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Democratising Knowledge:

a report on the scholarly publisher, Elsevier

Dr. Jonathan Tennant

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Education International

Education International represents organisations of teachers and other education employees across the globe. It is the world's largest federation of unions and associations, representing thirty million education employees in about four hundred organisations in one hundred and seventy countries and territories, across the globe. Education International unites teachers and education employees.

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Objective of the present report

In 2017, the publication of the G7 Science Communiqué set a strong precedent for a global vision where Open Science plays a fundamental role to address current and future global challenges and inequalities[1]. Education International mirrors this and believes that higher education and research are public services. Despite this, the current scholarly publishing and communication ecosystem is rife with tensions between private and public interests, and at the present is working against the needs and interest of the global scholarly community and wider public. One of the most dominant commercial publishers, Elsevier, a member of the multi-national corporation RELX Group, is among the most controversial actors here with a well-known history of business practices, remarkable among scholarly publishers for having extensive historical criticism from the global research community[2]. There are growing concerns that Elsevier, among other actors, are becoming very powerful as both publishers and knowledge service providers. Combined with soaring costs to journal subscriptions and services, political activism, extraordinarily high profit margins, and this increasing commercialisation of research infrastructure, Elsevier has positioned itself within a dysfunctional market as a leading actor in the commercialisation of knowledge, research information, and education. In a recent global survey among Education International's affiliates in the further and higher education and research sector, a number of affiliates have pointed to the problematic situation where Elsevier are profiting hugely from publicly-funded research. However, despite widespread criticisms, there is little consensus on the best approach to challenge Elsevier. This report aims to provide the foundations for a critical study into Elsevier's business model and practices and contribute to developing policy objectives relating to open public access to research and educational materials, academic freedom, researcher autonomy, and the scholarly communication system. This research will form a key part of Education International's Global Response campaign on the commercialisation and marketisation in and of education aimed specifically at the further and higher education and research sector.

1 Italian G7 Presidency 2017, Presidency of the Council of Ministers.
2 Elsevier, Criticisms and Controversies, Wikipedia.

Executive Summary

Elsevier are the largest and most powerful scholarly publisher, a status achieved through a long history of mergers and acquisitions and rigorously capitalistic business practices. The core issues surrounding Elsevier are that it operates its business primarily through charging for what should be public knowledge and education, with aggressive pricing strategies and marketing tactics that are anti-competitive and a drain on the higher and further education sectors. It has a long history of fighting against public access to knowledge, through a combination of political lobbying, public campaigns against openness, and regressive business models and strategies.

In recent years, Elsevier have undertaken a shift in business model and are transforming into a data and analytics service provider, while continuing to leverage its publishing capacity to support this. The principle risk here is that Elsevier continues to exert unprecedented control over the future of higher education and academic research, while impinging upon basic concepts of intellectual property, academic freedom, and infringing the principles of scholarly communication.

Now, there are the beginnings of a paradigm shift in scholarly communication occurring, with researchers, libraries, and national consortia beginning to fight back against Elsevier's business practices. These are taking the form of boycotts and strengthened negotiation tactics that take advantage of collective bargaining power over licensing agreements to reverse the power asymmetries that had previously created a fiscal drain on research institutes and library budgets.

This report discusses Elsevier's business practices in detail, provides a number of national resistance case studies, and finishes with a series of key recommendations for stakeholders engaged in scholarly communication. There is an incredible amount of scope for education unions to become engaged in aspects such as:

- Increasing attention and support of basic academic freedoms in scholarly publishing, which Elsevier currently constrain in numerous ways;
- Retention of intellectual property rights for researchers, which Elsevier otherwise acquire through unconventional copyright acquisition tactics;
- Fighting against the business strategies of Elsevier as a commercial publisher, especially regarding Open Access;
- Diverting public funds into high profit margins (36%+) for Elsevier during a time of decreasing research and library budgets;
- Challenging the democratic deficit and lack of transparency in Elsevier's business practices, including their political influence;

- Forming and strengthening coalitions for negotiating against Elsevier, including supporting ongoing boycotts;
- Helping to provide more sustainable alternatives for researchers, research institutes, and the future of scholarly communication.

Here, the ultimate solution is to reduce the constraints on scholarly communication imposed by Elsevier and return control and governance of research from private interests to the public.

Introduction

Summary: Elsevier are the largest scholarly publisher, and presently undergoing a transformation into an information and data analytics provider. Simultaneously Elsevier have increased their rate of acquisition in recent years, and now operate an organisational structure that occupies the entire research workflow. Such a shift takes advantage of the fact that Elsevier owns a disproportionately large proportion of published scholarly research, which it can use as leverage to sustain other related and integrated services.

Elsevier were established in Rotterdam in the late 19th Century as a publisher by Jacobus George Robbers[3]. Initially, its focus was on scholarly books and literature, but after World War II it began to publish international scientific journals. In the 1970s, Elsevier, along with much of the rest of the international publishing industry, was part of an extensive series of mergers and acquisitions. In 1991 they became the largest scholarly publisher in the world, following the acquisition of Pergamon Press [4].

Elsevier are a multi-national, publicly-listed company, owned by the parent RELX Group (historically Reed Elsevier)[5]. As such, they have a financial obligation to their shareholders and a business model based on profit-maximisation. In 2017, RELX Group announced their transformation into a global information and analytics company[6]. RELX Group also has other major divisions in Risk, Insurance, and Legal, each with their own pathways into the 'big data' scene. It has an extensive reach, with its products and services used by 25,520 research institutes around the world. As of the beginning of 2018, Elsevier employed 7,500 staff in 46 countries[7]. Their 'partners' include 20,000 academic editors, 72,000 editorial board members, and 830,000 peer reviewers.

Summary of major products and services

Elsevier generates 76-79% of its revenue from digital products[8], with the majority of the remainder from print format products. Much of this comes from the 420,000 peer-reviewed scholarly journal articles that it publishes on an annual basis (as of 2016), in

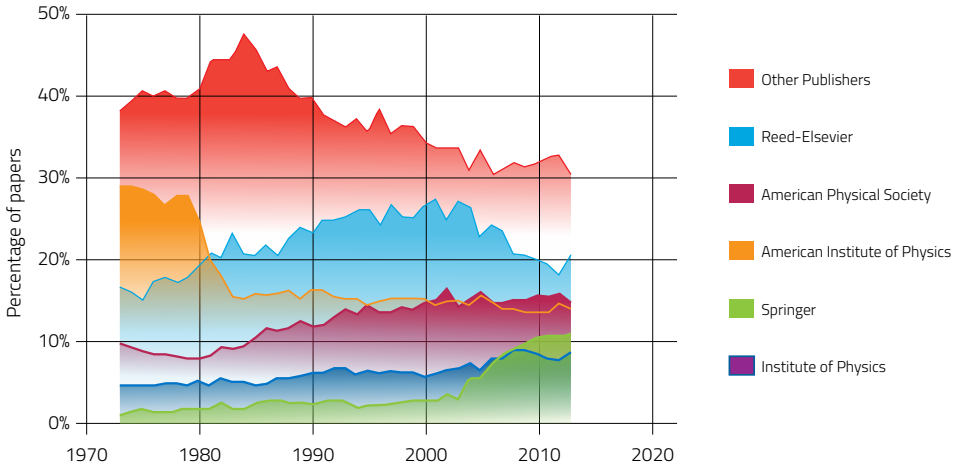
3 Timeline from 1880-2003, Web Archive.
4 Pergamon Press, Wikipedia.
5 RELX, Home page.
6 Announcement made via LinkedIn.
7 Elsevier, About page, Leader section.
8 Elsevier, About page, Trusted section.

around 2500 journals [9], which cover a broad spectrum across health and medicine, and the life, physical, and social sciences. These are archived through the ScienceDirect portal[10], launched in 1997, and which currently contains more than 13 million articles and 30,000 e-books with around 900 million annual downloads[11], representing an enormous wealth of global, but privately-owned, knowledge.

The target market for this published content and information includes the higher education and research institutions, government bodies, medical physicians and nurses, corporate research laboratories, educational organisations scientific researchers, authors, editors, policymakers, students, NGOs, hospitals and health professionals, and virtually anyone else who has a use for scholarly research. Research articles are typically acquired from researchers through a practice where the gift of publication is traded in exchange for authors' copyright. Researchers remain unpaid for providing their content and services, either as reviewers, authors, or editors. The irony here is that Elsevier relies on researchers as their free content and service providers and volunteer labour workforce, product, and primary consumers, while inhibiting academics' freedom to choose how and where their research is disseminated.

In 2003, Elsevier accounted for 25% of the world market in science, technology, and medical publishing. A recent study from Larivière et al. (2015) showed that, in 2013, three publishers accounted for more than 47% of all papers: Elsevier (24.1%; 1.5-fold increase since 1990), Springer (now Springer Nature; 11.9%; 2.9-fold increase), and Wiley-Blackwell (11.3%; 2.2-fold increase). Elsevier also accounted for 16.4% of all social sciences and humanities papers, a 4.4-fold increase since 1990. This represents around a total 25% ownership of the entire scientific journal market (Figure 1).

Figure 1. Percentage of papers published by the five major publishers in Physics, 1973–2013 (Larivière et al., 2015).



9 A summary of publishing activities from 2015, Elsevier.
10 ScienceDirect portal.
11 RELX, 2014 report.

Scopus, launched in 2004, is one of Elsevier's most popular products, and is among the world's largest abstract and citation databases of peer reviewed literature, comprising more than 65 million records and 22,500 journals and indexing content from around 5,000 international publishers. In late 2016, Elsevier also announced the new CiteScore service (based on Scopus journal data)[12], in direct competition with Clarivate Analytics' ubiquitous Journal Impact Factor. The CiteScore service amounts to an enormous conflict of interest, given that journals published by Elsevier are included in the citation rankings; akin to having McDonald's providing data on which fast food chains provide the healthiest food. This was emphasised in subsequent research[13], which showed that titles owned by Springer Nature, perhaps Elsevier's biggest competitor, scored 40% lower using CiteScore, whereas Elsevier titles increased by around 25%, compared to their journal impact factors. These figures were later revised by the same researchers after including the Lancet journal series (also owned by Elsevier), but still showed that Elsevier titles gain between a 10-12%[14] rise compared to their impact factors, while Nature-branded journals are lowered by 25-40%. Elsevier's organisational structure now includes products and services from across the entire scholarly research process, including production, communication, and evaluation. As also mentioned by the Eigenfactor project, having Scopus-based metrics such as CiteScore vertically integrated with the parent company of Elsevier presents a potential conflict of interest due to the financial non-independence of the two entities[15].

Major recent acquisitions

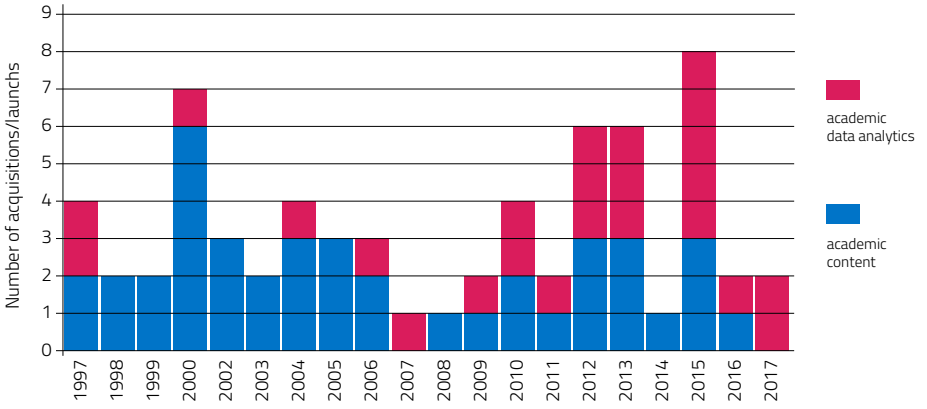
In the last decade, Elsevier has increased its rate of commercial acquisition substantially (Figure 2). These are entirely consistent with an organisational restructuring and business strategy moving away from traditional publishing and into integrated research workflow data and analytics, infrastructure, and support, as part of broader industry movements[16]. Acquisitions are also an efficient way to neutralise threats to their business model, which the Mendeley case illustrated in 2013 (see below). Elsevier now provide a range of services and digital tools for strategic research management, research and development performance, clinical decision support, and education. There is a concern that the primary motivation for this is to create an established 'locked in' monoculture for researchers, where researchers and institutes are forced into using their services[17]. This movement is best exemplified by the most recent update to Mendeley, which locked users into the service by preventing users from exporting their own data to other competing services[18]. Furthermore, this lock-in challenges the growth and development of any sort of publicly-owned open scholarly research infrastructure by providing functional limitations into standard parts of the research process, which become inter-dependent on other Elsevier-owned services.

12 Journal Metrics page, part of Scopus.
13 How to Measure Impact, Carl Straumsheim, Inside Higher Ed.
14 Lancet Publishing Group, Eigenfactor.
15 On conflicts of interest, Eigencfactor.
16 STM Association, 2015 Report.
17 Workflow Lock-in: A Taxonomy, Roger C. Schonfeld, The Scholarly Kitchen.
18 How do I import a Mendeley library into Zotero?, Zotero.

These acquisitions are all now branded under Elsevier's Research Intelligence portfolio[19]. Some major recent acquisitions include:

- 2013: Mendeley, a reference management and social scholarly platform with more than 3.5 million users[20]. Mendeley now offers usage statistics for authors, competing with the services of Google Scholar, as well as a data sharing platform[21].
- 2013: Knovel, a productivity application for the Engineering community[22].
- 2016: Hivebench, an electronic lab notebook designed to assist researchers with data management[23].
- 2016: SSRN (Social Science Research Network)[24], a preprint and publishing community which has more than 800,000 research articles, and recently expanded into the fields of Biology and Engineering[25]. It was described as a Trojan horse strategy for institutional repositories[26], by masquerading as an Open Access service while in reality turning repositories into discovery layers for commercialised paywalled content.
- 2017: Bepress[27], an institutional repository support platform. This made Elsevier a large player in the developing preprint landscape, due to the cloud-based system, Digital Commons, which has more than 500 participating institutes[28]. Their community remains divided over the acquisition[29], with some libraries immediately looking for new non-Elsevier partnerships.
- 2017: Plum Analytics, a leading altmetrics (alternative metrics) provider[30].

Figure 2. RELX Group mergers and acquisitions (source).

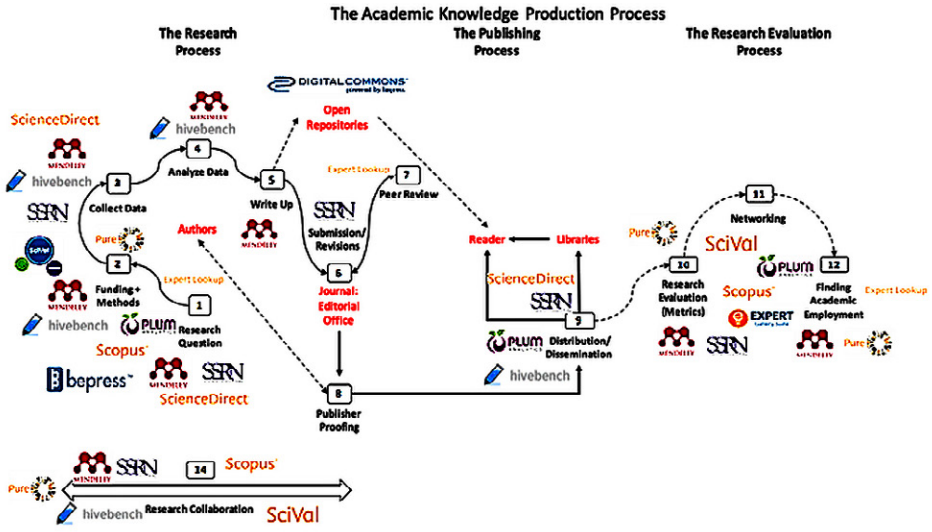


19 Research Intelligence, Elsevier.
20 A Matter of Perspective — Elsevier Acquires Mendeley... or, Mendeley Sells Itself to Elsevier, Kent Anderson, The Scholarly Kitchen.
21 Elsevier launches Mendeley Data to manage entire lifecycle of research data, PR Newswire.
22 Knovel, Elsevier.
23 Putting data management in the hands of researchers with Hivebench acquisition, Harald Boersma, Elsevier.
24 Elsevier acquires SSRN, Roger C Schonfeld, The Scholarly Kitchen.
25 Engineering Research Network, SSRN.
26 Beware the Trojan Horse: Elsevier's repository pilot and our vision for IRs & Open Access, Ellen Finnie and Greg Eow.
27 Bepress, Home page.
28 Elsevier acquires Bepress, Roger C. Schonfeld, The Scholarly Kitchen.
29 Bepress and Elsevier – an update, Jean-Gabriel Bankier, Elsevier.
30 Elsevier acquires leading 'altmetrics' provider Plum Analytics, Elsevier.

