RUPERT GATTI

https://orcid.org/0000-0003-0676-9024
Trinity College, Cambridge - Open Book Publishers
gattirupert@gmail.com

PIERRE MOUNIER

https://orcid.org/0000-0003-0691-6063
EHESS - OPERAS - OpenEdition
pierre.mounier@openedition.org

JOHAN ROORYCK

https://orcid.org/0000-0001-7214-7405
cOAlition S - Glossa - Leiden University
johan.rooryck@gmail.com

INTRODUCTION[1]

Diamond Open Access (OA) is rapidly gaining momentum in the academic publishing world. Several significant initiatives and developments are driving this trend, including the cOAlition S call for proposals on this topic in 2020 (cOAlition S 2020), the Open Access Diamond Journal Study in 2021 (Bosman et al. 2021), and the Diamond Open Access Plan in 2022 (Science Europe 2022). Notably, EU-funded projects like DIAMAS and CRAFT-OA, the Toluca Global Summit on Diamond OA (Redalyc 2023), the consultation

1 The authors thank the COPIM, CRAFT-OA, DIAMAS, Diamond Action Plan, Glossa, LingOA, Open Book Publishers, OpenEdition, Open Library of Humanities, PALOMERA, and OPERAS communities for inspiration for this article. Special thanks go to Lucy Barnes for incisive comments on an earlier version of this paper.

about a Global Alliance for Diamond OA under the auspices of UNESCO, and the establishment of the European Diamond Capacity Hub (EDCH) are key contributors to this movement.

It is evident that there is currently no universally accepted definition of Diamond OA within the scientific community (Ancion et al., 2023). For some, Diamond OA is synonymous with 'no-fee' open access, while for others it is associated primarily, if not exclusively, with 'institutional' OA publishing. In certain contexts, it is characterised as 'noncommercial' or 'non-profit,' alongside various other expressions that seek to convey similar meanings. This absence of a clear and uniform definition is, understandably, unsatisfactory for the academic community, which often seeks precision in its conceptual frameworks.

However, this very ambiguity opens a discursive space where the academic community can engage in critical reflection on its values, objectives, and expectations about scholarly communication. Although the categorisation of OA by 'colours' has been justly criticised (Tay 2021) for its imprecision and its overly broad generalisations, it should also be recognised for the important debates it creates a space for. These categories serve as 'trading zones': arenas where diverse ideas, values, and opinions can be exchanged. Diamond OA is no exception in this regard.

Our contribution to this ongoing discussion seeks to explore the various dimensions of Diamond OA from multiple perspectives. This chapter, co-authored by three authors, is the outcome of a collaborative dialogue. At times, its form will reflect the dialogical nature of this exploration. By attempting to move beyond the simplistic and technical definition of 'no-fee' OA, we aim to uncover the complex dynamics that underpin knowledge production, as well as the roles that publishers, scholars, institutions, and academic communities play within these processes. Diamond OA is undoubtedly much more than merely 'no-fee' open access. But what exactly does it encompass?

LOOKING BACK

At the beginning of the twentieth century, scholarly communication was primarily controlled by the scholarly community, conceived of as a public good with the objectives of sharing and disseminating research findings.

The vast majority of journals operated with financial losses that were covered by the society's membership fees, a benevolent supporter, or through institutional support. Commercial publishers existed – both Elsevier and Nature were founded in the late 19th century – but these commercial entities were primarily providing professional support to the society publishers. During the twentieth century, particularly the second half of the twentieth century and in the Northern hemisphere,[2] we witnessed the increasing commercialisation of the scholarly publishing industry. This commercialisation took two primary forms: via direct ownership or via the management of scholarly journals. Commercial entities increasingly acquired or created scholarly journals of their own, adopting the same model as scholarly societies for quality assessment, with scholars appointed to editorial boards, conducting peer review, etc. but with very different ownership models and strategic objectives. Alternatively, they began managing the journal on behalf of a society and delivering a share of the operating profits to the academic society. In doing the objectives for both commercial and many society owned journals pivoted away from providing a public good to a community of scholars towards generating a revenue stream and profit for the journal's owners and the publishers.

In their excellent overview of this transition, Fyfe et al. (2017) point out that the postwar expansion of the higher education sector internationally meant that, while the objectives of commercial and scholarly publishers were not identical, there was sufficient growth and financial support in the HE sector for the differing objectives not to clash. However, that began to change in the 1980s with university budgets becoming tighter and the emergence of the 'serials crisis', where the increasing cost of subscribing to journals became increasingly difficult for libraries to afford in an environment of tightening higher education budgets. The 21st century saw both the emergence of digital publishing technologies and – possibly as a consequence – increasing concentration of journal ownership and the bundling of journals by publishers into single retail packages (the so-called 'big deals'). The effect of both of these has been to reduce the diversity and strategic independence of journals. Using Web of Science data, Larivière, Haustein, and Mongeon (2015, see Figure 1) show that the

2 We are not considering here alternative publishing cultures that existed and developed separately over the period (e.g. in Latin America, Africa, and parts of Asia).

proportion of articles published by the five largest publishers increased from under 20% to over 50% between 1970 and 2013, with the number of journals owned by the same publishers following a similar pattern. This means that the scholarly publishing industry is now dominated by the commercial objectives of a very small number of revenue focused publishers, rather than by the traditional 'public good' scholarly objectives.[3]

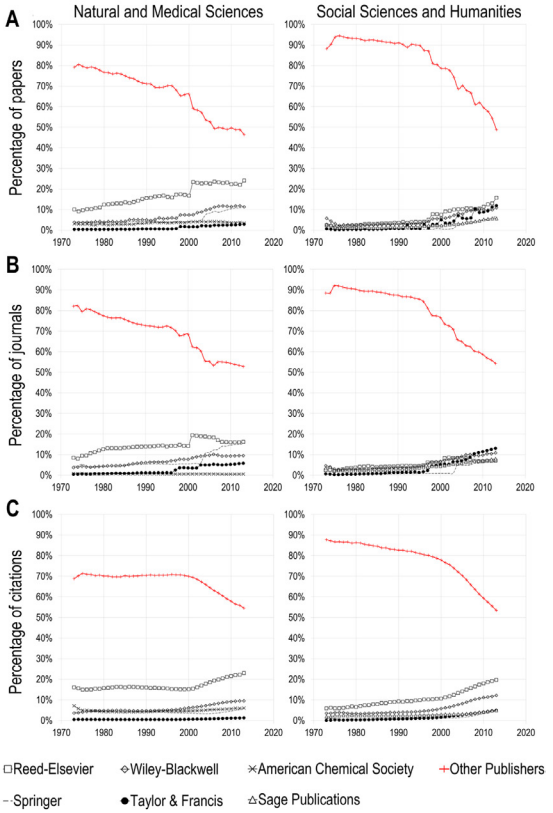

Figure 1: The Oligopoly of Academic Publishers in the Digital Era (Larivière, Haustein, and Mongeon 2015)

3 It is interesting to note that one of the Big Five in Natural and Medical Sciences is a scholarly society, the American Chemical Society - operating to raise revenue for other society activities. The remaining are purely commercial entities.

The relationship between scholarly societies and the journals they own is also changing, with many societies outsourcing the production and management of their journals to commercial publishers and relying on the share of profits received to finance other activities. A 2015 survey of 600 UK scholarly societies showed that just under half (279) owned a journal, with the majority of those (63%) publishing only a single peer-reviewed journal (Universities UK, 2015). Less than 30% (67) of those 279 societies published their journals 'in-house', however, with the vast majority outsourcing the publishing activities to commercial publishers or university presses. A follow-up survey in 2023 showed that the number of societies publishing 'in-house' had fallen even further (to just 44) (Johnson and Malcolmson 2024). Interestingly, they go on to note that over the period of their study (2015-23) the society publishers who had maintained 'in-house' publishing operations had successfully sustained revenue growth in line with inflation, while those with outsourced activities saw revenue decreases by an average of 30%. Similar falls in revenue/profits were not generally observed in the industry, suggesting that revenue shares returned to scholarly societies by publishers were falling. The authors suggest that this may be due to the reduced independence in revenue for individual journals funded through bundled agreements by their publishing partners and question if outsourcing publishing activities in this way is still in societies' best financial interests.

Late et al. (2024) suggest that there are significant differences in the activities of scholarly societies in the UK and other European countries, with publishing activities in the UK more commercialised and international than in non-English speaking countries. Surveying Social Science and Humanities societies across eight European countries (including the UK), they found that two-thirds (64%) of responding societies published at least one peer-reviewed journal and nearly 40% published at least one book series. The importance of supporting national interest and language publications was identified as an important motivation for many society publishing programmes, but increased commercialisation of publishing activities was generally noted.

At the same time, we have seen a dramatic increase in the number of new OA journals - some of these have been created by existing societies and publishers, but many reflect new publishing initiatives by societies or groups of scholars. Bosman et al. (2021) reveal that while a non-negligible part of the Diamond OA journals currently operating was 'flipped' at one moment of

their existence from other models, a large share of them were created during the last 10 years.

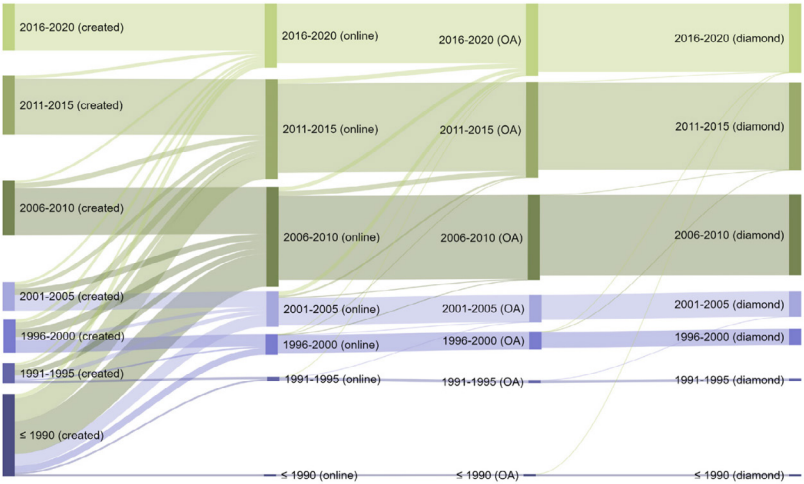

Figure 2: Years' journals were created, made available online, made available open access, and made available as Diamond OA according to Bosman et al. (2021).

In conclusion, the majority of journals across both science and humanities disciplines are now owned and controlled by a very small number of large commercially orientated publishers. This is a relatively new and concerning phenomenon for scholarly communications. Many societies see publishing journals as one of their important functions, but (at least in the UK) the vast majority now outsource the production, management, and revenue strategies of their journals to third-party commercially orientated publishers. Although these societies typically maintain control over the editorial content of their journals, they retain very little strategic independence over their journals' operations.

REGAINING AUTONOMY: DIAMOND OA BEYOND INSTITUTIONAL PUBLISHING

In response to these challenges, the academic community is increasingly turning to Diamond Open Access as a sustainable and equitable alternative. Regaining control and ownership of publications, a concept once central to academia, is gaining renewed traction after a relatively short period dominated by the belief that scholarly communication should be entrusted to commercial entities for efficiency. Two key factors supported this perspective: the perceived technical superiority of the commercial publishing sector and a narrow definition of research focused solely on data collection, analysis, and authorship.

However, the commodification of scientific knowledge in recent decades has fundamentally altered the nature of science and the role of researchers. The rise of the 'knowledge society' concept, which views knowledge as a resource for economic competition, has transformed researchers into 'resource producers' within a larger system controlled by others. This shift aligns with the diminished decision-making power of researchers in scholarly communication. Researchers are exploited at every stage of knowledge production, from author to reader, serving a publication machine operated by commercial entities that view papers as standardised products evaluated through metrics like the impact factor (Nentwich, 2001).

Several researchers, such as Fernanda Beigel (Beigel 2023) and others, argue that the power struggle between researchers and commercial publishers within journals and the broader scholarly communication sector is just one aspect of a larger conflict across the scientific field. The nascent effort to reform the scientific evaluation system through initiatives like CoARA, coupled with growing concerns about the governance of academic institutions (as noted by Gingras (2008)), clearly resonates with the renewed interest in 'scholar-led' initiatives such as Diamond OA.

The question of academic autonomy, constantly challenged by pressures from various sources such as religious, state, or economic powers, has a long and complex history. The enduring efforts of clerics, professors, researchers, and scientists to maintain a degree of autonomy in their work and resist external influences are fundamental to the very nature of academia. This struggle has manifested in various ways throughout history, from exemptions granted to medieval universities by temporal authorities to the development of academies during the Enlightenment, the Humboldtian system

in the 19th century, the scientists' strike at the dawn of the atomic age, the adherence to Mertonian norms, and the popularisation of the concept of 'collective intellectual' by Bourdieu in the 1970s, among others. A historical analysis of scholarly publishing from the perspective of academic autonomy remains unexplored, and such an undertaking would likely yield valuable insights.

One common strategy for academics to establish a degree of autonomy and self-governance in their collective intellectual endeavours has been institutionalisation through the creation of universities, societies, and academies. Although these institutions offer a degree of protection by establishing concrete, political, and symbolic barriers around knowledge, they also present challenges. They rely heavily on economic resources, necessitate governance structures (which inherently create power dynamics) and solidify academia within the social sphere, making it a more visible target than earlier diffuse intellectual networks. Thus, there is a paradoxical relationship between academics and their institutions. Institutions nurture, protect, and confer status upon academics, yet they also create a scientific field marked by power struggles, unequal resource distribution, and social dynamics that may have little to do with knowledge creation (Bourdieu 1988). The tension between the normative ethos of academics and the social reality of academia often leads to a continuous cycle of recreating or reforming academic institutions.

We propose that the dynamics of the scientific publishing sector cannot be solely attributed to the exploitation of passive academics by profit-driven commercial publishers. In reality, academics always actively shape the evolution of scholarly communication. Numerous examples exist where they invest in scholarly communication independently of, and sometimes in opposition to, their alma mater. The establishment of the prestigious Presses Universitaires de France by three professors outside of the University of La Sorbonne in the early 20th century, with the involvement of private capital, is one such instance. More recently, the introduction of a law in France allowing public universities to mandate the Open Access deposit of faculty publications in institutional repositories sparked widespread protests against the perceived 'nationalisation' of scientific publishing and the erosion of academic freedom (Darcos, Ouzoulias, and Henriet, 2022). In other words, collaborating with private, even commercial, publishers outside of their institutions is seen by some academics as a form of liberation from the power structures within the academic system. Non-institutional publishing offers

them an external resource they can leverage to navigate, counterbalance, or even reinforce these power relations through the accumulation of symbolic capital.

In essence, the scientific field is far more extensive and diverse than academic institutions alone. It is structured by power relations built upon the mobilisation of various resources, including publication venues. Scholars can make use of these venues as authors, reviewers, editors, and even founders to enhance their position within, outside of, or in opposition to institutions.

This perspective on scholarly publishing reveals a far more complex landscape than the simplistic view of academics as exploited knowledge workers. Although exploitation and value extraction undoubtedly occur, as evidenced by numerous studies (Chen, Posada, and Chan 2019), it often occurs with the consent of the 'victims'. Situated at the intersection of multiple power systems, academics may strategically play one against the other.

This nuanced understanding is crucial for understanding the complex dynamics at play in Diamond OA as well. While Diamond OA cannot be reduced to a mere 'no-fee' economic model, it should not be equated with 'institutional publishing' either. Reality is far more intricate.

