Open access: Could defeat be snatched from the jaws of victory?

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When news broke early in 2019 that the University of California had walked away from licensing negotiations with the world's largest scholarly publisher (Elsevier), a wave of triumphalism spread through the OA Twittersphere. The talks had collapsed because of Elsevier's failure to offer UC what it demanded: a new-style Big Deal in which the university got access to all of Elsevier's paywalled content ***plus*** *OA publishing rights for all UC authors – what UC refers to as a "Read and Publish" agreement. In addition, UC wanted Elsevier to provide this at a reduced cost.[1] Given its size and influence, UC's decision was hailed as "a shot heard around the academic world".[2] The news had added piquancy coming as it did in the wake of a radical new European OA initiative called Plan S. Proposed in 2018 by a group of European funders calling themselves cOAlition S, the aim of Plan S is to make all publicly funded research open access by 2021.[3] Buoyed up by these two developments open access advocates concluded that – 17 years after the Budapest Open Access Initiative (BOAI) – the goal of universal (or near-universal) open access is finally within reach. Or as the Berkeley librarian who led the UC negotiations put it, "a tipping point" has been reached.[4] But could defeat be snatched from the jaws of success?*

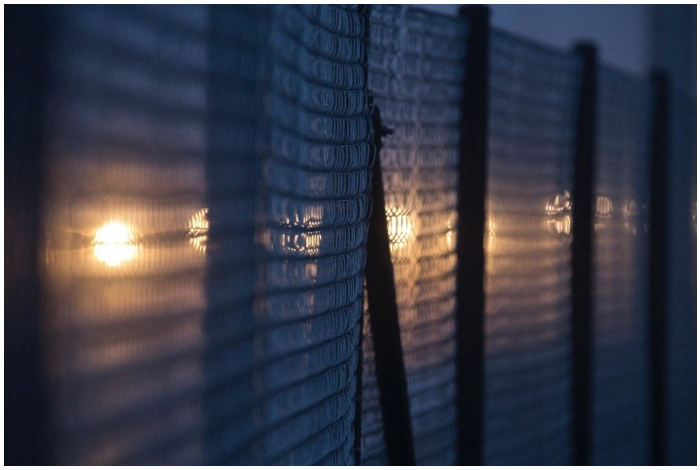

Photo by Phil Botha on Unsplash

[1] The issue of costs is complicated, with both sides of the dispute putting a different spin on it. But UC believes it should be paying less in an OA world. In fact, it can expect to pay more. See Page 63 for more on this.
[2] Elsevier did not cut off access until July.
[3] Initially it was meant to be 2020, but in response to criticism more time has been given.
[4] This is by no means a new claim. A tipping point for open access has been called regularly over the past ten years – see, for instance, this from six years ago, and this from three years ago.

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-- W H AUDEN
IN MEMORY OF W. B. YEATS

In the way of background

Let's start with some history: Although a few researchers (mainly physicists) had begun to make their papers freely available on the internet a number of years before the 2002 Budapest Open Access Initiative, it was at the BOAI meeting that the term "open access" was first used. And it was there that the OA movement is said to have been born.

The accompanying declaration issued by BOAI called for the removal of all obstacles preventing access to scholarly research, notably paywalls (financial barriers) but also legal and technical barriers. By make their work OA, BOAI said, researchers could "*accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, make this literature as useful as it can be, and lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge.*"

In short, the goal of the open access movement was to make all research freely available to everyone in the world. The assumption was that this will democratise knowledge and benefit not just the research community but the public (who fund research) and, crucially, researchers in the Global South, for whom the cost of journal subscriptions has always been prohibitively high.[5]

Open access advocates viewed OA as a no-brainer in an online world, and it was assumed that OA would be a bottom-up revolution in which researchers voluntarily made their research papers freely available to all by placing copies of them on the open internet. Alternatively, publishers would do it for them.[6] There was no expectation that governments or funders would be involved, or that researchers would need to be compelled to embrace OA, although it was accepted that they and their publishers might need a little persuading.

BOAI was very much of its time. Six years earlier cyberlibertarian John Perry Barlow had posted online his Declaration of the Independence of Cyberspace. This was in response to the

[5] That little consideration was given to the fact that many in the Global South have no or very poor access to the internet is telling.
[6] By, for instance, allowing authors to self-archive their papers on the internet (green OA) and/or themselves make papers OA (via gold OA).

passing into law of the US Telecommunications Act of 1996, which had for the first time included the internet in broadcasting and spectrum allotment. Addressing governments, Barlow proclaimed: "I declare the global social space we are building to be naturally independent of the tyrannies you seek to impose on us. You have no moral right to rule us nor do you possess any methods of enforcement we have true reason to fear."[7]

Inherent to Barlow's declaration was an assertion that governments had no authority to determine what happens on the internet, where a new self-governing, extraterritorial community was being created, which operated with rules based on unwritten codes and ethics independent of nation states. Amongst other things, this new culture held that in an online world information can and should be freely shared with anyone, regardless of their geographical location, nationality, religious belief, or the political context in which they lived. And it was assumed that this sharing would be done in a democratic non-hierarchical way.[8]

Cyberlibertarians like Barlow viewed the emergence of the internet as analogous to the invention of the printing press, but far more revolutionary and far more democratising.[9] What was held to be especially liberating was that it was now possible to copy and share information and content with anyone on the internet with a "click of the mouse"[10]

Embracing this credo, OA advocates predicted that the internet would see radical new forms of scholarly communication emerge. Stevan Harnad,[11] for instance, anticipated that researchers would engage in what he called "Skywriting" by means of Quote/Commenting. However, before this would be possible, he added, it would be necessary to achieve universal open access. As he put it, "The last papyrocentric habit we need to break is the notion that access-toll-gates must always separate our skywritings from their would-be skyreaders, commentators, and users."

A key point to make is that the internet was created not by entrepreneurs, start-ups or large companies in pursuit of profits but by the research community working in a non-commercial environment. As such, business models were not considerations. Of course, the network was subsequently commercialised (in 1995), but the ethos of free sharing had by then been baked into the internet. It was assumed, therefore, that what the internet offered corporations was

[7] This view bears comparing with that of the free market creed of neoliberalism. As Shoshana Zuboff put it in her book, *The Age of Surveillance Capitalism,* the free-market creed "aimed to revive acceptance of a self-regulating market as a natural force of such complexity and perfection that it demanded radical freedom from all forms of state oversight". She added. "Hayek explained the necessity of absolute individual and collective submission to the exacting disciplines of the market as an unknowable 'extended order' that supersedes the legitimate political authority vested in the state: 'Modern economics explains how such an extended order . . . constitutes an information-gathering process . . . that no central planning agency, let alone any individual, could know as a whole, possess, or control. . . .'"

[8] However, as Clay Shirky pointed out in 2003, with all human interaction power laws come into play.

[9] The Gutenberg Revolution on speed if you like.

[10] The constant battle over copyright on the internet that we have seen since Barlow's declaration, most recently over the EU Copyright Directive, demonstrates how naïve cyberlibertarians were.

[11] Skywriting, wrote Harnad in 2011, is "a new medium that … made my e-mailing seem as remote and obsolete as illuminated manuscripts. The principle is the same as e-mail, except that your contribution is 'posted' to a global electronic network, consisting currently of most of the universities and research institutions in America and Europe and growing portions of the rest of the scholarly and scientific world. I'm not entirely clear on how 'the Net,' as it is called, is implemented and funded, but if you have an account at any of its 'nodes,' you can do skywriting too."

not a platform for extracting new profits but a new way of engaging with customers by means of mutually beneficial online "conversations".

This argument was most fully articulated in the 1999 *Cluetrain Manifesto*, which asserted that a powerful global conversation has begun. Through the Internet, it said, "people are discovering and inventing new ways to share relevant knowledge with blinding speed."

In a list of 95 points, the authors went on to argue, amongst other things, that "In just a few more years, the current homogenised 'voice' of business – the sound of mission statements and brochures – will seem as contrived and artificial as the language of the 18th century French court."

They added that companies that do not belong to a community of discourse "will die."

Tellingly, the word profit appears just four times in the *Cluetrain Manifesto*, including in this paragraph: "Fact is, we don't care about business – per se, per diem, au gratin. Given half a chance, we'd burn the whole constellation of obsolete business concepts to the waterline. Cost of sales and bottom lines and profit margins – if you're a company, that's your problem. But if you think of yourself as a company, you've got much bigger worries."

This is not what we see on the internet today of course: mission statements abound, talk of profit is perennial and the web has become a massive shopping mall with most companies focused on doing what they always do: selling products and services. And corporate use of social media by and large differs very little from the way companies have always communicated with the world – i.e. in a contrived, artificial and homogenised way.

This should not surprise us. The one and only objective of corporations is to sell products and make money, not to chat online. However, it draws our attention to the fact that a fundamental conflict of cultures has always been inherent to the network: while most users assume everything should be free for all, companies view the network as virgin territory to be conquered, appropriated and monetised, for the benefit of shareholders and owners. This disparity of culture and expectations could be characterised as a conflict between the utopian exceptionalism espoused by cyberlibertarians and the abiding commercial view that (even on the internet) the only valid goal is to create new markets and maximise profits. This conflict is best exemplified by the music industry's response to the launch in 1999 of the music sharing service Napster – it embarked on a massive legal campaign that saw Napster shuttered within two years.[12]

There are lessons here for everyone who makes use of the internet – not least scholarly publishers and OA advocates – that I hope will become evident in what follows. Above all, we have re-discovered the hard truth that there is no such thing as a free lunch. Providing free content and services inevitably requires some form of revenue from somewhere. More noteworthy, we have learned that openness is by no means an unmitigated good.

Thus, for instance, the internet's foundational ethos of free sharing led web companies to devise business models that are now seen as both deceptive and predatory. Companies like

[12] Sure, the music industry changed as a result, but it is now more profitable than ever, while artists see less and less of the profits. What it has not seen is for music to become universally free to all.

Facebook and Google (a company whose motto was once "Don't be Evil") have created models that have worrying implications for, amongst other things, privacy and transparency. These are models in which (as the saying goes) "the user has become the product".[13]

Shoshana Zuboff has characterised this as "surveillance capitalism", since it consists of silently monitoring users and harvesting, storing and selling not just their personal information but the "data exhaust" that their online activities generate.[14] These data are then monetised in ways that not only run roughshod over and compromise users' privacy but allow the harvesting companies to predict, modify and direct user behaviour. As such, says Zuboff, they present a serious threat not just to users' freedom but to their moral agency.

We could note in passing that in creating and promulgating surveillance capitalism, companies like Google have utilised (and continue to utilise) very similar arguments to those put forward by cyberlibertarians like Barlow – arguing, for instance, that, "The online world is not truly bound by terrestrial laws . . . it's the world's largest ungoverned space."

Most now view these arguments as both specious and dishonest. As Zuboff points out, surveillance capitalism was arrived at when search and social media companies faced the real-world dilemma of having to make money in order to be able to continue offering the free services they had developed. Today we know these models have had undesirable unintended consequences. I shall suggest that open access has also had undesirable unintended consequences. And it is partly because the internet was developed by and for the research community, in a non-commercial environment, that OA advocates failed to anticipate them.

Thus the internet (which began life[15] as the Advanced Research Projects Agency Network, or ARPANET) was the product of a publicly-funded project,[16] and it was a team at the public University of California, Los Angeles (UCLA)[17]that in 1969 sent the very first message over the network, creating the email system we know today.

Likewise, it was at the publicly-funded European research organisation CERN that in 1991 Tim Berners-Lee invented the Web, when he wrote the first web browser and editor. As Berners-Lee explained at the time, "The project started with the philosophy that much academic information should be freely available to anyone. It aims to allow information sharing within internationally dispersed teams, and the dissemination of information by support groups."

In other words, both the internet and the web were created and designed to share research information, not to make money. This was also the aim of the physics preprint server arXiv that Paul Ginsparg created it in 1991[18]

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[13] This phrase, says Shoshana Zuboff in her book *Surveillance Capitalism*, is a misnomer. "You are not a product; you are the abandoned carcase. The 'product' derives from the surplus that is ripped from your life."
[14] What Zuboff calls the "behavioural surplus" created by user activity.
[15] In 1966.
[16] Specifically, the US Department of Defense and the National Science Foundation.
[17] Led by computer scientist Leonard Kleinrock.
[18] arXiv was created by Paul Ginsparg, initially as a central repository mailbox, later as an FTP service and then a Web service. Today arXiv hosts 1,509,050 e-prints in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics, all of which are freely available.

OA advocates also gave far too little thought to the fact that scholarly communication consists of a complex set of tasks and that these tasks incur costs (not least the cost of managing the peer review process). Nor did they factor in that many of these tasks – and ultimate control of the process – have since WWII to a great extent been outsourced (in the Global North at least) to for-profit companies with hungry shareholders to feed.

It did not help that the costs of scholarly publishing have traditionally been paid by librarians (via journal subscriptions), not the readers of the journals. Since these subscriptions are paid by intermediaries, and so the journals are free at the point of use, most researchers were and remain oblivious to the true nature of the costs being incurred on their behalf.

As a result researchers have too little understanding of the *affordability* problem that BOAI was partly intended to resolve.[19] For their part, supporters of green OA argued that all that was necessary was for researchers to post copies of their papers online. This, they assumed, would not incur any additional costs (but would not solve the *affordability* problem of course).[20] Alternatively, they anticipated new gold OA journals would be launched to offer publishing services at a much lower price than traditional journals. They failed to appreciate, however, that while some tasks can be discontinued in an online world new tasks become necessary. So while Harnad argued that in an online world costs would be less than 25% of the costs of print publishing, the reality may be that they are greater in an online world.

In short, OA advocates were almost exclusively focused on the *accessibility* problem. When the costs of open access (the *affordability* problem) could no longer be ignored, they encouraged publishers to introduce a deeply problematic business model – pay-to-publish open access funded by means of article-processing charges (APCs). Much as social media companies developed predatory business models, the OA movement gave the world predatory publishing.

OA advocates also failed to anticipate the ability of legacy publishers to adapt to the new environment in ways that would allow them to maintain their power and (as we now see) to increase it – by offering pay-to-play OA publishing services themselves, and priced at a level intended to migrate their profits to the new environment.[21]

Meanwhile, researchers have consistently proved reluctant to embrace green OA. For it turns out that most are content to continue sharing their work in the way they have always done – i.e. by submitting their papers to traditional journals and leaving the task of distribution to the publisher. In this respect, physicists were not typical: arXiv was intended to extend to the internet a long-standing practice of sharing print-based preprints via the postal service or fax. This habit is not one that most researchers understood or were attracted to.

Above all, researchers and their institutions have remained obsessed with ranking and scoring measures like the Impact Factor, not least because these provide off-the-shelf evaluation tools

[19] BOAI stated that "experiments show that the overall costs of providing open access to this literature are far lower than the costs of traditional forms of dissemination."
[20] Harnad argued that self-archiving would force publishers to downsize or get out of the way As he put it, "Paper publishers will then either restructure themselves (with the cooperation of the scholarly community) so as to arrange for the minimal true costs and a fair return on electronic-only page costs … or … watch as the peer community spawns a brand new generation of electronic-only publishers who will."
[21] Which, many will argue, was necessary.

for promotion and tenure purposes. Even though most now understand how inaccurate and manipulable such tools are 75% of European universities still use the IF to evaluate careers and 91% of Berkeley faculty still consider high impact factor an extremely important criterion when determining where to publish.[22] Unsurprisingly, therefore, researchers continue to insist on publishing in the prestigious journals primarily owned by for-profit legacy publishers.