In 2017, Elsevier announced that it would be launching a rival service to Wikipedia, called ScienceDirect Topics[31], for providing automatically generated scientific definitions based on information mined from their article corpus. This helps to at least partially explain why Elsevier are so resistant[32] to text and data mining from external non-research parties[33] (see also Elsevier's Fingerprint Engine[34]), as well as being unnecessarily restrictive to researchers[35]. Another popular Elsevier service is Pure[36], a complete CRIS (Content and Research Information System) for providing university administrators with research assessment and analytics tools. It has been described as a 'Trojan Horse', similar to SSRN, that allows Elsevier to infiltrate research institutes and take control of their portals[37].

A full database of mergers and acquisitions with Elsevier is available via The Knowledge Gap[38], as part of a wider project investigating publisher control of scholarly infrastructure[39], and at the present contains 344 entries. CrunchBase also tracks some acquisitions[40]. How these each integrate into a typical research workflow (including the process, publishing, and evaluation), has been modelled as part of the same Knowledge Gap study[41]. This strategic process of acquisition surrounding the academic knowledge production cycle (Figure 3), and the development of new integrated tools, services and platforms around this infrastructure, takes advantage of the fact that Elsevier already

Figure 3. A hypothetical example of how Elsevier now has services that impact the entire academic research and production cycle[42].



31 Elsevier launches ScienceDirect Topics to help researchers quickly build their knowledge and save valuable time searching, Elsevier.
32 Elsevier says downloading and content-mining licensed copies of research papers 'could be considered' stealing, Glyn Moody, TechDirt.
33 How does Elsevier's text mining policy work with new UK TDM law?, Elsevier.
34 Elsevier's Fingerprint Engine, Elsevier.
35 Legal communication with Elsevier, Chris Hartgerink.
36 Pure, Elsevier
37 Elsevier's PURE: self-interest and exploitation, Steven Harnad.
38 Mergers and Acquisitions, The Knowledge Gap.
39 Preliminary findings: Rent seeking by Elsevier, Alejandro Posada and George Chen, The Knowledge Gap.
40 Crunchbase, Elsevier acquisitions.
41 Elsevier companies/products, The Knowledge Gap.
42 Preliminary findings: Rent seeking by Elsevier, Alejandro Posada, The Knowledge Gap.

owns an unprecedented volume of scholarly content. The risk here is that researchers and their communities become dependent on Elsevier's tools and services for interoperability, severely compromising their ability to perform research with other tools and compromising their freedom and integrity. For research institutes, the risk is that such vendor lock-in and dependency recapitulates the existing dynamic where libraries become forced to pay for service 'bundles' with steadily increasing price hikes.

An additional major issue here is the inherent conflict of interest of having a commercial publishing vendor in charge of the production of academic content also providing the tools to evaluate those objects. If researchers become locked into, or dependent on, these tools and this process, then a commercial entity has the power and control over how the entire research process and collaboration occurs, how content is produced and distributed, and how those are assessed and validated. As Elsevier also has tools to locate funding (e.g., Mendeley[43]), as well as find potential employers (e.g., Expert Lookup[44]), there are concerns about how this system becomes biased against those outside of it. The consequence is that academics become further dependent on a single, commercial entity, which severely impinges upon their academic freedom and autonomy. However, given current research attitudes towards commercial publishers, it may be that in the future many remain apathetic towards such issues, unless significant changes are made to scholarly infrastructure.

43 Connect to a world of research funding, Mendeley.
44 Expert Lookup, Elsevier.

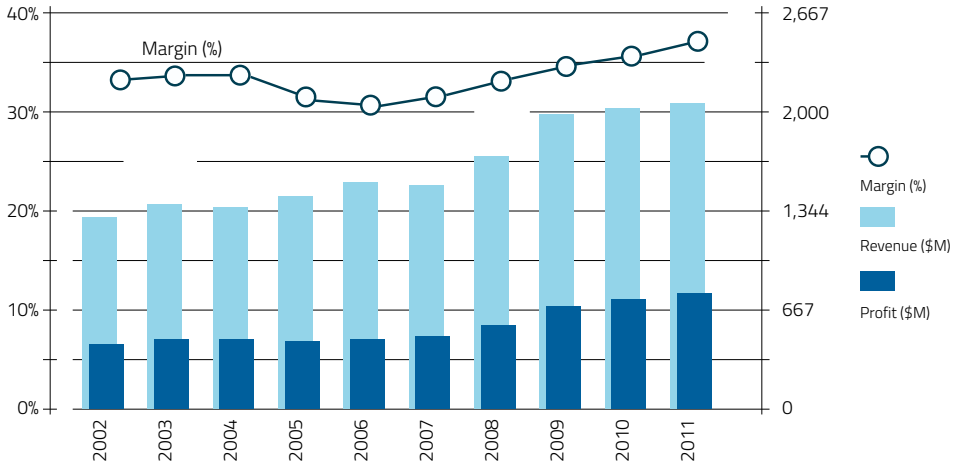
Financial structure of Elsevier

Summary: One of the principle criticisms levied at Elsevier is their continuous profit margins in excess of 35-36%. Elsevier alone accounts for more than a third of the total revenue of RELX Group, often generating in excess of £2.3 billion each year. It manages to obtain such high levels through a lack of a functional scholarly publishing market, which it explicitly helps to create through practices such as the use of non-disclosure agreements on licensing contracts. This is a profoundly anti-competitive practice and places a tax on public access to knowledge.

Elsevier receives the vast majority of its income from North America (~41%) and Europe (~26%), with the rest of the world comprising around 32% in total[45]. The most commonly heralded criticism of Elsevier is their ~37% profit margin, which has increased from around 33% in 2002[46] (note that it could even be as high as 40-50% before tax)[47] (Figure 4). In 2014, the 2013 STM (Science, Technology and Medicine) revenue was £2,126 million, with an adjusted operating profit of £826 million (39%). In 2015, Elsevier accounted for 35.5% of the revenues of RELX Group (£2.070 billion of £5,971 billion), generating 42% (£760 million of £1,822 million) of their operating profits (up 2% from 2014). In 2016, Elsevier accounted for 34% of the revenues of RELX group (£2,320 billion of £6.895 billion) (Figure 5). In adjusted operating profits, it represented 40% (£853 million out of £2,114 million), representing another 2% increase from 2015 to 2016. The latest figures from 2017 reported an underlying growth in adjusted profit margins of 6% over 2016[48]. The vast majority of this comes from institutional library budgets, with around 68-75% coming from public sources[49]. While some might view these profit margins as excessive, we must acknowledge that this is the very design of the capitalist economies that Elsevier operates within.

45 RELX Annual Reports and Financial Statements, 2016.
46 The obscene profits of commercial scholarly publishers, Mike Taylor.
47 Open access: The true cost of science publishing, Richard van Noorden, Nature News.
48 RELX press release for 2017 annual report.
49 The STM Report, 2015.

Figure 4. Elsevier revenues, profit, and profit margin, 2002-2011 (original data)[50].



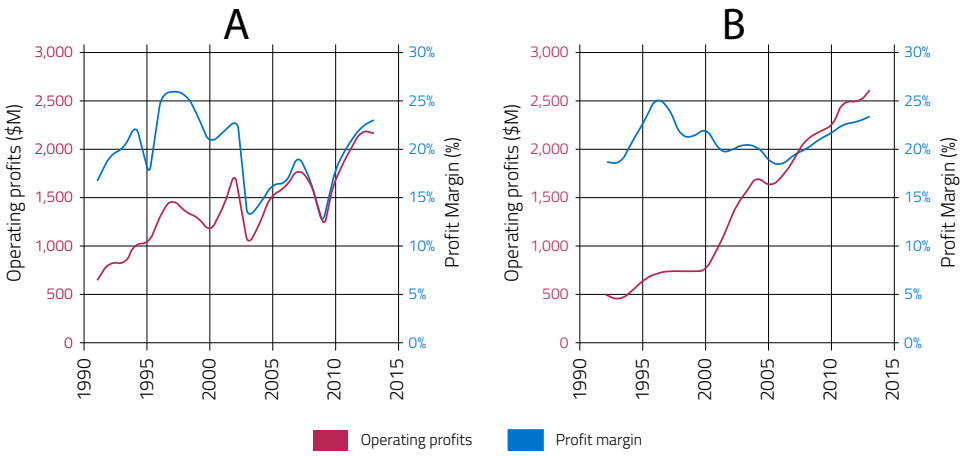
While there is a general lack of transparency into Elsevier's individual pricing plans for subscriptions, we know that average yearly increases are in the region of 4-5%[51], and the average title cost is around twice that for non-Elsevier titles in some cases (e.g., for Wiley, Springer Nature, and Taylor and Francis titles in the Netherlands[52]). This increase occurs in spite of Elsevier's already excessive profit margins, and the development of Web-based technologies that should have, at least in theory, greatly reduced the costs of publishing and dissemination due to the benefits from economies of scale. The effect of this is the continued erosion of the academic journal marketplace, and knowledge discrimination against those who are less financially privileged than all but the wealthiest portion of research institutes. Furthermore, as Elsevier almost entirely publishes only English-language research, this strongly discriminates against indigenous forms of knowledge, research conducted in non-English native speaking countries, and academics who do not speak English fluently as a first language. This geographical bias is also reflected in the content of the Scopus database, which is also biased against research in the Social Sciences, Arts and Humanities (Mongeon and Paul-Hus 2016).

Institutional costs for Elsevier subscriptions are difficult to obtain, as they are often protected by confidentiality clauses (or 'non-disclosure agreements', NDAs). Such clauses prevent Elsevier's clients from seeing how much they each pay for licensing agreements, and have the effect of preventing any sort of fair competition on price by discriminating between customers based on products of little or no material difference; something that was ironically and famously admitted by David Tempest[53], Elsevier's Deputy Director of

50 Why open access is better for scholarly societies, Stuart Shieber.
51 EUA Big Deals survey report: The first mapping of major scientific publishing contracts in Europe, European University Association, 2018.
52 Elsevier's Open Access controversy: German researchers resign to register protest, Enago Academy.
53 Elsevier's David Tempest explains subscription-confidentiality clauses, YouTube.

Universal sustainable Open Access, in 2013. Full price disclosure is a vital necessity for any well-functioning market with competitive pricing, and therefore such confidentiality is one of the root causes of a dysfunctional scholarly publishing market[54].

Figure 5. Operating profits (million USD) and profit margin of Reed-Elsevier as a whole (A) and of its Scientific, Technical & Medical division (B), 1991–2013 (Larivière et al., 2015).



Of note here is that these licensing agreements for journal subscriptions are often with publicly-funded higher education and research institutes. Such a lack of disclosure is a profoundly anti-competitive practice, designed to protect the financial interests of a for-profit corporation at the expense of public access to information and public funds. Similarly, they are detrimental to basic concepts of academic freedom within higher education, as outlined by UNESCO in 1997 [55]. On the occasion of the 20th anniversary of 1997 UNESCO Recommendation EI published the report "Twenty years later: International efforts to protect the rights of higher education teaching personnel remain insufficient" ... to map the status of the implementation of the 1997 UNESCO Recommendation which demonstrated insufficient implementation (Stromquist 2017). This anti-competitive practice further raises questions regarding Elsevier's dominant market position and the imbalance between the majority of their revenues coming from public resources that to a large extent funded the research in the first place. What is also important here is the connection between rising journal costs, and the fact that a growing number of research libraries see this at odds with their desire for any sort of sustainable Open Access (OA) in the future. In the United Kingdom, USA, and New Zealand, freedom of information requests (or their national equivalents) are beginning to expose some of the financial relationships between Elsevier and research institutes. An updated list of available data on the finances behind Elsevier's licensing agreements is maintained by Stuart Lawson [56].

54 Referring Elsevier/RELX to the Competition and Markets Authority, Martin Eve
55 Recommendation concerning the status of higher-education teaching personnel, UNESCO.
56 Publicly available data on international journal subscription costs, Stuart Lawson.

Criticisms of Elsevier's publishing practices

Summary: As one of the largest scholarly publishers, Elsevier have considerable power in dictating its future. With ongoing developments in Open Access, Elsevier have managed to distort it almost entirely, through rising costs, long embargo periods, and damaging licensing and copyright arrangements. Their publishing practices entirely disrupt the research communication process, and they have become one of the greatest barriers in public access to knowledge and education.

At the present, Elsevier has an online portal, ScienceDirect, which houses its published content. This includes more than 2,500 peer reviewed journals, making Elsevier the largest scholarly publisher, and from which it derives most of its present revenue. Between 2012 and 2015, Elsevier published almost 1.4 million journal articles[57]; in 2016 it published 25,000 OA articles, which it feels is substantial enough to grant itself the title of the second largest OA publisher[58], while forgetting that the vast majority of its content is not accessible but blocked by expensive paywalls. Each of these research articles is given to Elsevier by the authors for free, with both the editorial and peer review process being managed and undertaken primarily by volunteers. Peer review here is an unrewarded task, which is typically viewed historically as a mutualistic process within research communities (Mulligan et al., 2012), and represents basic academic rights by failing to reimburse them for services rendered. Furthermore, this lack of reward is then opportunistically capitalised on by publishers to help legitimise their journal brands (Fyfe et al. 2017), and is now a highly skewed process of power imbalances. For academics, it is difficult to decline a request to review due to the hierarchical structures in place and the important role that journals play in academic progression and recruitment. All of this largely public-funded activity serves mostly to benefit Elsevier, who then set journal prices so high which prohibit access to all but the wealthiest or privileged of academics.

The majority of researchers in low- and middle-income countries (LMICs) are at a distinct disadvantage and unable to access the majority of published research[59], something which

57 Elsevier, About Page, Leader section.
58 Elsevier, Spotlight on Open Access.
59 The rise of big publishers in development and what is at stake, Denisse Albornoz, The Knowledge Gap.

greatly inhibits their economic, academic, and social development (Kirsop and Chan 2005; Matheka et al. 2014; Bendezú-Quispe et al. 2016; Proaño et al. 2016; J. P. Tennant et al. 2016). By inhibiting access to critical research, Elsevier restricts the use of knowledge and tools that teachers, citizens, education unions, researchers, policymakers, and other potential users require in order to meet the everyday challenges of education systems, and wider societies. Their business model of knowledge commodification undermines the basic principle that all people have an equal right of access to knowledge and education, irrespective of their background, socio-economic status, or geographic location, among others. Furthermore, by operating on a basic 'pay to access' model, Elsevier's business explicitly discriminates against the financially under-privileged.

The consequence of this behaviour is that Elsevier's business model and practices clearly undermine the Sustainable Development Goals as adopted by the Member States of the United Nations[60], such as by stifling access to knowledge that could help ensure healthy lives and human well-being (SDG 3) and prohibiting global partnerships for sustainable developments (SDG 17).

Not such a 'big deal'

Elsevier now typically offer 'subscription bundles' of journals, often called 'big deals', a product pioneered by Academic Press (now owned by Elsevier) in 1996. These 'big deals' lock institutes into multi-year business-to-business contracts with steady annual price escalation for content that they often don't even want or use (Bergstrom et al. 2014; Shu et al. 2018). While nothing is objectively wrong with offering such services, the market position of Elsevier is exceptionally strong due to their consolidated size, and the 'big deal' is a powerful tool for enforcing this. Typically, they come in two parts from Elsevier: the 'Complete Collection' comprising all journals which a library previously subscribed to, and the 'Freedom Collection', which includes discounted access to nearly all other non-subscribed journals. The historical effect of the 'big deal' was to essentially convert thousands of smaller monopolies (i.e., journals) into a single larger one that each independent customer was reliant on having (Edlin and Rubinfeld 2004; Odlyzko 2013), and thereby instituting the current power dynamic between Elsevier and its clients.