In March 2023, the DIAMAS project conducted a survey across the European Research Area to gain a deeper understanding of the characteristics, challenges, and capacities of what its participants termed 'Institutional Publishers and Service Providers' (IPSPs). The survey garnered approximately 700 valid responses from over 40 countries within the European Research Area. One of the questions explored the relationship between IPSPs and their parent institutions. The diverse range of responses highlighted the variety of relationships that exist. IPSPs may operate independently while being owned by the institution, function as a department within a larger department, or even operate from the institution's library. The relatively even distribution of responses across these options indicates the absence of a single dominant model, although variations may exist at the country or subregional level (Bosman et al. 2024).

The intricate web of relationships has been effectively visualised by Bosman & Kramer (2022):

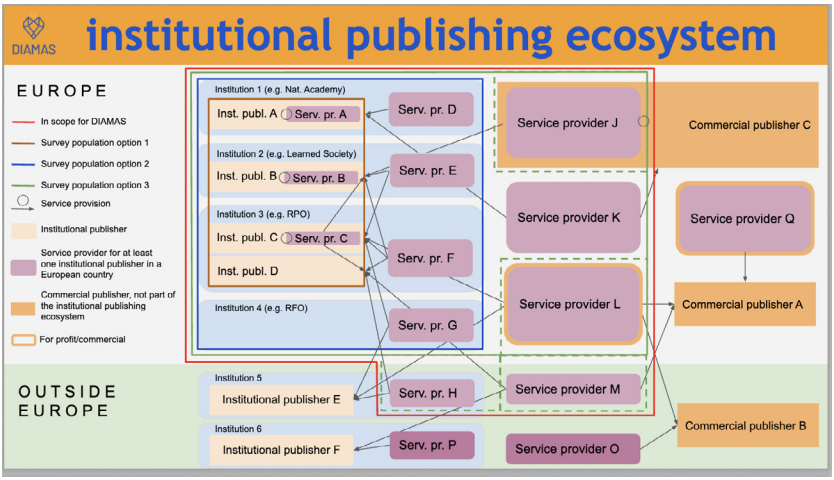

Figure 3: The institutional publishing ecosystem according to Bosman & Kramer (2022).

The complexity of the schema, reflecting real-world scenarios, adequately demonstrates the intricate web of relationships between institutions, institutional publishers and service providers, and commercial publishers and service providers. A Diamond journal may be owned by an institutional publisher but supported by one or more commercial service providers, or vice versa. All variations in the relationship between institutions and various publishing platforms exist in reality as scholars navigate this social space with varying degrees of adeptness, seeking to expand their autonomy beyond the core principles of editorial decision-making and peer review.

DEFINING SCHOLARLY COMMUNITIES

There is an additional element that has not been addressed yet, crucial for a deeper understanding of Diamond OA's dynamics: the role of scholarly communities. Unlike individual scholars, institutions, and publishing companies, scholarly communities are inherently more difficult to grasp and define. Less formal than institutions and incorporated organisations, they resemble fluid entities, constantly forming and dissolving, lacking clear boundaries and governance structures. To complicate matters further, scholarly communities can be nested within each other to an almost infinite degree.

Take, for instance, the 'community' of historians. It is, in reality, fragmented into sub-communities based on specific historical periods, methodologies, theoretical approaches, and research topics. Some historians feel closer to anthropologists than to fellow historians.

Recognising the fluid nature of this subject and avoiding any definitive pronouncements on the essence and role of communities in scholarly publishing, the three authors of this chapter have opted to share their personal perspectives on scholarly communities instead.

THE GLOSSA COMMUNITY (JOHAN ROORYCK)

I would like to argue that a journal represents a community that is perfectly capable of self-organisation. *Glossa: a journal of general linguistics* is a Diamond OA journal in linguistics that sprang from the ashes of Elsevier-owned *Lingua* in 2016, when its Editorial Team and Board, as well as its reader and author community, decided to abandon *Lingua* over a disagreement about journal ownership, Open Access, and the affordability of APCs. Eight years later, the move of the community to the new journal has been an unmitigated success: the journal recently published its 1000th article. *Glossa* clearly occupies the same standing in the community as *Lingua* in 2015. This is evidenced by the fact that it now occupies the same spot in the Google Scholar h5-index where *Lingua* used to be in 2015. On the contrary, although the title *Lingua* continues to exist with enlarged aims and scope, it failed to stay in the GS h5-index as soon as the 5-year afterburn effect of the articles curated by the original team had run its course.

In the broadest sense, *Glossa*'s community is made up of editorial board members, reviewers, authors and readers who decided to trust the editorial team enough so that they continued to submit their articles and reviews to the new journal instead of the old one. There is no formal membership: the *Glossa* community is a loose group of linguists worldwide who are interested in the kind of work described in the aims and scope of the journal. I estimate it to roughly involve between 7500 and 10.000 members. The journal's masthead stated that *Glossa* "publishes contributions from all areas of linguistics, provided they contain theoretical implications that shed light on the nature of language and the language faculty." This means that the editorial team reserves the right to reject articles that in their view do not comply with this

requirement. The aims and scope of a journal set the perimeter of the commons of the community, so to speak.

As stated by Potts et al. (2016), a journal community is a 'knowledge club', and the journal's articles and title are club goods. A club, of course, is a type of community. With that realisation come responsibilities that are no longer taken care of by a servicing entity like a commercial publisher. The editorial team and board have to decide how they want to run the journal (e.g. author and reviewer guidelines), what the journal's ownership and governance structure is (who owns the title? How are editors selected?);[4] and what services they will use (platform, copy-editing, typesetting). So within the community, a core group of people develop proposals and decisions on those elements and make them transparently available for the other members of the community. *Glossa* is lucky to be presently published by the *Open Library of Humanities*, who support the journal by putting the Janeway publishing infrastructure at the disposal of the editorial team, and by paying for the copy-editing and typesetting services of SiliconChips. Editors perform editorial services as part of their service to the field and do not receive payment.

Glossa also has an innovative governance and ownership structure: as stipulated in its constitution (https://www.glossa-journal.org/site/governance/), the legal ownership of *Glossa*'s title is in the hands of the Dutch nonprofit foundation (Stichting) *Linguistics in Open Access* (LingOA), which has granted beneficial ownership of the journal title to *Glossa*'s General Assembly, ie the joint members of its Editorial Team and Board. This divided ownership conveniently makes selling the journal title extremely difficult, obstructing any undue attempts at acquisition or temptations to sell. Indeed, I have personally been offered up to a million dollars for the acquisition of the journal, a sum that is easily understood in the context of an imagined Gold OA conversion of the annual output of the journal. With a current average of 120 articles published per year, a Gold OA conversion of *Glossa* charging an APC of $2500 could easily make its publisher a tidy gross income of $300.000 before production costs and taxes. Now, I just point the interested parties to our Constitution.

4 For Glossa's governance and ownership structure, see here https://www.glossa-journal.org/site/governance/

The community is therefore organised as a set of nested, gradually widening, concentric circles: the editorial team that handles the daily running of the journal, sending out articles for review, making publishing decisions, and finalising papers for publication; the editorial board, who have a say in how editors are selected and can provide solicited and unsolicited advice on matters of governance and service provision; the authors and reviewers who provide the journal with papers and reviews; and finally the wide community of readers who will use, build on, and cite the published articles.

COMMUNITY OWNERSHIP AND CONTROL (RUPERT GATTI)

I particularly appreciate the conception of the scholarly communities around a journal as a series of widening concentric circles. My own experience is predominantly in scholarly book publishing - and similar communities can be articulated around both individual books and book series. Books create multiple communities of readers, some within researchers' circles, some within education communities, and some within non-academic communities, each of which may coexist without significant interaction, and in many cases independently of the author as well.

There is another community to consider around scholarly research, however, and that is the communities involved in the research itself. Researchers who study specific communities and cultures and choose to publish their findings in closed-access publications (for their own careers and benefit) exclude the very communities and cultures they study from access to their findings. Geoffrey Khan has summarised this concern: '... The communities whose cultures the academics described [in traditional closed access publications] could not themselves get access to these descriptions of their own culture. To put it bluntly, it was a form of depredation and asset-stripping that benefited the career of academics but had no benefit for the communities themselves. Open-access publishing is the solution to this immoral practice..." (Kahn, 2024).

One primary motivation for many authors who publish open-access monographs is a recognition and desire to increase engagement of their work and research with the elements of those communities that have been marginalised and excluded by the pricing and controlled access of traditional non-OA publishing.

It should also be recognised that the communities surrounding a journal or publishing structure may also be exclusionary. As stated above, journals and scholarly communities cannot be separated from the power dynamics within the community - implicitly or explicitly 'defining' the nature and quality of research within that subdiscipline. Who is or is not accepted into the tighter and more powerful, discipline defining, inner circles? These processes are political, structural and behavioural. Are in-person interactions (or patronage, indeed) essential for acceptance and promotion with a group? Who is being excluded by these (possibly unrecognised) community practices? Pierre discusses these issues in more depth in the next section, but I would like to note that while open access certainly enhances the opportunity for inclusiveness of broader communities, it is not in itself sufficient. The ownership and governance of the journal are also critically important.

Johan has described the difficulties that can emerge when the objectives of the owners of a journal (Lingua) and the community surrounding the journal diverge and outlined the formalised legal and governance structures Glossa has created specifically to protect and represent the interests of the broader, less formally defined community. Bosman et al. (2021) note that while the majority of the Diamond OA journals they identified were owned by research institutions or scholarly society, half of them had no legal documentation establishing ownership. In considering terms such as 'community-owned', 'community-controlled', and 'community-led' it is the importance of these formal structures that I would like to consider further.

Legal ownership of a journal matters, the legal owners are the ones who have ultimate strategic control over the objectives and purpose of the journal. Guaranteeing editorial independence for a scholarly editorial board is important but does not give that scholarly group or the community the journal serves any direct control over production processes, marketing and pricing strategies,, open access strategies or (indeed) whether the journal continues to exist or not. The only way the scholarly community can respond to strategic decisions by the owners with which they disagree is to leave the community - as we have seen with Lingua and many other journals in recent years.

But what does it mean for a journal to be community-owned? Can a scholarly journal owned by a single member of the scholarly community, such as a university or university press, for example, claim to be 'community-owned'? My colleagues in COPIM have been considering these issues in the context of infrastructure and they highlight the importance of enabling

a broad community ownership and not having a single owner, however benevolent (Moore 2021, Hart et al. 2022, Fathallah 2023). When the owner is a single entity and can act unilaterally, strategic decisions can be made that support the owner's objectives but can be detrimental to the communities surrounding the journal. Lingua is one example where this occurred for commercial reasons, but university administrators have stopped supporting their presses with very little (if any) consideration for the communities surrounding and supporting the journals they publish, and publishers have been sold to alternative owners or taken over by new management, bringing in a very different set of strategic objectives. These changes in objectives may impact not only future authors and publications, but also past publications and authors. Many journals require copyright for the articles published to be transferred from the author to the publisher or owners of the journal, and so any new owners have strategic control over all previously published works and access to those works by the community, for the duration of copyright.

The consensus from COPIM research is that the scholarly communities that rely on or supporting scholarly infrastructure should have direct roles in the ownership of the infrastructure (Hopkins et al. 2024). Consequently, for a journal to be community owned, the broader community supporting and relying on it should also have direct involvement in its ownership structure and decision making.

But community ownership is only one part of the consideration; the community also needs to exert control over the strategic production decisions for the journal. As we noted earlier, many societies (with robust community governance models) have outsourced the production of their journals to specialised publishing entities. While technically, the owners may have the right to cease or renegotiate these agreements, many providers introduce lock-in strategies that make it very difficult for journals to leave (cf. Principle 5 in Rooryck 2023). These processes include providing specialist (proprietorial) journal management and editorial software, peer-review records and databases, connectivity with selected data repositories, and research software and pricing strategies. A recent and powerful addition to the arsenal of lock-in strategies is the emergence of 'big-deal' and 'read-and-publish' deals in which a collection of journals are sold as a single bundle. In these cases, the publisher receives a large payment from a single university or institution which is then allocated between the publisher on one hand and across the portfolio of journals provided on the other. Not only do the individual

journals have very little agency in the purchase price agreed or in determining the nature of the allocation mechanism, but the journals involved also lose any direct relationship with the institution making the payment. When libraries (for example) subscribed to an individual journal managed by a third-party publisher, the journal could still decide to publish the work in-house, or transfer operations to an alternative provider, without losing the associated subscriber base and revenue stream. Once the journal has been subsumed within a bundled funding model, this option is no longer available to them, as the journal no longer has any individual subscribers. Effectively, all journal owners can do is switch to an alternative publisher's 'bundle', losing strategic independence and the possibilities for internal publishing or engaging smaller specialist providers.

This has implications for collective funding models designed to support community-owned journals and Diamond OA publishing models. The collective funding should be defined around the journal ownership group, not the provider. Funding models that support large portfolios of journals owned by different scholarly communities relinquish strategic control of the journals away from the journals' owners to the bundle provider and so should be avoided in favour of models that recognise and support the journal/community itself. The model adopted by the Open Book Collective is a good example of this, providing a mechanism for libraries to support a collection of individual publishing initiatives but maintaining a clear and transferable association of the revenue stream with the entity being supported.

For a community to have genuine strategic and intellectual control over a journal, it needs to have direct control over the ownership of the journal, effective control over the management and operations of the journal, and control over the revenue sources for the journal, in addition to control over the editorial decisions of the journal.

HOW INFRASTRUCTURES SHAPE COMMUNITIES (PIERRE MOUNIER)

Recent scholarship (Bosman et al., 2021) has unequivocally highlighted the pivotal role of infrastructures in the advancement of Diamond OA, positioning them as indispensable pillars in the evolving landscape of scholarly communication. As evidenced by various studies (see, e.g., Dufour et al. 2023), a substantial segment of the Diamond OA ecosystem thrives on an inkind, nonmonetary economy, sustained by the voluntary contributions of

researchers and the provision of infrastructural services (DIAMAS study). However, while the centrality of infrastructures to Diamond OA publishing is undeniable, a comprehensive understanding of this role necessitates a deeper exploration that transcends mere acknowledgement and explores the intricate dynamics at play.

A conventional, and seemingly straightforward, approach is to conceptualise a unidirectional relationship predicated on service provision: preexisting communities have needs that are met, or not, by infrastructures. This functionalist and somewhat mechanistic, perspective, while offering a basic framework, oversimplifies the nuanced reality. It has long been established that infrastructures, despite user perceptions of static utility, are not passive entities. Instead, they engage in dynamic, multidirectional interactions, a concept captured by Bowker & Star's (2000) use of 'to infrastructure' as a verb, implying an active and reciprocal process.

To exemplify, a road, a typical infrastructure, is not merely a platform for vehicles; its very design and trajectory are influenced by the traffic it accommodates, the weight of the vehicles, and their turning radius. On the contrary, the road itself "infrastructures" the vehicles, influencing their design and capabilities by enabling or constraining their movement, dictating speed limits, and facilitating specific modes of transport. Therefore, a holistic understanding of terrestrial transport requires the study of roads, vehicles, fuelling stations, signage, traffic regulations, and their complex interrelationships. These elements evolve symbiotically within a dynamic, interdependent system (or ecosystem), shaping each other through continuous feedback loops and mutual adaptation. This inherent complexity explains the difficulty that policy makers face when attempting to effect radical systemic change, such as a transition to electric vehicles (or Diamond OA).