In short, like all the early denizens of cyberspace, OA advocates gave little or no thought to how the free online content and services they were demanding would be funded.[23] For their part, publishers were understandably chary about open access. Immediately seeing the potential threat to their businesses, they dragged their feet until they could see a way of making sufficient money out of open access. This has seen the *affordability* problem that OA was meant to solve ported to the new environment.

It is this combination of publishers' determination to maintain their revenues and researchers' lack of interest in open access, plus the naivety of OA advocates, that has made achieving OA such a difficult and protracted process.

However, two developments have brought these matters to a head. First, librarians (who signed up to OA in the belief that it would solve the *affordability* problem) have begun to insist that the traditional subscription agreements they sign with publishers must now include OA publishing rights as well as access to the publisher's paywalled content. They are also demanding that these should be less costly than traditional subscription deals. And when they don't get them they are now willing to walk away from the negotiating table today. California's decision to reject Elsevier's offer is just the latest such incident – we have seen similar decisions taken in both Germany and Sweden.

Second, persuaded by OA advocates that open access will reduce costs and stimulate the economy, governments and funders have been introducing ever more coercive OA mandates to compel researchers to embrace OA. Plan S is just the most recent and oppressive such mandate.[24]

These two developments have led open access advocates to conclude that a tipping point has been reached and the war won, or that it is about to be won. But if we have indeed arrived at a tipping point, can we be sure it will deliver the victory OA advocates expect? Will it achieve the objectives outlined in the BOAI Declaration? Will it solve both the *accessibility* and *affordability* problems? Will either be solved? Could defeat be snatched from the jaws of victory?

Below I discuss a number of reasons why I believe the BOAI objective of *"uniting humanity in a common intellectual conversation and quest for knowledge*" may not be realisable. I make no pretence that I can predict the future, or that the issues I discuss will prove sufficient to derail the movement. But since OA advocates have a history of failing to see the big picture, or anticipating the unintended consequences of their advocacy, I think these scenarios are worthy of consideration – if only to anticipate potential problems and try to mitigate them.

[22] Despite attempts to censure the practice.
[23] It was this mindset that was to lead to the long-standing conflict over copyright laws we have seen on the internet, not least with Napster.
[24] Indeed, Plan S is the *non plus ultra* of coercive OA mandates.

Pushback/ counterrevolution?

I want first to consider the possibility that open access could face a counterrevolution. One reason why it could is that while OA advocates often present openness as a moral issue,[25] governments have chosen to support OA for financial and economic reasons.[26] For them, OA is grist to the neoliberal mill. That is, they believe greater openness will boost the national and/or regional economy and save money. They assume, for instance, that OA to scholarly papers will make it easier for SMEs to monetise publicly funded research and turn it into profitable products and services to drive the economy.

The also assume that making scientific data freely available will have a positive financial effect. Thus a 2018 EU report estimated that FAIR data could save the economic bloc €10.2 billion per year. More recently it was reported that the EU's Open Data strategy is expected to provide an annual €40 billion boost to the EU's economy.

Such claims and estimates notwithstanding, it is in fact far from easy (perhaps not possible at all) to demonstrate that OA, open data, or open science will have, or is having, a positive economic impact.[27] [28] On the other hand, some of the costs of forcing openness on the research community are clear to see (also here).

So, we have to wonder what will happen if the expected economic benefits fail to materialise. What if, instead of saving money, open initiatives turn out to be creating expensive new cost centres? Might we not see the current craze for openness start to fade, or even reverse? Might we see a backlash against openness?

Considering open data specifically, it may turn out that the sheer quantity of data now being generated in the research process makes sharing data more expensive and difficult than any of the perceived benefits it provides. As Spinal Cord Injury researcher Vance Lemmon has put it, "Recently, with development of fluorescent light sheet microscopes that can image very large volumes at high resolution, image stacks have become enormous, from 5 GB to 1 TB. This kind of data is very hard to 'share'."[29]

We have also learned that openness is not a one-way street. Two widely used data sources for remote-sensing imagery – the Landsat satellites[30] and the agricultural-survey programme[31] –

[25] OA advocate Martin Eve recently wrote, "economic and pragmatic arguments for OA have played a role … but ethics, global justice, and the special status of education have been core."
[26] As the EC's open access envoy Jean-Claud Burgelman explained in 2018, EU officials do not view open science as "*an ideological debate*", but rather as an effort to provide a "*better return on investment of our public money*."
[27] As this article put its "Use of open science outputs often leaves no obvious trace".
[28] In this article I mainly discuss open access, but in doing so I also use the more generic term open science and refer to other open movements. Open science can be seen as encompassing OA, open data, open notebooks, open source etc. etc.
[29] The European Open Science Cloud (ESOC) is meant to address this issue. But it is not clear that it will be successful. Either way, it will surely be necessary to charge those who use it.
[30] Operated by the US Geological Survey.
[31] Run by the US Department of Agriculture.

started life as charged-for services. In 2008, it was decided to make the data freely available. Recently, however, the US government has been considering re-introducing charges.[32]

Likewise, journals can flip between open and closed states (peek-a-boo OA as Harnad has called it). This means that OA journals can go back behind a paywall – in what the authors of this article refer to as a "reverse flip". In 2013, a whole bunch of journals were flipped from open to closed – for reasons that were not entirely clear. [33] And with the "Subscribe to Open" model now flavour of the OA month, open access could become a revolving door – because the decision on whether or not to make a journal OA is decided on an annual basis depending on whether a sufficient number of libraries have agreed to "subscribe".

In short, openness can be fragile. And despite the considerable mindshare that OA has acquired amongst funders and governments, new subscription journals are still being launched.

Privacy concerns could also see pushback against openness. This is highly likely in the medical area, particularly now it has been realised that anonymous data can fairly easily be de-anonymised. This could see data initially made open later being moved behind some kind of access wall, or never being made open in the first place. News that millions of Americans' medical images and data are as good as freely available on the internet feeds such concerns, as do the increasing number of articles pointing out that "anonymity takes more than protecting personal details". There are also specific concerns around issues like sharing genome summary data from African populations for instance.

Nor is it just medical information at issue. Victoria State Government in Australia discovered that the "de-identified" data of more than 15m myki public transport users it had released was fairly easy to de-anonymise. Researchers were quickly able to use a combination of the Public Transport Victoria dataset and tweets, for instance, to identify MP Anthony Carbines's three-year travel history. This spurred Australian OA advocates to organise an Open Access Week event entitled "privacy vs access".

We are also beginning to understand the risks of making other types of information freely available. So, for instance, open access is helping wildlife poachers to identify endangered species, and leading to habitat destruction. It is also assisting the trade in human remains and the plundering of Roman coins.

We also see worries about making climate data freely available, and concerns in the Global South that if they make their data freely available it will allow better resourced researchers in the North who have superior computing facilities to mine and analyse the data in ways they cannot – leaving local researchers with a "justifiable sense of unfairness"

And there is concern about the possible negative consequences of making research in areas like artificial intelligence (or machine intelligence) open access, with at least one institute flipping the switch from open to "non-disclosed by default".

[32] Such decisions are, of course, controversial.

[33] This is also what happened to the journals published by bepress when they were acquired by De Gruyter.

Elsewhere, the technology non-profit company OpenAI announced that it planned to hold back or delay making public its GPT-2 language learning tool for fear that bad actors would use it to swamp the world with machine-generated fake news.

Others cite competitive and military concerns to argue that AI information should be treated as proprietary and/or secret. Entrepreneur and venture capitalist Peter Thiel has berated Google for opening an AI lab in China, on the basis that (as he put it) AI is "a military technology". While *Vox* disagreed with Thiel's larger claim, it did concede that "[M]any AI researchers are increasingly realising that the heyday of AI openness, where nearly all research is published for anyone in the world to explore, can't last forever. AI research will probably have to go behind paywalls at some point."

There is also the question about how AI developers will be able to monetise their work in an open environment, particularly as universities encourage faculty to create "spin off" companies. Director General of the World Intellectual Property Office (WIPO) Francis Gurry has argued that there is an inherent tension between AI and openness. "How do we reconcile the imperative of openness with innovation, on the one hand, with the desire or need of enterprises for closure at some point, and for a proprietary right at some point," he says. "This is the major … strategic and geopolitical question thrown up by AI: How you balance openness and closure."[34]

What we do know is that AI patenting is growing rapidly, with 340,000 AI-related inventions patented since the 1950s.[35] [36] Of course, it will be techniques, methods and algorithms that are being patented not data. But in order to develop effective algorithms and AI techniques huge amounts of data are needed to train machines. As Zuboff puts it, "This is the essence of the machine intelligence project. As the ultimate tapeworm, the machine's intelligence depends upon how much data it eats."

Today, data is viewed as the new oil for the 21st Century, and it is assumed that the most successful companies and countries will be those who best exploit data. That is why we are seeing growing interest in text and data mining (TDM) the research corpus.[37] But if those who have the data believe it offers them a competitive advantage then can we not expect to see increasing reluctance to share data, including both scientific data and the data embedded in research papers? Why would they want to help their competitors?

In other words, we are on the cusp of an AI arms race. And since those with the largest amounts of data can expect to have an advantage, they are likely to be more resistant to sharing data. That presumably is why Elsevier is reluctant to allow third part access to its data for the purposes of TDM – even where legislation has given researchers[38] the right to do so (see here for instance). And it is doubtless part of the reason why China does not want US

[34] One obvious problem here is that under the EU the Database Directive researchers intending to mine works protected by copyright would need authorisation from the database owner or an appropriate copyright exception, about which there is much uncertainty.
[35] Mentions of deep learning in patent filings grew annually at an average rate of 175% from 2013-16. Mentions of neural networks grew annually at an average rate of 46% over the same period.
[36] More on this topic here.
[37] For a sense of what can be done by mining the scientific literature see this paper, and commentary here.
[38] E.g. in the UK.

companies to move data they gather on Chinese customers' purchasing habits out of the country.

Might we eventually see a proprietary mindset overwhelm the field? Could AI become one of the first areas where we see significant pushback against openness?

We are also likely to see openness challenged when research budgets are squeezed, if only because there will inevitably be disagreement about priorities. Earlier this year, for instance, when Trump sought again to reduce science spending there was immediate disagreement over how the budget should be spent.[39] Trump's plan envisaged a new paediatric cancer initiative at the National Cancer Institute, and allowed for $50 million to be made available for drug discovery and studying the biology of paediatric cancers.[40] But the overall NCI budget was expected to fall by 15% to $5.2 billion.

Trump's plan also envisaged data being pooled from cancer cases and existing data sets to "create a comprehensive, shared resource to support childhood cancer in all its forms." This led researchers to complain that the plan was too heavily focused on data sharing, and that this would come at the expense of other paediatric cancer research and the overall NCI budget.[41]

Similar concerns (and hard choices) inevitably surface when any country faces a cut in research funding. Recently Australia, Mexico, Brazil[42] and Germany[43] have all found themselves struggling with this.

The point is that openness will inevitably have to compete with other priorities. And if it cannot demonstrate immediate or short-term economic and/or other tangible benefits – or comes at the expense of causes deemed more worthy – its value and role is likely to be questioned.

In what follows I am assuming that, if it is to be successful, open access (and all forms of openness in research) will require a high degree of international collaboration. I am not alone in believing this, I think. Commenting on a recent study undertaken by Digital Science, Daniel Hook argued that there is a direct link between openness and collaboration. "Collaboration is one of the watchwords when it comes to pushing Open Science forward," said Hook. "We need continued, coordinated initiatives … to keep the momentum going."

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[39] For more on this see the article here. "Trump has for the third year in a row proposed large cuts in science funding across a variety of agencies. Although Congress restored these cuts in the last two years, increased budgetary pressures may discourage them from doing so this year."

[40] The NIH budget was expected to fall by $5 billion to $34.4 billion, a 13% cut.

[41] It is not clear to me whether it was intended for these data to be made open data or just shared between groups. But my point is that when costs are under pressure people are more inclined to question the merits of sharing.

[42] In August, *Nature* reported that more than 80,000 science scholarships have been threatened in Brazil in the wake of funding cuts ordered by President Jair Bolsonaro's administration. Cuts to investments in schools of philosophy and sociology have also been proposed. It is hard to see OA being prioritised against this background.

[43] Oddly, a month after the announcement of a cut, Germans were promised a decade of budget increases. These are volatile times!

As I understand it, Hook's thesis is that a rise in international collaboration is a key ingredient and consequence of open access, that they are co-dependent.

In other words, openness and international collaboration feed off each other. This is surely also implicit in the *raison d'être* of BOAI – whose goal is to *"lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge"* by sharing "*the learning of the rich with the poor and the poor with the rich*".

I am also assuming that open access and international collaboration cannot flourish unless researchers have adequate autonomy and independence. As such, academic freedom would also seem to be essential. As I hope to show below, political and institutional interference in research, and attempts to curtail academic freedom, inevitably impede both sharing and collaboration. This can only impact negatively on the open access agenda.[44]

Before considering the current state of open access, therefore, I want to look at some of the threats that sharing, collaboration and academic freedom face today.

Populism and nationalism

First I want to consider the resurgence of populism[45] [46] and nationalism. Leaving aside for the moment the threat this poses to democracy, there are surely negative implications for researchers, for universities, for academic freedom, for international scientific collaboration and, by extension, for BOAI's goal of sharing "*the learning of the rich with the poor and the poor with the rich*".

The re-emergence of populism is said to be a product of several things, including the 2007/08 financial crisis[47] and the negative social impact that neoliberalism has had. We have also seen a fracturing of the Post-war Settlement that informed political and economic thinking in the West for 70-odd years. The election of Trump in the US and the outcome of the Brexit referendum are just the more visible signs of the new populism. And in a kind of non-virtuous circle both these events have served to reinforce the populism that gave birth to them.

In addition, we are seeing the emergence of what Hungarian Prime Minister Viktor Orbán calls "illiberal democracy" and the xenophobia and authoritarianism that go with it.[48]

These developments are challenging for the research community not least because they undermine the principles and practice of international collaboration that are believed to be essential for effective scientific progress. They also threaten the autonomy of universities and research institutions and so threaten academic freedom.

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[44] This seems also to be implicit in UNESCO's *Recommendation concerning the Status of Higher-Education Teaching Personnel*.

[45] For a sense of how this is growing in Europe, see the map here.

[46] Including what some call ethno-nationalism

[47] Janice Stein suggests the problem began earlier, with "the growth of inequality that began in the 1970".

[48] The *London Review of Books* says that while not all populist leaders are the same, right-wing populists have developed a common strategy and what might even be called a shared authoritarian-populist art of governance "They do not all look the same. But group them together and they clearly form a political family: Orbán, Erdoğan, Kaczyński, Trump, Modi, perhaps Netanyahu, Bolsonaro for sure."

So, for instance, populism is leading to direct attacks on researchers, on research institutions, on the scientific process, and on science itself. This hinders the culture of openness and sharing that the BOAI Declaration assumed as a given.

In Europe this is currently most evident in Poland and Hungary. The same threat is all too evident in Europe's neighbour Turkey. However, the issue is by no means confined to these countries. The BBC image on this page demonstrates how widespread populism has become in Europe.[49]

In Hungary we have seen the George Soros-founded[50] Central European University hounded out of the country and subjects like gender studies banned. The government's Program of Excellence is also directly undermining the independence (some say very existence) of the Hungarian Academy of Sciences.[51] [52] In short, we are seeing funding for research in the natural sciences, humanities, and social sciences coming under increased political control in Hungary.[53]

University autonomy and academic freedom are also under threat in Poland, with researchers increasingly attacked for their ideas and research. Worryingly, these attacks are often state sponsored. We have also seen a new law passed that outlaws the blaming of Poland for any crimes committed during the Holocaust. This clearly has implications for those undertaking research in this area and has a general chilling effect on researchers. Moreover, the attacks are not confined to Polish territory: in Paris earlier this year a conference held by Polish historians of the Holocaust was disrupted, with those attending heckled and threatened by nationalist protesters. (See also here).[54]

In 2018 the Polish government also tabled "Bill 2.0" (or a "Constitution For Education"), a sweeping bill that, among other things, "stripped small, regional universities of their research budgets and their right to award PhDs, and placed universities under the governance of external councils rather than collegial governance."