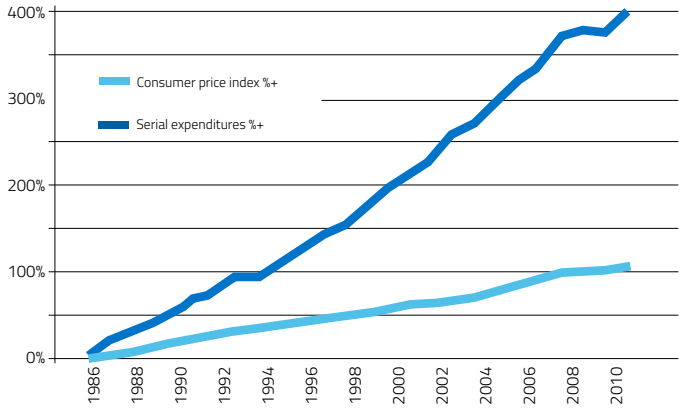
However, in the USA, open records laws invalidate most of these clauses at the state level and require public disclosure of such contracts[61]. Recent research from North American universities on the value of these 'big deals' has revealed that researchers only cite a small number of purchased journals, and that the overall cost per journal has increased through time (Shu et al. 2018). The value of this study is that it provides quantitative information on expenditure versus usage, which can be used for future negotiations between scholarly publishers and libraries. Therefore, libraries will have a stronger stance when deciding whether it is worth renewing 'big deals' in the future, or whether eliminating subscriptions

60 Sustainable Development Goals, United Nations.
61 Freedom of information in the United States, Wikipedia

or alternative approaches are more sustainable. This study represents a strong example of the value of collaboration between university researchers and librarians and indicates a level at which actionable steps can be taken towards reducing the negative impact of Elsevier and other scholarly publishers on the research system.

Nonetheless, these practices by Elsevier and others have led to a financial phenomenon called the 'serials crisis', where the cost of subscriptions has outpaced that of inflation by almost 300% since 1986 (Figure 6), creating a system where libraries could only afford access to an increasingly limited number of journals (Roth 1990). While affordability has always been an issue, libraries have had to find ways of sustaining this price escalation, including through increasing efficiencies, downsizing of services, and acquiring more funding, all the while receiving a declining percentage of university budgets. Institutes around the world are funded from a range of public and private sources, some of which is devoted by necessity to purchasing serials and books in order to fulfil their mission of advancing research. It is expected that, in 2019, there will be an additional 6% annual price increase for journal titles (Bosch, Albee, and Henderson 2018), which is eminently unsustainable and continues to threaten research library budgets and the future of scholarly communication.

Figure 6. Scholarly journal expenditures percentage increase from 1986 to 2010, compared to the consumer price index. Data from the Association for Research Libraries[62].



Elsevier and Open Access

Open Access (OA) refers to the practice of authors voluntarily making their research articles freely available for any person to read, redistribute, or remix, or use them for any other lawful purpose, without any financial, legal, or technical barriers[63]. Historically, Elsevier have been devoutly anti-OA. In 2004, they submitted evidence to the UK House of Commons Science and Technology Select Committee raising deep concerns over the apparent risks associated with OA, including threats to scientific integrity and research

62 Why Open Access is better for scholarly societies, Stuart Shieber.
63 Policy statement on Open Access in further and higher education and research – Education International.

quality[64]. In 2007, they launched a PR lobbying campaign against OA, in which Eric Dezenhall advised them to equate traditional publishing with peer review and OA to government censorship[65], and that putting pro-open organisations such as PLOS (the Public Library of Science) on the defensive was more effective than any form of intellectual debate[66]. Now, they have had a public transformation, and argue to be supportive of Open Science more broadly[67], while pushing for a 'transition' to OA[68]. However, Elsevier have been criticised widely for this[69], instead being viewed as attempting to stifle or pervert the growth of OA, co-opting it through a combination of market abuse[70], political lobbying, and 'open-washing'; for example, through creating a geographically-discriminative two-tiered system of access – something which completely misses one of the major foundations of OA, while presenting needless technological barriers[71].

Hybrid Open Access – A fool's errand

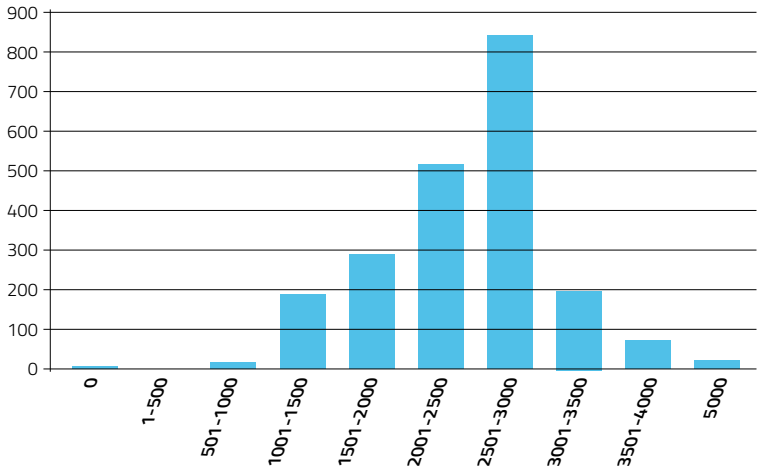
Elsevier, like virtually all large publishers, now has a range of OA choices for authors. These include a range of 'hybrid' options, which is a strategy where individual articles can be made OA while the journal itself remains subscription-based. These hybrid articles include author-facing fees called article-processing charges (APCs), typically in the range of $150-5000 USD per article[72] at Elsevier (Figure 7) and published under a range of Creative Commons licenses[73]. Many of these licenses are not compatible with widely accepted definitions of OA, and actively prohibit re-use of published research. The term 'APC' itself is unsettled too, as it remains unclear exactly what authors are paying for in terms of article production due to price opacity[74]. Pricing for these hybrid titles appears to be primarily based on factors such as levels of funding availability (Björk and Solomon 2014), as well as discipline categories for journals (Lawson 2014) (Figure 8), rather than anything to do with the actual cost of production. Elsevier, among all major scholarly publishers, has the worst trade-off between article impact (as measured by the Source Normalised Impact per Paper) and APCs[75].

Funding such hybrid OA ventures is problematic for a number of reasons. Firstly, it is the most expensive form of OA, and therefore hardly practical or sustainable from an author-facing perspective. This is especially so as the 'market' for hybrid journals is driven by the perception of quality (i.e., journal brands), with publishers therefore having little incentive to reduce costs due to a lack of downward pricing competition. The consequence of this, and the increasing up take of 'OA big deals' (see Geographic Case Studies below) is that strained library budgets are still being siphoned off

64 Appendix 46: Memorandum from Reed Elsevier, UK Select Committee on Science and Technology.
65 Open Access News, Peter Suber, 2007 archive.
66 PR's 'pit bull' takes on open access, Jim Giles, Nature News.
67 Open Science, Elsevier.
68 Working towards a transition to open access, Elsevier.
69 Why I don't share Elsevier's vision of the transition to open access, Stephen Curry.
70 Referring Elsevier/RELX to the Competition and Markets Authority, Martin Eve.
71 Elsevier's latest brilliant idea: Adding geoblocking to open access, Glyn Moody, TechDirt.
72 Elsevier OA price list.
73 Open Access licenses, Elsevier.
74 Why the term 'article-processing charge' (APC) is misleading, Jonathan Tennant.
75 News & Views: Open Access charges, Dan Pollock, Delta Think.

towards for-profit ventures at the cost of supporting lower cost, sustainable, non-profit infrastructure and services. As such, hybrid OA is only a useful service for the slow transformation needed for Elsevier to adapt to an OA world, while endangering and sacrificing the long-term vision of OA which maintains Elsevier's current business practices and profit margins. Furthermore, hybrid OA does absolutely nothing to challenge or reform the current research evaluation and award system which has become distorted by commercial publishers and their journal brands and ranking systems (Brembs, Button, and Munafò 2013), and continue to maintain these as a requirement for scholarly advancement within an increasingly neo-liberal academia. An additional consequence of the APC model is the increasing discrimination against, and marginalisation of, researchers from third world countries (Sotudeh and Ghasempour 2018); a natural consequence of allowing Elsevier to erode the global scholarly communications marketplace.

Figure 7. Frequency of Elsevier hybrid journals by price range (USD, as of 2016) (Morrison 2017).



Data from the OPENAPC project shows that the average APC for each Elsevier article is €2,644[76]. Data from the Wellcome Trust show that average APCs for Elsevier hybrid titles are 64% above fully OA titles[77]. This latter find was corroborated by the 2015 review of the RCUK OA policy[78], which also revealed that around 40% of OA articles published by Elsevier were non-compliant with the policy as they were not appropriately licensed (CC BY). The simple conclusion here is that, with Elsevier, you pay more for less. A 2014 study for a consortium of European research funders revealed that hybrid APCs from subscription-based publishers were nearly twice as much as those from fully OA publishers (Björk and Solomon 2014). This higher rate, which is also what the market seems to be converging on (£1,500-£2,000), seems to have been catalysed by the 2012 publication of The UK and the Finch Report in the UK, which

76 OPENAPC project.
77 The reckoning: An analysis of Wellcome Trust Open Access spend 2013-14, Wellcome Trust.
78 Review of the implementation of the RCUK policy on Open Access, RCUK (now UKRI).

erroneously equated high APCs with high quality (and low costs with low quality[79]). The Finch Report has been heavily criticised for selective exclusion of data in order to promote specific agendas (i.e., those of some commercial scholarly publishers), but seems to have become a self-fulfilling prophecy of the journal market (Lawson 2014). A preference for hybrid OA has been widely criticised as being divergent from virtually all other national OA policies[80], and for creating a highly dysfunctional market (Björk and Solomon 2014). Nonetheless, Elsevier remains the largest hybrid OA publisher as of 2016 (Björk 2017), and some consider this OA scenario in the UK to be even worse than when it started (Kingsley 2017).

A further consequence of hybrid OA is that the research published in hybrid titles is used to raise the symbolic capital (i.e., prestige or branding) or those titles, and then in turn to raise the APCs. Therefore, hybrid OA disadvantages virtually all other players within the scholarly communication ecosystem, including librarians, research funders, and researchers themselves, stifles the transition to fully OA models of publishing, recapitulates the same issues with scholarly journals as reputation engines, while retaining unnecessarily high costs. In June 2018, the EU announced that it would no longer pay APCs for hybrid titles under its 2021-27 Research and Development programme, which is a distinct shift from Horizon 2020 in which such fees were supported[81].

Figure 8. Elsevier hybrid journal APCs (Lawson 2014).

Discipline Category	*Average APC in USD*	*APC Price Range in USD*	*Correlation APC with SNIP**	*Number of Journals***
Arts and Humanities	*1452*	*750-1800*	*0.41*	*25*
Biomedicine	*2551*	*1100-5000*	*0.30*	*487*
Business and Economics	*1612*	*750-3300*	*0.39*	*160*
Chemistry	*2675*	*1000-3750*	*0.32*	*131*
Earth Sciences	*2631*	*1000-3750*	*0.5*	*232*
Engineering	*2524*	*750-3750*	*0.21*	*424*
Mathematics	*2099*	*750-3750*	*0.46*	*81*
Physics and Astronomy	*2479*	*1800-3750*	*0.36*	*117*
Social Sciences	*1835*	*750-3750*	*0.25*	*201*

* *Source Normalized Impact per Paper.*

** *Since some journals are multidisciplinary, the number of journals across disciplines totals to more than 1207, the actual number of journals.*

Distortion of 'green' Open Access

Elsevier has a long and complicated list of embargo periods[82], with variations depending on the article version, geographic location, research funder, discipline, and where

79 Despite the fact that around 71% of the 11,000 journals indexed in the Directory of Open Access Journals (DOAJ) have zero APCs.
80 Who is paying for hybrid?, Danny Kingsley and Philip Boyes.
81 EU set to snub hybrid open-access journals, Craig Nicholson, Research Professional.
82 Journal specific embargo periods 2018, Elsevier.

an author wants to share their work[83]. An embargo period is where Elsevier prohibit an author from sharing a version of their own research article, usually the accepted and peer reviewed pre-production manuscript, for a set period of time, so that the publisher can recuperate the potential lost revenue from an author freely sharing their own research. To be absolutely clear, this is a clear statement that above all else, including research dissemination, Elsevier value their fiscal duty to derive as much revenue as possible. However, an implicit irony from Elsevier here is that embargo periods would not be needed if they added sufficient value to published articles to justify their cost, and actually believed in that. Why would anyone pay for the same product that is available for free? The Association of Research Libraries has criticised Elsevier's sharing policies in May 2015[84] (and then again, several months later[85]), but little appears to have changed, as there is no regulatory body that can influence such regressive business practices. Nonetheless, this demonstrates that Elsevier are attempting to retain unprecedented influence over what researchers can and cannot do with their work, severely contravening basic concepts of academic freedom, while creating unnecessary friction between themselves, research funders, and researchers themselves.

As of late 2017, 88.5% of Elsevier journals offered a 12 month or less embargo for UK-based authors, and 60.5% for non-UK authors, and the trend appears to be towards reducing these embargo periods (Gray 2018). However, this remains despite the lack of evidence that embargoes do anything besides delay access to research[86], including zero-length embargoes leading to subscription cancellations, as is often asserted as justification for their need. In fact, the only real effect green embargoes have is massively increasing the complexity and cost of this mode of OA[87], which indeed seems to be a strategic method of stifling the overall growth of OA.

Articles published by Elsevier and made OA via the 'green' route are licensed under the restrictive CC BY-NC-ND license, which prohibits any re-use for commercial purposes (NC) and any derivative works (ND) being made from articles (e.g., for educational purposes)[88]. Elsevier's 'Open Access' license has been widely criticised, including for being inordinately obscure and complex, and also requiring authors to still transfer their rights[89] to Elsevier ('author nominal copyright'; Morrison (2017)). Indeed, many of Elsevier's OA policies are inordinately difficult to obtain and understand and can be off-putting or intimidating to those who wish to simply apply them[90] (though there are ways to subvert this; Bolick (2017)). Such a conclusion was also reached in a 2018 report from the Open Science and Research Initiative (Björk et al. 2018). The same can also be said of Elsevier's statements on copyright[91], which again can confuse or mislead

83 Article sharing, Elsevier.
84 Organizations around the world denounce Elsevier's new policy that impedes Open Access and sharing, Prue Adler, Association of Research Libraries.
85 ARL urges Elsevier to revise policy that impedes sharing of scholarship, Association of Research Libraries.
86 Half-life is half the story, Danny Kingsley.
87 Counting the costs of Open Access, Research Consulting report, 2014.
88 Attribution-NonCommercial-NoDerivatives 4-0 International Public License, Creative Commons.
89 Understanding Elsevier's open-access licence, part 4: who owns copyright?, Mike Taylor.
90 What a mess!, Kevin Smith.
91 Guest post – Academics and copyright ownership: Ignorant, confused or misled?, Elizabeth Gadd, The Scholarly Kitchen.

researchers (see also the section on Copyright from the public to private domain below). Many of Elsevier's policies are also in direct conflict with funder mandates, for example by requiring different embargo periods on accepted manuscripts. Elsevier could resolve many of these issues by electing to improve its communication strategy, provide clearer information on its policies, and make sure that its policies were easily compliant with those of research funders. However, it may have little incentive to do so, as all of these things in essence act to the detriment of its revenue streams.

In September 2017, Elsevier released a statement about how they were working towards a transition to OA[92], which was met with rigid criticism from others within the scholarly communication community[93]. This exchange highlighted how conservative Elsevier are towards OA in both thoughts and developments (fully expected based on their market position), including by advocating for things like regionally-dependent access levels[94], and maintaining the current level of financial investment in the industry. Such thoughts from apparent industry leaders simply highlights that they are actively stalling the development of OA from attaining any of the vision that it began with.