Similarly, the dynamic interplay between research practices and scholarly communication infrastructures is multifaceted. Although extensively explored in broader scientific contexts, notably in Paul Edwards' seminal work, A Vast Machine (Edwards 2010) its specific manifestations within the realm of Diamond OA warrant further investigation. The interactions are evident, as scholarly communities often coalesce around publications, particularly journals, as exemplified by Johan's argument, which serve as focal points for knowledge dissemination, debate, and collaboration. Scholarly communication infrastructures, through the regulations and conditions imposed on supported journals, the technical standards, and their design and

interfaces, exert a formative influence on communities in diverse and often subtle ways.

This influence is particularly salient in the context of platforms (Plantin et al. 2016), which, by design, can incentivise the fragmentation, amalgamation, maintenance, or dissolution of scientific communities. These incentives may be 'hard', manifested through explicit rules, or 'soft', subtly embedded within design elements such as index granularity, journal visibility within the platform, editorial autonomy, and the branding interplay between platforms and the communities they serve. For instance, a platform that prioritises interdisciplinary research through its indexing structure may encourage collaboration across traditionally distinct fields, while one that emphasises individual journal branding might reinforce existing disciplinary boundaries. Furthermore, the technical affordances of a platform, such as support for multimedia content or interactive data visualisation, can shape the types of research produced and disseminated within the community.

To extend the concept of community, one must consider infrastructures themselves as part of it. Many of the infrastructures supporting Diamond Open Access (OA) today—such as PKP, OLH, OpenEdition, Redalyc, and Hrcak—were established by scholars who initially developed these systems to meet the needs of their own journals. Over time, however, the tools they created have evolved into shared infrastructures, supporting dozens, and eventually hundreds, of journals with comparable features. These infrastructures embody a vision aligned closely with that of a scholarly community, thus laying the groundwork for community building around them.

As these infrastructures scale, however, they progressively enter a new dimension, moving further from the initial community-focused logic centred on a single or limited set of journals. Increasingly, infrastructural growth brings about constraints associated with human resource management, large-scale financial sustainability, technical maintenance, and user relations, as users begin to behave more as consumers than as community members. Operational streamlining, efficiency demands, rigorous oversight and, ultimately, bureaucracy, become prevalent and begin to transform the character of the infrastructure itself.

More significantly, upon reaching a certain scale, these infrastructures are compelled to develop closer relationships with external entities, such as government agencies, library consortia, and large funding bodies. These institutions impose specific requirements and often introduce their own

organisational culture, shaping the infrastructure in ways that may diverge from its original communal values. Consequently, these infrastructures face moral dilemmas as they struggle to balance their scholarly foundations with an administrative and technical culture that, in some respects, contradicts the very notion of community.

Ultimately, infrastructures initially rooted in a specific scholarly community find themselves compelled to serve multiple other communities, necessitating a gradual departure from their communitarian essence in order to fulfil these broader obligations.

In collaboration with Simon Dumas-Primbault, we modelled the fundamental tensions and vulnerabilities that scholarly infrastructures must constantly address, as they are perpetually stretched across competing dimensions and issues (Mounier & Dumas-Primbault, 2023). Our work investigated several cases to analyse how governance practices are embedded within knowledge infrastructures to shape not only their formal structures, but also the communities with which they engage. While not exclusive to Diamond OA infrastructures, and encompassing a broader spectrum of knowledge infrastructures, our study could help to elucidate the intricate relationships between infrastructures and communities in the context of Diamond OA. Our primary objective was to better understand how the governance of knowledge infrastructures reflects not only how these infrastructures are governed, but also, concurrently, how they govern their surrounding environment, which we refer to as their "milieu." a concept drawn from Gilbert Simondon (Simondon, 1958). We emphasise the ways in which infrastructures mediate connections between diverse actors, objects, and values, forging collaborations across heterogeneous elements.

From this perspective, the governance of an infrastructure is just one side of a larger dynamic: the other side is how an infrastructure, through its management of shared spaces, sociotechnical apparatus, and stakeholder networks, actively shapes its surrounding environment. These governance practices must simultaneously accommodate the diversity of epistemic traditions across the scientific communities they support, and justify their existence to a wide range of funding bodies, including government agencies, public institutions, and both private and public funders.

In my view, these multifaceted, multidirectional relationships between infrastructures and scholarly communities, including the ways in which publications are processed, managed, stored, indexed, categorised, disseminated,

and preserved, warrant more in-depth exploration in the Diamond OA context. If Diamond OA represents'more than just a business model,' it requires a comprehensive examination of governance practices, not only at the publication level, but also in relation to the communities and infrastructures that underpin them.

FOSTERING DIAMOND OA IN EUROPE AND WORLDWIDE

The intrinsic community-driven nature of the Diamond OA model is actively shaping ongoing efforts to advance and consolidate this model within the scholarly communication landscape, both in Europe and globally. This community orientation clarifies why certain types of actor, rather than others, lead this initiative, why it progresses slowly and methodically, and why it depends so heavily on fostering dialogue within the community to build broad consensus.

The push to promote Diamond OA in Europe began in earnest with the 2020 cOAlition S/Science Europe call for tender. A consortium was selected to study the diverse landscape of Diamond OA journals, especially within Europe but also on a global scale. Notably, the consortium assembled no fewer than ten organisations representing a wide variety of stakeholders, including several umbrella organisations—a rare occurrence given the limited funding available. From the outset, it was clear that this study should be conducted by a diverse and inclusive team to ensure a rich and comprehensive understanding of the community, using a highly participatory approach. The resulting Open Access Diamond Journals Study (Bosman et al. 2021) offered key insights into the current state and potential of Diamond OA journals. It underscored both the strengths of the model, commitment, quality, values, and its challenges, such as fragmentation, underfunding, and limited visibility.

This initial study spurred further interest in aligning and developing sustainable, noncommercial, community-led publishing initiatives, culminating in the 2022 Action Plan for Diamond Open Access. This plan laid out a strategic framework to strengthen Diamond OA by enhancing the visibility, quality, and sustainability of Diamond OA publications, helping them compete with commercial journals in terms of impact and recognition. To date, more than 160 organisations have committed to implementing at least

one action of this plan. The diversity of these organisations across countries, disciplines, and sectors illustrates the collective will to overcome the existing obstacles to the expansion of Diamond OA's expansion. This breadth of participation calls for a broader conception of community, extending beyond traditional boundaries to encompass not only researchers, but also librarians, publishing professionals, technologists, policymakers, and funders, creating an egalitarian space that challenges conventional power dynamics within the scholarly ecosystem. This spirit of shared values and objectives exemplifies why Diamond OA is more than a business model; it is a community-orientated approach based on a commitment to equitable access and collaboration.

European Commission-funded projects such as DIAMAS and CRAFT-OA (2022–2025) have also played a vital role in this ecosystem. CRAFT-OA seeks to enhance the technical and infrastructural capabilities of Diamond OA publishing, while DIAMAS promotes community collaboration and best practices. These projects provide essential resources to help Diamond OA journals thrive, but beyond this, they cultivate a long-term community of scholars and organisations committed to consolidating the dispersed resources and actors across Europe. Although the framework of the European Commission for funded projects is sometimes considered burdensome, its structure enables collaborative initiatives with a clear distribution of roles and decisions taken by consensus and with full transparency. Indeed, the collaborative culture and coproduction of outcomes within these projects are arguably as significant as the outputs themselves.

On an international level, collaboration has been strengthened through initiatives such as the Toluca Diamond OA Summit and the establishment of the Global Alliance for Diamond OA under the auspices of UNESCO. These platforms enable stakeholders worldwide to share ideas, best practices, and resources, fostering a unified approach to supporting Diamond OA. However, the challenges are considerable, given the socioeconomic and cultural diversity among global participants, which result in diverse interpretations of Diamond OA that will take time and concerted efforts to reconcile.

In Europe, specific efforts to coordinate community resources and building capacity are coalescing around the European Diamond Capacity Hub. This hub aims to support Diamond OA publishers across Europe, providing tools, training, resources, and networking opportunities to improve publication quality and sustainability. Although a relatively small number of actors currently spearhead this initiative, the objective is to establish a

distributed social infrastructure encompassing over 3,000 organisations across the European Research Area, as suggested by an initial survey conducted by the DIAMAS project. Coordinating such diverse stakeholders on scale will be challenging but essential, as the unique nature of the Diamond OA model demands that resources, coordination, and support be developed within the community and by the community.

CONCLUSION

In conclusion, the rise of Diamond OA represents a significant shift toward a more sustainable, equitable, and community-driven model of academic publishing. However, the academic community faces the critical challenge of defining and supporting organisations that truly represent their interests. By addressing this challenge and reclaiming the control and ownership of their publications, the academic community can ensure that the dissemination of scientific knowledge is guided by scholarly values and integrity, rather than commercial interests. This movement not only addresses the current challenges of the publishing system, but also aligns with a broader vision of maintaining the autonomy and credibility of the scholarly domain.

REFERENCES

Ancion, Zoé, Jean-François Lutz, Irini Paltani-Sargologos, & Pierre Mounier. 2023. 'Le Modèle d'accès Ouvert Diamant : Politiques et Stratégies Des Acteurs Français'. Billet. *The Diamond Papers* (blog). 7 July 2023. https://doi.org/10.58079/12710.

Beigel, Fernanda. 2023. 'A Transformative Relation between Publishers and Editors: Academic Autonomy at Stake.' https://doi.org/10.31219/osf.io/pf89t

Bosman, Jeroen, Jan Erik Frantsvåg, Bianca Kramer, Pierre-Carl Langlais, & Vanessa Proudman. 2021. 'OA Diamond Journals Study. Part 1: Findings'. Zenodo. https://doi.org/10.5281/zenodo.4558704.

Bosman, Jeroen & Bianca Kramer. 2022. 'The Institutional Publishing Ecosystem, Publishing and Service Providers: Scope and Concepts for DIAMAS'. November 30. https://doi.org/10.5281/zenodo.7378067.

Bosman, Jeroen, Bianca Kramer, Jadranka Stojanovski, Iva Melinščak Zlodi, Jan Erik Frantsvåg, Tabea Klaus, Julian Schima, et al. 2024. 'Institutional Publishing in the ERA: Full Country Reports'. Zenodo. https://zenodo.org/records/10026207.

Bourdieu, Pierre. 1988. *Homo academicus*. Stanford University Press.

Bowker, Geoffrey & Susan Leigh Star. 2000. *Sorting Things Out. Classification and Its Consequences.* Cambridge, MA: The MIT Press.

Chen, George, Alejandro Posada, & Leslie Chan. 2019. 'Vertical Integration in Academic Publishing : Implications for Knowledge Inequality'. In *Connecting the Knowledge Commons — From Projects to Sustainable Infrastructure : The 22nd International Conference on Electronic Publishing – Revised Selected Papers*, edited by Pierre Mounier. Laboratoire d'idées. Marseille: OpenEdition Press. http://books.openedition.org/oep/9068.

cOAlition S. 2020. 'Exploring Collaborative Non-Commercial Publishing Models for Open Access: Apply to Perform a Study | Plan S'. 27 March 2020. https://www.coalition-s.org/exploring-collaborative-non-commercial-publishing-models-for-open-access/.

Darcos, Laure, Pierre Ouzoulias, & Pierre Henriet. 2022. 'Pour une science ouverte réaliste, équilibrée et respectueuse de la liberté académique'. https://www.senat.fr/rap/r21-573/r21-573.html.

Edwards, Paul N. 2010. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Infrastructures. Cambridge, MA, USA: MIT Press.

Fyfe, Aileen, Kelly Coate, Stephen Curry, Stuart Lawson, Noah Moxham, & Camilla Mørk Røstvik. 2017. 'Untangling Academic Publishing: A History of the Relationship between Commercial Interests, Academic Prestige and the Circulation of Research'. https://zenodo.org/records/546100.

Dufour, Quentin, David Pontille, & Didier Torny. 2023. 'Supporting diamond open access journals: Interest and feasibility of direct funding mechanisms'. Nordic Journal of Library and Information Studies 4(2): 35-5, https://tidsskrift.dk/njlis/article/view/140344.

Fathallah, Judith. 2023. 'Governing Scholar-Led OA Book Publishers: Values, Practices, Barriers (2.0).' Zenodo. https://zenodo.org/records/7816770.

Gingras, Yves. 2008. 'La fièvre de l'évaluation de la recherche – Du mauvais usage de faux indicateurs'. *Bulletin de méthodologie sociologique. Bulletin of sociological methodology*, no. 100 (October), 42–44. https://journals.openedition.org/bms/3313.

Hart, Patrick, Janneke Adema, & COPIM. 2022. 'Towards Better Practices for the Community Governance of Open Infrastructures (1.0).' https://doi.org/10.5281/zenodo.6535460.

Hopkins, Kira, Janneke Adema, Lucy Barnes, Joe Deville, Judith Fathallah, Rupert Gatti, Anna Hughes, Kevin Sanders, & Toby Steiner. 2024. 'The Copim Perspective on Community-Led.' Copim. Retrieved November 8, 2024 from https://doi.org/10.21428/785a6451.cc2195f3.

Johnson, Rob, and Elle Malcolmson. 2024. 'You Don't Know What You've Got till It's Gone: The Changing Landscape of UK Learned Society Publishing'. https://doi.org/10.5281/zenodo.11181017.

Kahn, Geoffrey. 2024. 'Open Access publishing: A series editor writes.' Retrieved November 8, 2024 from Open Book Publishers Blog. https://blogs.openbookpublishers.com/open-access-book-publishing-a-series-editor-writes/.

Late, Elina, Raf Guns, Janne Pölönen, Jadranka Stojanovski, Mimi Urbanc, & Michael Ochsner. 2024. 'Beyond borders: Examining the role of national learned societies in the social sciences and humanities.' *Learned Publishing*, *37*(3). https://doi.org/10.1002/leap.1609.

Larivière, Vincent, Stefanie Haustein, & Philippe Mongeon. 2015. 'The Oligopoly of Academic Publishers in the Digital Era'. *PLoS ONE* 10 (6). https://doi.org/10.1371/journal.pone.0127502.

Moore, Samuel. 2021. 'Exploring models for community governance (1.0).' https://doi.org/10.5281/zenodo.4730687.

Mounier, Pierre & Simon Dumas Primbault. 2023. 'Sustaining Knowledge and Governing its Infrastructure in the Digital Age: An Integrated View'. https://cnrs.hal.science/OPENEDITION/hal-04309735v.

Nentwich, Michael. 2001. '(Re-)De-Commodification in Academic Knowledge Distribution?' *Science & Technology Studies* 14 (2): 21–42. https://doi.org/10.1371/journal.pone.0127502.

Plantin, Jean-Christophe, Carl Lagoze, Paul N. Edwards, & Christian Sandvig. 2016. 'Infrastructure studies meet platform studies in the age of Google and Facebook. New Media & Society.' ISSN 1461-4448 DOI: https://doi.org/10.1177/1461444816661553.

Potts, Jason, John Hartley, Lucy Montgomery, Cameron Neylon & Ellie Rennie. 2016. 'A Journal is a Club: A New Economic Model for Scholarly Publishing'. (April 12, 2016). Available at SSRN: https://ssrn.com/abstract=2763975 or http://dx.doi.org/10.2139/ssrn.2763975.

Redalyc. 2023. 'CUMBRE GLOBAL SOBRE – ACCESO ABIERTO DIAMANTE'. 23 October 2023. https://globaldiamantoa.org/.

Rooryck, Johan. 2023. 'Principles of Diamond Open Access Publishing: a draft proposal.' the diamond papers. Retrieved October 17, 2024 from https://doi.org/10.58079/1270y.