Likewise, in Turkey we have seen state-sponsored attacks on the university community, and the targeting of individual scholars.[55] Following an attempted coup in 2016, 15 universities

[49] The recent European election might suggest it is not as threatening as assumed. A *Science* article published after the results includes this: "Far-right and euroskeptic parties did score high in countries such as Italy and France, but the predicted populist flood didn't materialize across the continent … But scientists and their institutions should remain vigilant about their influence, says Maud Evrard, head of policy affairs at the Brussels-based Science Europe, a group of funding agencies and research organizations. 'We're concerned about academic freedom. We shouldn't take it for granted,' she says." Vigilance and trepidation would seem the watchwords.

[50] George Soros has also been a key funder of open access initiatives, beginning with the BOAI.

[51] More here.

[52] In early July the Hungarian parliament adopted a controversial bill that will strip the 200-year-old Hungarian Academy of Sciences of its network of 15 research bodies and hand them over to a newly conceived state research network: the Eotvos Lorand Research Network (ELKH). This agency will be run directly by the government, through its minister for innovation and technology, László Palkovics. The new law is expected to come into force in September. This was challenged in the courts in September.

[53] More here and here.

[54] For background on the tussle over Poland's historical disagreements see this *LRB* piece here.

[55] See also here

and many other institutions were closed by the Turkish government, allegedly for being affiliated to the Gülen movement. Aside from the inherent injustice of attacking researchers and their institutions for political reasons, incidents like this weaken the ability of the Turkish research community to engage in the independent pursuit of knowledge and it negatively impacts on academic collaboration between Hungary and the rest of the world.

While petitions have been launched in support of the targeted Turkish academics (see also here), we must doubt these will have much impact on the policies of President Recep Tayyip Erdogan. True, he experienced some pushback this year, not least with his party's loss of the mayoral election in Istanbul. But the dramatic changes to the constitution Erdogan has overseen in recent years have given him sweeping new powers. As evidence of his authority, he was able to get the first mayoral election in Istanbul annulled.[56] Moreover, Turkey's recent military offensive in Syria appears to have given Erdogan a boost in popularity. He also oversees "networks of influence" that, critics say, give him and his family a deeply rooted dominance of the Turkish polity.

As with Poland, attempts to silence and intimidate critics of the Turkish regime have not been confined to it borders. We have seen complaints that the Turkish government has sought to exert political influence on American educational institutions and to prevent a Japanese University from running Kurdish language classes.[57]

What is at stake for the research community above all here is academic freedom, the principle that to be effective research needs to be free of political control, or outside interference or pressure, and that research institutions should have autonomy. Populism threatens both the independence of research institutions and their ability to collaborate internationally. As such, it poses a serious challenge to the open access, open data and open science movements. We have to ask: how can "*a common intellectual conversation and quest for knowledge"* take place when universities and researchers are subjected to political censure and control, and international collaboration becomes difficult or impossible?

Moreover, these developments are by no means confined to the European side of the Atlantic. Trump's arrival in the White House has seen the science of climate change and the environment subjected to political attack. As such, a consensus arrived at by scientists after a century's worth of research has been rejected by the President and his administration not as a result of scientific disagreement but for political and ideological reasons.

Trump has also sought to reduce or withhold funding for research he does not like. Writing in *The Guardian* last year John Podesta, Chair and Counselor, of the Center for American Progress reported: "The Trump administration has twice now issued budget proposals that sought to dramatically reduce funding for or outright eliminate the collection and analysis of data about Earth's atmosphere, oceans and geological, biological and energy systems."

Meanwhile, the president has overseen the suppression and deletion of scientific data. As the authors of a report published last year explain: "We have found significant loss of public

[56] Nevertheless, the re-run saw Erdogan's AKP party lose by an even larger margin, with Erdogan saying, "legal action could remove him [Mr. Imamoglu] from office" for an insult he allegedly made to a regional governor during a recent argument.

[57] Wikipedia reports that in Turkey, it is illegal to use Kurdish as a language of instruction in both public and private schools. The Kurdish language is only allowed as a subject in some schools

access to information about climate change."[58] This is a direct attack on open access and open data and an act of scientific vandalism.

And in an act that many view as a callous appropriation of the calls for open data, in 2018 the Trump administration proposed a new rule called "Strengthening Transparency and Validity in Regulatory Science" . This would require scientific studies that support "pivotal regulatory science" to publish their underlying data, models, and assumptions.[59] Critics say the proposal would forbid the EPA, whose mission is to "protect human health," from consulting scientific research into humans unless the data is publicly available. But medical researchers cannot make their supporting material open available without invading patients' privacy, since the data is often gathered under confidentiality agreements.

The proposal attracted a great deal of criticism, but when a new draft was published recently it became apparent that the scope of the rule has been extended and it will be applied retroactively. This will allow Trump to roll back rules or fail to update rules based on the best information to protect publish health and the environment. This, says Paul Billings, senior vice president for advocacy at the American Lung Association, "means more dirty air and more premature lungs,"

As evidence that US populism poses a threat to international collaboration we could add that as part of his "America First" agenda Trump is gradually disengaging the US from international scientific efforts and initiatives. This year, for instance, the US left UNESCO, an organisation that has been key in supporting global scientific efforts – including the formation of the Geneva-based research institution CERN (where the web was invented) and the synchrotron light source (SESAME) in Jordan. [60]

In passing, we could add that Trump is ending US participation in the Paris Agreement on climate change (leaving in 2020) and he has adopted a hostile attitude to the International Criminal Rome Statute of the International Criminal Court (ICC).[61] While this last decision might not directly concern science, it underlines the degree to which the US is withdrawing from the global community. This is not the world envisaged by BOAI, which assumed international collaboration and collective endeavour as a given.

More recently, Trump has been seeking to roll back most of the significant federal efforts to curb greenhouse-gas emissions initiated during the Obama administration. We have also seen the National Oceanic and Atmospheric Administration (NOAA) support an erroneous tweet by Trump as a result of political interference and contrary to scientific evidence. This is a threat to science, to scientists and to the scientific process.

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[58] See also the *New York Times* article reporting that the Environmental Protection Agency plans to change the way it calculates the health risks of air pollution, making it easier to roll back a key climate change rule.

[59] As *The Atlantic* put it, "The seven-page proposed rule … uses the language of 'scientific transparency' to prohibit the agency from consulting a wide swath of peer-reviewed scientific research. If adopted, the policy would essentially bar the EPA from consulting most large-scale medical studies when creating rules about air pollution, toxic chemicals, and water contaminants. The proposal could also force the agency to revoke decades of clean-air protections."

[60] True, the US has had an on/off relationship with UNESCO since 1984.

[61] While the US has never ratified the ICC, Trump is hostile to it, and in April revoked the visa of the international criminal court's chief prosecutor in response to her intention to investigate potential war crimes by US soldiers in Afghanistan.

It is important to note, however, that political interference in science by the US government began before Trump's arrival in the White House. Both Bush and Obama have been accused of doing this. We can presumably expect it to continue after Trump's departure.

What we have learned is that populism raises the likelihood of political interference and increases suspicion of scientists. This has seen declining public trust in science and in experts. Ironically, many believe it is the very openness of the web that nurtures and feeds this distrust. As Gleb Tsipursky puts it, "The rise of the internet and, more recently, social media is key to explaining the declining public confidence in expert opinion."

Tsipursky adds, "Only a third of Americans trust scientists and most people can't tell the difference between truth and falsehood online."

Climate denial aside, perhaps the most visible sign of the current distrust in science is the anti-vaxxer (or vaccine hesitancy) movement, which has led to a dramatic increase in measles around the world. As the *Guardian* reported in April: "Measles cases worldwide rose by 300% during the first three months of 2019 compared with the same period last year, the World Health Organization (WHO) has said, amid growing concerns over the impact of anti-vaccination campaigns, particularly spread through social media."[62]

It would seem that populism is at least partly a product of the open global network. and that openness is, therefore, by no means an unmitigated good.

OA advocates argue that the answer to this distrust and scepticism is to make more research open access, on the basis that if "the facts" are made freely available the public will be able to assess the claims of, say, anti-vaxxers or climate change deniers. The problem is that the public cannot generally understand research papers or the raw data behind them. More importantly, if they no longer trust experts, they are unlikely to trust any evidence scientists put before them.

Some are now so distrustful of science that even measles epidemics don't appear to give them pause for thought. In May, hundreds of people attended an anti-vaccination event in New York, the city where the outbreak hit hardest.[63] Elsewhere, we have seen parents in California taking their children out of school in order to prevent them being vaccinated by the state.

The OA mantra that making publicly funded research open access will help the public better understand and respect science is far from self-evident.

Trade protectionism, tariffs, sanctions and suspicion

I want now to consider the implications that the current rise in trade protectionism, trade sanctions and growing international suspicion could have for openness. The evidence suggests that these too pose a threat to the sharing and collaboration assumed essential for effective research. And if it is correct that international collaboration and open access are co-dependent they pose a threat to the BOAI goal too.

[62] See also this story: *US measles cases hit highest mark in 25 years*. And this one.
[63] See also an example of the dangers of homemade remedies here.

During his presidential election Trump pledged to rip up or renegotiate a whole raft of international trade deals. And once in office he moved quickly to act on his promise, taking on China and Europe,[64] as well as Canada, and Japan. He also withdrew the US from the Trans-Pacific Partnership (TPP) and the Transatlantic Trade and Investment Partnership (TTIP) and set about re-negotiating the North American Free Trade Agreement (NAFTA) between Canada, Mexico and the US.[65] [66]

Trump has also shown himself to be a keen proponent of trade sanctions – most notably on Iran after he pulled America out of the Iran nuclear deal framework, and also on North Korea. He is also happy to weaponise tariffs for political purposes – e.g. threatening to impose tariffs on Mexico unless it stopped or slowed down the flood of migrants entering the US via Mexico.[67]

This kind of behaviour is always infectious. Not only does it trigger tit-for-tat responses, but other countries tend to emulate it. Thus we have seen China impose sanctions on US firms that sell arms to Taiwan and we have seen tariffs weaponised in the current dispute between Japan and South Korea. Elsewhere, France and Ireland threatened to do something similar in connection with the EU-Mercosur trade deal between the EU and a Latin American bloc that consists of Argentina, Brazil, Uruguay and Paraguay.

Trump's actions have been strongly informed by a belief that the trade agreements he inherited were not in the best interests of America. In the case of China there is also concern about the US's growing trade deficit with the country.[68] There is also longstanding frustration with the way China protects and subsidises its own industries – a practice the US refers to as its "predatory trade and investment policies." (Of which more later).

We also need to view Trump's actions against the geopolitical backdrop of the "great power rivalry" taking place today between the US and China. The two countries are competing for the status of primary superpower in the 21st Century.

At the same time, we are seeing a larger and broader geopolitical shift taking place. This includes the growing economic power and assertiveness of Asia more widely, and of Latin America,[69] plus a resurgent Russia keen to re-establish itself as a powerful international player following the collapse of the Soviet Union in 1991.

Further complicating the picture, a number of other states are clearly keen to thrust themselves on the world stage, including some the US classifies as rogue states – e.g. Iran, Syria and North Korea.

I believe these shifting geopolitical forces and tensions have important implications for international collaboration, for open access, and for scholarly communication more generally.

Take the case, for instance, of Shahin Akhondzadeh, of the Tehran University of Medical Science. *The Scientist* reports that a paper he submitted to a US journal was rejected as a

[64] See also here.
[65] For an overview of the process and outcome of this see the Wikipedia page here.
[66] A timeline for Trump's trade negotiations can be viewed here.
[67] A tactic that seems to have worked.
[68] Recently this was estimated at $419 billion.
[69] Brazil is now the ninth largest economy, above Canada.

result of his nationality and location. “We are used to having an unfair situation in politics,” Akhondzadeh said. “But to have an unfair situation in science is very bizarre.”

Bizarre perhaps, but not surprising given the current environment.

And while some Western publishers are still accepting papers from Iranian researchers, if the authors want to publish open access they have no way of paying APCs as many international banks have introduced their own restrictions in response to the US sanctions. The resulting blockade on currency exchange, says *The Scientist*, makes it impractical for Iranian scientists to pay the publication fees required by many open-access journals.

Elsewhere, Iran’s science minister Mansour Gholami told *Nature* that Iranian researchers are being prevented from travelling to scientific conferences abroad and that active research collaborations between the US and Iran are also on hold.

Again, it is important to note that while Trump has proved particularly aggressive, it was not he who began the process of marginalising and punishing the Iranian research community. As Abbas Edalat, a British-Iranian computer scientist at Imperial College London points out: “Even after the 2015 treaty [the so-called Iran Nuclear deal], under Obama there were all these limitations imposed by the United States on Iranians, including Iranian academics.”

Edalat added that under Obama’s presidency the US State Department emailed him to say his membership of a visa waiver scheme was being cancelled because of his nationality. “It’s true that it has become much more accentuated under Trump – there is no comparison – but it all started under Obama”, Edalat said.

Along with new tariffs and sanctions we are seeing increasing suspicion in the West that foreign governments and/or their agents and citizens are bent on stealing Western ideas and innovation, including technology and intellectual property. From the perspective of the US, the main culprits here are China, Russia and Iran. But India and Pakistan are viewed with suspicion too.

We should not doubt this is now having a negative impact on international sharing and collaboration. And since many new ideas, techniques and innovations are described in research papers it is not impossible that at some point this will cause governments to question the advisability of open access and open science. Either way, foreign researchers are being treated with greater distrust, especially in the US.

And perhaps there are good grounds for this distrust. In March last year, nine Iranians were charged with “conducting a massive cyber theft campaign on behalf of the Islamic Revolutionary Guard Corps. Amongst other things, reported *The Scholarly Kitchen* (TSK) this involved the “the bulk theft of intellectual property from academic institutions in a brazen scheme to gather and redistribute scholarly content.”

Specifically, more than 100,000 US professors were sent phishing emails in an attempt to steal their credentials and “access and copy materials, including scholarly journals, theses and dissertations, and electronic books for further distribution.”

We are also seeing claims that foreign students and researchers are going to study and work in the US in order to steal intellectual property, engage in academic espionage and rob

research from labs. Last year a professor at Duke University alleged that a Chinese doctoral student working in his laboratory on materials for "cloaking" objects from electromagnetic waves had returned to China with sensitive, government-funded findings that he used to start a billion-dollar tech company.[70]

As the largest public funder of biomedical research in the world, the US National Institutes of Health (NIH) finds itself in the middle of this new battleground. In early April, it was reported that all visitors to NIH, including patients, must now disclose their citizenship as a condition of entry – a new rule that two Iranian students quickly fell foul of. When one of the researchers (who is based at Georgetown University) arrived for an interview at the NIH he was removed from a lab by NIH police and escorted off campus.[71]

In another incident, an Iranian brain researcher visiting NIH said he was told to leave, then delayed at security for nearly an hour filling out online forms. It was only after interventions by NIH police and other officials, that he was he told that an exception would be made in his case so that he could deliver the presentation he had come to give to two dozen waiting researchers.

These incidents mark a new era of suspicion within the US research community and it clearly has implications for both researchers and universities. The first signs of this became publicly discernible in a 2018 hearing of the Senate health committee that oversees NIH. Warnings were given of potential threats to biomedical research and the diversion of US intellectual property to foreign governments. As a result of these threats, NIH Director Francis Collins reported, NIH had written to more than 10,000 NIH-grantee institutions urging them to ensure that NIH grantees are properly reporting their foreign ties.