Publish or perish

One major issue with commercial third-parties having this sort of control over academia is that it has created a 'publish or perish' culture, in line with the wider neo-liberal paradigm (Lawson, Sanders, and Smith 2015). This is due to the 'prestige economy' that academia operates in, with career progression and funding success being defined primarily by journal brands. Researchers are therefore part of a system in which they must compete for an artificially scarce resource (i.e., space in a journal) in order to sustain and progress their careers. One consequence of this is that work conditions for researchers are very unhealthy, with high rates of mental health issues[95], abnormal working hours, and perverse research incentives. This all occurs within a system where funding is becoming scarcer and on a short-term basis due to decreasing public funding and increasing competition, and where short-term and part-time contracts are becoming the new norm, resulting in the casualization of employment conditions. At the present, there is little incentive for Elsevier to acknowledge their accountability or role in all of this. By having control of journal brands, and through that academic career progression, Elsevier define their intrinsic value to the global research community and therefore financial success.

A further implication of this journal-based 'prestige economy' is that Elsevier-branded journals are seen to have a good reputation – based on a combination of factors including historical longevity, impact factor manipulation (Tort, Targino, and Amaral 2012), strong editorial boards, and marketing. In a marketplace where these factors primarily define where researchers submit their work, it makes new entrants to the

92 Working towards a transition to open access, Gemma Hersh, Elsevier.
93 A response to Elsevier's insights into making the transition to open access possible, Toby Green.
94 Gold or green? Elsevier proposes regional open access model, Rachael Pells, Times Higher Education.
95 More academics and students have mental health problems than ever before, Paul Gorczynski, The Conversation.

publishing market disadvantaged right from the offset, irrespective of the intrinsic value they provide beyond prestige and branding. The hegemony of Elsevier represents the paradigm of modern scholarly publishing, where increasing commercialisation and marketization are threatening quality of research and equity within higher education more broadly.

Double-dipping

"Double-dipping" describes a practice by publishers of hybrid journals to receive fees in order to make individual articles OA within an otherwise subscription-based journal, without a concomitant reduction in the subscription price for that journal, thereby charging twice for OA content. Many countries now have offsetting agreements[96] with publishers in place in order to prevent this, concordant with one of the major recommendations of a preferential 'gold' OA approach as outlined in the 'Finch Report' (Finch et al. 2013)[97]. Elsevier explicitly claim that they do not double dip[98]. Their justification for this is not that subscriptions articles are being 'replaced' by OA ones, but that the total amount of articles is increasing, and therefore this leads to corresponding increases in charges, rather than decreases[99]. Therefore, all Elsevier has to do each year is publish an equal volume of additional non-OA articles corresponding to the number of OA articles compared to the previous year, in order to adhere to its own policy and claim that it is not double dipping.

Nonetheless, the result of Elsevier's policy is that there is no associated price reduction for its 'big deals', in spite of any secondary income from hybrid OA, which is part of the very definition of double dipping. What this represents is the simple conversion of public funding designated for OA to additional revenue and profits for Elsevier and represents a flagrant misuse of such funds[100]. This is best exemplified using data from UK institutions (Pinfield, Salter, and Bath 2015): In 2013, the total spend here was £14,259,959 on subscriptions and an additional £937,531 on hybrid OA in Elsevier journals, leading to a ~6% increase in revenue. As David Prosser, Director of the Research Libraries UK (RLUK), stated: "Without hybrid OA the total from these 20 institutions is £14,259,959. With hybrid OA it is £15,197,490. It is clear that this is additional revenue for the same content – i.e., double dipping!"[101] Furthermore, there was no concomitant price reduction in 2014 based on this, and indeed prices for big deals increased as if there were no additional expenditure. As of 2017, in the UK Elsevier still had no offsetting deal in place with Jisc (Lawson 2017b), the organisation who negotiates with Elsevier on behalf of UK Higher Education institutes. Elsevier have even been accused of "triple-dipping" in some cases, for example the NHS in the UK[102].

96 Offsetting agreements for Open Access publishing, Liam Earney, Jisc.
97 Accessibility, sustainability, excellence: how to expand access to research publications. Report of the Working Group on Expanding Access to Published Research Findings, Dame Janet Finch CBE.
98 No double dipping, Elsevier.
99 The empire strikes back, Adam Smith, Research Fortnight.
100 Is the staggeringly profitable business of scientific publishing bad for science?, Stephen Buryani, The Guardian.
101 The costs of double dipping, David Prosser, RLUK.
102 Elsevier, double-dipping, and the NHS, Ben Toth.

Copyright from the public to private domain

Elsevier engages academics in alarmingly anti-competitive copyright transfer tactics[103], using copyright ownership to stifle the advantages that digital technologies and information transfer can bring to higher education institutes[104]. Typically, the authors of a submitted research manuscript must wait for months or even years after submission for the editorial and peer review process to be completed (after the time already spent performing the research and writing the manuscript). Should the manuscript eventually be accepted for publication, the requirement of progressing to the article production phase is that full and exclusive rights to the article must be granted to Elsevier using a copyright transfer agreement. Such a tactic means that Elsevier end up 'owning' virtually all of the research they publish, which enables them to have financial leverage in exchange for accessibility, which in turn has negative consequences for the entire scholarly communication ecosystem.

In practice this represents a severe breach of academic freedom, as the agreement creates the illusion of choice, whereas in reality the authors have very little as transfer of copyright is conditional for publication, which academics depend on in turn for advancing in their careers. Therefore, the concept of 'academic freedom' within scholarly publishing is already compromised as researchers are forced to submit to these processes or risk prohibiting the dissemination of their research, as well as their livelihoods. The option not to transfer copyright means that the entire lengthy process of submission and peer review has been without an outcome for authors and is therefore highly impractical, while also stifling their career progression. Furthermore, it slows down the communication of their research, which becomes contingent on being published in specific scholarly journals where Elsevier has a dominant position. Thus, copyright transfer is rarely in the best interests of authors themselves, but nonetheless has become a requirement for any sort of scholarly advancement.

Copyright here is not so much transferred as required, with Elsevier taking advantage of its position by leveraging the late-stage timing of exchange, the conditions put to researchers, and its dominant market position. In the process, research institutes become beholden to publishers, as they must buy back the very work that those they employ have produced. This issue is exacerbated by the fact that most higher education and research institutes are often, at least in part, publicly funded. This describes the core issue of the present higher education and scholarly communication system, in a bewildering display of parasitism by corporate entities over public investment in higher education and research. At the present, it remains objectively unclear why such a relationship has been allowed to develop and remain unchanged for such a long time.

Transfer of copyright from researchers to third-party commercial publishers impinges on the foundations of academic independence and freedom, by severely restricting

103 The ethics of copyright transfer for scientific research, Jonathan Tennant.
104 Author rights: Using the SPARC Author Addendum, SPARC.

what researchers are able to do with their own work. This is perhaps best exemplified by scholars broadly recognising the importance of sharing their research online to engage both their colleagues and wider audiences, but such sharing often leading to conflicts with Elsevier. Elsevier enforce their copyright strictly, almost unique among other scholarly publishers, and have a history of making legal threats and issuing takedown notices to authors who publicly share their work after transferring copyright to Elsevier, as well as their research institutes (e.g., University of California, University of Calgary, and Harvard University)[105]. Months after acquiring Mendeley, Elsevier sent thousands of takedown notices to one of its biggest rival platforms, Academia.edu, receiving heavy criticism from academics in return[106]. A similar pattern was followed after the acquisition of SSRN, when Elsevier again began removing copyrighted material from the platform[107]. These measures clearly act against the best interests of all other parties and have a detrimental effect on the dissemination of scholarship.

These activities complicate the academic concepts of intellectual property ownership, including over content relating to heritage, medical knowledge, history, culture, and society (to name a few), with this knowledge being treated as a private commodity to the market, rather than a public good. Publicly funded researchers and institutes must realise that this impacts upon their responsibilities in terms of knowledge dissemination and preservation, and it must be questioned whether it is appropriate for researchers to sign away the rights to their work to a third-party entity such as Elsevier.

105 How one publisher is stopping academics from sharing their research, Andrea Peterson, The Washington Post.
106 Posting your latest article? You might have to take it down, Jennifer Howard, Wired Campus.
107 Just as open competitor to Elsevier's SSRN launches, SSRN accused of copyright crackdown, Mike Masnick, TechDirt.

Major additional criticisms of Elsevier's business practices

Summary: Beyond scholarly publishing, there are widespread criticisms of a range of Elsevier's business practices. This includes political lobbying to influence public policy, marketplace distortion and anti-competitive business practices, and the failure to prevent the publication of fake and plagiarised content. The results of Elsevier's business practices are that it wields almost unrivalled power in dictating the future of scholarly communication, which has far-reaching negative consequences into the higher education sector, including controlling academic career progression through its journal brands.

Political influence

The UK and the Finch Report

The publication of the Finch Report was the primary driving factor behind developing a national OA policy for the UK (Finch et al. 2013). Shortly after, the Research Councils UK (now UKRI) published an updated policy on OA, which became one of the first to be globally implemented[108]. As such, it represented an important benchmark in the global development of OA policies.

Elsevier, along with representatives from other large commercial scholarly publishers including Taylor and Francis, Oxford University Press, Springer Nature, and Wiley, were all engaged in either the main working group, or one of the sub-groups working on the Finch Report (see pages 113-114 of the main report). These groups were tasked with finding solutions to shape the national approach of the UK in expanding access to research outputs. Aligning commercial interests with those of other stakeholders in terms of public policies and strategies is difficult, makes objectivity impossible, and creates a tension between maximum access and maximum profit, the latter being clearly over-represented.

108 Open Access policy, UK Research and Innovation.

The major consequence of these conflicts is that the Finch Report's main recommendations sought to find new sources of revenue through OA publishing without damaging the existing business practices of commercial publishers. Three major policy objectives where this is most apparent are:

1. ***High-price author-facing 'gold' OA charges (APCs);***
2. ***Long embargo periods for 'green' OA; and***
3. ***Complex licensing agreements through public libraries.***

Each of these policies result in protecting, and supplementing, commercial publishing revenue streams while stifling the growth of OA and dissemination of scholarly research; for example, through additional, but selectively distributed, provision of government funds for 'gold' OA. The result of this now is that national APC pricing is converging on the high £1500-2000 estimate from the Finch Report, with little downward political or marketplace pressure. By allowing Elsevier to dictate the market price, they have helped now drive costs upwards towards this, irrespective of the actual cost of publishing. In 2013, the BIS Select Committee published a report asking for RCUK and the government to reconsider this mistaken preference for gold OA, among other major criticisms[109]. However, little seems to have changed since then, and suggests that the political influence that Elsevier exerts, combined with a lack of political accountability, is dangerous for the sustainable future of the scholarly communication ecosystem.

Now, the Universities UK Open Access Coordination Group has a representative from Elsevier, on behalf of the Publishers Association. In December 2017, they released a report on monitoring the 'transition to Open Access'[110]. This representation coincides with a sharp rise in the number of APCs paid to Elsevier since 2014. In 2016 more than half of the expenditure went to Elsevier, Wiley and Springer Nature (Figure 8). Elsevier remains the market leader in terms of revenue from OA, with 28.5% of the total market share from 38 UK institutes (15.8% for Springer Nature, 11.2% for Wiley) (Figure 9).

Lobbying in Europe

The Horizon 2020 expert group on the Future of Scholarly Publishing and Scholarly Communication also has a member of RELX group (Anne Kitson) as an organisational representative[111]. Other representatives include experts appointed in their personal capacities, additional scholarly publishers, and private research funders. RELX otherwise has 6 representatives operating within the European Commission, including at least one of whom has direct access to European Parliament premises[112]. RELX also spent between €4-499,999 euros on lobbying in the EU in 2017 alone[113]. The

109 Government mistaken in focusing on Gold as route to full Open Access, House of Commons Business, Energy, and Industrial Strategy Committee.
110 Monitoring the transition to Open Access, Universities UK.
111 Horizon 2020 expert group on Future of Scholarly Publishing and Scholarly Communication (E03463), Register of Commission Expert Groups.
112 RELX Group, EU Transparency Register.
113 RELX Group, LobbyFacts.eu.

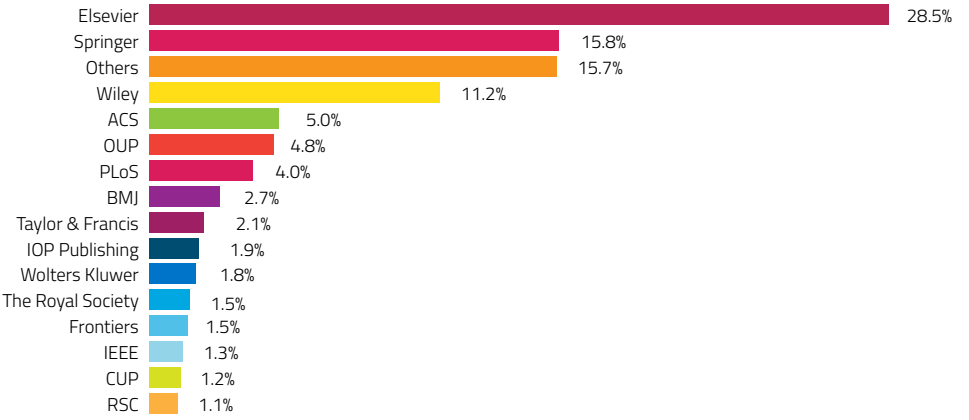
consequence of this is that at a high political level, there are clear conflicts of interest remaining for commercial publishers, which appears to be going unchallenged despite the clear influence this has had in the past (e.g., with the Finch Report). This is not to say that Elsevier's voice should not be heard within political environments, just that there are more appropriate communication channels for private corporations that should be used instead (e.g., calls for evidence or consultations).

In March 2018, it was announced that Elsevier were being subcontracted to monitor the development of Open Science in the EU, along with a consortium including the Centre for Science and Technology Studies at Leiden University[114]. At the present it remains unclear what the impact of this will be, but it is highly likely that Elsevier will continue to have a strong role in defining the future of Open Science if it retains this current position. Furthermore, this represents an unsettling appearance of a conflict of interest where Elsevier will not only be favouring their own systems and services in the monitor, but will also be paid to help monitor the dysfunctional system that it was involved in creating, and with this information being used to inform future EU policy decisions[115]. There was a strong public response to this from the global research community[116], with more than 1,000 signatories for a formal complaint to the European Commission, raising issues about Elsevier's role, and a lack of transparency in the subcontract awarding process (Tennant 2018). On open commenting system for the Open Science Monitor highlights these concerns, with dozens of comments taking issue with the role of Elsevier, the inherent conflicts of interest, and the bias of the data sources initially proposed[117]. Further issues were raised about why Elsevier were awarded the subcontract based on its anti-open lobbying history[118], and the strange timing of the award notification, which prevented the submission of any formal complaint[119].

Interestingly, the UK and European Commission have been almost alone in pushing for a gradual 'flip' of subscription journals to OA, with the slow development of hybrid OA and concomitant lack of complete flipping a demonstration of the utter failure of this approach. This stance remains, despite the overall geographic discordance it creates, and the available evidence showing that it is financially unrealistic for Elsevier ever to make a full switch to OA (Morrison 2017); indeed, there is little incentive for them to do so, given that hybrid OA is essentially treated as an additional revenue stream at the present. It is clear that having commercial entities so intimately involved in forming national policies with far-reaching consequences for the entire global higher education sector is profoundly problematic. Fundamentally, it reveals how special corporate interests are playing a major role in influencing these policies against the wider interests of the public.

114 Project to monitor Open Science kicked off, CWTS.
115 Hated science publisher Elsevier to help EU monitor Open Science – Including Open Access, Glyn Moody, Techdirt.
116 Elsevier are corrupting open science in Europe, Jon Tennant, The Guardian.
117 EU Open Science Monitor – Help us improving the indicators!, Making Speech Talk.
118 Elsevier corrupts open science in Europe?, Maria Kądzielska, Wprost.
119 Voor open science-project gaat de EU in zee met... Elsevier, Sophie Stadhouders, Follow the Money.

Figure 9. Market share of publishers in 2016 from 38 UK institutions (Universities UK).



Lobbying in the USA

In the USA, the total lobbying expenditure of RELX was $1.41 million USD in 2017[120]. Reed Elsevier donated thousands of dollars to the campaign of Representative John Coyers during the 2002, 2004, and 2006 election cycles – someone who was a vocal protestor of the National Institute of Health's progressive OA policy[121]. Historically, Elsevier have supported a range of anti-OA bills, including SOPA (Stop Online Piracy Act) and PIPA (Protect IP Act) The amount spent on lobbying peaked in 2007 at $4.36 million, a time when OA developments in the USA were at their strongest. Most of this lobbying expenditure was based on issues to do with copyright, patents, and trademark, science and technology, and governmental issues.