Science Europe. 2022. 'Action Plan for Diamond Open Access'. Science Europe. 3 February 2022. https://www.scienceeurope.org/our-resources/action-plan-for-diamond-open-access/.

Simondon, Gilbert. 1958. *Du Mode d'existence des objets techniques*. Paris, Aubier (Ligugé, impr. d'Aubin).

Tay, Aaron. 2021. 'Why Open Access Definitions Are Confusing'. Blog. Aaron Tay's Musings about Librarianship. 6 April 2021. https://musingsaboutlibrarianship.blogspot.com/2021/04/why-open-access-definitions-are.html.

Universities UK. 2015. Monitoring the transition to open access: A report to the Universities UK Open Access Co-ordination Group. London, England. Retrieved from https://www.universitiesuk.ac.uk/sites/default/files/uploads/Reports/monitoring-transition-to-open-access-2015.pdf.

FOSTERING AN OPEN SCIENCE CULTURE WITH EDUCATION, LIFELONG LEARNING AND INCENTIVES STRUCTURES

JESSICA M. LINDVALL*

jessica.lindvall@scilifelab.se
Science for Life Laboratory, Department of Biochemistry and Biophysics, Stockholm University, S-10691 Stockholm, Sweden

Jessica M. Lindvall is an associate professor in Bioinformatics from Stockholm University and is the Head of Training for the Swedish national research infrastructure SciLifeLab (within the technology- and data-driven life science discipline). She is a co-lead for the ELIXIR Training Platform (ELIXIR is a pan-European ESFRI) and involved in the EOSC related training and education community of practices.

ELIN KRONANDER

elin.kronander@nbis.se
National Bioinformatics Infrastructure Sweden, Science for Life Laboratory, Dept of Cell and Molecular Biology, Uppsala University, Uppsala, Sweden

Elin Kronander has a PhD from Swiss Federal Institute of Technology (EPFL) and currently works as a Data Steward at the National Bioinformatics Infrastructure Sweden (NBIS), a national research infrastructure dedicated to support the Swedish research community in bioinformatics and data. She leads the training at NBIS and is a Training Coordinator in ELIXIR-SE. Elin is dedicated to establishing training and upskilling opportunities for data management, Open Science and FAIR.

Both Jessica and Elin are long-time advocates for Open Science, FAIR, fair, inclusivity and community work, specifically targeted to the lifelong learning and knowledge sharing from research infrastructures.

* corresponding author

Learning is the basis of all human development. By supporting lifelong learning, openly and inclusively, we improve the world! Open Science and FAIR are cornerstones for this to be a reality.

ABSTRACT

For Open Science to truly become Science, it is essential to invest time, dedication, and resources into education, lifelong learning, and creating incentive structures that support Open Science and FAIR (Findable, Accessible, Interoperable, Reusable) practices. Open Science cannot thrive in isolation. Collective efforts as well as focused initiatives are needed from academic institutions, research infrastructures, policy makers and funders to target researchers and experts to ensure these principles are adopted across the entire research life cycle. This chapter argues that three interconnected issues—education, lifelong learning, and incentives—are critical for building a robust Open Science culture, where the researchers and experts in the end are the ambassadors of pushing Open Science to be Science.

The landscape today is heavily fragmented and where different stakeholder groups are scattered and uncoordinated. Many times the results for pushing Open Science are silo:ed and not coordinated on a higher level. We envision a future where academic institution leadership, research infrastructure management, policymakers and funders come together and hold the power to push for a change via dedicated educational efforts. Ultimately, also pushing for the change with regard to the incentive structures for researchers and experts within research, development and innovation. Educational, lifelong learning and incentive efforts will create the needed "ripples on the water" as to get the residual effect needed to scale and push the implementation of Open Science.

We hope the reader will be inspired by the examples throughout the text, and hopefully also start to implement some of them. We are many that advocate for the push to increase Open Science education and lifelong learning in our respective ecosystems and the need to create the needed incentive structures to properly acknowledge and accredited the efforts. After this chapter, we hope to be more!

INTRODUCTION

This chapter focuses on how educational programs at Higher Educational Institutions (HEIs) and lifelong learning from other knowledge hubs, such as Research Infrastructures (RIs), are key drivers for the capacity-building that is necessary to embed Open Science and FAIR principles into everyday research practices. The gap between grassroots initiatives and top-level policies, funding and management at academic institutions remains a barrier, and closing this gap requires rethinking institutional structures, educational efforts and reward systems.

Through examples of successful Open Science initiatives in education and lifelong learning, we aim to provide inspiration for fostering an inclusive, transparent, and collaborative research environment. Additionally, we call attention to the urgent need to reform current incentive and assessment frameworks to recognize all types of research outputs, not just publications. This cultural shift towards Open Science will bring significant benefits and trust in science. Ultimately, fostering a culture of Open Science is not just an institutional or personal responsibility—it is a societal imperative. Now is the time to seize the opportunity.

WHY OPEN SCIENCE MATTERS

There is an undeniable urgency to build the capacity of the scientific community in Open Science, across all disciplines and at every level. For this to happen, academic institutions must fully embrace their responsibility to design, develop, and deliver dedicated educational initiatives focused on Open Science and FAIR practices. The reality today, however, is that there remains a significant gap between the different levels of stakeholders—from policy makers and funders at the top, to researchers and experts on grassroot level. Each group is making progress in its own way, but this fragmented approach reflects a broader failure to implement Open Science practices in everyday work.

Researchers and experts, especially at the individual and team levels, are eager to adopt Open Science, but they often lack the support and resources from their institutions. On the other hand, those at the top—funders, management, and policymakers—are not always providing the necessary structures for Open Science to be effectively integrated into research processes.

The disconnect between these groups slows the pace of change, resulting in fewer researchers actively using the practices of Open Science and FAIR in their work, which in turn limits the potential for transformative, impactful research and technology/methodology development.

This text targets two crucial groups: management and researchers within Higher Educational Institutions (HEIs), which are responsible for formal education, and the lifelong learning providers that are found across various knowledge hubs such as Research Infrastructures (RIs), which have it within their assignment to capacity build their specific research communities. Both groups play an interconnected and complementary role in raising awareness and building capacity for the society. HEIs, with their focus on formal education, must begin embedding the topic of Open Science into their existing educational programmes and also create new curricula targeting new roles and needs. As a complementary to formal education, lifelong learning providers must ensure that the current research community is upskilled with the necessary knowledge and tools to implement Open Science in their work.

The end goal is clear: Open Science needs to become a foundational part of how research is conducted, benefitting society through increased transparency, inclusivity, and compassion. A society that embraces Open Science is one that promotes better research and, by extension, better decision-making. Failing to adopt and implement these practices will leave institutions, researchers, and even entire countries behind, diminishing their potential for innovation and impact. No one wants to be the last standing when the "Open Science train leaves the station."

To foster this shift, we need to ask and answer fundamental questions: Why Open Science? Why FAIR? Why transparency and inclusivity? These questions must be addressed at every level—across academic institutions, from the top management down to individual researchers and experts. Cooperation is essential; it's not enough for change to come from the top down or bottom up. Progress must flow in both directions, meeting in the middle to ensure a seamless adoption of Open Science across the board.

Clear policy guidance so that researchers and experts know what is expected of them in their work is needed. In addition the accessibility of technical resources needs to be established as a support for any researcher and expert to ensure the principles of Open Science can be followed. Last but not least, targeted educational support is crucial to upskill the research community, as to ensure the technical tools are being used properly as well as

the policy guidelines are followed and understood. These areas are deeply interconnected and should not be treated in isolation. Furthermore, academic institutions must adopt incentive structures that recognize and reward Open Science practices throughout a project's life cycle—not just the final publication. Too often, traditional academic metrics overlook the contributions made throughout a project's life cycle. When in reality, data sharing, knowledge sharing and other Open Science practices are the necessary means to ensure the goal of a data-driven, collaborative research future - and should be recognized as such.

Ultimately, if we are serious about moving towards a future where Open Science is not just a concept, but the standard, both HEIs and lifelong learning providers must rise to the challenge. Formal education, ongoing professional development, and institutional incentives are the key components in making Open Science not just possible, but inevitable.

THE ROLE OF EDUCATION IN OPEN SCIENCE

Education is the backbone of any cultural shift, and for Open Science to become the norm, it must be embedded into the very fabric of formal education at HEIs. The next generation of scientists should not only understand the importance of Open Science and FAIR principles but also be equipped with the mindset and practical tools to apply these concepts in their work. The task is clear: we need to ensure that Open Science is integrated into academic programs, curricula, and professional development initiatives. In this section, we outline the role of formal education in driving Open Science forward, with practical examples of what has worked and where improvements are still needed.

FORMAL EDUCATION AND CURRICULUM DEVELOPMENT

The responsibility for preparing the next generation of researchers falls squarely on the shoulders of HEIs. Traditionally, Open Science and FAIR principles have not been central to most academic programs, and this needs to change. HEIs must start redesigning their existing curricula as well as develop new educational programmes to reflect this reality, ensuring that every

graduate leaves their program with a clear understanding of how to apply Open Science in their future work.

Open Science should no longer be viewed as an optional add-on but as a core component of research education. This includes the creation of entirely new roles, such as Data Stewards and Data Managers, who will be essential in guiding researchers through the complexities of data stewardship and management. For these roles, dedicated programs need to be established. Additionally, existing programs across all fields must be updated to incorporate Open Science and FAIR practices, ensuring that everyone is trained from the outset in how to share and manage data responsibly and transparently.

Several initiatives have begun to tackle these challenges head-on. In Sweden, as elsewhere, we have seen a boom of developing educational courses and material for the Sweden-based research community (Lindvall J and Kronander E, 2024) As an example, Stockholm University has introduced a PhD course dedicated to Open Science (Stockholm University news, 2024), offering students insights into the principles of data sharing, transparency, and inclusivity. Similarly, institutions at the Karolinska Institutet and Umeå University have launched their own courses and training programs focused on FAIR data practices, equipping researchers with the skills necessary to contribute to an Open Science ecosystem (Karolinska Institutet RDM training, workshops and courses, 2022; Data Management and Open Science, 2022). In the Netherlands, which we believe is the country in Europe that has come the farthest with regards to acknowledging certification in the topics of Open Science, FAIR and Data management, there are initiatives aiming to consolidate the training and educational courses that exist within organisations (Open Science Netherlands, 2023; DTL, 2015.) The DTL is the Dutch national platform for Data-driven Health and Life Sciences, which have dedicated training events of FAIR data trainings, Bring-Your-Own-Data-Workshops (BYOD) and Trainings in Data management (Data Stewardship training at DTL, 2015; DTL Zenodo Community, 2016). The dedicated focus taken by the Netherlands with regards to the country's national strategy on Open Science has led to the development of clear guidelines and educational frameworks across universities, making them leaders in this field. We believe that if others follow suit, programs like these will offer a roadmap for embedding Open Science into any formal educational systems and thus creating a standard that everyone can follow. However, we would

like to see more consolidation and cooperative efforts nationally or jointly between educators within disciplines across the nation.

DATA STEWARDS AND DATA MANAGERS: KEY ROLES FOR THE FUTURE

One of the most promising developments in Open Science education is the recognition of Data Stewards and Data Managers as critical roles within the research community. These professionals serve as the bridge between researchers and the technical aspects of data management, ensuring that Open Science practices are followed throughout a project's life cycle. HEIs have a responsibility to develop and deliver targeted educational programs that train individuals for these roles. There are several challenges related to data stewardship training and education such as *Findability* of accessible education and training (both on a formal educational level and within the lifelong learning trajectory training), *Competences* i.e there is a lack of agreement on responsibilities, tasks and competency profiles of data stewards, which complicates the creation of any educational programme or training, *Coordination* from both a local, national and international perspective on developing education and training for Data stewards and data managers of the future, and *Certification* issues where academic institutions still do not have formal roles for these experts within any local, national and international university systems.

We like to highlight a couple of examples that we find exceptionally good promoting and pushing for Data Stewardship curricula and roles. The University of Vienna's Data Stewardship Certificate Course (Data Steward, 2022) is a prime example of how formal education can address this need. Another example is the Dutch National Programme Open Science (NPOS, 2022) which is a collaboration of 16 Dutch Partners coming together with the intent on realising Open Science in the Netherlands. By providing specialised training in data stewardship, universities can help create a workforce that is not only equipped with the skills necessary to manage research data but also capable of advocating for Open Science practices within their institutions and hopefully beyond the borders of the discipline and country.

These roles are essential for the future of research. Without Data Stewards and Data Managers, the implementation of Open Science and FAIR principles will remain inconsistent, leading to missed opportunities for collaboration, innovation, and transparency in research.

PERMEATING OPEN SCIENCE ACROSS DISCIPLINES

Finally, the education of researchers cannot be limited to those already focused on Open Science in the core of their expertise such as Data stewards and Data managers. All academic programs—whether in STEMM (Science, Technology, Engineering, Mathematics, medicine), social sciences, or law etc—must integrate Open Science principles into their already established educational programmes. Each field stands to benefit from increased transparency and collaboration, but this will only happen if students are trained early and consistently in these practices. Hence, Open Science and FAIR should be permeated topics throughout individual course modules within new and existing curricula.

Inspiration can be drawn from several HEIs that have begun to weave Open Science into their broader educational frameworks. Courses in research data management, reproducibility, and ethics are increasingly common (see examples and links throughout this chapter), but more work is needed to ensure that these topics are taught not as isolated subjects, but as core components of every researcher's education. This shift will only be effective if there is a concerted, national and international aligned effort, to establish curricula that make Open Science a non-negotiable part of academic training.

In conclusion, the role of education in fostering a culture of Open Science cannot be overstated. HEIs must take the lead by incorporating Open Science into their curricula and educational programs, ensuring that the future workforce have the knowledge and tools they need to contribute to an open, transparent, and FAIR research ecosystem. By doing so, HEIs will not only prepare the next generation of researchers and experts but also drive the systemic change needed to make Open Science the standard in research across all fields.

LIFELONG LEARNING AND KNOWLEDGE HUBS

Lifelong learning plays a pivotal role in ensuring that researchers and experts remain at the forefront of innovation and best practices. Open Science and FAIR practices are not static concepts—they evolve with technological advancements and shifts in research culture. As such, researchers and experts, regardless of their career stage, need to continuously capacity build themselves to update their skills and knowledge to stay relevant and

maintain the quality of their work. In this context, knowledge hubs such as RIs and other entities that enable capacity building for lifelong learning are crucial players. In contrast to HEIs, knowledge hubs are typically not legal entities, an example being an RI, and with this the training and lifelong learning these entities provide are not accredited to provide ECTS credits together with their course provision. However, knowledge hubs are an important complement to HEIs, as to continuously capacity build the research community beyond their formal educational trajectory. Knowledge hubs are an important support in society for education and lifelong learning. Here, continuous training for researchers and experts take place to ensure both the individuals and organisational learning is met. Entities such as RIs have the responsibility to capacity build the research community within their scientific discipline. They provide targeted training and professional development that is indispensable for fostering and maintaining a culture of Open Science across the research community.

This section explores the significance of lifelong learning and the role of RIs as knowledge hubs in providing the support and resources necessary for researchers to adopt Open Science practices. By integrating training into their service offerings, RIs are empowering researchers and experts with the skills and tools needed to manage, share, and reuse data responsibly and transparently.

THE IMPORTANCE OF LIFELONG LEARNING FOR RESEARCHERS AND EXPERTS

In today's fast-paced research environment, lifelong learning is no longer optional—it is a necessity. The rapid advancements in digitalization and artificial intelligence (AI) are transforming how research is conducted, managed, and shared. Researchers must constantly evolve their skills, and Open Science and FAIR practices are now foundational competencies for maintaining the highest standards of research quality.