Collins added that NIH was investigating about a half-dozen cases in which NIH-funded investigators may have broken reporting rules. "The robustness of the biomedical research enterprise is under constant threat", he said, adding that "the magnitude of these risks is increasing."

Subsequently it was reported that NIH had also written to dozens of major US research universities asking them to provide information about specific faculty members with NIH funding and who are believed to have links to foreign governments that NIH did not know about.

In April, *Science* reported that at least 55 institutions had launched investigations and MD Anderson Cancer Center in Texas had removed three senior researchers on the grounds that

[70] We can see the same concerns emerging in Australia, with warnings that Australian universities will need to be increasingly cautious about the international PhD students they enrol over the risk of compromising sensitive emerging technologies.

[71] Also of note, in July the National Science Foundation posted a statement on NSF's "commitment to secure, open international research collaboration". It said that NSF's science and engineering enterprise is "put at risk when other governments endeavour to benefit from the global research ecosystem without upholding these values". And it listed a number of actions it was taking to address the issue.

they had committed potentially "serious" violations of agency rules involving confidentiality of peer review and the disclosure of foreign ties.[72] [73]

In May it was reported that Emory University had sacked two US government-funded scientists for allegedly failing to disclose their sources of overseas financing and research ties in China. Their lab was also shut down.[74]

In August an academic at the University of Kansas was accused of federal fraud for allegedly failing to disclose a full-time employment contract that was held with a Chinese university while simultaneously conducting research in Kansas financed via federal research contracts. "If convicted," reported the *Times Higher*, "he faces up to 20 years' imprisonment and a maximum fine of $250,000 (£204,000) on the wire fraud count, and up to 10 years' imprisonment and a maximum fine of $250,000 on each of the counts of program fraud".[75]

In September two researchers in Ohio were charged with stealing exosome-related trade secrets related to the research, identification and treatment of a range of paediatric medical conditions from their medical research labs at the Nationwide Children's Hospital's Research Institute, having allegedly founded a company in China in 2015 without the hospital's knowledge. While they continued to be employed by Nationwide Children's, it is alleged they were marketing products and services related to exosome isolation through the Chinese company.

Recently the *NYT* reported that nearly 200 investigations are now underway at major academic centres in the US and that NIH has referred 24 cases in which there may be evidence of criminal activity to the inspector general's office of the Department of Health and Human Services. These include allegations of theft of scientific ideas, designs, devices, data and methods that may lead to profitable new treatments or diagnostic tools. Some researchers under investigation are said to have obtained patents in China on work funded by the United States government and owned by American institutions. Others are suspected of setting up labs in China that secretly duplicated American research.

This new vigilance, reports the *NYT*, is ultimately being driven by the FBI and has been building for several years. In June 2016 the FBI contacted NIH officials "with unusual questions about the American scientific research system." What we see today presumably is the unfolding of that initial inquiry.

Again, it is important to note the timing because it is further evidence that concern about foreign researchers predates Trump's arrival in the White House. As *Science* has pointed out, a 2015 FBI Counterintelligence Division handout had warned that recruiting scientists

[72] MD Anderson is part of the University of Texas (UT) system.
[73] We are also seeing the start of a tit-for-tat visa denial process getting underway, as reported in the *Times Higher* here. See also here.
[74] Days later, Jinan University in China's southern Guangdong province, said that it would welcome of the Chinese researchers back, along with the rest of the Emory research team from the that lab had been closed.
[75] The US Education Department has also announced that it is probing Georgetown, Cornell and Rutgers seeking records dating as far back as nine years, outlining agreements, communication and financial transactions with entities and governments in countries such as China, Qatar, Russia and Saudi Arabia."

through programs such as Thousand Talents[76] was allowing China to "benefit from years of scientific research conducted in the United States' and 'severely impacts the US economy'."[77]

Universities and researchers are therefore going to have to adjust to the fact that their governments are becoming increasingly suspicious about foreign researchers, and that international collaboration and sharing is going to become more difficult as a result. One administrator told *Science* (on condition of anonymity): "People have already told me that they are rethinking whether they should continue to work with someone from another country. They say, 'Maybe I should just do the work myself, or find a US-based collaborator.'"

Today this is most evident in the US, but as international tensions grow the alarm is spreading to other nations, including Australia and the UK. In October it was reported that UK intelligence agencies MI5 and GCHQ had "warned universities to put national security before commercial interest as fears grow over state theft of research and intellectual property from campuses." Both China and Russia were named, and universities were told that the growing number of international collaborations requires particular care.[78]

This presents a clear challenge to the OA movement. After all, global sharing and collaboration is fundamental to BOAI's goal of "*uniting humanity in a common intellectual conversation and quest for knowledge"*.

It is also possible that at some point open access might start to look like a dangerous idea. Could we even see researchers told to stop making their work open access?

Level of naïveté

I have elsewhere argued that OA advocates have a history of being naïve about open access and the possibility that their advocacy could have unintended consequences. They did not anticipate, for instance, that pay-to-publish OA would open the floodgates to predatory publishing and prove extremely divisive as a result (of which more later). Likewise, they did not see that persuading funders and governments to force OA on researchers by introducing ever more coercive OA mandates would have the effect of alienating researchers from OA, with the result that some have dragged their heels and resisted funder policies. Likewise, they did not see that insisting on the use of liberal creative commons licences would be both divisive and counterproductive (of which more later). Librarians also did not anticipate the possibility that open access might lead to funding for libraries being reduced – as the authors of this document warn. (Page 3).

[76] Thousand Talents Program was established in 2008 by the central government of China to recognize and recruit leading international experts in scientific research, innovation, and entrepreneurship. The program has been praised for recruiting top international talent to China, but also criticised for being ineffective at retaining the talent. An unclassified 2018 US National Intelligence Council analysis highlights that the program threatens the US's economic base by enabling technology transfer to China. See also this 2019 DOE memo.

[77] See also this more recent FBI document.

[78] The UK government agency Centre for the Protection of National Infrastructure, which has issued specific guidance to UK universities reports that a fifth of the world's scientific papers are now produced through international collaboration.

And today the OA movement seems oblivious to the possible consequences that the changing geopolitical environment could have on their aspirations.

It seems I am not the only one to have concluded that OA advocates (and the research community more widely) have and continue to be naïve. The FBI appears to have reached a similar conclusion. And it is precisely the issue of openness that concerns it. In January, the *New York Times* reported FBI director Christopher Wray telling Congress that China is "exploiting the very open research and development environment that we have."[79] And he added that "the level of naïveté on the part of the academic sector about this creates its own issues."

To tackle this naivety the FBI has been meeting with university officials to brief them on information security issues. The events at Emory, University of Kansas and MD Anderson Cancer Center are doubtless partly a consequence of this.

There can be no doubt that there are implications here for open access. Wendy Streitz, president of the Council on Governmental Relations (which represents nearly 200 research universities and institutes) characterises the situation in this way: "We have two opposing forces here – there is a move towards open access publishing and open access data from the science agencies, and at the same time the security agencies are saying maybe we shouldn't be sharing our research."

The possibility is that the latter position might tip the balance towards closed rather than open.

As one might expect, the FBI's intervention is controversial and has attracted criticism, not least because it inevitably leads to particular ethnic groups being focused on. As PEN complains, asking universities to monitor particular nationalities and groups, "raises serious concerns about privacy rights, racial profiling, and academic freedoms".

Fears that the FBI's intervention will lead to injustice and overreaching are understandable, possible, and worrying.[80] But agree with the agency or not, it has concluded that the research community has been, and remains, too trusting, if not negligent. And given its considerable powers it would be irresponsible for any US university to ignore the FBI.

Doubtless for this reasons the University of California (the US university with the largest number of Chinese students) has been considering the implications of the FBI's intervention.[81]

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[79] See also the comments of Trump's science advisor Kelvin Droegemeier here: "Think about what open access means: I'm giving open access to something I'm producing. If we're saying we have to be vigilant and protect our assets – and by the way, everything is open – inherently there's a conflict there. But there doesn't have to be conflict. We're having conversations and making plans about this – how we balance this important openness of our enterprise, including open access, which is vital to the conduct of research, with the vigilance that's needed to make sure that our hard work is not taken. We do all the hard work, and bad actors reap the benefits. We don't want that."

[80] As a number of societies warn in this letter.

[81] This includes inaugurating a systemwide audit to identify risks related to "foreign influence" and reviewing all grants to assess compliance with federal rules and identifying categories that may be susceptible to problems.

Again, we should stress that these concerns predate Trump. Nor are they likely to go away when Trump does. At a nationwide level the US National Science and Technology Council (NSTC) is currently working to establish government-wide requirements for what information researchers need to disclose in order to receive federal research grants. The need for this was outlined in a memo to the US research community by the current chair of NSTC Kelvin Droegemeier. In his memo, Droegemeier warns that the US scientific ecosystem, "features new and extraordinary threats which must be confronted thoughtfully and effectively." He adds that success in meeting these threats requires "striking a balance between the openness of our research ecosystem and the protection of our ideas and research outcomes."

More importantly, US politicians have also concluded there are threats that need addressing and proposing new legislation as a result. In March Representative Jim Banks introduced a bill called the Protect Our Universities Act of 2019, with the aim of ensuring that foreign students participating in "sensitive" research projects can be monitored. The bill would also prevent students with past or current citizenship in China, Russia, Iran or North Korea from having access to such projects "without a waiver from the Director of National Intelligence."

Elsewhere, Senator John Kennedy has proposed the Protecting American Technology Act of 2019 in order "to safeguard the information and technology produced on college campuses by requiring a deemed export license to be in place before foreign nationals can conduct scientific research in university labs". The goal: to "prevent controlled technologies from leaking to America's competitors."

And in June Senator John Cornyn introduced a bill called the Secure Our Research Act, with the aim of protecting federally funded research from foreign theft.

Finally, the Securing American Science and Technology Act (SASTA) has been introduced to "address academic espionage at our institutions of higher education".

As these bills indicate, the concern extends to a number of foreign countries. Nevertheless, we should not doubt that China is a primary target and considered the main threat, not least because it has been actively embedding itself in universities around the world by means of the so-called Confucius Institutes.[82]

Initially considered a benign exercise in soft power and provider of language teaching these institutions are now viewed as tools designed to censor Chinese students studying abroad, to spread Chinese propaganda, and to erode academic freedom in their host universities and countries.[83]

They are also said to lack transparency, and many of the universities hosting them are accused of having naively signed partnership agreements that give too much control to the Chinese government. A report by a US Senate committee published in February concluded that Confucius Institutes provide money with strings attached. Amongst other things, the

[82] The BBC reports that there were 548 Confucius Institutes around the world by the end of last year. According to Wikipedia these are expected to grow to 1,000 by 2020 in dozens of countries, with the highest concentration in the United States, Japan, and South Korea.
[83] More here.

committee said, they "compromise academic freedom" and export China's censorship to host nations.[84]

In March Human Rights Watch published a 12-point Code of Conduct intended to help universities still planning to host a Confucius Institute avoid being compromised.

On this issue too new legislation is being proposed. One of the bills filed by Senator John Kennedy, for instance, is called The Confucius Act. This aims to "protect national security by ending China's unfettered access to American college campuses" and to reduce its influence on US colleges and universities "by granting full managerial authority of Confucius Institutes' teaching plans, activities, research grants and employees to the [host] universities."

Concern about Confucius Institutes has spread to other countries too. There is growing unrest in Australia,[85] and in February the *Times Higher (THE)* reported discontent in the UK too.[86] *THE* added that universities around the world have been cutting ties with Confucius Institutes.

One of the less obvious but more worrying aspects of censorship, of course, is that it chills speech and leads to self-censorship (a phenomenon that in the context of China has been dubbed the "anaconda in the chandelier"). It also makes people less willing to share and collaborate.

Concern that China is bent on censoring activities it does not like in foreign countries has been amplified by reports in March that Chinese officials had pressured Canada's Concordia University to cancel an event with a Uighur activist, and by a November report by a committee of UK MPs that said it had found "Alarming" evidence of Chinese interference in UK universities (including via the activities of the state-backed Chinese Students and Scholars Association). The report also said it had received reports of scholars in the UK being bugged in discussions about Russia, and that those studying Central Asia had received threats against their families. The committee added that it had been told that a Russian government-sponsored body called Russkiy Mir is active on UK campuses.

Meanwhile as a sign of its increasingly assertive stance, China is now happy to slap down foreigners who complain about matters that it views as its internal affairs. Gone are the days of China's commitment to keeping a low profile – referred to as its Bide and Hide policy [87]. In response to warnings from the UK Foreign Secretary over how Hong Kong was responding to civil protests, for instance, vice-president of the Centre for China and Globalisation Victor Gao told the BBC, "I don't think the British government has the guts" to take a tough stance on the issue.

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[84] In Australia *The Sydney Morning Herald* reviewed a number of contracts and concluded, "Australian universities hosting Chinese government-funded education centres have signed agreements explicitly stating they must comply with Beijing's decision-making authority over teaching at the facilities."

[85] In July the Australian government whether Confucius Institutes at Australian universities require registration as a source of foreign influence. In a statement, the education minister, Dan Tehan, said he had spoken to Universities Australia on Thursday to stress "the importance of all universities that host foreign institutes complying with the foreign influence transparency scheme". See also this.

[86] See also this.

[87] "Hide your strength, bide your time, never take the lead." This was the principle of the former leader of China, Deng Xiaoping. The policy has been overturned by Xi Jinping.

More recently, the Chinese Academy of Sciences (CAS) responded robustly to what it viewed as a biased history of CAS published by *Nature*, challenging in particular the claim that the Chinese central government takes "harsh measures against its people". CAS added, "In carrying out its scientific and technical mission, CAS stands firmly with the central government and with the people. We reject any such false allegations with disruptive intentions and are strongly opposed to biased judgments of China's internal affairs, and to any unnatural linking of political or ideological positions with our mission."

The more tension rises between countries the less able will the research community be to collaborate and share. What price here a "*common intellectual conversation and quest for knowledge*?" To assume that the shifting of these geopolitical tectonic plates will have no impact on the research community, and on open access, would surely be naïve?

Growing gulf

Meanwhile, back home in China state control of universities and researchers continues to intensify and grow.[88] And while we often see external protest and petitions in support of academics targeted for their dissenting views the likelihood that these will have much impact seems negligible.

Nevertheless, we are seeing protests grow over the way foreign researchers are treated by authoritarian states. In April, for instance, Scholars at Risk filed a submission with the United Nations' Universal Periodic Review (UPR) highlighting attacks and pressures on higher education in Iran, including wrongful imprisonment and prosecution and restrictions on student expression.[89] [90]

It is hard not to conclude that a growing gulf is opening up between the West and those countries whose values are deemed to be out of sync with the principles held dear in the West, including free speech, academic freedom[91] and human rights. This inevitably has a negative impact on international collaboration.

In response to the death sentence imposed on Iranian-Swedish academic Ahmadreza Djalali, for instance, European universities announced that they would restrict collaboration with Iranian institutions.

Likewise, when Hong Kong police recently stormed university campuses, academics from around the world immediately signed an online statement saying, amongst other things, "We may have to reconsider our partnerships with Hong Kong universities in the future if student's safety is at risk and such blatant violation of academic and intellectual freedom continues."

And when researchers from the West visiting authoritarian regimes are targeted by the host country, collaboration is again the first casualty. The controversial and high-profile arrest of

[88] And is surely likely to be extended to Hong Kong at some point.

[89] See also here.

[90] A subsequent report Scholars at Risk set out to map the "threats to academic freedom that jeopardize China's higher education ambitions."

[91] Ironically, one could argue (and some do) that the push for open access in Europe is itself a threat to academic freedom.