Elsevier have also made numerous documented contributions to senior executives of Rep. Carolyn Maloney of the House of Representatives, in order to increase support for an anti-OA bill she introduced[122]. This bill, backed by the American Association of Publishers (AAP) and called the Research Works Act (RWA)[123], would have made it illegal for federal granting agencies to require grantees to publish their work in OA journals. After an enormous public backlash, Elsevier withdrew support for the RWA in early 2012, and the bill was stopped[124].

120 Annual lobbying by RELX Group, OpenSecrets.
121 Publishers launch an anti-OA lobbying organization, Peter Suber.
122 Elsevier-funded NY Congresswoman Carolyn Maloney wants to deny Americans access to taxpayer funded research, Michael Eisen.
123 H.R.3699 – Research Works Act, US Congress.
124 Elsevier withdraws support for the Research Works Act, Elsevier.

Anti-competitive business practices

In 1998, Elsevier and Wolters Kluwer called off a proposed merger between the two publishing groups after it became apparent that European regulatory bodies would intervene due to the monopolisation of scholarly publishing that would have resulted[125]. Subsequently, the UK Office of Fair Trading (OFT) standards released a report in 2002[126] investigating the market for STM journals after a merger between Elsevier and Harcourt[127], concerns over which were also raised by the Association of Research Libraries[128]. This report found that, between 1994 and 1998, Elsevier increased its share of ISI-rated STM journals to 20%. It concluded: "We believe that there is evidence that the market for STM journals may not be working well. In the light of the developments noted in chapter 7 above, this does not, however, appear to the OFT to be a matter warranting further investigation on our part at this stage. However, if competition fails to improve, or should additional significant information come to light, we may consider further action." 16 years later, competition has not improved, and conditions have worsened (Larivière, Haustein, and Mongeon 2015), and therefore it is strange that the OFT has not decided to intervene again.

In 2016, Elsevier were referred to the UK Competition and Markets Authority (CMA) following the advice of Ann McKechin MP during an inquiry into Open Access in 2013[129]. At the present this referral has not been responded to. The two major factors likely contributing to this were Elsevier's position as a dominant market player as well as broader problems within the scholarly publishing market sector. This referral was primarily based on the widespread usage of NDAs for licensing contracts, which represents a serious breach of competitive market practices as customers lack any sort of price sensitivity. Furthermore, such a practice goes profoundly against any principled expenditure of public funds. As each research article is unique and non-substitutable, this means that normal competitive restraints do not work and therefore there is no market price pressure.

Elsevier know that they possess a dominant position when it comes to their relationships with research institutes – the content they own the rights to is required by researchers, otherwise their work (and reputation) will be in jeopardy. Current estimates are that Elsevier, along with Wiley-Blackwell and Taylor and Francis, together account for more than 50% of all published STM papers in 2013, going as high as 71% in fields such as psychology (Larivière, Haustein, and Mongeon 2015). This allows Elsevier to exploit its market position, increase prices as it sees fit, and exert control over its customers, as it creates a situation in which smaller publishers find it very difficult to compete. Following the 2002 report by the OFT, the situation for the scholarly publishing market has clearly deteriorated, leading to the creation of platforms such as Sci-Hub that provide massive-

125 Reed Elsevier and Wolters Kluwer call off merger, Jean Richardson and Jim Milliot, Publishers Weekly.
126 The market for scientific, technical and medical journals, Office of Fair Trading.
127 Reed Elsevier and £4bn takeover of Harcourt is closed, Campaign Live.
128 ARL statement on Reed Elsevier's acquisition of Harcourt General, Library Juice.
129 Referring Elsevier/RELX to the Competition and Markets Authority, Martin Eve. Note that the author of the present report was one of the three UK-based academics involved in this referral.

scale access to the scholarly literature by infringing upon publisher-owned copyrights (Himmelstein et al. 2018). As Elsevier now own up to 25% of the STM journal market, a further investigation is required, based on the recommendations of the OFT[130] itself.

Professional implications

Due to the efforts of organisations like Elsevier, access to scholarly literature remains an enormous global issue, despite the fact that much of the research itself was often publicly funded. The lack of financial transparency in scholarly communication represents a great obstacle to creating a functioning publishing market, as well as creating evidence-based policies around the financial aspects of publishing (Lawson, Gray, and Mauri 2015). This issue is compounded by flawed evaluation criteria at numerous levels, often centred around the label of 'excellence' (Moore et al. 2017), which tends to focus on where research is published rather than the intrinsic quality of that research. The power that this grants Elsevier and other publishers in controlling current journal hierarchies creates issues around academic recruitment and career progression (Brembs, Button, and Munafò 2013), limits the development of a fully OA publishing system, and gives Elsevier strong control and governance over the scientific policies of research institutes and even nations.

Turning a strength into a weakness

Elsevier, despite its size, is not immune to standard market forces. In 1995, an article in Forbes by journalist John Hayes predicted that Elsevier would be "the internet's first victim", with the result that Elsevier stock fell 7% in 2 days to just $26 a share[131]. In 2011, a senior investment analyst at Bernstein Research in London, Claudio Aspesi, predicted that Elsevier were heading for a crash, and published a report recommending that his clients sell Elsevier stock. This was based on the assumption that, in the face of continued cuts in library budgets, libraries would progressively abandon their 'big deal' contracts. A consequence of this is that, over a two-week period in 2011, Elsevier stock lost 20% of its value (around £1 billion)[132].

A further market disruption came in July 2012 when the European Commission and UK both released large reports on OA. On July 18, the day after the EC announcements, Elsevier stock lost -1.6% and -2.5% (in absolute terms) and -2.7% and -3.7% (in relative terms), respectively. Aspesi and colleagues again released a report in September 2012 noting that the risk posed by these developments to Elsevier's business model is substantial[133]. It was noted in this report that global adoption of policies such as the UK one could reduce the profitability of Elsevier's journals by as much as 60%. They also stated that "A collapse of the profitability of Elsevier would be catastrophic for Reed

130 The OFT no longer exists in the UK, hence why in 2016 Elsevier were reported to the CMA instead.
131 Can't disrupt this: Elsevier and the 25.2 billion dollar a year academic publishing business, Jason Schmitt.
132 Is the staggeringly profitable business of scientific publishing bad for science?, Stephen Buranyi, The Guardian.
133 Reed Elsevier: A short history of two days in July (and why investors should care), Bernstein Research.

Elsevier [now RELX Group]." Elsevier bounced back from both disruptions through increasingly vigorous negotiations with libraries, but this reveals that they are in some ways subject to the same market rules as everyone else. An updated report in 2014, again by Aspesi, declared Elsevier to look less vulnerable to these structural challenges around OA[134]. This was due to the combination of libraries continuing to renew their 'big deal' contracts, and the increasingly common governmental OA policies remaining indifferent to the financial interests of Elsevier and other legacy publishers.

Publishing of fake journals and plagiarised books

Between 2000 and 2005, Elsevier published 6 fake journals that had to be removed from the market[135]. These 'sponsored journals' were products from pharmaceutical companies designed to mimic legitimate peer reviewed medical research journals in order to promote their products, but who did not disclose any of the conflicts of interest. They have also had to retract articles on multiple occasions for peer review manipulation[136]. In 2017, Elsevier was found to have published a book based on plagiarised content copy and pasted from LinkedIn[137]. In the same thread[138], it also became apparent that Elsevier might be in breach of Trademark Law by "passing off" one of their journals as an equivalent to Science[139], a highly popular scholarly journal published by the American Association for the Advancement of Science. In 2017, a similar issue came to light showing that Elsevier were notoriously nonchalant and poor at handling cases of plagiarism[140]. While not a fake journal in itself, Elsevier does publish the journal *Homeopathy*[141], which not only publishes pseudoscience[142], but was also delisted from Thomson Reuter's journal ranking in 2016 due to excessive self-citations[143]. This is not the only controversial or even non-peer reviewed journal that Elsevier have been known to publish[144]. Another case revealed that the Editor in Chief of the journal *Chaos, Solitons and Fractals*, self-published 273 papers over 18 years (including 57 in one year), without peer review (Arnold and Cohn 2012).

Collectively, these examples raise serious questions about Elsevier's ability to provide proper oversight for its collection of journals. They also raise the demand for an inquiry into whether more such examples are in place across their portfolio, whether they can be relied on to provide peer review with integrity, and what the implications are for the reliability of their scholarly journals and the information within.

134 Reed Elsevier: Goodbye to Berlin – The fading threat of Open Access (upgrade to market-perform), Bernstein Research,
135 Elsevier published 6 fake journals, Bob Grant, The Scientist.
136 Elsevier retracting 26 papers accepted because of fake reviews, Victoria Stern, Retraction Watch.
137 Matt Hall, Twitter.
138 Stephen Hicks, Twitter.
139 Science Bulletin, Elsevier.
140 The F13 files, part 4 – Dealing with Elsevier, Ari Jokimäki.
141 Homeopathy (journal), Wikipedia.
142 Reject the pseudoscience of homeopathy, Edzard Ernst, Stat.
143 Does a journal of homeopathy belong in science?, Ivan Oransky and Adam Marcus, Stat.
144 New editor for Medical Hypotheses, Daniel Cressey, Nature News.

Refusal to open up citation data

In April 2016, more than 60 publishers joined the Initiative for Open Citations (I4OC) to liberate their citation information in Crossref; however, Elsevier were one of the few large publishers who refused to participate[145], despite them depositing around one-third of all journal article references in Crossref. This is most likely due to the financial conflict with Scopus, Elsevier's subscription-based citation database, that would arise given the free availability of this bibliographic data. A 2017 analysis showed that of the 470,008,522 references from journal articles stored at Crossref that are not open, 305,956,704 (65.10%) are from journals published by Elsevier[146]. Again, this clear stance positions Elsevier as one of the most regressive actors in open scholarly communications.

Other strange business practices

- When Elsevier enticed people using $25 Amazon gift cards to anyone who would leave a five-star review on one of their published titles[147].
- When Elsevier were sued for breach of contract. Louisiana State University filed a breach of contract claim against Elsevier in February 2017 for allegedly blocking IP addresses to their School of Veterinary Medicine Library, stating that Elsevier were abusing its size and marketing power to extort them[148]. The dispute appears to have been resolved in January 2018, although details on how this was settled remain scarce[149].
- When Elsevier went on a mass 'takedown spree'. They targeted the academic social network, Academia.edu with thousands of Digital Millennium Copyright Act takedown notices. The reasons stated[150] for this were due to the fear of risk of library cancellations if content is otherwise freely available.
- When Elsevier were repeatedly caught selling 'free' or Open Access articles[151]. This apparently technical issue remained even years after being notified of the issue[152].
- When Elsevier were involved in the arms trade. Historically, Elsevier has been deeply involved in organisation events for the global arms trade, which prompted a series of editorials from senior figures in publishing (Sibbald 2007), as well as an online petition with more than 1000 signatories. It ceased organising arms trade fairs in 2008[153].
- When Elsevier manipulated their impact factors. Elsevier, as well as some other publishers, deliberately implement delays in the publication dates between

145 Funders should mandate open citations, David Shotton, Nature World View.
146 Elsevier references dominate those that are not open at Crossref, David Shotton.
147 Elsevier offered gift cards for 5-star book reviews, Lucas Laursen, Nature News.
148 Louisiana State University sues Elsevier for breach of contract, Krista Cox, Association of Research Libraries.
149 LSU libraries, Elsevier quietly resolve suit over journal access, Andrew Albanese, Publishers Weekly.
150 How one publisher is stopping academics from sharing their research, Andrea Peterson, The Washington Post.
151 How is it possible that Elsevier are still charging for copies of open-access articles?, Mike Taylor.
152 Elsevier charges to read #openaccess articles, Peter Murray-Rust.
153 Reed Elsevier makes its final farewell to arms, Katie Allen, The Guardian.

online and print versions of a manuscript which has the consequence of artificially raising their journal impact factors (Tort, Targino, and Amaral 2012).

- When Elsevier sold sensitive consumer data. In 2008, Reed Elsevier had to settle charges brought against it through the Federal Trade Commission for failing to provide adequate security for sensitive consumer data[154].
- When the CEO of RELX Group, Erik Engstrom, received more than $14 million USD in salary in 2016, the highest in the whole industry (around 7000 APCs, for context)[155]. While this might be normal capitalistic behaviour, it does not stop it from being outrageous.
- Elsevier have a median gender-based pay gap of 40.4%, more than twice the average for the UK and the worst reported for any publisher[156].
- In 2018, Elsevier were referred to the UK Advertising Standards Authority (ASA) for misleading advertising regarding the prices of their journals[157]. The ASA took steps to make sure that Elsevier complies with the relevant codes and regulations in the future.
- When Elsevier impinge upon the rights of peer reviewers, by violating their copyright and ownership through ineffective communications (Schiermeier 2017a).

What is odd, is that despite all of these very serious allegations and criticisms, Elsevier still remains one of the largest scholarly publishers. Despite its reputation, and consistently negative press, researchers still continue to sign away their services (e.g., peer review, editorial) and research for free to them, which amounts to a strange psychological alliance. What this all illustrates is the dominant position that Elsevier has over the higher education system, providing products and services deemed essential by its customers and therefore allowing it to get away with what could generally be considered as industrial malpractice and market abuse.

154 Agency announces settlement of separate actions against retailer TJX, and data brokers Reed Elsevier and Seisint for failing to provide adequate security for consumers data, Federal Trade Commission.
155 RELX's Engstrom tops industry ‚rich list', Tom Tivnan, The Bookseller.
156 Elsevier reports 40% gender pay gap, Benedicte Page, The Bookseller.
157 Referring Elsevier/RELX to the Advertising Standards Authority, Ross Mounce.

Resistance

Summary: Some or all of the criticisms above have led to Elsevier being singled out for a global boycott from researchers, which currently stands at more than 17,000 signatories. Furthermore, there are major shifts happening all around the world now, with national consortia coming together to challenge Elsevier over their publishing practices and pricing for licensing contracts. This is seeing a different dynamic in negotiations between Elsevier and the higher education sector, with some countries, such as Germany, cancelling all subscriptions to Elsevier content.

The Cost of Knowledge boycott

At the beginning of June 2018, the largest current grassroots boycott of any academic publisher, The Cost of Knowledge, had more than 17,000 signatories, who agreed to not write, review, or edit exclusively for Elsevier[158]. This boycott, launched in January 2012 and inspired by Tim Gowers[159], was based on Elsevier's business practices[160], including excessively high prices and profits, and lobbying in support of policies that aim to restrict the free exchange of information (e.g., SOPA[161], PIPA). This public stand against Elsevier became known as the 'Academic Spring' at the time[162]. However, the long-term impact of this boycott remains largely unknown, and direct consequences seem to have been limited (e.g., few editorial resignations), possibly as a consequence of low media attention[163]. At the present, the boycott can probably be best viewed as a statement by academics of their continued dissatisfaction with Elsevier – no other publisher has received this sort of negative attention, but then no other publisher really behaves in the same way as Elsevier.

More than 80% of signatories pledged not to publish in Elsevier titles in the future. A 2016 evaluation of the boycott found that, from a sample of around 1000 from Chemistry and Psychology, 21% of signatories were unidentifiable, and 19% had not published at all (in the 4 years since signing) (Heyman, Moors, and Storms 2016). Of the remainder, 23% did go on to publish in an Elsevier outlet for reasons unknown, and the remaining 37% stuck

158 The Cost of Knowledge, boycott website.
159 Elsevier – my part in its downfall, Tim Gowers.
160 The Cost of Knowledge statement, Tim Gowers.
161 All the companies supporting SOPA, the awful internet censorship law – and how to contact them, Sam Biddle, Gizmodo.
162 Academic Spring, blog for the Cost of Knowledge boycott.
163 Elsevier journals – some facts, Tim Gowers.

to their guns. It seems therefore unlikely that, on the grand scale of things, the boycott will continue to have any substantial impact on Elsevier's publishing behaviours due to its modest success and slow growth rate. Other boycotts and petitions do exist in the scholarly publishing world (e.g., Research Without Walls[164] and the Open Access Pledge[165]), but these are not explicitly Elsevier-focused and relatively small-scale.