Lifelong learning ensures that researchers and experts remain adaptable and informed about the latest developments in Open Science practices. Whether it's mastering new data management tools or staying updated on legal and ethical considerations around data sharing, professional development is essential for enabling researchers to make their work more transparent, reproducible, reusable and impactful. This is particularly relevant as Open Science

principles become integrated into research assessment, funding requirements and institutional policies worldwide. Without continuous learning, scientists risk falling behind, diminishing the impact of their work and their ability to collaborate in an increasingly interconnected scientific community.

Lifelong learning also fosters a mindset of continuous improvement, encouraging researchers and experts to not only adopt Open Science practises themselves but also to influence their peers and institutions. In this way, lifelong learning creates a ripple effect, propagating Open Science principles through the research ecosystem.

THE ROLE OF RESEARCH INFRASTRUCTURES IN LIFELONG LEARNING

RIs are essential knowledge hubs that offer much more than just technical support—they are key players in capacity building within the greater research community, cross-disciplinary and transversal. RIs are uniquely positioned to provide technology- and domain-specific expertise and tailored training, making them a vital resource for individuals looking to implement Open Science and FAIR practices in their work. As RIs operate at the intersection of research and technology, allowing them to offer both cutting-edge solutions and training, this positions them as both enablers and advocaters of Open Science.

By offering training and (open) educational resources, RIs help ensure that researchers and experts have the necessary knowledge and skills to handle various types of data responsibly and meet the growing demands for transparency, reusability and reproducibility. Open Science is not just about sharing data and knowledge; it's about sharing data in a way that is findable, accessible, interoperable, and reusable i.e FAIR and fair. RIs play a crucial role in educating researchers on how to achieve this, through proper data management and processes on the way-of-working reproducible, the use of standardised tools, and adherence to FAIR principles. We believe that training delivery and lifelong learning in Open Science and FAIR practices should be seen as a core service offered by RIs and other knowledge hubs. These entities are not just repositories of technical resources—they are integral to the educational infrastructure that supports researchers. RIs must be proactive in designing, developing, and delivering training programs that address the real-world needs of the research community. The training programmes offered by knowledge hubs such as RIs are designed to be scalable and the examples provided here are aligned with national and international

Open Science policies, ensuring that the skills learned are transferable across institutions and borders.

For example, RIs like ELIXIR, a pan-European Infrastructure within the life science domain, have made Open Science a core part of their mission (ESFRI RIs Portfolio, 2024; Smith A, Martin C and ELIXIR Partners, 2023). As an RI, ELIXIR not only provides technical services and resources but also emphasises the importance of building a community around Open Science practices (ELIXIR, 2020; CORDIS 2020) many times through the means of training and knowledge sharing. By embedding Open Science in its walls, ELIXIR has become a model for how RIs can foster a culture of openness, transparency, and collaboration. Their focus on making software, tools, services, and training as open as possible—and as closed as necessary—demonstrates how RIs can balance openness with the need for security and intellectual property protection. As an outcome of the ELIXIR-CONVERGE project (ELIXIR, 2020; CORDIS 2020) ELIXIR established dedicated working groups that push for Open Science in various ways. One of its recent initiatives is the ELIXIR Research Data Management Community that upholds training in data management, reproducibility and reusability. Another project is the ELIXIR-STEERS (ELIXIR, 2024; CORDIS, 2024), where good software management practices are to be produced to support life scientists with their software management needs. The goal being to collect the good practices into a dedicated open toolkit for green and reproducible software and workflows. All these initiatives and projects showcase ELIXIR as an RI in the forefront of the Open Science movement.

Another example is the European Open Science Cloud Association (EOSC-A), which works to advance Open Science in the service of creating new knowledge, inspiring education, spurring innovation and promoting accessibility and transparency. A key objective of EOSC-A is to create a federated system where researchers can access and share data across disciplines and borders. EOSC-A highlights the importance to success is to have RIs that are not only technically advanced but also are committed to promoting Open Science through education and training. EOSC-A helps shape the policy and funding landscape and is committed to establish international guidelines and educational resources that HEIs and RIs, as well as other knowledge hubs, can adapt to their own contexts.

On a national level, we showcase the Swedish national RI for technology- and data-driven life science, SciLifeLab, which aims to offer comprehensive

training courses to the broader scientific community on data management, tools for reproducible research, as well as hands-on workshops aimed at embedding Open Science into the daily practices of scientist (examples from NBIS course catalogue: Introduction to Data Management practices (2021); Tools for Reproducible Research (2018); BYOC Snakemake (2019). All of these are delivered regularly at least yearly. These capacity building efforts are designed to be scalable as available open educational resources for the community to consume, at any given time. SciLifeLab is also an RI that is conscious of the training provided is to be part of a larger training catalogue building tailored learning paths for any educational structure to embed.

The training is also ensured to be aligned with national and international Open Science policies i.e the skills learned are transferable across institutions and borders.

Typical for any RI training is that they span from short modules to more comprehensive workshops. In addition, an RI is often not a legal entity. Hence, the RI training does not carry European Credit Transfer and Accumulation System (ECTS) credits as part of its set-up and therefore rather use the model of providing certifications to their participants upon completion. If ECTS is needed by the participants, e.g being a PhD student, it is the participants' academic institutions that validates the credits for respective training events. This established process between the RI and the academic institutions, where the academic institutions endorse and formalise the training delivered from the RI, ensures that individuals can integrate their learning into their career development and professional growth, further incentivizing participation. By creating structured programs and offering hands-on training, the knowledge hubs such as an RI are not just supporting individual scientists but are also impactful training centres that are to contribute to the larger cultural shift towards Open Science. I.e RIs have a responsibility to both their immediate users and the broader scientific community to lead by example, ensuring that the knowledge and tools for Open Science are widely accessible, and this is made possible via training and lifelong learning.

In conclusion, the role of lifelong learning in the Open Science movement cannot be overstated. RIs, with their unique position at the intersection of research and technology, are central to capacity building within the scientific community. By offering targeted training programs, courses and open educational resources, knowledge hubs empower researchers and experts to adopt Open Science and FAIR practices in their daily work. Hence, lifelong

learning ensures that researchers and experts remain adaptable, informed, and equipped to contribute to a more transparent, inclusive, and impactful research landscape.

INCENTIVES AND ASSESSMENT STRUCTURES

For Open Science to truly take root within academic institutions, we need to rethink how we incentivize and assess researchers and their outputs. The current system, which primarily values publications as the gold standard of success, overlooks the broader contributions researchers make—especially those aligned with Open Science principles. Sharing data, code, scripts creating impact to any given research project in addition to developing new tools, educational resources and knowledge sharing as well as the efforts brought to engage in collaborative research practices should all be recognized and rewarded. But how? Without a shift in how we evaluate research, the adoption of Open Science will remain piecemeal and undervalued, leaving many researchers hesitant to fully engage.

This section will explore why reforming the incentive and assessment structures is crucial for fostering a culture of Open Science and discuss how such reforms can be implemented across academic institutions and knowledge hubs such as RIs. We'll highlight examples from global initiatives that are pushing for change and provide a roadmap for how institutions can better align their assessment systems with the goals of Open Science.

THE CHALLENGE OF THE CURRENT INCENTIVE SYSTEM

The traditional academic incentive system is largely focused on the publication of research papers in high-impact journals. This narrow focus has shaped a culture where only the final interpretation of research output is valued, while the significant underlying contributions such as methods and data, the development of open tools, or community engagement—are either overlooked or undervalued. This system also overlooks other impactful roles within a research project that scientifically and/or technologically/methodologically significantly contributed to the project's outcome. These are all roles that with their individual expertises made new and impactful contributions to the project and should hence be recognised and accredited in its own right.

Researchers and experts who spend time ensuring their data is FAIR, contributing to open-source projects, or educating their peers on Open Science often receive little to no recognition for these efforts. This discourages and prevents researchers from adopting Open Science practices, as the time and resources spent on them are not rewarded under the current system.

In a world where research is becoming increasingly data-driven, it is somewhat self-contradictory that contributions like data stewardship and software development are not considered impactful in the same way as publications. This disconnect between what researchers are incentivized to do and what actually benefits the broader research community creates a major barrier to the widespread adoption of Open Science.

We need to move beyond this outdated structure if we are serious about creating a culture where Open Science is the norm. Institutions as well as RIs must recognize that impactful research extends beyond publications and that data, tools, and methods shared openly can have as much, if not more, influence than a single paper.

PROPOSALS FOR REFORMING INCENTIVE STRUCTURES

A key reform needed is the inclusion of Open Science contributions in promotion and hiring decisions. Institutions, preferably coming together on a national level, should develop policies that explicitly reward practices such as data sharing, participation in open research collaborations, and the development of FAIR-aligned resources. This can be done through new evaluation criteria that prioritise the quality and openness of research practices over traditional journal metrics like impact factors.

To this end, several global initiatives are leading the way. One prominent example is the Declaration on Research Assessment (DORA), which advocates for broader recognition of research outputs beyond publications. DORA suggests that datasets, software, educational resources, and other contributions should be given the same weight as journal articles in evaluations. Established in 2012, DORA calls for academic institutions, publishers, and funders to move away from relying solely on journal-based metrics and to instead assess the broader impact of research contributions. DORA recommends that all types of research outputs, from datasets to educational tools, should be included in evaluations, alongside qualitative measures of

research impact. More than 125,000 individuals and institutions have signed DORA, committing to reforming their assessment processes to better align with the principles of Open Science.

Similarly, the Coalition for Advancing Research Assessment (CoARA) takes this one step further by focusing on the implementation of reforms. CoARA is working to establish common guidelines and best practices for research assessment. The emphasis is on the need for inclusivity, transparency, and flexibility in research evaluation, advocating for a system that acknowledges the diverse range of contributions researchers make throughout a project's life cycle. CoARA invites institutions to sign a set of 10 core commitments aimed at transforming research assessment practices. By adopting these recommendations, academic institutions and knowledge hubs with legal entity status can create a fairer and more supportive environment for researchers committed to Open Science.

The third effort we bring up here is the project under DORA called Tools to Advance Research Assessment (TARA) which is another initiative aimed at providing practical solutions for reforming research assessment. TARA focuses on developing policies and practices that reflect the diverse nature of research contributions. Emphasis lies on that the value of research should not be determined solely by traditional metrics but by the broader impact that research has on the scientific community and society. TARA is particularly important for research infrastructures, as it provides guidelines for recognizing the contributions of data stewards, FAIR practitioners, and others involved in Open Science.

In conclusion, reforming incentive and assessment structures is a crucial step in fostering a culture of Open Science. Academic institutions and knowledge hubs such as RIs must broaden their understanding of what constitutes impactful research, moving beyond publications to recognize the full range of contributions that drive scientific progress. By adopting policies that align with global initiatives like DORA, CoARA, and TARA, institutions can create an environment where Open Science practices are rewarded, supported and encouraged, leading to more inclusive, transparent, and collaborative research. Ultimately, these changes will not only benefit individual researchers but also improve the quality and impact of science as a whole.

CHALLENGES AND OPPORTUNITIES

The transition to a fully embraced Open Science culture is far from straightforward. While there has been undeniable progress in recent years, significant challenges remain that hinder its widespread adoption. As we have listed in this text, these obstacles range from institutional resistance to deeply ingrained academic practices that prioritise traditional metrics over the collaborative and transparent nature of Open Science. Yet, these challenges also present unique opportunities for growth, cultural transformation, and the advancement of science as a collective endeavour.

In this section, we will explore the key challenges that must be addressed for Open Science to become the norm, while also highlighting the opportunities that lie ahead. A strong emphasis will be placed on the power of community, the role of education, and the need for a fundamental cultural shift within the research ecosystem.

KEY CHALLENGES IN ADOPTING OPEN SCIENCE

1. INSTITUTIONAL RESISTANCE TO CHANGE:

One of the most pressing challenges is the inertia present within many academic institutions. Despite the growing awareness of Open Science, the research community is still often bound by traditional incentive structures that prioritise publications in high-impact journals over other valuable research outputs. This creates a system where researchers are reluctant to share data, methods, or preliminary results openly, fearing it may not lead to the recognition needed for career advancement.

This institutional resistance stems not only from outdated evaluation systems but also from a lack of understanding or commitment at the leadership level. Many academic leaders, policy makers, and funding bodies continue to view Open Science as an added burden rather than a transformative opportunity for improving the quality and accessibility of research. Without leadership buy-in, researchers on the ground face an uphill battle in implementing Open Science practices.

2. LACK OF INCENTIVES FOR DATA SHARING AND COLLABORATION:

Even when researchers are willing to adopt Open Science practices, the lack of clear incentives and rewards for sharing data remains a significant barrier. In many cases, the current academic reward system still places disproportionate value on the publication of final research articles, with little to no recognition for the open sharing of data, software, or methodologies. This discourages researchers from fully engaging in Open Science, as the personal benefits seem limited, especially in competitive fields where career progression depends heavily on traditional markers of success.

3. CULTURAL AND DISCIPLINARY SILOS:

Another challenge is the fragmentation within and between academic disciplines. Expectations around Open Science vary widely across fields, creating silos where some disciplines are more open and collaborative, while others remain closed. This lack of uniformity leads to inconsistencies in how Open Science is implemented and creates friction between disciplines that would benefit from greater cross-disciplinary collaboration. Moreover, this fragmentation makes it difficult to establish universal standards for data sharing, transparency, and collaboration.

4. CAPACITY BUILDING AND TECHNICAL BARRIERS:

While many researchers support the idea of Open Science in principle, they often lack the technical skills or resources to implement these practices effectively. Researchers need access to training in data management, FAIR practices, and tools for reproducible research, but these resources are not always available or adequately funded i.e not prioritised. In addition, technical infrastructure at many institutions and RIs is underdeveloped, making it difficult for researchers to manage, share, and store large datasets in compliance with Open Science standards.

OPPORTUNITIES FOR GROWTH AND CULTURAL CHANGE

Despite these challenges, there is a growing momentum towards Open Science, and with it, a wealth of opportunities to transform the research landscape for the better. The shift towards Open Science is not just about compliance or policy—it represents a fundamental change in the way research is

conducted, shared, and valued. Hence , the cultural shift! Here are some key opportunities that can drive this cultural shift forward:

1. BUILDING COMMUNITIES OF PRACTICE:

The power of community should not be underestimated. When researchers feel part of a larger network that values openness, they are more likely to embrace new practices, even in the face of institutional resistance. Furthermore, as these communities grow, they create pressure from the bottom up, encouraging institutions to adopt the necessary policies and structures to support Open Science more broadly.

At the grassroots level, there is an increasing number of researchers and experts who are leading the way in Open Science through Communities of Practice (CoPs). These communities foster collaboration and knowledge sharing across disciplines, creating a critical mass of individuals committed to open and transparent research practices. CoPs such as those formed around the aforementioned ELIXIR RDM Community (D'Anna F, Jareborg N, Jetten M et al., 2024) or the Open Life Science (OLS, 2019) project are just a few excellent examples of how collective action can catalyse change. Another standout example is The Turing Way (The Turing Way Community, 2024), an open-source guide to data science and data management that is a product of the community effort. This project emphasises reproducibility, transparency, and collaborative research, providing a practical framework for students and researchers alike to implement Open Science from day one.

By creating supportive environments such as these, where researchers can share their experiences, learn from each other, and build trust, such communities will become even more essential for pushing the Open Science movement forward.