UK academic Matthew Hedges by UAE authorities last year for spying exemplifies this: UK universities immediately began to end their ties with UAE.

Another source of friction are the international branch campuses (IBCs) that Western universities have been setting up in regimes considered authoritarian – e.g. UAE, Qatar, Saudi Arabia, Singapore and China. Critics complain that in doing so Western universities are signing ill-thought-through partnership agreements that cede too much control to the host country and show far too little regard for issues like academic freedom.

Withdrawing from such agreements, however, means forfeiting revenue, kudos and (in theory) an opportunity to promote Western values. Partly for this reason, when universities with IBCs are criticised their instinct is to wave the concerns away. Thus when NYU President Andrew Hamilton faced criticism about NYU's campus in Abu Dhabi, he responded: "I'm not aware of any constraint on discussions that take place on the Abu Dhabi campus or discussions that take place in the classroom at Abu Dhabi". He then somewhat undercut his position by saying that NYU should not be viewed as a democratic institution.[92]

Yale too faced criticism when its branch campus in Singapore (Yale-NUS) cancelled a course called "modes of dissent and resistance in Singapore". Critics complained that the decision was contrary to the principle of academic freedom. Explaining why the course had been cancelled, the President of Yale-NUS Tan Tai Yong said that the planned activities in the course schedule would have put students at risk of breaking Singapore's laws, and so of "incurring legal liabilities". He added, "All institutions have to operate within boundaries of legally permissible activity, and that is true in all countries."[93] When Yale University launched a probe into the cancellation it agreed that the course would have posed a legal risk to international students if they had taken part.[94]

What we learn is that when a Western university seeks to promote Western values in an authoritarian country it is in danger of simply pandering to the authoritarian values of the host nation. It is a fine line. As *Inside Higher Ed* pointed out, amongst other things the Yale incident raises questions "about whether academic freedom can be protected in authoritarian states." At a time of increased international tensions, and growing suspicion and distrust between nations, incidents like these are leading some to conclude that operating an IBC is too risky and/or compromising. Either way, we are likely to see a fall in international collaboration. As the *THE* suggests, the branch campus movement seems to be on the wane.

At the same time, foreign nationals are finding it more and more difficult to obtain visas to study or work abroad. Iranians looking to obtain a visa to work in the US are especially challenged. As STAT explains: "While it's hard to track scientists specifically, the overall numbers have dropped drastically, from 35,363 Iranians getting such visas in 2015 to 6,014 in 2018."

[92] Meanwhile, the pro-democracy protests sweeping Hong Kong are considered too controversial to discuss at NYU Shanghai.
[93] Yale President Peter Salovey later issued a statement and report.
[94] For a balanced discussion of this see this article.

Unsurprisingly, the US has also been clamping down on visa requests from Chinese researchers – as explained in this *Nature* article.[95]

Trump's arrival in the White House also saw the introduction of a travel ban that currently affects eight countries, six of which are predominantly Muslim. Travel bans don't just impact the targeted country. Because of the new US rules, for instance, European researchers are more reluctant to visit banned countries, for fear that a stamp in their passport showing they have visited a banned country could make it more difficult for them to enter the US. As *The Scientist* points out, a prior trip to, say, Iran prevents European researchers from being able to benefit from common visa waiver schemes that avoid the need to apply for a full US visa.

And the more suspicion researchers face when they visit the West, the fewer are likely to apply in future. Likewise, the more we see collaboration between research institutions fall. As Philip Altbach points out, "for both internal political reasons and as a reaction to foreign criticism, especially from the United States, China is likely to become less open to international collaboration with top-tier universities."

He adds: "[W]ithin China, academic collaboration arrangements with foreign universities are slowing. Last summer, 234, or one-fifth, of its international university partnerships were closed, including more than 25 with American institutions – many of which were inactive anyway."

There are two important additional reasons why Chinese researchers and students are less inclined to study or undertake research abroad today: First, for many the idea of going abroad to get a "liberal education" is no longer appealing. Second (and related) China is now much more confident about its role in the world and its own importance as a research hub. This new confidence is the result both of China's economic success and the government's decision to invest heavily in research[96] – both at home and abroad.

Key here is the Belt and Road Initiative (BRI).[97] Announced in 2013 the BRI, reports *Nature*, is expected to cost an estimated US$1 trillion and intended to connect China with "more than 130 nations through roads, railways and marine links to increase trade and China's influence in the world."[98]

Importantly, despite the name, this is not about building physical infrastructure alone. The BRI is heavily focused on technology and science too, and China is investing in research in BRI countries around the world, including by means of the so-called digital silk road

[95] The number of F1 visas – the primary type of student visas – issued to China fell by 13% between fiscal 2017 and 2018, compared to an 8% decline for all countries, according to an analysis of State Department data by the nonpartisan National Foundation for American Policy (and reported by the *LA times* here).

[96] *Nature* reports that Europe's relative share of global science and research spending is shrinking as China's expands. Elsewhere, the *Wall Street Journal* reports that US funding has been falling, and that it is investing more money in life sciences relative to important areas like AI, gene editing, synthetic biology, 5G and quantum computing.

[97] Otherwise known as the New Silk Road.

[98] The competing US New Silk Road Initiative announced in 2011 never got off the ground.

initiative.[99] It is also funding scholarships for researchers in the Global South to spend time in China.

In other words, China is flexing its geopolitical muscles not just economically and politically, but in science and education as well. Essentially, the government wants to shift science's centre of gravity from the West to China.[100] This of course helps to fuel suspicion in the West and, as I shall suggest, could have important implications both for OA and scholarly communication more generally.

So, we can expect to see a decline in international collaboration and a fall in foreign students and researchers studying and conducting research in the West. Speaking in California, at a gathering of university leaders from countries of the Pacific Rim, including the US, Canada, Latin America, China and the Asia-Pacific, the vice-chancellor of the University of New South Wales in Sydney, recently reported that he is seeing a "pushback" against the large number of foreign students visiting Australia. "In the current political environment, it is influenced by things that are happening here [in the US] and elsewhere that are flowing through to Australia."

Again, this indicates that while it is a particular issue for the US right now, it looks set to become a general trend, as this article also makes clear. And in confirmation of this, in September it was reported that for the first time the number of visas issued to students from China applying to study in Australia has fallen.

In the same month came news that Iranian students accepted to US schools had had their visas suddenly revoked without explanation.

Also of note: at the same California event, the president of the California Institute of Technology (Caltech) indicated that this is bipartisan concern in the US and "not going to go away if there is a change of administration."

International collaboration is also falling in the UK,[101]not least because of Brexit. Amongst other things, this will see a decline in the free movement of researchers in Europe. In 2016, the Royal Society (RS) warned: "Many of the research programmes funded by the EU support scientists to move to and from the UK … They also support scientists to establish and maintain international collaborations, including large networks across Europe and beyond."

The RS added that it would be arguing for the UK to have the closest possible association with EU research programmes, but added mournfully, "whether the UK will remain a part of them will ultimately be decided through the Brexit negotiations."[102]

In fact, even before Brexit had taken place the number of Horizon projects led by UK researchers in nine universities surveyed had dropped from 49 in 2016 – the year that the British voted for Brexit – to just 20 in 2018. The RS also reports that Britain's annual share

[99] See also here. This initially includes an attempt to create new networks and telecoms standards, and providing BRI countries with technology dedicated to ecommerce, surveillance and censorship.
[100] See this article for more on this.
[101] See this article for some of the problems academics from abroad are having when trying to get a UK visa.
[102] See also here.

of EU research funding has fallen by nearly a third since 2015. (See here for some case studies).

Some also believe that (ironically) Europe's current push for OA with Plan S could have a similar. effect. If it fails to get global buy-in (and it seems increasingly likely that it will fail to do so)[103] collaboration between researchers in countries that sign up to Plan S and those that don't is expected to fall – an unfortunate and counter-intuitive consequence of trying to force greater sharing and collaboration on the research community.

The larger point is that wherever you look today international collaboration looks look like a tide going out. The Dutch Minister of Education, Culture and Science, for instance, has proposed drastic cuts to the budget of the Dutch Organization for Internationalisation in Education (Nuffic), and in 2018 the University of Groningen in the Netherlands shelved plans to establish a branch campus in China after concerns were raised about academic freedom.

Meanwhile, the atmosphere for foreign researchers is becoming less welcoming and collaboration more difficult not just in the West but in other parts of the world too. Some countries are creating a hostile environment for foreign researchers. Thus, Indonesia has passed a new law that will see foreign researchers found guilty of violating visa regulations facing criminal charges.[104] And in India, the University Grants Commission has decreed that Indian colleges and universities will no longer be able to collaborate with Chinese institutions without prior approval from the Ministry of Home Affairs and the Ministry of External Affairs.

International collaboration and sharing seem to be declining across the globe. If Hook is right to argue that open science and international collaboration are co-dependent, then current events must give us all pause for thought.

All of which suggests that the BOAI vision of a world in which research is openly and freely shared on a from-all-to-all basis looks increasingly naïve. Countries now look more likely to erect barriers[105] and turn inwards, than collaborate and share.

Homogeneity vs. heterogeneity

Why is this happening? I have pointed to the rise of populism and I have suggested that this is partly a product of neoliberalism. And I have suggested that great power rivalry between China and the US, and the changing geopolitical environment, are also important factors.

[103] In fact, those who have signed up appear to have started backsliding. In March it was announced that the Swedish funder Riksbankens Jubileumsfond said that it could no longer support Plan S in its current form. In August the Italian funder Compagnia di San Paolo also appears to have left cOAlition S. There was no public announcement, the funder's name simply disappeared off the cOAlition S website. And in May rumours began that Agence Nationale de la Recherche wants to continue using green embargoes (rather than insisting that all research is made immediately freely available on publication).

[104] In addition, any foreigner who conducts research without a valid permit could face a fine of Rp 4 billion [US$287,418] and be banned from applying for a permit for five years."

[105] Or what in the context of the developing populism and attempts to erect new walls against immigrants Yascha Mounk refers to as "populist curtains".

But I think there is a broader issue to consider, one that stems from the West's mistaken assumption that it had won the ideological war.

Following market liberalisation and reforms in higher education and science in China in 1978, and the collapse of the Soviet Union in 1991,[106] the West assumed that both countries would have little choice but to liberalise, both economically and politically. And it was assumed that they would adopt Western-style liberal democracy and sign up to the Rules Based International System established in the wake of WWII via organisations like the United Nations and World Trade Organisation (WTO).

It was also assumed that this could only be good for the West. When China was allowed to join the WTO in 2001, for instance, the US assumed that its entry would "force China to open its markets, which would produce one-sided gains for the United States."

The thinking behind these assumptions was famously articulated by Francis Fukuyama in his 1989 book *The End of History*[107]. For Fukuyama, the end of the Cold War and the collapse of the Soviet Union signalled not just "the passing of a particular period of post-war history, but the end of history as such: that is, the end point of mankind's ideological evolution and the universalisation of Western liberal democracy as the final form of human government."

This thinking was later extended to argue that the combination of market liberalisation, globalisation and the growth of the internet would force most if not all countries to adopt openness and neoliberalism. As American political commentator Thomas Friedman put it in 2000, the combined forces of globalisation and the web are, "acting like nutcrackers to open societies." Essentially, it was believed that a newly homogenised world was emerging and that this new world was being created in the image of the West.

Today these assumptions look naïve. As US historian Timothy Snyder puts it, "Until recently, we had convinced ourselves that there was nothing in the future but more of the same. … We allowed ourselves to accept *the politics of inevitability*, the sense that history could move in only one direction: toward liberal democracy."[108]

But it turns out that the world remains, and is keen to stay, economically, culturally, and politically heterogeneous. More countries may be embracing the market, but they are choosing to do so in their own way, not simply aping the West. In fact, interest in liberal democracy has been declining ever since. In Russia, we have seen the ascendency of Putin and the iron grip he has maintained on the country for the past 20 years. In China, we saw the 1989 crackdown of the Tiananmen Square protesters in Beijing,[109] and we have seen the recent decision by the Chinese National People's Congress decide to the remove the two-term

[106] In 1978 China announced a number of reforms that led to market liberalisation. In 1989 the Berlin Wall fell and in 1991 mass privatisation took place.

[107] As Wikipedia puts it, "Fukuyama argues that, following the ascendency of Western-style liberal democracy following the Cold War and the collapse of the Soviet Union, humanity was reaching 'not just ... the passing of a particular period of post-war history, but the end of history as such: that is, the end point of mankind's ideological evolution and the universalization of Western liberal democracy as the final form of human government'."

[108] *On Tyranny: Twenty Lessons from the Twentieth Century*, Timothy Snyder, Page 115, 2017 (Kindle)

[109] One of the leaders of the protests, Wu'er Kaixi, says, "From that day on they said, okay, we're going to give you economic freedom. In exchange you give us your submission." Elsewhere, Shao Jiang, one of the student leaders in 1989, has said, "The Chinese government has turned China into a big prison."

limit on the Chinese presidency, effectively allowing Xi Jinping to remain in power for life. Thirty years on, political oppression in both countries has increased not reduced.

So, while many countries are adopting a more market-based approach, they are developing their own distinctive approaches, approaches better suited to their cultural and national predilections. And this usually means spurning the model of democratic capitalism promulgated by the West.

Thus today we see the state-directed, or state-controlled, capitalism favoured by China and Russia, we see the "state-sponsored capitalism" characteristic of countries like Hong Kong, Macau, Japan, South Korea, and Taiwan, and we see the so-called Singapore model. In addition, there are the models adopted by countries in Western Asia like Iran and those in Middle Eastern countries like Saudi Arabia and UAE. These latter approaches better fit the needs of Islam. Importantly, these countries take an authoritarian approach and attach little significance to human rights, free speech, and academic freedom.

Today we see a rich mix of different ideologies and cultural norms, and a range of different views on how societies should be organised and managed. And we are seeing a growing clash between countries viewed as authoritarian and those that are liberal democracies.

This is the source of much of the conflict between nations, cultures and ethnic groups. And it inevitably poses a threat to international collaboration, sharing and, ultimately, to the openness agenda of BOAI. Looking over the long arc of history, of course, there is nothing new here. What is different is that the West had assumed we were now all headed in the same direction and that a more homogeneous world was in the making.

Above all, however, we see two large countries (China and the US) with very different values and economic interests squaring off against each other as they jostle for the position of dominant superpower in the 21st Century. The US wants to retain its pole position, China wants to "recast the global order" in line with its own values and restore itself to its former position as "one of the world's great civilizations". This, suggests *Nature*, "includes being seen by all other nations as a source of scientific power, too".

The developing world will find it hard not to get sucked into this struggle, and countries in the Global South will likely feel the need to pick a side.

The renewed stress on heterogeneity has brought with it a strong sense that Western assumptions about the role and place of science in society, what the research priorities should be, and indeed the nature of knowledge itself, need to be challenged and questioned, and we are seeing calls in some countries for science and education to be reassessed and reengineered to fit local needs.

This is most evident in countries that experienced European colonialism. In South Africa, for instance, we can see calls for the de-colonisation of education in order to get rid of "colonial tags, colonial means of assessing students, and their colonial curricula." Only in this way, advocates insist, can the current system be freed from its "apartheid-linked shackles." A recent conference of the Southern African Historical Society went so far as to conclude[110]

[110] Consider also the contrast between the home-grown Continental Education Strategy for Africa and SDG4. Yet CESA has yet to be funded.

that "unless [South African] universities becomes spaces of robust and open debates in the true sense, they may as well close down."

We have also seen calls to de-colonise science, and even to statements like "science must fall".

More widely, there is growing discontent sense in the Global South that the Global North has been able to embed its dominance, its priorities and its interests into both the international education system and the international research process. And it is complained that this has allowed them to continue to enjoy unfair privilege, and to engage a form of academic neo-colonialism.