Elsevier and the National Autonomous University of Mexico (UNAM)

In November 2017, a report was publicised about an account of a secretive contract agreement where Elsevier obtained the right to publish 44 of the UNAM's OA journals (Alperin et al. 2017). This report managed to obtain information on this process, including a leaked copy of the contract itself. Here, the report focussed on increasing the transparency behind the process of the agreements, as well as the contract itself. It highlighted that currently there are no best practices in how to manage such agreements, which Elsevier therefore capitalise upon, with secrecy maintained to prioritise private over public interests. The report emphasised that we cannot expect Elsevier to act in the best interests of the research community or public, as their goals are simply misaligned. However, the power dynamic is so skewed due to the lack of transparency, and therefore this should be a prerequisite for a stronger position in negotiations, and force Elsevier to be held to a higher standard.

Other boycotts

In November 2015, the entire editorial board of Elsevier's journal Lingua resigned after Elsevier rejected their request for authors to retain copyright to their own work, and to provide fair cost APCs[166]. The editorial board reformed a new OA journal, Glossa, with substantially lower APCs ($400 versus $1800 at Lingua). Subsequently, the journal Cognition petitioned Elsevier to significantly reduce costs, and currently has more than 1600 signatories[167]. These examples are some of the most recent from a long history of entire editorial boards, and their research communities, rallying against Elsevier's practices[168].

164 Research Without Walls.
165 Open Access Pledge.
166 Editors of the journal Lingua protest – quit in battle for Open Access, Julia Greenberg, Wired.
167 Support fair Open Access at Cognition, petition,
168 Criticism and controversies, Elsevier, Wikipedia.

Geographical case studies

The last several years have seen some interesting shifts in the power dynamic between the research and education sectors and Elsevier. Around the world, libraries and research institutes are banding together at national levels to negotiate with Elsevier and leverage the power of collective bargaining to strengthen their positions. At the present, this responsibility has largely been taken on by groups of senior figures at higher education and research institutes, and involvement of education unions, research communities themselves, and dedicated initiatives from other higher education bodies appears to have been largely absent (although there is some engagement). The present state of this is highly significant, as these negotiation consortia have final say at a national level about Elsevier's involvement in the future of their publishing behaviours. The results of these often-ongoing negotiations have been distinct in all cases, but collectively are beginning to erode the apparent stranglehold that Elsevier has had.

In 2017, LIBER (Ligue des Bibliothèques Européennes de Recherche – the Association of European Research Libraries) presented 5 principles for libraries to use when conducting negotiations with publishers[169]:

1. Licensing and Open Access go hand-in-hand;
2. No Open Access, no price increase;
3. Transparency for licensing deal: no non-disclosure;
4. Keep access sustainable;
5. Usage reports should include Open Access.

Although not explicitly targeted at Elsevier, it is clear that these principles could be applied internationally by libraries and library consortia to improve their negotiation strength and accelerate the transition towards a fully-OA ecosystem (Otegem, Wennström, and Hormia-Poutanen 2018). The main goal here is to address the fundamental imbalance between researchers who provide their free labour and a third-party service provider with a history of exorbitant pricing schemes and exploitative practices. The same can also be said of the numerous ongoing high-level 'boycotts' that are challenging Elsevier. A full list of such boycotts, at national and institutional levels, is being developed by SPARC[170]. These negotiation principles are strengthened by the fact that new national consortia are sharing their tactics and strategies for dealing with publishers, including through increased transparency into the terms of deals, which helps to foster increased international collaboration as well as collectively stronger negotiation foundations.

169 Open Access: Five principles for negotiations with publishers, LIBER.
170 Big Deal cancellation tracking, SPARC.

Africa

South Africa

Information on negotiations between South African universities and Elsevier is rare, again due to the apparent use of NDAs. South African universities and government agencies signed a petition by the Confederation of Open Access Repositories (COAR) against Elsevier's proposals for lengthier embargoes[171]. Signatories here include the universities of Pretoria and Cape Town, the Council for Scientific and Industrial Research, the National Research Foundation (South Africa's main research funder), the Library and Information Association of South Africa and the South African National Licensing Consortium, among others (a total of 285 organisations from around the world).

Asia-Pacific

Australia

While a breakdown by publisher is not currently known for Australia, information from the Council of Australian University Librarians (CAUL) indicates that in 2010, Australian university libraries spent a total of AUS $181 million on journal subscriptions[172].

Japan

The Japan Alliance of University Library Consortia for E-Resources, established in April 2011 and comprising 533 member library organisations, is responsible for managing Japan's academic information infrastructure, including licensing negotiations. JUSTICE reported that, in 2014, 13.482 articles were published with Elsevier (with Wiley and Springer Nature publishing 13.829 together), with only 188 of these being fully OA, and 356 being hybrid OA[173]. The total cost just for these OA articles in 2014 was 840,000 euros. JUSTICE are aware that it is theoretically possible to make all articles in Japan OA based on current finances, with potential annual savings of around 45% estimated. While information on licensing contracts from Japan does not appear to be available, it is noteworthy that Elsevier maintains a separate subscription price list exclusively for Japan[174], but no other individual country. Of note is that the Institutional Repositories Promotion Committee and Digital Repository Federation, both based in Japan, signed the COAR statement denouncing Elsevier's sharing policy in 2015.

171 Statement against Elsevier's sharing policy, Confederation of Open Access Repositories.
172 CAUL statistics, 2010 academic libraries, dataset.
173 From subscription to Open Access? JUSTICE study on OA publishing and APC spend in Japan, Jun Adachi.
174 Journals pricelist 2018, Elsevier, dataset

New Zealand

In late 2017, a preliminary analysis was released of university spending in New Zealand[175]. The total amount spent on four publishers (Elsevier, Springer Nature, Wiley, and Taylor and Francis) was around USD $14.9 million in 2016. The University of Auckland spent USD $1.55 million[176] on Elsevier alone in 2016 (Wilson 2017).

South Korea

A consortium of 300 universities in South Korea are also actively boycotting Elsevier, with more than 70 libraries being threatened with their access being cut off at the beginning of 2018[177]. The reason for this again was cited primarily as high, and increasing, prices, often for little-read titles, with the average university library spending 31% of their subscription budget on Elsevier alone. A survey of 123 member organisations of the library association indicated that they collectively spent USD $140 million each year on journal subscriptions, USD $33 million of which was on Elsevier and ScienceDirect. In January 2018, an agreement was reached, including annual price rises between 3.5-3.9% (Normile 2018).

Taiwan

In December 2016, it was announced that 75% of Taiwanese universities were collectively boycotting Elsevier due to increasing prices ($27 million USD annually for access to ScienceDirect[178], up 53% from 2016 to 2017) and declining library funds, led by the 140-member institutions of CONCERT (Consortium on Core Electronic Resources in Taiwan[179]). Elsevier tactically tried to negotiate with universities individually, but the collective action of CONCERT held firm against this. In January 2017, Elsevier granted Taiwanese universities a one month extension to their online subscriptions (Schiermeier and Rodríguez Mega, 2017). Since then, negotiations between Elsevier and CONCERT have resumed, and in June 2017, an agreement was reached and access was reinstated (although details remains scant)[180].

Europe

Austria

While a breakdown by publisher is not known for Austrian universities, a report in 2016 by Open Access Network Austria and Universities Austria estimated that the current

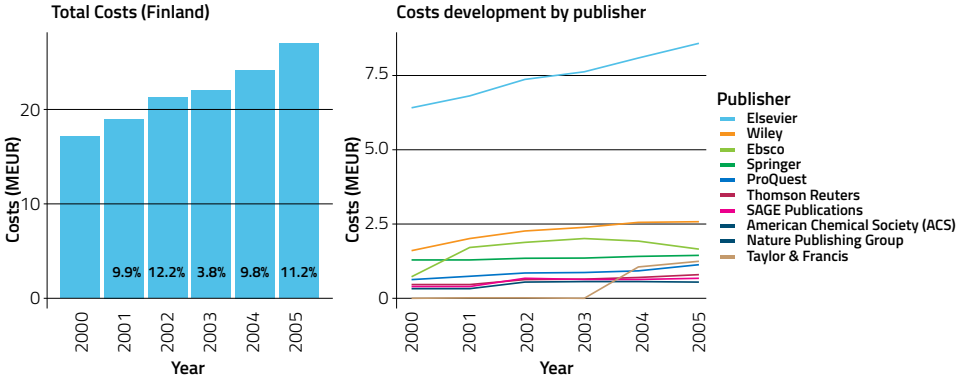
175 Big Deal journal bundles: price information from New Zealand. Mark Wilson.
176 Universities spend millions on accessing results of publicly funded research, Mark Wilson, The Conversation.
177 A consortium is renegotiating rights with academic DB, Daily UNN.
178 About the Elsevier Library contract negotiation CONCERT statement, CONCERT.
179 Taiwan Tech to discontinue subscription to Elsevier ScienceDirect starting 2017, National Taiwan University of Science and Technology.
180 Status of Open Access in Taiwan 2017, Crystal Tu.

spend by their public sector on academic journal subscriptions is €65-70 million per year (Expert Group "National Strategy" of the Open Access Network Austria (OANA) and Universities Austria (uniko) 2016). The latest publication cost data from 2017 is also available online (Rieck et al. 2018).

Finland

In 2016, the Ministry of Education and Culture of Finland published the national academic publishing costs from between 2010 and 2015[181], including a breakdown by publisher[182]. 34.4% of the total costs went to Elsevier, which rose from €6.41 million in 2010 to €8.58 million in 2015, representing a 134% overall increase[183]. The 2016 dataset is available online[184].

Figure 10. Annual increases in costs paid (left) to the top 10 publishers (right), which corresponds to 77% of the overall costs (Finland).



Other countries are following a similar 'hard' approach to Germany, including the FinELib library consortium in Finland[185]. Here, more than 2800 members of the academic community in Finland have signed a 'No Deal, No Review' statement calling for fair pricing for subscriptions and open access, with more than 2/3 preparing to abstain from editorial and reviewer duties until such a deal is made[186]. FinELib's proposal is based on a 'fair copyright policy' to make 100% of Finnish articles Open Access through the 'green' route. In late 2017, the negotiations appeared to have been gridlocked, with neither side refusing to move from its position[187]. At the end of 2017, it was announced that FinELib had progressed[188] and posted an open letter on Facebook, although details

181 Academic publisher costs in Finland 2010-2015, Etsin.
182 Publisher Costs, Open Science and Research Finland.
183 Scientific journal subscription costs in Finland 2010-2015: A preliminary analysis, rOpenGov.
184 Academic publisher costs, Open Science and Research Finland.
185 No to Elsevier's unfair deals, No Deal, No Review.
186 The cost of scientific publications must not get out of hand, Teidonhinta.fi.
187 Divide and conquer: Elsevier approaches Finnish academic institutions and individual researchers, Joona Lehtomäki, No Deal, No Review.
188 FinELib's negotiations with Elsevier progressing, FinELib.

were not available[189]. In January 2018, FinELib announced[190] that they had signed a 3-year license agreement with Elsevier (for 26.7 million euros[191]), with associated researchers entitled to a 50% discount on APCs in around 1600 journals and access to around 1850 journals through ScienceDirect. Details of this transaction are slowly becoming more transparent[192], thanks to a commitment to LIBER's transparent negotiations principles and refusing to sign an NDA clause[193]. However, crucial statistics such as the annual costs per subscribing institute were not made available, which led to a Freedom of Information request to FinELib from the No Deal, No Review signatories (April, 2018)[194].

France

In 2014, it was revealed that the French Ministry of Research had signed a 5-year contract with Elsevier for €172 million, for access to around 2,000 journals at 476 universities and hospitals[195]. At the beginning of 2018, it appears that the French national consortium, Couperin, comprising more than 250 academic institutes and in collaboration with certain other French research institutes, was beginning new national-scale negotiations with publishers[196]. One consequence of this was that in March 2018, Couperin announced that it was cancelling all of its subscriptions to Springer Nature, over disagreements around OA and the cost of licensing contracts[197]. Here, the Syndicat National des Chercheurs Scientifiques FSU (SNCS), one of EI's affiliates, has played an important role, most recently publishing a special issue on the business of scientific publishing, and highlighting the ethical and financial issues surrounding Elsevier and other large publishers[198].

Germany

Since 2016[199], members of the Project DEAL[200] have been negotiating nation-wide 'publish and read' licensing agreements with Elsevier on behalf of the Alliance of Science Organisations in Germany (Hunter 2018). The DEAL team is widely representative of librarians and academics[201], and comprises a steering committee, a negotiation group, and the project team itself. The main objectives of DEAL are:

- All research institutions participating in the DEAL agreement are to have permanent full text access to the entire range of Elsevier e-journals.

189 An open letter to No deal, no review participants, Heidi Lane, Facebook.
190 FinELib and Elsevier agreement: Access to scholarly journals and 50% discount of article processing charges, FinELib.
191 FinELib-Elsevier SD Freedom agreement.
192 Q&A with FinELib, the consortium of Finnish Universities, Research Institutes and Public Libraries, Richard Poynder.
193 FinELib's Elsevier agreement and transparency – questions and answers, FinELib.
194 Finnish researchers are calling for improved transparency in academic journal pricing, Joona Lehtomäki, No Deal, No Review.
195 France prefers to pay (twice) for papers by its researchers, Open Knowledge International Blog.
196 Germany, Finland, and France, Gavia Libraria.
197 French universities cancel subscriptions to Springer journals, Diana Kwon, The Scientist.
198 Le business des publications scientifiques, SNCS.
199 Elsevier licence offer contravenes Open Access and fair pricing for scientific publications, Alliance of Science Organisations in Germany.
200 Projekt DEAL, About page.
201 From the DEAL engine room – an interview with Bernhard Mittermaier, LIBREAS.

- All publications by authors from German institutions will automatically be open access (CC-BY, including peer review).
- Fair pricing according to a simple, future-oriented calculation model, based on the volume of publications.

Negotiations stalled in early 2017 (Schiermeier and Rodríguez Mega, 2017), leaving German researchers without access to Elsevier titles for more than 40 days before Elsevier reinstated access while they continued negotiating (Vogel 2017). During this termination of access, institutes appear to have suffered little to no problems in matching supply and demand for published articles, using legal methods such as document delivery services and inter-library loan[202]. The increasingly widespread availability of access to research articles, primarily through legal means, represents a significant reduction in risk for cutting off journal access. As an additional negotiation tactic, German researchers began resigning from Elsevier editorial and advisory boards in 2017[203] (full list maintained by Projekt DEAL[204]). The prestigious Helmholtz Centers joined the 'boycott', terminating all of their license agreements effective by the end of 2017[205]. The German Federal Antitrust Authority (Bundeskartellamt) cleared the negotiation process[206], deeming it as a fair competitive practice for German institutes to exercise against Elsevier and other publishers. Forschungszentrum Jülich published an 'Open Access Barometer' describing the transformation from subscription journals to OA, highlighting that Elsevier alone accounted for 41.6% of total expenditure, despite only accounting for 25.6% of publication, and with 92% of this being on subscriptions – substantially higher than any other publisher[207].

Now, more than 160 cooperating scientific organisations have terminated, or not extended, their license agreements with Elsevier as part of a national campaign to strengthen the negotiating position of DEAL[208]; estimated to be up to around 200 German universities at the end of 2017 (Schiermeier 2017b). At the beginning of 2018, as an apparent courtesy Elsevier again reinstated access to all German institutes without a contract, until a national agreement had been reached (Schiermeier 2018b). However, despite further negotiations, DEAL maintained that Elsevier's demands were still unacceptable to the academic community, and no agreement was reached[209]. The result of this was that in July 2018, Elsevier cut of access to all newly published journal content to research institutes in Germany[210].