2. LIFELONG LEARNING AS A DRIVER OF CHANGE:

Education is another key lever for promoting Open Science. By embedding Open Science principles into formal education and professional development programs, academic institutions and knowledge hubs can ensure that researchers and experts are equipped with the skills they need to thrive in an open, transparent research ecosystem. Lifelong learning is critical here—Open Science is not just for early-career researchers but for professionals at all stages. Lifelong learning training opportunities offered by

e.g. RIs, such as ELIXIR and SciLifeLab, are already playing a crucial role in upskilling the research community on FAIR principles, data management, and open collaboration (see earlier links and references on training).

Institutions that embrace lifelong learning and invest in professional development programs focused on Open Science are positioning themselves to lead in this new research era. As researchers and experts gain the skills to manage data responsibly, collaborate across disciplines, and engage with open tools and resources, the entire research community benefits from increased transparency and reproducibility.

3. CULTURAL CHANGE THROUGH LEADERSHIP AND POLICY:

Change must also come from the top. There are clear opportunities for institutional leaders and policymakers to drive the adoption of Open Science by establishing supportive frameworks that reward openness and collaboration. Recent initiatives like the aforementioned CoARA and DORA are leading the charge in reforming how research outputs are evaluated, moving beyond traditional metrics like journal impact factors to recognize the broader contributions researchers and other expert roles make, including data, code and software sharing, knowledge sharing and community engagement.

By aligning policies with the principles of Open Science, academic institutions and other knowledge hubs can create environments where researchers are not just allowed, but actively encouraged as well as supported, to share their data and collaborate openly. This kind of cultural shift requires strong and upstanding leadership that is daring enough to rethink the traditional norms of academic success and push for systems that value openness and transparency as much as publication counts, without bend-stretching scientific excellence and significance.

MOVING FORWARD - BUILDING A SUSTAINABLE OPEN SCIENCE CULTURE

Open Science is no longer a distant goal but a necessity for creating a more inclusive, transparent, and impactful research ecosystem. We have throughout this chapter argued for the importance to fully embed Open Science into everyday practice, three key areas must be prioritised: education, lifelong learning, and reforming incentive structures.

First, education is at the heart of this cultural shift. HEIs must take responsibility for integrating Open Science and FAIR principles and practices into formal curricula, ensuring that every new generation of researchers is equipped to contribute to this evolving landscape. Equally important is the role of lifelong learning, with RIs and other knowledge hubs providing continuous, targeted training to help researchers and experts stay up to date with best practices in data, code, software, training material, knowledge sharing in addition to management, and collaboration ways-of-working.

Second, the current incentive and assessment structures must be reformed to recognize all contributions to the research process — not just publications. Rewarding transparency, knowledge sharing, collaboration, and the development of open tools and resources will encourage more researchers and experts to adopt Open Science principles and implement its practices, ultimately improving the quality and accessibility of science.

Finally, the power of community and collective action cannot be underestimated. Grassroots initiatives, Communities of Practice, and leadership from within the research community are crucial in driving the cultural change needed for Open Science to flourish. By building strong networks of collaboration, we can create the critical mass necessary for systemic transformation.

The path forward is clear: with a concerted effort from researchers and experts, academic institutions and knowledge hubs, funders and policymakers, Open Science can and should become the standard. The future of science depends on our ability to embrace openness, community, inclusivity, and transparency — now is the time to act.

REFERENCES

CORDIS - EU research results. (2020) *ELIXIR-CONVERGE Grant agreement ID: 871075* [Online] Available at:https://cordis.europa.eu/project/id/871075 [Accessed: 22nd August 2024] (https://doi.org/10.3030/871075).

CORDIS - EU research results. (2024) *ELIXIR-STEERS Grant agreement ID: 101131096* [Online] Available at: https://cordis.europa.eu/project/id/101131096 [Accessed: 22nd August 2024] (https://doi.org/10.3030/101131096).

Course in open science: "Investment in your future research career" (2024). *Stockholm University news* [Online]. Available at: https://www.su.se/english/news/course-in-open-science-investment-in-your-future-research-career-1.683453 [Accessed: 22nd August 2024].

D'Anna F, Jareborg N, Jetten M et al. (2024) A research data management (RDM) community for ELIXIR. [version 2; peer review: 2 approved with reservations]. *F1000Research* 2024, 13(ELIXIR):230 (https://doi.org/10.12688/f1000research.146301.1).

Data management and open Science. (2022) *Umeå University* [Online] Available at: https://www.umu.se/en/humlab/education/postgraduate-studies/data-management-and-open-science/ [Accessed: 22nd August 2024].

Data Steward. (2022) *University of Vienna.* [Online] Available at: https://www.postgraduatecenter.at/en/programs/communication-media/data-steward/ [Accessed: 22nd August 2024].

Data Stewardship training. (2015) *DTL Learning* [Online] Available at: https://www.dtls.nl/training-and-education/data-related-training [Accessed: 22nd August 2024).

DTL Learning. (2015) *Dutch Techcentre for Life Sciences* (*DTL*) [Online] Available at: https://www.dtls.nl/training-and-education/ [Accessed: 22nd August 2024).

DTL Zenodo Community. (2016) *Dutch Techcentre for Life Sciences (DTL) and ELIXIR Netherlands.* [Online] Available at: https://zenodo.org/communities/dtl/records?q=&l=list&p=14&s=10&sort=newest [Accessed: 22nd August 2024].

ELIXIR. (2024) *ELIXIR-STEERS* [Online] Available at: https://elixir-europe.org/about-us/how-funded/eu-projects/steers [Accessed: 22nd August 2024].

ELIXIR. (2020) ELIXIR-CONVERGE [Online] Available at: https://elixir-europe.org/about-us/how-funded/eu-projects/converge [Accessed: 22nd August 2024].

ESFRI RIs Portfolio. (2024) *ELIXIR-A distributed infrastructure for life-science data* [Online] Available at: https://ri-portfolio.esfri.eu/ri-portfolio/portfolio-editions/2024-first-edition/catalogue/elixir/ [Accessed: 22nd August 2024].

Lindvall J. and Kronander E. (2024). *Examples of courses in Open Science practices in Sweden* (Version 0). SciLifeLab. (https://doi.org/10.17044/scilifelab.27138834).

NBIS Course catalogue. (2019) *BYOC Snakemake* [Online] Available at: https://uppsala.instructure.com/courses/87249 [Accessed: 22nd August 2024].

NBIS Course catalogue. (2018) Tools for Reproducible Research [Online] Available at: https://uppsala.instructure.com/courses/87979 [Accessed: 22nd August 2024].

NBIS Course catalogue. (2021) *Introduction to Data Management Practices* [Online] Available at: https://uppsala.instructure.com/courses/79097/pages/introduction-to-data-management-practices [Accessed: 22nd August 2024].

NPOS. (2022). *Open Science 2030 in the Netherlands: NPOS2030 Ambition Document and Rolling Agenda*. Zenodo. (https://doi.org/10.5281/zenodo.7433767).

Open Science for PhD-students. (2024) *Stockholm University* [Online] Available at: https://www.su.se/doctoral-school-in-the-humanities/courses/open-science-for-phd-students-5-ects-1.651401 [Accessed: 22nd August 2024].

Open Science Netherlands. (2023) [Online] Available at: https://www.openscience.nl/en [Accessed: 22nd August 2024].
RDM training, workshops and courses. (2022) *Karolinska Institutet* [Online] Available at: https://staff.ki.se/research-support/research-data-management/rdm-training-workshops-and-courses [Accessed: 22nd August 2024].
Smith A, Martin C and ELIXIR Partners. (2023) ELIXIR's long-term sustainability plan (2023) [version 1; not peer reviewed]. *F1000Research* 2023, 12(ELIXIR):534 (document) (https://doi.org/10.7490/f1000research.1119412.1).
The Turing Way Community. (2022). *The Turing Way: A handbook for reproducible, ethical and collaborative research* (1.0.2). Zenodo. (https://doi.org/10.5281/zenodo.3233853).
We are OLS (2019) Open Life Science (OLS).[Online] Available at: https://we-are-ols.org/ [Accessed: 22nd August 2024].

ABBREVIATIONS:

FAIR: Findable, Accessible, Interoperable, Reusable.
HEIs: Higher Educational Institutions.
RIs: Research Infrastructures.
DORA: Declaration on Research Assessment.
CoARA: Coalition for Advancing Research Assessment.
TARA: Tools to Advance Research Assessment.
EOSC-A: European Open Science Cloud Association.
ESFRI: European Strategy Forum on Research Infrastructures.

ITALY, OPEN SCIENCE AND MISSED OPPORTUNITIES

PAOLA GALIMBERTI
https://orcid.org/0000-0003-1410-1307
Università degli studi di Milano - Direzione Performance, Assicurazione Qualità, Valutazione e Politiche di Open Science
paola.galimberti@unimi.it

INTRODUCTION

Italy's journey with Open Science tells a story of promising ambitions tempered by unfilled potential. Although Italy's scientific community has long acknowledged the benefits of Open Science, enhancing transparency, expanding access, and supporting ethical research practices, the initiatives designed to embed these values have often faltered, producing fragmented and inconsistent outcomes. The merger of the country's three major research consortia, Cineca, Cilea, and Caspur, symbolized a step toward collaborative infrastructure that could have propelled Open Science forward. However, despite this consolidation, the hoped-for synergy and impact on Open Science adoption have been limited. What initially seemed like a foundation for systemic progress has yet to develop into a comprehensive and sustainable practice.

This paper delves into how Italy initially set the stage for robust Open Science and Open Access policies, only to see these ambitions curtailed by a lack of enduring support, resources, and understanding. Although the 2004 Messina Declaration marked Italy's early commitment to Open Science as a national priority, this vision has since faded. However, in our country, there is all the expertise needed to implement a monitoring and analysis service that serves to feed evidence-based decision-making processes. Twenty years later, the Ministry of University and Research has yet to collect foundational data on Open Science initiatives, including metrics on costs, open data, publications, software, and code, indicating an absence of oversight that has stymied progress. This persistent neglect reveals a worrying reality: despite Italy's need for Open Science to drive educational reforms, foster collaboration, and prevent scientific misconduct, it remains deprioritized at the national level.

POLICIES

On 4 November 2024, the Declaration of 20th anniversary of the Messina was celebrated in Messina, commemorating Italy's initial commitment to the Declaration on Open Access. In 2004, Italian university rectors, guided by CRUI (Conference of Italian University Rectors), had enthusiastically pledged to promote open access for publicly funded research. This commitment called for specific institutional actions, including the definition of open-access policies, the implementation of supportive tools, the establishment of monitoring systems, and the provision of training. However, practical follow-up was scarce, and only a few institutions fully honoured the commitments they made in 2004.

Following the Declaration, the Open Access Commission developed guidelines to help Italian universities establish coherent open-access practices, but these guidelines had limited impact. In 2013, Italy passed an Open Access law[1], though it was unusual, introduced not by the Ministry of Research but by the Ministry of Cultural Heritage in the context of a broader law on cultural assets. This law included a paragraph on open access to publicly funded publications, but, lacking monitoring or funding provisions, it remained largely ineffective[2].

Ten years later, in 2014, Italian universities returned to Messina to renew their commitment to open science principles and outline a new roadmap (including research data and FAIR data). This second meeting reasserted Italy's intention to support open access through institutional repositories and to collaborate on a national research data policy. However, unlike the original Declaration, this meeting was attended only by the coordinator of the Open Access Commission, and the leadership from CRUI was notably absent. Fifty-two institutions signed the renewed roadmap, yet the absence of strong institutional backing limited its impact.

---

1 Decreto legge 8 agosto 2013 n. 91 "…disposizioni urgenti per la tutela, la valorizzazione e il rilancio dei beni e delle attività culturali, con particolare riferimento alla necessità indifferibile di garantire misure immediate di tutela, restauro e valorizzazione del patrimonio culturale italiano …" https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legge:2013;91.

2 Roberto Caso, La legge italiana sull'accesso aperto agli articoli scientifici: l'inizio di un percorso normativo https://www.roars.it/la-legge-italiana-sullaccesso-aperto-agli-articoli-scientifci-linizio-di-un-percorso-normativo/ROARS.

Fifty-two institutions signed the new roadmap. Once again, the signing of the roadmap should/could have led to concrete actions, especially as Europe was developing its Open Science policies and many countries were aligning.

After this second Declaration, divergent approaches to Open Science began to emerge among Italian institutions. Some universities, often involved in European networks, independently developed open access policies, services, and training, striving to align with Europe's emerging Open Science landscape. However, many institutions faced challenges aligning themselves with inconsistent or weak national policies. For example, PRIN (Research Project of National Interest) began referencing open access in 2017[3], but the Ministry of Universities and Research of Italy still does not monitor compliance with open access publications, a marked contrast to the oversight of the European Commission.

It was not until 2022, when countries like France had already released their second national plans, that Italy unveiled its own national Open Science plan[4]. Unfortunately, this document, like its predecessors, suffered from a lack of funding (think of the Netherlands[5]) and support tools (think of France[6]), rendering it largely impractical from the outset.

In 2023, the Ministry established a monitoring group for Open Science, but without adequate funding or staffing, comprehensive data collection remains unlikely in the foreseeable future. This limited institutional support risks leaving Italy's Open Science efforts fragmented and disjointed in an increasingly data-driven international research landscape.

In 2024, two universities (Milan and Bologna) and three public bodies signed the Barcelona Declaration on open research information[7]. The commitment is to promote an open infrastructure and use open data for research analysis and monitoring. This is an important step toward systems independent of private interests and toward a more equitable representation of scientific research. Again, and unlike, for example, in France with the Open Science monitor[8], the Ministry of University continues to rely on proprietary data.

3 https://miur.gov.it/-/bando-prin-2017.
4 https://www.mur.gov.it/it/news/lunedi-20062022/pubblicato-il-piano-nazionale-della-scienza-aperta.
5 https://www.openscience.nl/en/news/open-science-nl-presents-work-programme-for-2024-and-2025.
6 https://hal.science/.
7 https://barcelona-declaration.org/signatories/.
8 https://frenchopensciencemonitor.esr.gouv.fr/

INSTITUTIONAL POLICIES

Italy has faced a recurring challenge in establishing effective institutional policies for open access, particularly through 'green' open access, which allows researchers to deposit a version (preprint or post-print) of their work in repositories. Such policies could have empowered researchers to retain more control over their publications, despite restrictive publisher agreements. While efforts to draft and consolidate these policies have emerged, as seen with the Berlin Declaration, they often lack essential human and financial support. Without adequate resources, researchers struggle to make their work accessible, encountering barriers even for pre- or post-print versions. This institutional-level structural deficiency mirrors the broader national issue, where open-access practices receive little support or recognition, leaving researchers without incentives or funding to pursue them.

One of the few institutional-level initiatives to address open access is the consortial signing of "read and publish" agreements, which aim to transition journals to full open access by covering both reading and publishing costs for affiliated researchers. This approach, spurred by Coalition S's requirement that funders only support transformative journals transitioning to open access, initially promised a path to universal open access. However, the transformative effect has failed to meet expectations[9], leading Coalition S to end support for this model, as it failed to achieve widespread open access10.