This is a valid and justified critique. It was the Global North that defined what modern science is, what its priorities should be, how it should be conducted and communicated, and in what language it should be communicated. And it was the Global North that devised and continues to control the international ranking systems and tables (not to mention the Journal Impact Factor) that are used to evaluate and measure the activities of researchers and institutions and to define what good science is. These ranking systems invariably favour those in the Global North.

Strikingly, we are also seeing suggestions that open access needs to be de-colonised, with events organised specifically to discuss how this might be done. This provides a timely reminder that open access itself has been defined, and is to a great extent controlled, by and for those in the Global North.[111]

So, today we are seeing Western assumptions and privileges challenged in many different ways, and as the tectonic plates of geopolitics begin to shift, so political and cultural differences are being heightened and exaggerated. This is leading to new tensions and points of difference and the research community cannot withstand these developments, not least because the resulting conflict is starting to impact negatively on international collaboration.

Indeed, the very nature and structure of international collaboration is being questioned. We have in recent years seen growing complaints that researchers in the Global South are routinely exploited and side-lined when they partner with those from the North.

Writing last year, *The Lancet* said, "No one likes a parachute researcher: the one who drops into a country, makes use of the local infrastructure, personnel, and patients, and then goes home and writes an academic paper for a prestigious journal". Or as a recent *BMJ Global Health* article put it, "Current paradigms of scientific advancement provide no long-term models to challenge the status quo or privilege knowledge that is generated primarily in the Global South".

This must surely impact on the willingness of developing countries to share and collaborate.

In short, the world is increasingly fissiparous. Indeed, the desire for greater heterogeneity and self-determination is leading calls for more localism in all parts of the world, including in the

[111] As INASP's Siân Harris puts it, "In practice … many discussions about Open Access approaches have taken place without the involvement of stakeholders in the Global South."

Global North. This is what led to the Brexit decision, and it what is driving calls for devolution and independence in a number of other European regions – e.g. Scotland and Catalonia.[112] [113] Unfortunately, this tends to encourage populism and the less healthy aspects of nationalism I have been discussing, and so feeds further conflict.

Wrong footed

As the global order reshuffles the West is confronted with the fact that China appears to have a more effective long-term strategy,[114] one moreover based on a more realistic understanding of the geopolitical moment. Mesmerised by the belief that it had won the ideological war, and that an end of history moment had arrived, the West now finds itself wrong-footed. And Trump's erratic foreign policy decisions will surely exacerbate the problem.

One of the more important battlegrounds for the great power rivalry between the US and China will be fought around technology and the internet. This inevitably has implications for sharing and collaboration, and for open access.

Although it is a global network today, the internet was built in California. As such, its infrastructure and the values baked into it reflect a Western (mainly American) view of the world. Even if unconsciously, the people who created the internet assumed a cultural, social, technological and economic homogeneity that does not exist in the real world.

Having created the internet, the US tended to assume that it would continue to dominate the network and the technology around it. This assumption is now being challenged in a number of ways and the US is having to contemplate the possibility that it could lose its dominance, both of the internet and of the cutting-edge technologies that are expected to power economic development in the 21st Century.

The current dispute between the US, China and Huawei is a case study here. A Chinese multinational technology company, Huawei is now said to be the world's leader in 5G, the technology that will be key to the development of the internet, the Internet of Things (IoT) and AI. Not only is 5G much faster than current cable internet but – unlike the hardware-driven 4G – it will rely heavily on software, and much of this software is being created by telecommunications providers like Huawei.

And in a kind of virtuous circle, 5G will allow the fast machine-to-machine interaction that will be essential for the IoT and AI revolutions, while also providing the infrastructure and large data sets that AI needs to realise its potential. In return, AI is driven by advances in machine learning and so will be able to make sense of the chaos and complexity of 5G.

Both Huawei and 5G are central to China's plans to dominate the rollout of a super-fast wireless network and to assume a leadership role in both 5G and AI. And we should not doubt Chinese ambitions here, or the efforts it is putting into realising them. In its 2017 New Generation Artificial Intelligence Development Plan, China set as a goal that by 3030 its domestic AI industry will be worth nearly $150 billion.

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[112] See also.

[113] Consider also how in 1991/92the former Yugoslavia became six separate countries.

[114] A point conceded recently by Trump's science advisor Kelvin Droegemeier. "The Chinese think really long term," says. China has played the long game and is doing things that are concerning to us."

And judging by China's publication of AI-related papers, *Nature* believes the country overtook the United States in in this key feld in 2006, putting it in second place to Europe. Elsewhere, *Wired* has estimated that China is now the leader in AI implementation, noting "What matters in AI implementation is speed, execution, product quality, data, and government support. Chinese companies are equal to or ahead of their American counterparts in each of these areas."[115]

Moreover, since access to very large amounts of data will be critical to the success of AI, China has a further advantage in that it will be able to generate huge amounts of data from the monitoring and surveilling it undertakes on its 1.43 billion citizens.

Huawei is vital to many of the other areas that China is focused on too, and so key to the country's ambition of becoming a global tech superpower. As *The Los Angeles Times* points out, the company is also working to become the first to produce "a new generation of sensitive military systems, smart grids, autonomous transportation vehicles and other crucial products and services."

China is also said to be leading in the area of quantum computing.

It is against this background that we need to view the arrest in Canada last year of Huawei's CFO Meng Wanzhou.[116] The main charge against Wanzhou is that she covered up violations of sanctions on Iran. But that would seem to be only one of several grievances the US has against the company, including allegations of intellectual property theft. The US also believes Huawei poses a national security threat, not least by spying on governments and companies (see also here).[117] [118]

While Huawei has repeatedly denied these claims, its case was not helped by the discovery of a "backdoor" in one of its laptops.

In short, the arrest of Wanzhou underlines US concern about China's growing technological prowess and awareness that primary superpower status in the 21st Century will depend on having technological supremacy.

What we are seeing, therefore, is the emergence of what the BBC has characterised as a tech cold war and Huawei is at the centre of the battlefield. "The fate of Huawei will be decided by forces that could define the unfolding century: the tension between US exceptionalism and Chinese expansionism," says *The Los Angeles Times*.

One again we should note that this struggle predates Trump's arrival in the White House. When Edward Snowden leaked highly classified information in 2013, for instance, we learned that the National Security Agency (NSA) had been hacking into Huawei's servers as far back as 2009.[119] And this spying activity was defended by Obama in 2014.

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[115] See here for a contrary view.
[116] Wanzhou is the daughter of the company's founder Ren Zhengfei.
[117] Further background on this case can be read here.
[118] It also seems to have led to tit-for-tat punishment by China.
[119] In an operation code-named "Shotgiant".

Elsewhere, the UK has had a Huawei cyber security evaluation centre in place since 2010. The centre's fifth annual report was published in March.[120]

As always, of course, Trump has upped the ante and shown a determination to confront China in ways that Obama was not, including triggering the current trade war with China.

It was when trade talks with China broke down in May that the US attack on Huawei came to a head. Trump responded by signing an executive order banning the company from the US.[121] A few days later Google suspended Huawei's access to updates of its Android operating system and, the same week, the BBC reported that an internal memo sent out by UK chip manufacturer ARM indicated that it would need to suspend business with Huawei.[122] [123]

This was a major blow to the company, which shortly after announced that it expected its revenue to be $30 billion less than forecast over the next two years. And *The Wall Street Journal* predicted extensive layoffs at Huawei's US operations as a consequence.

How this dispute will end we do not know. When he met Chinese President Xi Jinping at the G20 meeting in June Trump announced that he would lift some restrictions on Huawei. Exactly what this meant was unclear. When the ban was delayed for 90 days on 19th August we were told that this was in order to allow "companies such as Google to trade with Huawei while adjusting to the restrictions." In the meantime, US lawmakers seem intent on keeping the company blacklisted and Trump is said to have been contemplating blocking all US investment in China.

The US has also been putting pressure on other countries to ban use of Huawei's 5G technology. When in May a leaked UK government document[124] indicated that the British government was planning to allow the company to supply some parts for the UK 5G infrastructure US officials threatened that if the UK did so the US would have to reassess its ability "to share information and be connected with them in the ways that we are today" – a point later emphasised by US Secretary of State Mike Pompeo. c|net is keeping a timeline on the Huawei ban here.

The dispute over 5G will surely impact the future of the internet[125] (See also here), and perhaps (without wanting to sound pompous) the next chapter in humanity's development. As the *New York Times* puts it, "If China and the United States have begun a technological Cold War, then the Huawei order can best be seen as the beginnings of a digital Iron Curtain."

I shall later argue that the dispute could also see the technology underlying the internet begin to facture. It if did it would surely have serious implications for the research community and its ability to share and collaborate internationally and so jeopardise the whole OA project.

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[120] Amongst other things, the report concludes, "Overall, the Oversight Board can only provide limited assurance that all risks to UK national security from Huawei's involvement in the UK's critical networks can be sufficiently mitigated long-term."

[121] It is also thought that the Chinese surveillance firm Hikvision could also be blacklisted.

[122] What impact this will have remains unclear.

[123] Trump's executive order has also led to IEEE banning Huawei employees from reviewing paper for over 200 journals.[123] (This ban has subsequently been lifted).

[124] The leaking of the information also led to the sacking of the UK's Defence Secretary Gavin Williamson.

[125] As the BBC put it, "If there is going to be an all-out ban on US firms working with the Chinese company then that could make its products – which use some American components – unreliable in the longer term."

Imbalance of values

I said earlier that rather than embracing the values and political model of the West, many countries have chosen to manage their economy, their country and their citizens in their own way. These decisions reflect a different view about, amongst other things, individual freedom, privacy, human rights and free speech. China is key here not just because it is building an unprecedented surveillance state in which not even lip service is paid to these values, but because it is newly powerful and assertive and it is busy exporting both its values and its surveillance and blocking technologies to other countries so that they can follow its example. "Thirty-six countries sent representatives to Chinese training programs on censorship and surveillance since January 2017," explains the Internet Society. "Another 18 countries have purchased monitoring technology or facial recognition systems from Chinese companies during the same time frame."[126]

The important point here is that China is seeking to make its model and values the new global norm. As a UK House of Commons report put it in March: "In the area of human rights, the evidence suggests that China does not intend to reform the rules-based international system but rather intends to subvert it, by promoting an alternative version of human rights which stresses economic development at the cost of the universality of individual civil and political freedoms."

Great power rivalry aside then, the growing tension between China and the West reflects a fundamental clash of culture and of value systems. Here too China would seem to have an advantage. As an authoritarian country it doesn't have to go through the laborious process of consulting citizens before taking action, or be overly sensitive about the impact its political decisions will have on its citizens. This allows it to respond to events more quickly and to exploit what it surely views as weaknesses in the Western model. As BBC anchor-man John Humphrys found himself perplexedly asking an interviewee when discussing the controversy over Huawei, "So authoritarianism is more effective than liberal democracy?"

Thus, China is happy to exploit the West's commitment to free speech for its own advantage. This point was made in a March 2019 Bloomberg article reporting on the arrest of Huawei's CFO. Pointing out that there is an "imbalance of values" between the West and China the author argued that this imbalance favours both Huawei and China.

For instance, the article says, Huawei was able to respond to US attempts to limit its activities in the US by suing the US government.[127] It can also use overseas media[128] and social media to press its case. As such, Bloomberg noted, the company has been able to utilise freedoms available in the West to do in the US what China would not allow others to do in its own country. Let's not forget, Bloomberg added, that China is "one of the world's least-free countries based on an aggregate of scores across 25 categories."

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[126] In terms of internet freedom, the Internet Society says, the most restrictive countries were China, Iran, Ethiopia, Syria, and Cuba, the group said. Iceland, Estonia, Canada, Germany, and Australia were the countries with the most Internet freedom. The United States ranked sixth highest, the UK seventh, and Japan ninth.

[127] Huawei took the US government to the courts over an earlier ban, even going so far as to challenge the very legality of the ban and asking that what is known as Section 889 of the National Defense Authorization Act (NDAA) thrown out.

[128] The interview the company's founder gave to the *Lost Angeles Times* is a case in point.

Bloomberg went on to point out that the Chinese government frequently uses this strategy too – i.e. it is happy to leverage "the openness of developed-nation democracies to push its message, while refusing the same opportunities at home." It added, "China blocks its citizens from accessing Twitter, yet the country's state-controlled media and government agencies have dozens of accounts with the US social media service that they use to spread Beijing's agenda. One editor-in-chief even regularly criticises foreign governments on his personal timeline, a practice that would probably land him in detention if it was directed at his own government."

It is not always apparent how self-consciously (or cynically) this is being done. In commenting on the controversy caused by the leak over UK plans to allow Huawei's 5G technology on its mobile network[129] the Chinese Ambassador to the UK wrote to *The Telegraph* to suggest (without any apparent irony), that "The last thing China expects from a truly open and fair 'global Britain' is a playing field that is not level."

In some ways, we might be better talking about conflict of values rather than an imbalance of values.

I will return to this imbalance when I come on to discuss OA initiatives like Plan S. For the moment, we could note that the research community has been directly impacted by the Huawei dispute, not least because many universities are now dependent on funding from corporations. Those US universities in receipt of money from Huawei have therefore faced pressure from their government to cut their financial links with the company[130] – pressure that they seem to have no choice but to bow to.[131]

Pandora's Box

But before I come on to discuss current developments in open access, I want to explore another background issue – one that I think could have very real and important implications for OA. This goes back to the point I made earlier about openness not being an unmitigated good. I am going to suggest that OA advocates have been naïve not just about open access but about the internet itself. That is, they failed to appreciate the unintended consequences that creating a global network whose default position is set to open would have.

I am not just pointing the finger at others here. I admit I too was naïve. In retrospect, everyone (including me[132]) who thought that it was possible to create a global network, insist that the content and services on it should be open by default, that anyone using it should be able to do so anonymously, and that the network would operate by some magical new laws separate from the real world were plain silly.

[129] The leak quickly became a source of controversy, as it was said to originate from a top-secret cabinet meeting, and led to the Defence Secretary Gavin Williamson being sacked by the Prime Minister.
[130] In September Reuters reported that Huawei plans to spend more than $300 million a year in research funding for universities.
[131] In April MIT cut ties with Huawei. In the UK universities have independently been rejecting Huawei funding.
[132] I am not aware that I ever self-described as an OA advocate, but I have always supported the idea of greater openness.

Today we can see that rather than laying the foundation for "*for uniting humanity in a common intellectual conversation and quest for knowledge"* the internet has opened a Pandora's Box in which "all the ills of humanity swarmed". Much of the content flowing across the network today is not knowledge but lies, damned lies and dubious sales pitches. To change metaphors, the well has been well and truly poisoned.

We also failed to anticipate the security and privacy issues that would arise on an open network, particularly when people are able to roam around on it wearing the cloak of anonymity. [133] Above all, we failed to anticipate that the internet would unleash on the world a tide of fake news and political propaganda from both home-grown and foreign actors, including state actors like the Russian government (which has shown itself happy to conduct false and deceptive media campaigns for political purposes).

Elsewhere the Chinese government has been happy to distort the news reporting of Taiwan-related issues, and in August we learned that Twitter had removed nearly 1,000 accounts associated with the Chinese government targeting protesters in Hong Kong.

The internet is now widely used by governments not just to spread misinformation about their own country (and its past) for propaganda purposes but to sponsor hate campaigns against anyone and everyone deemed threatening, including those who are simply critical of the regime. Most worryingly, it is being used to interfere with the democratic process in multiple countries. A recent report indicates that the number of countries that have been subjected to social media disinformation campaigns by governments or political parties reached 70 this year, up from 48 in 2018 and 28 in 2017. In October Facebook announced that in preparation for the US 2020 election it had removed four separate networks of accounts, Pages and Groups on Facebook and Instagram that originated in Russia and Iran for "engaging in coordinated inauthentic behaviour".