Nonetheless, this negotiation revealed that national level boycotts can expose 'big deals' as completely dispensable[211], with DEAL calling Elsevier's bluff. Some view this as a good reason to shift entirely away from 'legacy' publishing models, and instead to

202 German universities plan for life without Elsevier, David Matthews, Times Higher Education.
203 Scientists resign editorship of Elsevier journals, Hochschulrektorenkonferenz.
204 Press release HRK: Scientists abandon editorship of Elsevier journals + list, Projekt DEAL.
205 Helmholtz Centers terminate agreements with Elsevier, Roland Koch, Helmholtz.
206 Scholars seek Open Access in academia journal deal, Robbie Morrison et al., WikiTribune.
207 Open Access Barometer, Forschungszentrum Jülich.
208 Contract termination, Elsevier 2017, Projekt DEAL.
209 DEAL and Elsevier negotiations: Elsevier demands unacceptable for the academic community, HRK.
210 Universities in Germany and Sweden lose access to Elsevier journals, Diana Kwon, The Scientist.
211 Germany, Finland, and France, Gavia Libraria.

invest in a 'scholarly commons' model[212]. These successes have also received attention from other editors of Elsevier journals as motivation for a call to action (Wainwright and Büscher 2017). Estimated savings for German institutes in 2017 are around €10 million[213], with this number expected to increase in 2018 as more contracts run out. OA2020 Deutschland recommended that the saved funds be reinvested into initiatives that more readily support the 'transition' to OA, including innovative publishing ventures and their business models, new research workflows, and increase collaboration between libraries and researchers[214].

It is worth noting that while the DEAL project has only been operating progressively since 2016, for many years before this, individual libraries were already cancelling subscriptions to Elsevier journals (e.g., the Center for Mathematics at the Technical University, Munich, 2013[215]). Of note too is that, while language surrounding the DEAL-Elsevier negotiations has been invariably negative and conflicted in the media, language regarding Springer Nature has been overwhelmingly positive by contrast[216].

Italy

In July 2018, it was announced that at the end of 2017 Elsevier had signed a 5-year contract with CRUI (the Conference of Italian University Rectors), which represents more than 70 Italian research institutes[217]. No details on this agreement are available due to the application of confidentiality clauses.

Spain

A news article in February 2018 reported that research from the Unidad de Datos de El Confidencial estimates that Spanish institutes spend around €25 million annually on Elsevier subscriptions[218]. Prices for the 52 individual institutes and smaller, regional consortia have been recently disclosed, but at the present there does not seem to be any national negotiating consortia.

Sweden

In May 2018, the Swedish Bibsam Consortium – comprising 85 research organisations, administer by the National Library of Sweden and governed by a steering committee consisting of representatives nominated by the Swedish Rectors' Conference, the Association of Special Libraries and the National Library of Sweden – decided against renewing its licensing agreement with Elsevier as of June 30[219]. The estimated saving,

212 Open Access in Germany: The best DEAL is no deal, Alex Holcombe and Björn Brembs, Times Higher Education.
213 Will other countries follow Germany into battle with Elsevier, David Matthews, Times Higher Education.
214 What to do with funds after subscriptions with Elsevier are cancelled?, Alexandra Jobmann, OA2020-DE.
215 Elsevier-Zeitschriften, Fakultät für Mathematik.
216 DEAL and Springer Nature: First results of the negotiation, German Rector's Conference.
217 Elsevier Agreement – CRUI for publication in Open Access, Giovanni Salucci, Academic Publishing Services.
218 Todos contra Elsevier, el gigante editorial científico que cobra a España 25 'kilos' al año, Antonio Villarreal, El Confidencial.
219 Sweden stands up for Open Access – cancels agreement with Elsevier, Annica Wentzel, OpenAccess.se.

based on combined subscription and APC data from 2017, is €13.8 million per year[220]. The lack of renewal was based on the tensions between strained university budgets and Elsevier's high prices and profit margins, and a desire to move towards a more sustainable model of OA. Swedish research organisations will retain access to all Elsevier articles published between 1995 and June 2018 as part of the post-termination terms[221]. Stockholm University is already using the finances it has saved to push for a more rapid transformation to full OA by funding only costs for non-hybrid journals[222].

Along with other negotiating consortia in the UK, Austria, Germany, and the Netherlands, these cancellations in Sweden represent the beginnings of a large shift in power dynamics between research institutes and Elsevier, as well as the limits of sustainable partnerships between the parties (Else 2018). Here, one of EI's affiliates, the Swedish Association of University Teachers, appears to have been following the negotiations closely, and communicating developments to its members while taking a clear stance on the matter[223]. The role of the union here may have been critical in providing support for Sweden and the Bibsam consortium, which at the present has taken one of the most progressive stances of any national negotiating body.

Switzerland

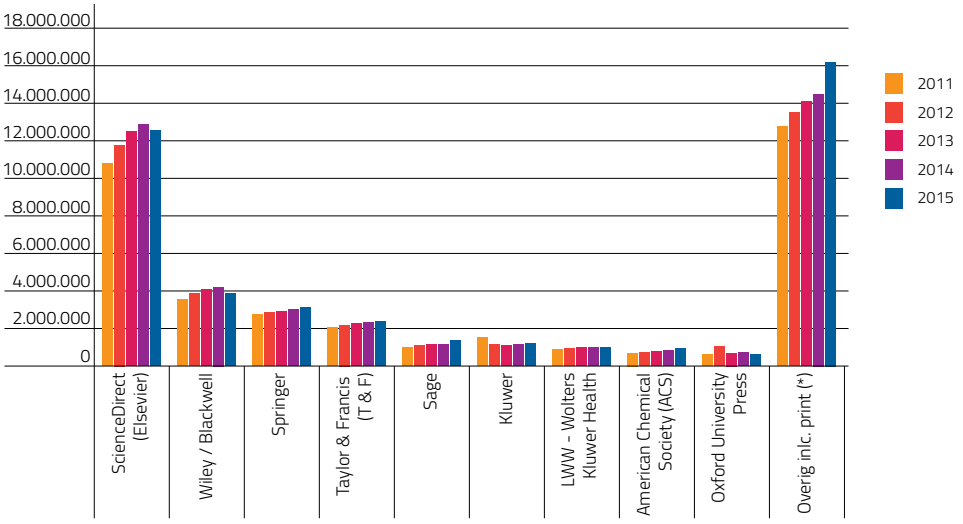
In Switzerland, a request for transparency over licensing contracts with Swiss universities went to the courts, with some universities demanding 11,000 Swiss francs for revealing this information[224]. In the end it was revealed that Swiss institutes were paying around 70 million Swiss francs each year (over 60 million euros) for subscriptions (as of 2015), and a further 6 million for OA (Cambridge Economic Policy Associates Ltd 2017). Elsevier in particular have again been called out for market power abuse[225], and it has been proposed that Elsevier should be reported to the Swiss Competition Commission for its commercial practices. As of 2016, Elsevier remains the largest publisher of Swiss research (22% of articles) (Machado et al. 2016). At the present, Switzerland is taking the same negotiation stance as Austria, Switzerland, and France: 100% OA with full reading access and no yearly price increase[226].

The Netherlands

In 2016, Dutch universities received a request based on the Government Information Act about the costs of publications, and the figures were made available[227]. Between 2011 and 2015, Elsevier received more than 3 times the total revenue of any other publisher for access to ScienceDirect (Figure 11)[228].

220 Sweden's dealings with Elsevier, Open Access 2020 DE.
221 Q&A about the cancellation of the agreement with Elsevier commencing 1 July, OpenAccess.se.
222 Stockholm University gives researchers more support to get published in full Open Access journals, Stockholm University Library.
223 Sverige säger upp avtalet med förlaget Elsevier, SULF.
224 On the situation of Open Access in Switzerland: Interview with Christian Gutknecht, LIBREAS.
225 The ETH Domain and Elsevier: Part 1, Christin Gutknecht, Wisspub.net.
226 Q&A about the cancellation of the agreement with Elsevier commencing 1 July, OpenAccess.se.
227 Overview of costs incurred by universities for books and journals by publisher, VSNU.
228 Overview of costs incurred by universities for books and journals by publisher, dataset, VSNU.

Figure 11. Total costs for Dutch universities by publisher, 2011 to 2015.



In 2015, the Association of Universities in the Netherlands (VSNU), led by the university presidents, announced their plan to start boycotting Elsevier after negotiations for a new open access policy broke down[229]. This boycott comprised three proposed steps:

1. A request for all Dutch scientists with the role of Editor-in-Chief at an Elsevier journal to resign their posts (met with variable willingness[230]).
2. To ask Dutch researchers to stop reviewing for Elsevier journals.
3. To ask Dutch scientists to cease publishing in Elsevier journals.

Eventually, the VSNU reached a 'pilot' agreement with Elsevier that by 2018, 30% of Dutch papers[231] will be allowed to be published OA in selected VSNU-subscribed Elsevier journals (only 397[232]), with no additional cost to universities or the Netherlands[233]. Elsevier will also raise its subscription fees from €11,697,147.68 in 2016 by 2.5% (2017) and 2.0% (2018)[234]. The full contract is available online[235], and the relative level of transparency is noteworthy (the same is also true for more recent agreements between VSNU and Springer Nature and Taylor & Francis[236]). In January 2018, an interview with the chief negotiator of the VSNU, Koen Becking, stated that they were intending to take the same hard stance as Project DEAL and prepare for a 'no deal' scenario[237].

Some researchers expressed their disappointment at this agreement, lamenting the failure to capitalise on the opportunity to use the increased negotiating power of the

229 Dutch universities start their Elsevier boycott plan, Jozien Wijkhuijs, Univers.
230 Universities take first step to boycott scientific publisher Elsevier, Marcel aan de Brugh, NRC.
231 Dutch universities and Elsevier reach agreement in principle on Open Access and subscription, VSNU.
232 Agreement with universities in the Netherlands, Elsevier.
233 The Dutch approach to achieving Open Access, Maria A. M. Heijne and Wilma J. S. M. van Wezenbeek.
234 Leaked Elsevier contract reveals pushback, Sicco de Knecht, ScienceGuide.
235 Elsevier subscription agreement, VSNU.
236 Contracts Springer Nature and Taylor & Francis published, VSNU.
237 "We are prepared for a 'no deal'", Sicco de Knecht, ScienceGuide.

VSNU[238]. However, this boycott is important as it represented a significant shift in relationships and negotiation dynamics between libraries and publishers. Typically, negotiations occurred between Elsevier and individual institutes and their libraries, and not a national consortium of institutional representatives, in this case the Vice Chancellors of the Dutch universities. As such, this represented the first hints of unionisation from academic institutes against the scholarly publishing industry.

United Kingdom

In 2016 Elsevier accounted for around 1/3 of all APCs paid by UK institutes, generating £5.3 million in revenue[239]. It is noteworthy that Elsevier are the only publisher, besides Oxford University Press, to have no offsetting deal in place (i.e., a reduction in subscription revenue commensurate with increased income from 'hybrid' OA). Elsevier are also seeing their article-processing charges (APCs) increasing at a faster rate than competitors like Wiley or Springer Nature, whose APCs are stabilising. Data for many universities from the UK and USA are available from separately from 2014[240] and from 2010 to 2014 (Lawson, Meghreblian, and Brook 2015), with the total amount paid for by UK universities for access to ScienceDirect being around £40 million. In 2016[241], Jisc Collections signed a five-year agreement with Elsevier on behalf of UK research institutes, despite in the same year publishing a report criticising Elsevier's unchallenged practices with 'double-dipping'[242]. In terms of negotiations with Elsevier, there has been generally less organisation and co-ordination in the UK as seen in other countries such as Sweden and Germany. The University College Union (UCU) is broadly supportive of OA and improvements to national research infrastructure, and has pushed strongly for proper OA policies[243]. Along with the UCU, the wider UK research community is taking progressive steps towards a fairer OA system, including the development of the strongly supported Scholarly Communications License[244], which, among other things, would allow researchers to retain legal rights to their work, even if it should go on to be published with Elsevier.

Latin America

Argentina

Unverified subscription amounts for a range of publishers are available online for Argentina, although the source remains unknown[245]. For Elsevier (ScienceDirect and

238 VSNU failed itself in meagre deal with Elsevier, Chris Hartgerink, Univers.
239 Article processing charges in 2016, Katie Shamash, Jisc scholarly communications.
240 Elsevier journals – some facts, Tim Gowers.
241 Jisc Collections and Elsevier agreement: questions and answers, Liam Earney, Jisc.
242 Article processing charges (APCs) and subscriptions, Katie Shamash, Jisc.
243 Open Access, University College Union.
244 About the UK Scholarly Communication License, UK-SCL.
245 Cotizaciones 2008-2016 distribuidos por editor, dataset.

Scopus together), the price has risen from USD $5.85 million from 2008/09 to $13.86 million in 2016/2017, representing a total increase of 236% over that time frame. To date, only a single Argentinian institute, Asociación Latinoamericana de Análisis Cualitativo, has signed the COAR statement in 2015 against Elsevier's sharing policy[246].

Brazil

From the Brazilian Open Science mailing list (April, 2014): Brazil has a nationwide agreement providing journal access to 423 academic and research institutions. It is called Portal de Periódicos, provided by CAPES. According to its 2013 financial report, last year CAPES spent USD $93,872,151.11 (with USD $31,644,204.12 paid to Elsevier)[247]. Some institutions do not meet the eligibility criteria and therefore are not covered by the agreement, so had to pay separately in order to get access to Portal de Periódicos, spending an additional $11,560,438.93 USD. Seven Brazilian research institutes also signed the COAR statement denouncing Elsevier's sharing policy in 2015.

Chile

The Consortium for Access to Electronic Scientific Information (CINCEL) in Chile has detailed records of all subscription information from 2004 until 2016[248]. According to the latest report, Elsevier subscriptions cost USD $3.12 million in 2008, going up to USD $7.65 million in 2016, representing an increase of 245% over the period. To date, only a single Chilean institute, Universidad Diego Portales, has signed the 2015 COAR statement against Elsevier's sharing policy.

Peru

From 2017, Peruvian researchers were set to lose access to ScienceDirect and Scopus (Schiermeier and Rodríguez Mega, 2017). This was due to a combination of a purported lack of appropriate government funding from the National Council for Science, Technology and Technological Innovation (CONCYTEC), increasing subscription costs, and the growing availability of articles at alternative sources on the Web. This is an especially pressing matter given that in 2012, Peru's improving economic status meant that it lost access to research from the HINARI initiative. The estimated annual saving here is $3.3 million USD.

246 Statement against Elsevier's sharing policy, Confederation of Open Access Repositories.
247 Relatorio de Gest„o do exercIcio de 2013, Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior/CAPES, Ministério da Educação.
248 Memorias de la Corporación, CINCEL.

North America

Canada

Since 2015, several Canadian universities have announced significant cuts to their 'big deal' packages, or the intention to cancel them. These include the Université de Montréal[249], Memorial University[250], and Ryerson University[251]. Motivation for this largely comes from analysis of usage data, showing that large numbers of 'big deal' titles are virtually never used, and therefore insufficient value for money. Simon Fraser University provides annual cost data for all serials broken down by department (but not by publisher)[252]. The University of Alberta has also made data from 2014 to 2017 on subscription expenditures publicly available, as a commitment to its core institutional principles of accountability, openness, and transparency[253]. In February 2018, the Canadian Association of Research Libraries (CARL) released a report calling for a national response to increasingly unsustainable cost of journals[254]. Aspects of this include redistribution of library budgets, collective re-negotiation for a better deal, unbundling of the 'big deal' packages, and presenting a united front while doing this. Recently, subscription data for CARL members for the period 2016-2017 were released, revealing a total cost of $35,839,070 for 26 institutes' access to ScienceDirect, representing almost half of the total amount spent on licensing to all vendors (Khair 2018). Western University announced also that as of January 2019 it would be shifting all of its library-hosted journals away from the now Elsevier-owned Digital Commons platform to the Open Journal Systems open source journal management system[255].

United States of America

In the US, the total amount paid for by libraries in terms of subscriptions has increased by more than 20% from 2013-2017 for all but public libraries[256]. In 2009, US-based researchers sought the details of these contracts using state Freedom of Information Act laws to analyse the long-term economic impacts of subscription contracts in the USA. This was contested by Elsevier at Washington State University and the University of Texas[257], but the judge ruled unequivocally against them, putting public access to this information above private interests[258]. This research demonstrated that Elsevier journal subscription bundles are variably cost effective in terms of cost per citations, concluding: "Among the commercial publishers in our study, Elsevier's prices per citation are nearly 3 times those charged by the non-profits, whereas Emerald, Sage,

249 UdeM Libraries cancel Big Deal subscriptions to 2,231 periodical titles published by *Taylor & Francis Group*, Les Bibliothèques.
250 Memorial University Libraries Collections Review 2015-2016, Memorial University Libraries.
251 Ryerson University says it must consider cancel journal subscriptions, like MUN is considering, Laura Howells, CBC.
252 SFU Library serials cost, Simon Fraser University.
253 Subscription expenditures, University of Alberta Libraries Dataverse.
254 Responding to unsustainable journal costs. A CARL brief. Kathleen Shearer, CARL.
255 Journal publishing, Western Libraries.
256 Five year journal price increase history (2013-2017), EBSCO.
257 Elsevier's failed effort to prevent release, Ted Bergstrom.
258 Elsevier versus Washington State University, State of Washington Superior Court.

and Taylor & Francis have prices per citation that are roughly 10 times those of the non-profits" (for large, PhD-granting universities) (Bergstrom et al. 2014). In 2004, Peter Suber assembled a comprehensive list of US-based university libraries that had taken action against publishers (primarily Elsevier) in protest of high journal prices[259]. Where data on subscriptions prices are available, the costs of the contracts are extremely high (e.g., for New York State, with individual contracts in excess of USD $57 million[260]).