In Italy, the CRUI consortium has focused on these transformative agreements, but the lack of national-level data on their costs and benefits

9 Leigh-Ann Butler, Lisa Matthias, Marc-André Simard, Philippe Mongeon, Stefanie Haustein; The oligopoly's shift to open access: How the big five academic publishers profit from article processing charges. Quantitative Science Studies 2023; 4 (4): 778–799. doi: https://doi.org/10.1162/qss_a_00272;
Thomas Klebel, Tony Ross-Hellauer; The APC-barrier and its effect on stratification in open access publishing. Quantitative Science Studies 2023; 4 (1): 22–43. doi: https://doi.org/10.1162/qss_a_00245;
Najko Jahn, How open are hybrid journals included in transformative agreements? [preprint] https://doi.org/10.48550/arXiv.2402.18255;
Laura Rothfritz, W. Benedikt Schmal, Ulrich Herb,Trapped in Transformative Agreements? A Multifaceted Analysis of >1,000 Contracts [preprint] https://doi.org/10.48550/arXiv.2409.20224.
W. Benedikt Schmal, La Révolution Dévore ses Enfants: Pricing Implications of Transformative Agreements [preprint] arXiv:2403.03597v2.

10 Transformative journals: analysis from the 2022 report https://www.coalition-s.org/blog/transformative-journals-analysis-from-the-2022-reports/.

makes it difficult to assess their value. Unlike the UK's JISC, which publishes cost-benefit analyses for transparency[11], CRUI has yet to release comparable reports. As a result, transformative agreements continue to be renewed without a clear understanding of their financial or practical impact. Similarly, there is limited institutional transparency around the costs associated with gold or hybrid open access, which mixes subscription and open access fees. Only a few institutions contribute data on publishing fees through projects like Open APC[12] or other reporting initiatives. Recently, a bottom-up effort led by several universities[13] has aimed to compile several data on open science issues for comparative analysis, which could benefit from broader participation and tools like the OpenAlex API to facilitate automation.

Over the past few years, increased support from research funders has prompted many Italian universities to release Open Science policies[14]. These policies often span multiple areas, such as publications, doctoral theses, data, and software, and some universities, including Milan, Bologna, Trento, and eastern Piedmont, have established dedicated Open Science working groups and appointed Open Science delegates. For these groups to be effective, however, they must include both technical and academic staff to provide a balanced mix of expertise and perspectives that can address the varied facets of Open Science implementation.

TRAINING AS A TOOL FOR NORMALISING OPEN SCIENCE

Training is essential to embed Open Science principles within Italian academic culture. Students, early career researchers, and faculty need guidance on implementing Open Science practices, yet few institutions offer ongoing training on these topics. The gap is partly due to limited in-house expertise and insufficient staffing dedicated to Open Science. Although there are intensive training programmes, particularly for Ph.D. students, these often remain theoretical and lack follow-up with practical tools and resources that could help researchers implement what they learn.

11 https://zenodo.org/records/10882118.
12 https://treemaps.openapc.net/.
13 Guidelines for monitoring OS activities https://zenodo.org/records/10389874.
14 The portal https://open-science.it/ collects Italian policies and documents on Open Science.

Online resources and training materials for Open Science are widely available, but institutional incentives to participate in such training are minimal. Few Italian universities recognise or reward Open Science training as a professional achievement, limiting its perceived value for researchers' career progression. Embedding Open Science training within professional development and providing formal recognition for these efforts could help Italian researchers build the practical skills they need to advance Open Science practices, both within Italy and in alignment with broader European standards.

TOOLS AND INFRASTRUCTURES

The 2014 merger of Italy's three primary research consortiums, Cineca, Cilea and Caspur—brought a unified tool for managing research output across universities and institutions: IRIS, based on DSpace, became the CRIS system adopted by several universities and research centres. While IRIS data play an integral role in various ministry-led evaluations, including ASN (National Scientific Qualification), doctoral boards, and PRIN (Research Projects of National Interest), a comprehensive national research registry has yet to materialise. Such a registry would provide centralised validation, ensuring data quality and consistency across the fragmented IRIS systems currently in use. Today, IRIS's functionality varies widely among institutions, resulting in inconsistencies in data completeness, quality, and the availability of full texts. Although some IRIS implementations are closely managed and validated, others rely on automated validation processes, which, despite improvements, struggle to ensure full text accessibility due to limited staffing for version validation and compliance monitoring.

Another problem is the inadequacy of Cineca in aligning with new versions of the DSpace software, wich cuts universities off from important developments and features at global level.

DIAMOND OPEN ACCESS IN ITALY

Diamond Open Access, a non-profit model led by public institutions and free for both authors and readers, is gaining traction in Italy, with several academic journals and university presses adopting this model. These initiatives emphasise quality and public accessibility, drawing on the voluntary

efforts of researchers who prioritise scholarly contributions over commercial gain[15]. However, without structured support from the Ministry of University and researchy, these open access diamond projects face challenges in sustainability and visibility[16]. The tendency of some academic communities to favour commercial publishers further complicates the shift, even when the diamond model matches or exceeds commercial standards[17]. National recognition and funding for these initiatives could ensure their continued growth, reflecting the support given to similar projects in other countries.

RESOURCES AND PROCESSES FOR OPEN SCIENCE

To embed Open Science as a foundational practice, Italian institutions need expertise across a range of fields, including academic publishing, research evaluation, tool management, intellectual property, research integrity, and performance monitoring. These skill sets, essential for bridging administrative and research needs, remain largely underdeveloped, given the low prioritization in Italy. Only a handful of universities publish annual Open Science reports, a critical tool for tracking progress and informing policy. Without systematic resources and institutional commitment, Italy risks falling further behind in cultivating a culture of openness and transparency in research.

RESEARCH EVALUATION: A PERFORMANCE-BASED APPROACH

Research evaluation in Italy has taken on a distinctly quantitative focus since the "Gelmini Law" introduced a performance-based evaluation framework. Metrics, often derived from commercial entities, have been the primary basis for evaluation, centralising control under ANVUR and the Ministry. Despite evidence of system flaws, such as the problematic rise in self-citations, no major revisions have been made since the system was introduced in 2012. Eligibility for national scientific habilitation is determined by

15 DOAJ indexes 462 italian journals diamond open access https://tinyurl.com/2p8zecjs.

16 A meritorious example is the South American one with the project Scielo https://www.scielo.org/en/.

17 Of course, this depends very much on the scientific areas. There are excellent journals published by commercial publishers and excellent journals published by nonprofit venues, but the former enjoy the favor of researchers because they are linked to indicators essential to their careers that are usually higher.

quantitative "thresholds," which have escalated due to the pervasive publish-or-perish culture. Although recent research quality evaluations were intended to use quantitative indicators merely as a reference to support qualitative assessments, there is little indication of a shift away from the emphasis on metrics, and some scientific communities still rely mainly or exclusively on quantitative indicators.

In an effort to move toward more qualitative and Open Science-friendly evaluation criteria, many Italian universities and research centres have joined the Coalition for Advancing Research Assessment (COARA)[18]. COARA's National Chapter in Italy is working to harmonise local evaluation criteria, prioritising quality over quantity and incorporating Open Science practices into recognition frameworks. ANVUR, a signatory to COARA, has pledged to uphold these principles, but little progress has been evident in policy or practice, and the recently published action plan continues to overlook the core tenets[19].

PROVISIONAL CONCLUSIONS: TOWARD SYSTEMIC CHANGE

Italy's Open Science landscape is currently defined by isolated advances rather than cohesive policy. Institutional initiatives often lack systemic support and recognition, creating a weak approach to Open Science. Yet, within the international research community, Open Science is increasingly valued and incentivised, underscoring the need for Italy to align with these broader expectations. Greater integration between experts and structures, which are actively engaged with Open Science, and research bodies could foster a stronger commitment to Open Science practices across institutional levels.

To make Open Science viable for researchers, training programmes must address the practical demands of Open Science practices, including data sharing, open access publishing, and compliance with evolving open standards. Such training should be both general and tailored, equipping researchers (and students) with skills that span multiple disciplines and meet specific field requirements. Given the time investment Open Science

18 COARA national Chapter: Italia https://www.coara-italia.it/.

19 Di statistica e virtù: i criteri della VQR 2020-2024 e la riforma europea della valutazione della ricerca https://aisa.sp.unipi.it/language/it/.

demands, providing tangible benefits, such as recognition or incentives, will be crucial in fostering genuine engagement.

The foundation for a normalised approach to Open Science has long been in place in Italy, and now the COARA National Chapter may offer a path forward. By aligning Italy's research evaluation and support structures with international Open Science standards, the country can move from isolated initiatives to a unified, systemic commitment that promotes transparency, quality, and public accessibility in research. The COARA national chapter and related initiatives represent a new opportunity for Italy. And this time it is necessary not to miss it.

REFERENCES

AISA (ASSOCIAZIONE ITALIANA PER LA SCIENZA APERTA), Di statistica e virtù: i criteri della VQR 2020-2024 e la riforma europea della valutazione della ricerca (2024), https://aisa.sp.unipi.it/di-statistica-e-virtu-i-criteri-della-vqr-2020-2024-e-la-riforma-europea-della-valutazione-della-ricerca/.

BARCELONA DECLARATION ON OPEN RESEARCH INFORMATION (2024), https://barcelona-declaration.org/signatories/.

BUTLER, Leigh-Ann – MATTHIAS, Lisa – SIMARD, Marc-André – MONGEON, Phil – HAUSTEIN, Stefanie, The oligopoly's shift to open access: How the big five academic publishers profit from article processing charges. Quantitative Science Studies 2023; 4 (4): 778–799. doi: https://doi.org/10.1162/qss_a_00272

CASO Roberto, La legge italiana sull'accesso aperto agli articoli scientifici: l'inizio di un percorso normativo, https://www.roars.it/la-legge-italiana-sullaccesso-aperto-agli-articoli-scientifci-linizio-di-un-percorso-normativo/ ROARS.

COARA NATIONAL CHAPTER ITALY https://www.coara-italia.it/.

COALITION S, Transformative journals: analysis from the 2022 report (2022), https://www.coalition-s.org/blog/transformative-journals-analysis-from-the-2022-reports/.

DECRETO LEGGE 8 AGOSTO 2013 n. 91 "…disposizioni urgenti per la tutela, la valorizzazione e il rilancio dei beni e delle attività culturali, con particolare riferimento alla necessità indifferibile di garantire misure immediate di tutela, restauro e valorizzazione del patrimonio culturale italiano …", https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legge:2013;91.

FRENCH MINISTRY OF HIGHER EDUCATION AND RESEARCH, HAL, Science Ouverte https://hal.science/.

FRENCH MINISTRY OF HIGHER EDUCATION AND RESEARCH, The French open science monitor https://frenchopensciencemonitor.esr.gouv.fr/.

Gruppo di lavoro italiano monitoraggio attività di Open Science, Schema di monitoraggio attività di Open Science (2023), https://zenodo.org/records/10389874.

JISC, A review of transitional agreements in the UK: Executive summary (2024) https://zenodo.org/records/10882118.

Klebel Thomas – Ross-Hellauer, Tony, The APC-barrier and its effect on stratification in open access publishing, Quantitative Science Studies 2023; 4 (1): 22–43. doi: https://doi.org/10.1162/qss_a_00245.

Mur, Bando PRIN (2017), https://miur.gov.it/-/bando-prin-2017.

Mur, Piano Nazionale Scienza Aperta (2022), https://www.mur.gov.it/it/news/lunedi-20062022/pubblicato-il-piano-nazionale-della-scienza-aperta.

Najko Jahn, How open are hybrid journals included in transformative agreements? 26 Sep 2024 [preprint], https://doi.org/10.48550/arXiv.2402.18255.

Open Apc, https://treemaps.openapc.net/.

Open Science NL, Workprogramme for 2024 and 2025, https://www.openscience.nl/en/news/open-science-nl-presents-work-programme-for-2024-and-2025.

Rothfritz Laura – Schmal W. Benedikt – Herb Ulrich, Trapped in Transformative Agreements? A Multifaceted Analysis of >1,000 Contracts 30 Sep 2024 [preprint], https://doi.org/10.48550/arXiv.2409.20224.

Schmal W. Benedikt, La Révolution Dévore ses Enfants: Pricing Implications of Transformative Agreements 30 Sep 2024 [preprint], https://doi.org/10.48550/arXiv.2403.03597.

TO PUBLISH OR TO REPUBLISH, THAT IS THE QUESTION: IS THE RIGHT OF REPUBLICATION JUST PALLIATIVE CARE?

MARIA CHIARA PIEVATOLO

http://orcid.org/0000-0003-3089-6218
Università degli Studi di Pisa - Dipartimento di Scienze Politiche
mariachiara.pievatolo@unipi.it

THE SECONDARY PUBLICATION PARADOX

The right of re-publication or right of secondary publication allows scientific authors who receive public funding to make their work freely available to the public, even if they have signed away their copyright in a contract with a commercial publisher.[1]

Although it is recognized in all central-western European countries except Italy,[2] it contains a paradox: why do scientific authors working in universities and public research institutions need a special right to *republish* texts already *published* by commercial publishers? What is the function of the first "publication" if, despite its name, it is not to make texts available to the public?

In the last decade of the last century it was already possible to make public use of reason, circumventing the mediation of publishers who "publish" without making texts public.[3] In 1989, Tim Berners-Lee invented the World Wide Web so that "any person could share information with anyone

1 R. Caso – G. Dore, *Academic copyright, open access and the "moral" second publication right*, in "European Intellectual Property Review" (2021)

2 Knowledge Rights 21, *A position statement from knowledge rights 21 on secondary publishing rights*., In 2019, an attempt to overcome Law No. 112 of 7 October 2013, which disregarded EU recommendations on embargoed open access, by introducing a moderate secondary publication right, was blocked in the Italian Senate after being approved in the Chamber of Deputies: Roberto Caso, *La proposta di legge Gallo sull'accesso aperto all'informazione scientifica (DDL n. 1146)*, 2019 https://aisa.sp.unipi.it/sulla-proposta-di-legge-gallo-sullaccesso-aperto-allinformazione-scientifica-ddl-n-1146.

3 In the age of the printing press, copyright could be justified as an industrial regulation to protect authors from publishers, rather than to protect publishers and other kinds of distributors from the public and from authors themselves, if they are interested in making public use of reason (R. Stallman, *Freedom or Copyright? - GNU Project - Free Software Foundation*).

else, anywhere".[4] In 1991, when CERN offered it to the world, the interest of a part of the scientific community in sharing their research led to the first open disciplinary repository, the ArXiv, now hosted by Cornell University and funded by universities and other research institutions. The GNU-GPL license also dates back to 1989. And at the turn of the millennium, it was joined by the GNU Free Documentation License and the Creative Commons by and by-sa licenses to help make not only the source code of software, but all works of authorship publicly available.

More than thirty years later,[5] ArXiv's access control remains minimalist: personal knowledge (endorsement) is supplemented by "light" moderation, assisted by a machine learning program that selects papers requiring moderator intervention. Moderation does not guarantee scholarly quality, but it does ensure that texts are usable and identifiable, and it filters out papers that are off-topic or do not meet academic standards. And yet, as Paul Ginsparg notes,[6] during the pandemic, open repositories helped to quickly discard poorly-founded hypotheses and introduce new recommendations and effective treatments,[7] while some of Elsevier's closed peer-reviewed journals published articles on questionable remedies such as hydroxychloroquine[8] and ivermectin.[9] And even before the pandemic, Jean-Claude Guédon wondered whether scientific journals themselves, structured around the economic and

4 T. Berners-Lee, *Long live the web: A call for continued open standards and neutrality*, in "Sci. Am." (2010).

5 P. Ginsparg, *Lessons from arXiv's 30 years of information sharing*, in "Nature Reviews Physics" 3 (2021) 9, 602–603.

6 *Ibid.*

7 K. Randall et al., *How did we get here: What are droplets and aerosols and how far do they go? A historical perspective on the transmission of respiratory infectious diseases*, in "Interface Focus" 11 (2021) 6, Royal Society, 20210049. was originally shared on SSRN; (P. Horby et al., *Effect of Dexamethasone in Hospitalized Patients with COVID-19 – Preliminary Report*).