Sadly, many internet users are so silly that they (often unwittingly) help spread the tide of propaganda and fake news that swills around the internet, particularly when it supports their own prejudices and/or political biases. This is not just confusing, annoying and offensive; it can be downright dangerous – leading, for instance, to health epidemics and posing a direct threat to democracy.

It is important to remind ourselves here that it was our desire for free content and services that gave rise to the toxic business models that have facilitated this flood of fake news and disinformation. As Zen Faulkes, a biologist at the University of Texas Rio Grande Valley has pointed out, it also gave rise to recommendation algorithms that allow false and malicious information of all sorts to be widely and repeatedly disseminated. In fact, Faulkes suggests, this is the "biggest problem in science communication" today. YouTube, he adds, is particularly pernicious: "You watch one thing, and YouTube recommends something even a little crazier and more extreme. Because YouTube wants you to spend more time on YouTube".[134]

[133] I understand that anonymity can play a very useful role – for instance with whistleblowing – but as a general rule of the network it has turned out to be dangerous. Some intermediate position is surely required.
[134] I.e. since YouTube is advertising based, the more time users spend on it, the greater the revenues generated from the ads it sells.

In response to a *Verge* article discussing the same topic another researcher[135] tweeted "I will say this until I am blue in the face – repeated exposure to disinformation doesn't just confirm your priors. It warps your world and gets you to adopt beliefs that initially seemed ridiculous to you."[136] [137]

This is the flip side of the wisdom of crowds, it is a phenomenon some now refer to as "the madness of crowds."

In short, the business models developed to allow content and services to be free on the internet have made us all susceptible to quacks and quackery and helped increase public distrust in science and scientists. A famous *New Yorker* cartoon in 1993 had a picture of a dog at a keyboard saying, "On the internet, nobody knows you are a dog". This remains a powerful image and well encapsulates the fact that on the internet, we frequently do not know whether the information we are receiving comes from an expert, a faux expert, or a complete charlatan. More worryingly, many of us no longer seem to care.

The reality is that a network created to help researchers share their work and ideas with one another has been so thoroughly co-opted and monetised by for-profit organisations, scammers, spammers, propagandists and other bad actors that it has been engulfed in false information, and this is often indistinguishable from (or viewed as no more authoritative than) information provided by specialists and experts. This is ironic indeed.

The implications of this for the research community are only just beginning to be understood. These articles here and here outline some of them. The authors of the first article (medics), for instance, point out that the internet has made it extremely easy to disseminate "unfounded opinions and personal beliefs based on no formal, validated, or evidence-based data". This, they add, "is frightening to us in the medical field."[138]

Regulators have begun to respond by, for instance, disciplining vaping companies for inappropriately promoting their flavoured nicotine formulas through "influencers" on Facebook, Twitter and other social media sites.[139] But we must question whether the tide can be turned.

Recently, a transgender teenager in Cambridge UK was so distressed when he was told he would have to wait six-years for treatment on the National Health Service that he resorted to buying hormone treatment from unregulated online doctors who had been suspended. Shortly afterwards he committed suicide.

The problem is that trying to police and prevent these dangers is like playing whack-a-mole. The company that sold the unregulated hormone treatment quickly reappeared operating under a different name and on a different web site.

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[135] Mike Caulfield

[136] *Wired* reported recently that Amazon Prime Video is "full of dodgy documentaries pushing dangerous cancer "cures".

[137] This study found that the majority of videos on YouTube propagate conspiracy theories about climate science and technology.

[138] The issues were also discussed in a recent Royal Society article called, "Fake science and the knowledge crisis: ignorance can be fatal".

[139] These products the FDA warned are being promoted without proper warnings attached.

The internet has also allowed online extremism (of all kinds) to grow and flourish, not just through the dissemination of hatred, religious intolerance and racist poison via social media, but via the "Dark Web", a place where vulnerable and gullible people are daily radicalised and weaponised by disturbed and/or malevolent actors.

As the UK's Minister of State for Security and Economic Crime Ben Wallace has pointed out, the internet allows people with extreme views to gather together to reinforce their ignorance and teach each other ways to harm their fellow citizens by, for instance, building explosive devices or buying and creating guns.[140]

Elsewhere, the former UK Home Secretary Sajid Javid warned that social media "is increasingly being used as a platform to incite violence, promote gang culture and also legitimise the use of knives" (the latter is currently a serious problem in the UK).

As noted, it was the internet's foundational principle of openness that led companies like Google and Facebook to create the business models that facilitate many of the problems we see on the network today. Likewise, the ability the internet offers for people to operate anonymously has fed the explosion of disinformation, propaganda and crime online.

The problems of social media aside, pay-to-publish open access has given rise to predatory publishing (as noted earlier) This allows false science to be widely disseminated over the web by any rogue, quack, misguided individual or snake oil salesman. For those willing to pay for the faux authenticity these publishers provide it is now possible to present any misleading or downright dishonest information as sound science. Predatory publishers also allow dishonest researchers to scam their institutions and funders in order to advance their careers and obtain funding on false pretences. Sadly, it also means that naïve researchers now regularly pay $1000s a time to have their research posted on the Web without it being subjected to adequate, or any, peer review first. They mistakenly believe that they are dealing with a respectable publisher, and if trapped by one of these predators they risk facing irreparable reputational damage.

These rogue publishers also offer a new marketing channel for pharmaceutical and medical device companies looking to promote their products by falsely presenting marketing messages as independent and objective research. (See this for instance). This is the research community's own fake news, fake news that is not only deceitful but potentially very dangerous.

Predatory publishers aside, pay-to-play open access may itself be a boon for pharmaceutical companies even when they publish in reputable journals. In 2010 three medical doctors, a biostatistician, and a research librarian examined the funding source and access status of 216 extended reports published between 2007 and 2008 in the *Annals of the Rheumatic Diseases*, a journal published by the prestigious BMJ Group. Their conclusion: "author-paid open access publishing preferentially increases accessibility to studies funded by industry. This could favour dissemination of pro-industry results."

Pharmaceutical companies are now also able to exploit the less rigorous peer review process of OA megajournals (which accept around 50% of the papers submitted to them). Here again,

[140] See also here.

marketing messages can too easily slip through the net.[141] (See also this commentary on a paper published in *Nature's* megajournal).

Finally, as the OA movement increases its calls for the routine posting of unrefereed preprints our concern should be that much greater. Preprint servers allow pharmaceutical companies to post unrefereed papers online in the knowledge that they will be unlikely to undergo meaningful scrutiny by experts in the field before being made freely available to all. The dangers here were flagged in 2017.[142]

Given their uncertified status, Kent Anderson has suggested that preprints should not be made freely available to the world but only to researchers able to judge the scientific claims made in them. Anderson reports that c.30% of preprints remain unpublished. In the context, this must be cause for concern.

It is hard not to conclude that we were naïve to think that openness is an unmitigated good and that everything can and should be free on the internet.

What is to be done?

For Tim Berners-Lee this is all hugely dispiriting. On the recent 30th anniversary of the Web he complained that his invention has now been so thoroughly "hijacked by crooks" that it could be destroyed. It has, he says, "morphed into a platform where disinformation spreads like a contagion, hate foments and personal privacy has been relinquished to the highest bidder looking to make a quick buck." What he had never anticipated, he added, was that nation-states "would use the web to influence elections and public discourse."[143]

As a solution, Berners-Lee has proposed what he calls a "Contract for the Web". His idea is that governments, companies and individuals agree to a set of principles designed to defend a free and open internet.[144] Along similar lines, last year 30 technology companies signed up to a "digital Geneva convention", committing never to partake in cyber-attacks against individuals or businesses. While Facebook was one of the signatories of this convention, Google, Apple and Amazon were not. In any case, cyberattacks are just one part of the problem we face today.

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[141] As the blogger who drew attention to this paper commented, "I am very concerned about the open access and loose editorial control of PLOS ONE as a megajournal being exploited by commercial interests seeking a peer-reviewed article to advertise their products."

[142] There is also concern that the launch of medRxiv could be particularly risky because, as *Nature* puts it, "some researchers are concerned that releasing unvetted clinical research could be risky, if patients or doctors act on what could end up being inaccurate information."

[143] *Technology Review* reports that social media was used to influence elections in at least 18 countries in 2016, including in the US. Bad actors were also said to have used Facebook to influence the UK's Brexit referendum – although we should note that head of global affairs and communications at Facebook, Nick Clegg has denied that Facebook was used to influence the Brexit decision.

[143] The Church of England has also published a set of guidelines for social media, designed to make online platforms happier places.

[144] The Church of England has also published a set of guidelines for social media, designed to make online platforms happier places.

Either way, one is bound to conclude that talk of contracts and digital conventions is too little, too late, and highly unlikely to provide adequate solutions.[145] Apart from anything else, the extent to which social media companies are willing to co-operate meaningfully to fix the web must be doubted.[146]

The fundamental problem is that at the heart of the business models developed by these companies is the need to monetise personal data. It is this that has given rise to surveillance capitalism and to incidents like the Cambridge Analytica scandal. It has also facilitated and encouraged the fake news problem, not least because these business models are highly dependent on online advertising and so clicks are more important than veracity, and the companies have taken the view that they have no responsibility for the content posted on their sites. Any solution would surely require that social media companies abandon their current business models in favour of less predatory ones – which would surely mean replacing their current free models with pay-to-play models. This in turn would challenge the foundational principle that content and services on the internet should be free.

Interestingly, as scholarly publishing moves away from subscription-based models, newspapers are returning to them.[147] And this seems to be a successful strategy: In May, the *Guardian* reported that by adopting a "contribution/subscription" model it has been able to break even after a long period of losses.

One of the benefits of having users subscribe to news services is that it can avoid many of the problems inherent to free content models. It would also see an improvement in the user experience. Ad-driven sites inevitably offer an appalling user interface, with web pages drowning in a mess of colours, flashing text, audio and clickbait, all of which makes it practically impossible to read the content adequately.

The job of journalism is to separate truth from falsehood. When reporting is overwritten with ads and distracting promotional messages the user inevitably struggles to distinguish factual reporting from fake news.[148] [149] The subscription model, by contrast, enables (and actively encourages) publishers to fund professionally trained journalists and fact checkers and to focus on creating a trustworthy brand and a pleasant user experience. In this way, by moving back to subscriptions news sites can begin to chip away at the fake news problem and produce more valuable products and services. And as the reader becomes the primary customer (not the advertiser) there is much greater incentive to create a cleaner and clearer user experience.

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[145] Berners-Lee is also developing software based on a decentralised web called Solid with the aim of allowing users to own and control their own online data. Again, it may be too little, too late.

[146] Consider, for instance, that Facebook promised to crackdown on vaccine misinformation, but then little happened. It also failed to honour the first agreement it came to with the US government. More recently it introduced a new policy that includes not fact-checking political ads, nor putting restraints on politicians' speech on the Facebook platform.

[147] Often now called a "membership" model as users who do have a subscription can get, say 4 free articles a month) – e.g. here, here and here. Another approach that has become popular is the so-called freemium model.

[148] See one example of how this works in these two pieces I wrote in 2106 (here) and in 2017 (here).

[149] Worth noting here perhaps Elsevier's view that "Online advertising allows Google/Facebook to capture most of the value, leaving media companies with crumbs."

Is there a lesson here for the research community as it grapples with the problem of predatory publishing? I think so. Certainly, some believe that the subscription model is more suited to scholarly communication, not just because it helps avoid predatory publishing but because it offers a more stable and predictable revenue stream. Importantly, it significantly reduces the temptation to accept ever lower-quality papers in order to earn revenue from APCs. Again, the reader becomes the customer rather than the advertiser (author). These points are frequently made by Anderson – e.g. here and here.

The long and short of it is that free and open content appears to have created as many (if not more) problems than paywalls ever did.

What we have also learned is that business models have implications not just for sustainability and profitability. They have political, sociological and legal implications. And new and untested business models too often have undesirable and/or dangerous side effects.

Reaching for legal remedies

As the unintended consequences of the internet have become ever more apparent and regulators have struggled to grapple with them governments are now reaching for legal remedies. Last year the US Federal Trade Commission sought to address the problem of predatory publishers by suing an India-based predatory publisher called OMICS, a company grown rich on its dubious publishing and scam conference activities.[150] [151] – an intervention also that appears to have had little or no effect.

Above all, governments are looking at ways to force the so-called FAANGs to fix the problems they have created and/or facilitated – by, for instance, blocking and taking down inappropriate, false, violent, illegal and/or dangerous content and desisting from selling or inappropriately using the personal data of their users, or allowing others to use their platforms for these purposes.[152]

The search for legal remedies will surely grow, because while social media companies have made some effort to address the problems – Facebook, for instance, has suspended apps and Twitter has suspended accounts – they have done far too little to satisfy critics and politicians, and seem unlikely to unless something significant changes. It does not help that these companies don't appear to accept it is entirely their responsibility to fix the problems. Facebook's head of global affairs and communications Nick Clegg, for instance, has suggested that others need to take responsibility to clean up the mess too. To this end, the company has proposed an independent oversight board be created.

[150] A federal judge ordered journal publisher and conference organiser Srinubabu Gedela and his companies to pay more than $50.1 million to resolve Federal Trade Commission charges that they made deceptive claims to academics and researchers about the nature of their conferences and publications, and hid steep publication fees.

[151] Meanwhile, a Russian site is selling authorships for more, allowing researchers to pay to have their names attached to articles.

[152] This is an important development if only because internet-based providers who host third party content have long held that they are not publishers and so not responsible for the content on their platforms. In the US this is articulated in Section 230 of the 1996 Communications Decency Act.

Moreover, given the huge revenues these companies earn they have to date been generally unfazed by efforts to rein them in. Facebook's earnings are sufficiently high that it was able to set aside $3 billion to settle with US federal regulators over the Cambridge Analytica incident without much pain. As NPR pointed out, Facebook's total revenue for the first quarter stood at more than $15 billion. "So whatever the final figure, the company has the money to pay for the estimated fine."

In the event, the company was fined $5 billion. But when the news was released Facebook's shares rose![153]

Government intervention will therefore undoubtedly escalate. With an eye to solving the fake news problem, for instance, 17 governments have now approved or proposed new laws intended to restrict online media.[154] And given that some of these companies can simply shrug off large fines, individual directors and executives are also likely to be targeted. In the UK, a new "online harms bill" has been proposed that would provide powers "to issue substantial fines, block access to sites and potentially to impose liability on individual members of senior management." In the US a proposed new bill would aim to address the privacy issue by allowing greater fines and threating senior executives with 10 to 20 years in prison if they lie about their privacy standards.

However, there are no easy solutions here. Attempts to improve user privacy can exacerbate some of the other problems. When, in order to provide greater privacy, Facebook announced plans to encrypt all the messages on its platform governments complained that doing so would hamper existing agreements to grant law enforcers faster access to private messages on social media in order to protect young people from online exploitation.

Given their sheer size and power, proposals are also being made to break up the larger social media companies. Democratic presidential hopeful Senator Elizabeth Warren is one of those who has called for this.[155] We have also seen a series of moves in the US in recent months that would seem to be moving in this direction, including an announcement by the US justice department of a wide-ranging antitrust review of tech giants, an antitrust investigation of Facebook by the attorneys general of eight states and Washington, DC, and an antitrust investigation of Google by 50 attorneys general.

But breaking up these companies will not fix the problems inherent in surveillance capitalism, says Zuboff. At issue is not just the size of these companies, she explains, but the business models they use.