Recently Florida State University Libraries joined numerous other US-based research institutes in cancelling its Elsevier 'big deal' subscription, due to unsustainable high and ever-increasing costs[261]. The consequence of this is that the library can now reinvest the saved funds (around $2 million per year) into other critical services and materials for its researchers. Access to Elsevier titles was retained through a combination of selective subscription to most-used titles, single-article payment options through Web of Science, and standard inter-library loan procedures[262].

259 University actions against high journal prices, Peter Suber, SPARC Open Access Newsletter.
260 Open Book New York, Office of the State Comptroller, search for Elsevier.
261 Changes to FSU's Elsevier 2019 subscriptions, Julia Zimmerman, Florida State University Library.
262 Minutes, Faculty Senate meeting, March 21, 2018, Florida State University.

Ongoing developments

Summary: Elsevier are currently fighting against most of the scholarly communication ecosystem on numerous fronts. They are engaging in legal battles with ResearchGate and Sci-Hub, demonstrating their will to control the outputs of scholarly research. High-level negotiations between Elsevier and national consortia of research institutes are helping to rebalance the skewed power asymmetries and strengthening their negotiation stances. The consequences of this are the beginning of a chain of events where Elsevier are struggling to justify the value add of their services within a rapidly changing scholarly communications landscape.

Negotiations – not business as usual

Negotiations between a range of national consortia and research institutes and Elsevier continue, and are attracting significant media attention. The strength of these national consortia is relatively powerful compared to negotiations at the individual institutional level and help to address the power asymmetries between Elsevier and libraries[263]. This is due to a system of 'collective bargaining', which was otherwise impossible at the individual level, and also to the occlusion that typically occurred with individual deals through application of 'non-disclosure agreements'. What remains ironic is that negotiations even happen at all. Libraries and researchers act as both service providers and consumers and provide the critical services of peer review and editorial work that Elsevier need to legitimise their journals and form the basis for their products. If Elsevier, as a service provider, want to be paid then they should have to demonstrate that the services they provide beyond packaging and branding are of positive value, in competition with other publishing houses, and are commensurate with the services they provide. This is why the German and Swedish cases are so important, as they are proving for the first time that the traditionally held power dynamic is completely backwards to how it should be. If Germany and Sweden remain successful in their negotiations, then other negotiation consortia will have substantially more leverage in the future. It is estimated that around 350 consortia that license scholarly content exist, with numerous additional institutes outside of these[264].

263 Time for Elsexit?, Tim Gowers.
264 Will consortia cancellations change the market?, Dan Pollock, Delta Think.

Activation of these consortia in a similar manner to that of Germany and Sweden could have a substantial financial impact on the scholarly communication market. It is entirely possible that the consequences form a chain of events, including:

- Researchers choosing non-Elsevier alternatives for publishing;
- Researchers read proportionally fewer Elsevier articles, impacting usage data;
- Libraries continue to let subscriptions to Elsevier titles run out;
- Researchers cite proportionally fewer Elsevier articles; and
- Elsevier journal brands become diminished.

Even as far back as 2004, there were numerous public statements that protested not just Elsevier's prices, terms, and policies, but also its negotiation tactics[265]. Elsevier apply such a 'divide and conquer' approach and the application of terms, such as non-disclosure, in order to maintain their negotiation power and to keep costs from being lowered by removing any element of competition[266]. As such, these national consortia are developed and strengthened, and could perhaps even become internationally co-ordinated, in which case we should expect to see a substantial weakening of Elsevier's negotiation strength, and the reduction of their dominance towards higher education and research institutes.

The 2017 financial report from RELX indicated that Elsevier's profit margins remained at 36.8%, the same as 2016[267]. The report notes that if the ongoing methods of negotiation between Elsevier and national consortia continue, it could have serious adverse effects on their revenue. In February 2018, financial analysts have noted that this has created an "uncertainty problem" with RELX, due to the high revenue from their STM division, and in particular the impact that the ongoing German negotiations are having[268]. At the present, RELX group is undergoing a corporate restructuring, becoming primarily listed in London (UK). The company is also buying back shares en masse at the present, with the intention of purchasing £700 million back in 2018[269].

Elsevier versus ResearchGate

As of 2017, Elsevier are leading a legal battle against the for-profit scholarly networking platform, ResearchGate, for large-scale illicit sharing of copyrighted research articles. ResearchGate is renowned for remaining apathetic to the copyright status of uploaded articles, and actively encourages researchers to illicitly upload copyrighted content through aggressive communication strategies. This latest episode was sparked by a letter from the STM Association, hosted on Elsevier's website, which contained a series of threats to ResearchGate to cease activities or face legal repercussions[270]. ResearchGate did not publicly respond to the letter. One consequence of this was an apparent

265 University actions against high journal prices, Peter Suber, SPARC Open Access Newsletter.
266 Elsevier's David Tempest explains subscription-contract confidentiality clauses, YouTube.
267 Results for the year to December 2017, RELX Group.
268 Diverse opinions on RELX ahead of results this week, with an Investec 'buy' just in favour, Proactive Investors.
269 RELX 2017 profit jumps; to shift to single company, Adra Calatayud, Market Watch.
270 STM proposal – RG platform to become consistent with usage and access rights for article sharing, Lenz Caemmerer.

rift between publishing members of the STM Association. Elsevier and 4 other publishers formed a new organisation, the Coalition for Responsible Sharing[271], to tackle ResearchGate, while Springer Nature released a very short joint statement with ResearchGate about ongoing co-operations[272]. The remaining 130+ member organisations have otherwise largely remained silent.

At the present, the American Chemical Society and Elsevier have both taken to the courts in Germany to clarify the copyright responsibility of ResearchGate (Chawla 2017). While details remain limited, it does seem that ResearchGate has been making some infringing articles private, but without notifying the Coalition[273]. However, it is unclear on what scale, with what protocol, if it was reversible, in co-operation with whom, and whether authors were even made aware.

Elsevier versus Sci-Hub

Sci-Hub, often labelled a 'pirate website' is an archive of more than 65 million research articles, and perhaps the biggest current act of civil disobedience to challenge the commercialisation of knowledge. In 2017, Elsevier sued Sci-Hub for copyright infringement[274], being awarded $15 million USD in damages for 100 articles[275] in a default judgement (Schiermeier 2018a). The sole founder of Sci-Hub, Alexandra Elbakyan, never appeared in court, the website portal remains operational, and she has said Elsevier will never see any of that money. Researchers have publicly stated their solidarity with Sci-Hub over the matter, stating that this issue simply indicates how broken the scholarly communication system is[276]. Of relevance here is a 300-page report, conducted by the Dutch company Ecorys, awarded in January 2014 and worth €360,000, and on behalf of the European Commission. This report was delivered to the EC in May 2015 but remained strangely unpublished, and found that there is no evidence to support the idea that online copyright displaces sales[277]. The report was finally made public after a Freedom of Information request by Julia Reda MEP in July 2017.

What is interesting about both of these developments with ResearchGate and Sci-Hub, is rather than Elsevier seeing these as indicators of an access problem that they have created (Lawson 2017a), they are instead seeking to punish those websites and doing little to remedy the problem. Indeed, when an informal poll on Twitter asked "What does the most damage to the scholarly community?", 95% voted for Elsevier, and only 5% for Sci-Hub (with 956 votes total)[278]. Conversely, by attacking platforms that are actively promoting the widespread distribution of knowledge (through whatever means they deem necessary), Elsevier are explicitly labelling themselves as opposing that.

271 Publishers and societies take action against ResearchGate's copyright infringements, Coalition for Responsible Sharing.
272 ResearchGate and Springer Nature plan cooperation, Springer Nature.
273 ResearchGate removed significant number of copyrighted articles, Coalition for Responsible Sharing.
274 Academic publishing giant fights to keep science paywalled, Maddie Stone, Gizmodo.
275 Exhibit A – List of 100 representative Elsevier works infringed by Sci-Hub and LibGen, Stephen McLaughlin.
276 In solidarity with Library Genesis and Sci-Hub, Custodians Online.
277 What the Commission found out about copyright infringement but 'forgot' to tell us, Julia Reda.
278 TedOnPrivacy, Twitter.

Conclusions

At the present, the vast majority of scholarly research remains behind expensive paywalls under the ownership of private publishing companies. The largest of these, Elsevier, represents one of the greatest barriers towards public access to research and education, and through a combination of aggressive pricing strategies and political lobbying is doing all that it can to stifle the advances of sustainable Open Access and scholarly research around the world. It has achieved this status through direct lobbying against OA, steep pricing regimes within a dysfunctional and oligopolic journal market and making sure that it is present at numerous political positions and throughout the research workflow, despite numerous apparent conflicts of interest. Elsevier are chief among scholarly publishers in privatising critical research knowledge that should be both a public good and being used to advance human education and society.

Potential future role of unions

There is an incredible amount of scope for unions to become more engaged with a range of activities mentioned in this report, including challenging Elsevier's rent-seeking behaviour and helping to accelerate the movement towards a fully OA ecosystem. Such can be achieved largely through co-ordinated efforts to help inform their respective members about Open Access, and also challenging Elsevier and their business practices. This is especially the case for unions that already have position statement or policy on Open Access, such as the Canadian Association of University Teachers[279] and University and College Union[280] (UCU). One strong example of such engagement is when UCU consulted its 1,600 academic members to respond to the HEFCE 2013 consultation into OA, which challenged the national imposition of a preference towards high-cost 'gold' OA. The largest areas of potential influence are outlined below in the recommendations, and largely revolve around harnessing the currently untapped power of academic communities to help underpin larger changes occurring in scholarly communication, including with respect to author rights and freedom, national negotiations between publishers and academic consortia, and shifts in scholarly research evaluation criteria.

Academic freedom

One of the core aspects of academic freedom relates to the right of authors to choose the venues and methods for disseminating their research. At the present, such freedoms are

279 Policy statement on Open Access, Canadian Association of University Teachers.
280 UCU as a union supports moves towards Open Access publication, University and College Union.

directly impinged upon by commercial publishers like Elsevier, who trade the academic capital associated with their journal brands in exchange for the potential of career advancement. With respect to developments in OA, the high costs that Elsevier imposes, as well as complicated embargo periods that conflict with research funder policies, create further tensions with academic freedom. In practice academic freedom of dissemination of scholarly works is essentially a myth, as the power dynamic is skewed away from academics and towards the control of publishers.

Intellectual property

Elsevier currently operate a clever publishing system, whereby the premise of additional protection and rights is sold to authors, who actually for the most part lose all rights to their research. This is due to harmful tactics using publication agreements that require academics to trade their rights away for the perceived benefits of publishing that work in an Elsevier title, which itself contravenes basic academic freedoms as mentioned above.

Rights to accessing knowledge

The primary business model that Elsevier operates is access prevention. It achieves this through a combination of anti-open tactics including long embargo periods, high and increasing subscriptions fees, and high charges for OA. Virtually all of these practices contradict the general principles of scholarly communication in that knowledge should be shared as widely and as rapidly as possible.

Public money turned into private profits

The increasing profit margins of Elsevier (5-6% per year growth) are in stark contrast to global university and research funding trends and prohibit any sort of sustainable investment into a community-governed scholarly research infrastructure. The core problems here of shrinking library budgets for subscriptions, deteriorating of working conditions of academic staff, academic career advancement based primarily on publications, and research output evaluations based on citation metrics for those publications, lead to a system in a Groundhog Day state, in which academics are destined to repeat the same actions until committing to a substantial change in behaviour.

Elsevier are clearly 'double-dipping' on subscription and OA fees. Given the disproportionately high cost of Elsevier hybrid OA titles, it should be made clearer that APCs will only be paid for APCs in which costs are transparently related to the costs of production. The fact that Elsevier are continuing to adopt practices that demonstrate they are clearly converting income from the public funding of OA to increasing profits should be extremely damaging to their reputation. Given that around 68-75% of Elsevier's

revenue comes from public sources, there is a clear public interest at stake here, and an incentive for governments to intervene on pricing issues. This is especially the case now that there are many close links between national policies on industrial strategies and innovation and those on publicly-funded research.

Democratic deficit and transparency

Elsevier are engaged in political processes in numerous jurisdictions and at multiple levels, which has a direct impact on the development of public policy. This is best exemplified by their distortion of the UK's Open Access policy, their political lobbying against OA in the USA, and the level of access they have to the European Commission and European Parliament. This represents a profoundly undemocratic practice, and members of committees (e.g., the Horizon 2020 expert group on the Future of Scholarly Publishing and Scholarly Communication) with explicit commercial interests should not be invited to draft public policy and should be removed from positions where this is the case. Scholarly communications communities should decide what services it values from publishers and allow vendors such as Elsevier to supply it competitively, in the same as virtually every other industry. There are mechanisms where evidence from the private sector can be integrated into the drafting of public policies, such as through responses to consultations.

As a matter of public interest, the nature of the right to access information on contractual agreements ('big deals') between publicly financed research institutes and Elsevier also requires reconsideration. In countries where the subscription rates to Elsevier remain unknown, the capacity for using freedom of information requests (or equivalent) to obtain this data needs to be strengthened in order to gain a more holistic global view of Elsevier's subscription revenue flow.

Need to organise and form coalitions

The biggest opportunity for in response to Elsevier's business practices comes from the national consortia negotiations, which illustrate the effect of taking a collective stance during licensing negotiations. These are both impactful at the local level, and also generate substantial media attention. These are demonstrating that without the involvement of research communities and institutes, publishers lose the majority of their apparent value. This represents an enormous power shift, by highlighting the dependency that publishers have on research institutes in maintaining their relevance and reputation. Germany is taking a clear lead in this respect at the present. While on the grander scale of things, the present negotiations are perhaps not too impactful, they represent a changing series of conditions that can be leveraged for greater disruption of the scholarly communication industry. Interconnectivity between these national consortia will be pivotal and strengthen their collective negotiation positions even further. If Elsevier are deprived of their primary revenue source (i.e., 'big deals'), a chain reaction could start and the entire company could

become much less powerful. To be most effective, this would be best delivered before Elsevier have completed their transformation into a research workflow and data analytics service provider.

Ultimately, the intention here should be to disengage with the commercial model of scholarly publishing altogether, and to establish a community-owned scholarly communications infrastructure for public access to research and education. Policymakers will become more empathetic to this vision and the needs of research institutes once they see greater cross-sectorial resistance. This in turn means they will stop being so indifferent towards the profits of the scholarly publishing industry and start revising or creating policies that are less influenced by corporate interests.

Alternatives to Elsevier and related commercial approaches

Elsevier have put themselves at immense risk through a system of acquisition. They assume that the communities who use them will remain loyal to the services, in spite of any existing hostility, and that user attrition rates will remain low. Elsevier are heavily reliant on acquired user bases, which are often established based on product engagement and trust. Furthermore, by moving into service-oriented workflows, Elsevier are at risk as such services are both dispensable and can be substituted by users, unlike scholarly journals. Based on the multiple cases where entire editorial boards for Elsevier journals have resigned and established new journals, an awareness campaign targeting the 20,000 or so remaining editors could be extremely effective. Finally, there is an increasing need to provide additional support to the African scholarly publishing sector, in order to stop Elsevier infiltrating this market with a pan-African megajournal, with all the traits of a neo-colonial takeover of African scholarship[281]. There is too much at stake to let Elsevier manage research publication at this scale in Africa.

281 An Elsevier African megajournal proposal re-colonising the university in Africa?, Eve Gray, University of Cape Town Intellectual Property unit.

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a report on the scholarly publisher, Elsevier

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