8 P. Gautret et al., *Hydroxychloroquine and azithromycin as a treatment of COVID-19: Results of an open-label non-randomized clinical trial*, in "International Journal of Antimicrobial Agents" 56 (2020) 1, 105949. The article was not retracted, although a letter of concern from the journal's publishing society, the International Society of Antimicrobial Chemotherapy's, had publicly criticized it. (A. Marcus, *Hydroxychloroquine-COVID-19 study did not meet publishing society's "expected standard"*, *Retraction Watch*). Later, it became clear that the article was just the tip of an iceberg (K. O'Grady, *The reckoning. Didier Raoult and his institute found fame during the pandemic. Then, a group of dogged critics exposed major ethical failings*, in "Science" 383 (2024) 6687).

9 L. Caly et al., *The FDA-approved drug ivermectin inhibits the replication of SARS-CoV-2 in vitro*, in "Antiviral Research" 178 (2020), 104787.

technical constraints of the press, should be overtaken by a development model inspired by free software. All we need to do is to identify authors - for example with ORCID - and texts - for example with DOI - and find ways to discuss and select them with a kind of public peer review. Do we really need journals that mimic print to do that?

> It may be a surprise to discover that the very notion of "journal" may act as a form of blockage, but this is the case if the journal is taken as a proxy of the Great Conversation. The same would have been true, at the end of the Middle Ages, if *scriptoria* had been taken as a proxy of the copy-function.[10]

SECONDARY PUBLICATION RIGHT: JUST PALLIATIVE CARE?

Fraud[11] to make papers spicy enough to be published in highly cited commercial journals, tricks to artificially multiply citations,[12] and the inflation of scientific literature under the "publish or perish" imperative [13] cannot be dismissed as "anecdotal" - and not just because scientific theories are not mass-produced items whose quality can be determined by weapons of mass evaluation.[14] The dysfunctionality,[15] cost and unreliability of commercial scientific publishing are now being denounced not only by open science

10 N. Stern – J.-C. Guédon – T. W. Jensen, *Crystals of knowledge production. An intercontinental conversation about open science and the humanities*, in "Nordic Perspectives on Open Science" 1 (2015).

11 See, just for instance J. P. A. Ioannidis, *Why most published research findings are false*, in "PLoS Med." 2 (2005), J. R. Ravetz, *How Should We Treat Science's Growing Pains?*, in "the Guardian" (2016).

12 A. Baccini – G. D. Nicolao – E. Petrovich, *Citation gaming induced by bibliometric evaluation: A country-level comparative analysis*, in "PLOS ONE" 14 (2019) 9.

13 See for instance M. A. Edwards – S. Roy, *Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hypercompetition*, in "Environmental engineering science" (2016); R. Van Noorden, *How big is science's fake-paper problem?*, in "Nature" 623 (2023) 7987, Nature Publishing Group, E. Fried, *Antidotes to cynicism creep in academia*.

14 As the Wakefield case has shown, even a single paper can cause very serious social and public health damage: J. Belluz, *20 years ago, research fraud catalyzed the anti-vaccination movement. Let's not repeat history.*, *Vox*, in https://www.vox.com/2018/2/27/17057990/andrew-wakefield-vaccines-autism-study.

15 C. Aspesi, *The time has come: L'ecosistema editoriale accademico dopo il COVID-19 [OAweek2021]*.

advocates such as Björn Brembs,[16] but also by the mainstream press itself[17] and the Council of the European Union, which recommends that publishing be returned to the hands of the scientific community.[18]

What happened to *publication* if it has become crucial to grant scholars a new right of *republication* so that they can make a public use of reason? The answer is well known[19] and now widely shared in European institutions:[20] an evaluation of research that is no longer part of the discussion among researchers who understand and critique "content," but has been given away in the hands of bureaucrats, or scholars working as bureaucrats,[21] who make calculations about "containers" or publication venues. As a result, the owners of the containers that have become essential to the evaluation of research and the careers of researchers have been able to impose restrictive copyright terms on authors and their institutions, and to extract ever higher prices for either reading[22] or publishing,[23] or reading and publishing[24] - while researchers are under pressure to *publish* at all costs, or perish.

16 B. Brembs, *The trinity of failures*, *bjoern.brembs.blog*, in https://bjoern.brembs.net/2021/10/trinity-of-failures/.

17 R. McKie, *The situation has become appalling': Fake scientific papers push research credibility to crisis point*, in "The Guardian" (2024).

18 Competitiveness Council conclusions, *Council conclusions on high-quality, transparent, open, trustworthy and equitable scholarly publishing*, May 2023: https://data.consilium.europa.eu/doc/document/ST-8827-2023-INIT/en/pdf: *Joint statement: Council conclusions on not-for-profit scholarly communication ecosystem*, 2023 https://www.scienceeurope.org/our-resources/joint-statement-council-conclusions-on-not-for-profit-scholarly-communication-ecosystem/ : "As key public research and innovation actors in Europe, we are committed to supporting the development of a publicly owned, not-for-profit scholarly communication ecosystem in collaboration with policymakers in Europe and beyond."

19 J.-C. Guédon, *In Oldenburg's Long Shadow. Librarians, Research Scientists, Publishers, and the Control of Scientific Publishing*, Washington D.C., Association of Research Libraries, 2001.

20 F. Di Donato, *What we talk about when we talk about research quality*, in "Bollettino telematico di filosofia politica" (2024). §1.

21 M. Biagioli, *Quality to Impact, Text to Metadata: Publication and Evaluation in the Age of Metrics*, in "KNOW: A Journal on the Formation of Knowledge" 2 (2018) 2, 249–275.

22 S. Buranyi, *Is the Staggeringly Profitable Business of Scientific Publishing Bad for Science?*, in "the Guardian" (2017).

23 J. P. Alperin, *Why I think ending article-processing charges will save open access*, in "Nature" 610 (2022) 7931, 233–233.

24 J. Tennant, *"Transformative" Open Access Publishing Deals Are Only Entrenching Commercial Power* , in "Times Higher Education (THE)" (2019).; (L.-A. Butler et al., *The oligopoly's shift to open access publishing: How for-profit publishers benefit from gold*

In Italy, the evaluation of research is not only performed by administrators, but is also centralized in an agency, ANVUR, whose board of directors is appointed by the government.[25] For the humanities and social sciences, the agency determines which journals are scientific and which are not, and which scientific journals are excellent and which are not, on the basis of lists drawn up by scientists under its control; for mathematics, physics and the natural sciences, it relies on the proprietary databases Scopus and Clarivate Analytics, in the hands of commercial private oligopolies. ANVUR uses its governmental and corporate bibliometrics to set mandatory quantitative thresholds, both for researchers applying for the National Scientific Qualification for Professorship (ASN) and for the commissioners who will evaluate them.[26] Of course, the publishers of journals listed by ANVUR or by Scopus and Clarivate Analytics are also blessed with the privilege of *publishing* without *making public*.

In this context, the introduction of a right of republication in Italy would certainly be an important step. However, it would remain exposed to the risk of being only a palliative for the disease of publishers who do not honor their name - unless Italian scholars regain the independence or the interest to challenge the dystopian alliance of big government (state evaluation) and big business (private intellectual monopolies) that has kidnapped the publication and continues to hold it captive.

and hybrid article processing charges, in *Proceedings of the annual conference of CAIS / actes du congrès annuel de l'ACSI*, 2022); Maria Chiara Pievatolo, *Contratti trasformativi: perché, in Italia, varrebbe la pena discuterne*, AISA, 2024 https://aisa.sp.unipi.it/contratti-trasformativi-perche-varrebbe-la-pena-discuterne/.

25 M. C. Pievatolo, *The Scale and the Sword: Science, State and Research Evaluation*, in "Bollettino telematico di filosofia politica" (2024).

26 M.C. Pievatolo, Taking all the running one can do, to keep in the same place: ANVUR's complicated relationship with the COARA agreement, 2023-24.

REFERENCES

Alperin, Juan Pablo, *Why I think ending article-processing charges will save open access*, in "Nature" 610 (2022) 7931, 233–233.

Aspesi, Claudio, *The time has come: L'ecosistema editoriale accademico dopo il COVID-19 [OAweek2021]*.

Baccini, Alberto – Nicolao, Giuseppe De – Petrovich, Eugenio, *Citation gaming induced by bibliometric evaluation: A country-level comparative analysis*, in "PLOS ONE" 14 (2019) 9.

Belluz, Julia, *20 years ago, research fraud catalyzed the anti-vaccination movement. Let's not repeat history.*, *Vox*, in https://www.vox.com/2018/2/27/17057990/andrew-wakefield-vaccines-autism-study.

Berners-Lee, Tim, *Long live the web: A call for continued open standards and neutrality*, in "Sci. Am." (2010), in http://www.scientificamerican.com/article.cfm?id=long-live-the-web, https://www.cs.virginia.edu/~robins/Long_Live_the_Web.pdf.

Biagioli, Mario, *Quality to Impact, Text to Metadata: Publication and Evaluation in the Age of Metrics*, in "KNOW: A Journal on the Formation of Knowledge" 2 (2018) 2, 249–275, in https://www.journals.uchicago.edu/doi/10.1086/699152.

Brembs, Björn, *The trinity of failures*, *bjoern.brembs.blog*, in https://bjoern.brembs.net/2021/10/trinity-of-failures/.

Buranyi, Stephen, *Is the Staggeringly Profitable Business of Scientific Publishing Bad for Science?*, in "the Guardian" (2017), in http://www.theguardian.com/science/2017/jun/27/profitable-business-scientific-publishing-bad-for-science.

Butler, Leigh-Ann – Matthias, Lisa – Simard, Marc-André – Mongeon, Phil – Haustein, Stefanie, *The oligopoly's shift to open access publishing: How for-profit publishers benefit from gold and hybrid article processing charges*, in *Proceedings of the annual conference of CAIS / actes du congrès annuel de l'ACSI*, 2022.

Caly, Leon – Druce, Julian D. – Catton, Mike G. – Jans, David A. – Wagstaff, Kylie M., *The FDA-approved drug ivermectin inhibits the replication of SARS-CoV-2 in vitro*, in "Antiviral Research" 178 (2020), 104787.

Caso, Roberto – Dore, Giulia, *Academic copyright, open access and the "moral" second publication right*, in "European Intellectual Property Review" (2021), in https://doi.org/10.5281/zenodo.5764841.

Di Donato, Francesca, *What we talk about when we talk about research quality*, in "Bollettino telematico di filosofia politica" (2024), in https://commentbfp.sp.unipi.it/quality-fdd/.

Edwards, Mark A. – Roy, Siddharta, *Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hypercompetition*, in "Environmental engineering science" (2016), in https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5206685/.

FRIED, Eiko, *Antidotes to cynicism creep in academia*, in https://eiko-fried.com/antidotes-to-cynicism-creep.

GAUTRET, Philippe – LAGIER, Jean-Christophe – PAROLA, Philippe – HOANG, Van Thuan – MEDDEB, Line – MAILHE, Morgane – et al., *Hydroxychloroquine and azithromycin as a treatment of COVID-19: Results of an open-label non-randomized clinical trial*, in "International Journal of Antimicrobial Agents" 56 (2020) 1, 105949.

GINSPARG, Paul, *Lessons from arXiv's 30 years of information sharing*, in "Nature Reviews Physics" 3 (2021) 9, 602–603.

GUÉDON, Jean-Claude, *In Oldenburg's Long Shadow. Librarians, Research Scientists, Publishers, and the Control of Scientific Publishing*, Washington D.C., Association of Research Libraries, 2001, in https://www.arl.org/wp-content/uploads/2001/12/in-oldenburgs-long-shadow.pdf.

HORBY, Peter – LIM, Wei Shen – EMBERSON, Jonathan – MAFHAM, Marion – BELL, Jennifer – LINSELL, Louise – et al., *Effect of Dexamethasone in Hospitalized Patients with COVID-19 – Preliminary Report*, in https://www.medrxiv.org/content/10.1101/2020.06.22.20137273v1.

IOANNIDIS, John P. A.., *Why most published research findings are false*, in "PLoS Med." 2 (2005), in http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0020124.

KNOWLEDGE RIGHTS 21, *A position statement from knowledge rights 21 on secondary publishing rights*, in url.

MARCUS, Adam, *Hydroxychloroquine-COVID-19 study did not meet publishing society's "expected standard"*, *Retraction Watch*, in https://retractionwatch.com/2020/04/06/hydroxychlorine-covid-19-study-did-not-meet-publishing-societys-expected-standar.

MCKIE, Robin, *The situation has become appalling': Fake scientific papers push research credibility to crisis point*, in "The Guardian" (2024), in https://www.theguardian.com/science/2024/feb/03/the-situation-has-become-appalling-fake-scientific-papers-push-research-credibility-to-crisis-point.

O'GRADY, Kathleen, *The reckoning. Didier Raoult and his institute found fame during the pandemic. Then, a group of dogged critics exposed major ethical failings*, in "Science" 383 (2024) 6687, in https://www.science.org/content/article/failure-every-level-how-science-sleuths-exposed-massive-ethics-violations-famed-french.

PIEVATOLO, Maria Chiara, *The Scale and the Sword: Science, State and Research Evaluation*, in "Bollettino telematico di filosofia politica" (2024), in https://commentbfp.sp.unipi.it/maria-chiara-pievatolo-the-scale-and-the-sword-statal-science-and-research-evaluation.

RANDALL, K. – EWING, E. T. – MARR, L. C. – JIMENEZ, J. L. – BOUROUIBA, L., *How did we get here: What are droplets and aerosols and how far do they go? A historical perspective on the transmission of respiratory infectious diseases*, in "Interface Focus" 11 (2021) 6, Royal Society, 20210049.

RAVETZ, Jerome R., *How Should We Treat Science's Growing Pains?*, in "the Guardian" (2016), in http://www.theguardian.com/science/political-science/2016/jun/08/how-should-we-treat-sciences-growing-pains.

STALLMAN, Richard, *Freedom or Copyright? - GNU Project - Free Software Foundation*, in https://www.gnu.org/philosophy/freedom-or-copyright.html.

STERN, Niels – GUÉDON, Jean-Claude – JENSEN, Thomas Wiben, *Crystals of knowledge production. An intercontinental conversation about open science and the humanities*, in "Nordic Perspectives on Open Science" 1 (2015).

TENNANT, Jon, *"Transformative" Open Access Publishing Deals Are Only Entrenching Commercial Power* , in "Times Higher Education (THE)" (2019).

VAN NOORDEN, Richard, *How big is science's fake-paper problem?*, in "Nature" 623 (2023) 7987, Nature Publishing Group.

In an era where the dissemination of knowledge is both an ethical imperative and a contested space, *Current Trends in Open Science* offers a critical examination of the evolving landscape of academic publishing. Edited by Nicola Cavalli, this volume brings together leading voices to explore the promises and challenges of Open Science, from the transformative potential of Diamond Open Access to the structural reforms necessary for a more equitable and transparent research ecosystem.

Through rigorous analysis, contributors dissect the tensions between commercial publishing interests and the scholarly community's push for greater autonomy, shedding light on policy frameworks, infrastructure needs, and cultural shifts required for meaningful change. Whether interrogating Italy's stalled progress on Open Science or advocating for a publishing model driven by academic values rather than profit motives, this book is an essential resource for researchers, policymakers, and advocates committed to the future of knowledge as a public good.

www.ledizioni.it

9 791256 003679

€ 14,00