As noted, these models are a direct consequence of the internet's open philosophy. If web companies were forced to jettison them then the free content and services that we have all become accustomed to would likely be closed or converted to pay-to-use. Actually, this may already be the direction in which we are travelling. YouTube, for instance, is currently aggressively promoting a premium subscription service. We could therefore see the

[153] *The New York Times* put it, the recent FTC settlement was "so extraordinarily light that it makes a slap on the wrist seem like cruel and unusual punishment".
[154] *The Los Angeles Times* reports that governments around the world, including in Russia, Malaysia and France, have introduced regulations seeking to stem the spread of so-called fake news. So too has Kenya. Meanwhile Ukraine is considering introducing legalisation and the EU has outlined an action plan to counter disinformation.
[155] See also.

fundamental principle of openness underlying the internet challenged. And this could call into question the whole open philosophy of the internet.

For his part, Clegg argues that taking action against the FAANGS would be counterproductive. Describing current criticism of social media companies as a "techlash", he maintains that weakening or breaking up the FAANGS would simply open the door for large Chinese companies to fill the vacuum. "There is a battle for tech dominance between China and the US," he told the BBC. "They [China] don't have similar privacy concerns as we do. I can predict within a short period of time, we will have a tech domination from a country with a wholly different set of values to our own."

This is clearly an opportunistic response, but it could prove a successful strategy. For that reason it is now a routine rejoinder from social media companies. In May Google's CEO Eric Schmidt warned that attempts by the EU to curb the power of the FAANGs, "hands China a competitive advantage on everything from privacy to data collection."

A further problem is that absent more drastic action (which I will discuss below) it is far from clear that content can be effectively controlled on the internet After the Christchurch mosque shootings earlier this year, for instance, Facebook reported that it had deleted a video of the shooting 1.5 million times in the first 24 hours.[156] Did that eradicate the video?

Collateral damage

Breaking up the FAANGS may not therefore be politically do-able. Unfortunately, legislation intended to filter and block content may also not be workable on a global network whose founding principle is untrammelled openness. The inherent difficulties in doing so could perhaps explain why the UK dropped its plans to introduce online porn blocking legislation.

Blocking content can also cause collateral damage. In the US, for instance, the Internet Archive has demonstrated that attempts to block content can lead to perfectly harmless information being mistakenly identified as, say, terrorist content.

In addition, legislation aimed at blocking content raises free speech issues. Commenting on the proposed UK Online Harms Bill, for instance, critics complain that it would mean the "state regulation of the speech of millions of British citizens."

Similar concern has been raised over a new law introduced in Singapore intended to protect citizens from fake news. The way the law is worded, say critics, will give the government of Singapore the power to decide what qualifies as true or false, and so become a censorship tool.[157]

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[156] The BBC discovered images and videos on social media of the bodies of fighters and civilians being desecrated by fighters from the self-styled Libyan National Army, videos that Facebook and YouTube seemed unaware were there – despite reported claims that they have developed sophisticated tools to detect and take down such content.

[157] As Kirsten Han put it in commenting on the new law in Singapore in *The Nation*, "For a ruling party that already dominates the mainstream media and has the power to set the national agenda, such a law is a handy weapon to add to the government's arsenal of methods to suppress speech. It would allow PAP ministers to become the arbiters of truth in the first and second instance. The implications for freedom of expression, press freedom and even academic freedom were clear."

Moreover, they say, the Singapore Bill could infringe academic freedom, censoring not just fake news and illegal content but research papers and the journals they are published in too. As economist Linda Lim puts it, "It's not just a problem for academics but also for any platform that hosts their work. It could be just one sentence in a book or an entire article in an academic journal that they object to, and the entire thing would have to be taken down."[158]

There are also concerns that legislation intended to protect the privacy of online users will have similar negative effects. In 2018, for instance, the EU introduced the General Data Protection Regulation (GDPR) in order to protect personal data. One immediate consequence of the GDPR was that many mainstream news sites became unavailable in Europe, including the web sites of widely regarded professional newspapers.

This is because where publishers outside Europe choose not to, or are unable to, comply with the new law (or have yet to do so) their web sites are blocked to European users. Amongst other things, this means that many US newspapers and news web sites are now effectively off limits to European users. At the time of writing (some 18 months after the GDPR came into effect) around 1,000 such sites were inaccessible in Europe, including those of the *Chicago Tribune*, the eighth-largest newspaper in the United States by circulation. Some parts of the web site of the *Los Angeles Times* (the third-largest circulation among United States newspapers) are also blocked.[159]

The GDPR is also thought likely to have implications for open science. Concerns have been expressed, for instance, that it will clash with journal and funder open data policies (as noted here). On Twitter, one OA advocate said: "data protection laws now also intersect in wildly unpredictable ways with open data. It can be illegal to do open science under data protection laws."

Copyright laws also inevitably have unintended consequences. The recently introduced EU Directive on Copyright in the Digital Single Market is expected to see a lot of content blocked, both material that is infringing but also perfectly legitimate content.

The most controversial part of the EU Copyright Directive is Article 13, which requires online platforms to police content uploaded to them. To do that they will need to use content-blocking technology. This, says the Internet Society, is "generally inefficient, often ineffective, and prone to cause unintended collateral damages to Internet users." Making the same point, the Electronic Frontier Foundation demonstrated that the Mueller Report into

[158] As reported here: "The bill also allows ministers to order internet service providers to block access to content in Singapore that the country deems false. Academics fear that international academic journals will issue corrections to prevent their content being blocked in Singapore and it could also make foreign scholars more reluctant to collaborate with Singaporeans … scholars fear that the bill could be used to censor academic papers across the world and university teaching materials both at institutions in Singapore and at foreign universities with links to the country, unless the wording of the legislation is amended to include a specific protection for academics." See also here.

[159] As noted, the purpose of the GDPR is to protect data and presumably could help in the struggle with surveillance capitalism. However, POLITICO fears that the European regulator (in Ireland) may not be able and/or willing to police the legislation effectively.

President Trump and his presidential campaign was being blocking by copyright bots.[160] Again, there are fears that it could also impact on the research community. (See also here).[161]

In short, balancing openness with information integrity, user privacy and intellectual property rights is far from easy and legislative attempts to block and filter content often introduce new harms. As *World Politics Review* has noted, the EU Copyright Directive, the implementation in Australia of a new law[162] to police certain content on social media following the mass shooting in New Zealand and the UK's white paper on online harms have "major international implications: the importance of adequate checks and balances on these kinds of internet policies, in both what content these governments filter and how they do that filtering."

For their part, cyberlibertarians argue that any effort to censor content on the internet is not only inappropriate but in vain. Users, they say, can always access blocked content via Tor services, proxy servers and Virtual Private Networks (VPNs) etc.

But these tools may be out of reach or too expensive for many (as online users in Chad discovered when they tried to turn to VPNs) and governments are in any case now seeking to control and emasculate them. This year, for instance, Russian authorities introduced a new law that requires internet providers to install equipment that will route Russian internet traffic through servers based in Russia. This will make it harder to circumvent government restrictions. And the government has said that unless 10 of the top providers of VPNs connect to its state content-filtering system they will banned from operating in the country. (see also).

There is also a view that in the constant cat and mouse game we have seen being played out between those offering circumvention tools and the authorities, the authorities are gaining the upper hand in other ways. In June, an article published by KFGO noted: "Ahead of the [Tiananmen Square] anniversary, censors at Chinese internet companies say tools to detect and block content related to the 1989 crackdown have reached unprecedented levels of accuracy, aided by machine learning and voice and image recognition."

What is indisputable is that the openness of the Web has opened a Pandora's Box. Today most people still want content to be freely available but they realise that a free-flowing uncensored network where users can operate anonymously has created all sorts of problems, including a tide of hate, pornography, child grooming, cyberstalking, fake news,[163] scam ad campaigns, conspiracy theories, cybercrime, cyberattacks etc. etc.

Today, much of what is now available online is of unknown provenance, uncertain truthfulness (and for vulnerable or naïve users) downright dangerous. People want this kind of content censored and/or removed. But two important questions arise: Can it be done effectively? Who decides what is acceptable?

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[160] See also here.

[161] Although the Directive has been welcomed by some academic librarians, while elsewhere the European University Association sees both good and bad in the legislation.

[162] As the *NYT* put it on 3rd April 2019, "Australia passed sweeping legislation Thursday that threatens huge fines for social media companies and jail for their executives if they fail to rapidly remove "abhorrent violent material" from their platforms."

[163] And now "deepfake".

Importantly, much of this noxious content and activity traverses national borders.[164] The CEO of the UK's National Cyber Security Centre (NCSC) reports that cyber-attacks from Russia, China, Iran and North Korea pose "strategic national security threats to the UK".

What is surely certain is that legislation is no silver bullet and, as always with the internet, the issues are both complex and controversial.

Some may say that these issues have minimal or no relevance to open access, others will say they do. Lim, for instance, worries that Singapore's plans to filter and censor content could see research papers blocked, either accidentally or as an act of censorship. We could also note that the second most targeted sector for cyber threats is academia. The threat to universities, says the latest report from the NCSC, comes from nation states looking to steal sensitive research, research data, intellectual property and other assets, for strategic advantage.

There is also the thorny issue of Sci-Hub to consider. Sci-Hub is a huge illicit database of 60 million stolen research papers made freely available on the internet by computer programmer Alexandra Elbakyan.

OA advocates are conflicted over Sci-Hub. Many are inclined to applaud Elbakyan's activities – on the grounds that it is helping to persuade publishers to embrace open access. But is supporting an illegal service really good publicity for OA?

The larger issue is that legislation like the EU Copyright Directive seems unlikely to solve the problem with Sci-Hub since the service operates out of Kazakhstan. For this reason, legal attempts to close the service have to date failed. This failure, and the problems of blocking content, could fuel calls for more drastic action – and this could certainly have implications for the research community, which I will discuss in the next section.

My point is that if the legal remedies currently being introduced by governments fail to be effective, we can expect more drastic measures to be taken. Some predict that this will eventually lead to the breakup of the internet. If that were to happen, BOAI's hopes of open access laying the foundation "*for uniting humanity in a common intellectual conversation and quest for knowledge"* will begin to seem decidedly moot.

Splinternet?

This brings us to what could prove the greatest threat for open access today – the possibility that the infrastructure on which its very logic depends could fracture and be balkanised.

The possibility of this was raised in a 2018 *Fast Company* article entitled 'splinternet'. As the article puts it, "Rising protectionism, nationalism, and security fears could see an internet sequestered by national borders."

How likely is it that the internet could break up? I cannot say, but currently the signs are not encouraging. In a separate article called the World Walled Web *Engineering and Technology* (*E&T*) magazine[165] noted: "In just two decades the internet has gone from being a symbol of

[164] The *New York Times* reports that while some ransomware attacks on US cities come from within the country, many come from Eastern Europe and Iran.
[165] *E&T* is the Institution of Engineering and Technology's monthly magazine.

'no borders' utopianism to a place where nationalist-inspired 'cyber-space sovereignty' is being robustly asserted by countries keen to cordon themselves off from the rest of the world – and the trend is unlikely to peter out any time soon."

For the research community this raises the possibility that paywalls could be pulled down only to be replaced by national/regional firewalls.

As *Fast Company* points out, countries and groups of countries are already creating separate networks able to operate independently of the internet. "In 2013, Brazil, India, and South Africa joined Russia and China in constructing a completely separate telecommunications system cut off from the global internet's infrastructure," it reported. Known as the BRICS Cable, this is intended to "connect the five countries with each other by a 34,000-kilometre long underwater fibre optic cable". The goal of the group, says *Fast Company*, is to "construct its own independent internet between the countries involved."[166]

In a separate initiative, China and Chile are building an underwater fibre optic cable between the two countries. Explains *China Daily*, "It would be the first underwater fibre optic cable to directly connect Asia with Latin America and would help drive interconnectivity, trade, investment, as well as scientific and cultural exchanges between two continents."

In other words, as the geopolitical environment becomes increasingly fissiparous, we could see the internet start to break up. As noted earlier, many governments are now filtering more and more content and a growing number of countries have begun to permanently censor parts of the network. This is most evident today in authoritarian states with, for example, China's Great Firewall (GFW), Iran's halal net, North Korea's Kwangmyong, and Cuba's RedCuba.

We are also seeing more countries blocking specific web services – sometimes on a temporary basis (usually during times of social unrest, which is becoming more common), and sometimes on a semi-permanent basis. In Turkey, Wikipedia has been blocked for the past two years, leading Wikipedia to request the European Court of Human Rights to demand that the block is lifted.[167]

While it will sometimes be a specific service (e.g. Twitter and Facebook) that is blocked, at other times the entire internet is being cut off. In April it was reported that Chad had been without internet access for over a year. This year Sudan, Zimbabwe, Benin, and the Democratic Republic of Congo have all faced a shutdown for various reasons.[168] Some of the implications of this for citizens are outlined in this article about Sudan.[169]

Likewise, when India recently revoked Kashmir's special status the first action of the Indian government was to shut down mobile networks, internet, broadband, and landlines.[170] For a sense of the impact this had on the research community in the region see this article.

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[166] Current plans are that a number of other South American countries might also join.
[167] See the Turkish civil society Declaration on the state of the internet here.
[168] See the Internet Without Borders web site for more information.
[169] According to the pilot African Open Science Platform landscape study,20 African governments applied some form of Internet censorship 45 times since 2001, of which 36 times the shutdowns related to anti-government related protests. The study also found internet access impacted by power cuts, failure to appreciate the benefit of NRENs and that many journals are still only available in print form.
[170] See also here.

In this context we should also note that half the world is still not online.

In short, suspension and/or cutting off of the internet (or parts of it) is becoming routine in a growing number of countries, often as an attempt by the government to quell or prevent civil unrest or discussion. The Internet Society reports that in 2018 freedom on the global internet declined for the eighth straight year, with a group of countries moving toward what it calls "digital authoritarianism". Elsewhere, Freedom House reports that about 47 percent of Internet users now live in countries where access to social media or messaging platforms has been temporarily or permanently blocked.

And while many of these shutdowns are temporary, the duration is getting longer. The end point for some countries may be permanent loss of the internet, to be replaced by a national or regional intranet. Recently, Iran's Supreme Council of the Cultural Revolution announced that the country's national information network (Iran's intranet) is now 80 per cent complete, and that it has conducted 142 successful tests to "weigh the independence of Iran's national intranet network, against a possible internet disconnection." And this last weekend Iran organised a near-total internet and mobile data blackout following civil unrest. While this is still not a simple process for countries with many network connections, this *Wired* article explains how governments are becoming more and more adept at doing so.

In February there were reports that Russia was planning to temporarily disconnect the country from the internet. Subsequently (early May), Russian President Vladimir Putin signed into law new measures that would enable the creation of a national network able to operate separately from the rest of the world. As CNN put it, "Russia is one step closer to creating its own, independent internet – at least legally speaking."

But it would be wrong to imply that it is only authoritarian states that are toying with the idea of creating a separate national or regional intranet. When the German chancellor Angela Merkel discovered that US spies had tapped her personal BlackBerry her first reaction was to call for the European Union to create its own regional internet tied to the political bloc.[171] This, explained *Fast Company*, was envisaged as being "separate and completely walled off from the world wide web".

And during the 2015 presidential campaign Trump suggested that in order to counter the online activities of extremist groups like ISIS, US technology leaders should be consulted with a view to "closing that Internet up in some way."[172] Trump's suggestion was derided as naïve and silly. In fact, at the time, Hilary Clinton was making a not so dissimilar suggestion.[173]

In other words, a growing list of countries are beginning to explore the possibility of boxing off parts of the internet or "closing that internet up in some way". Concern about terrorism, cyberattacks, cyberespionage and other illegal and/or malign online activity is feeding this

[171] See also this and this.
[172] See also here.
[173] Compare this with what President Bill Clinton said in 2000: "Now there's no question China has been trying to crack down on the internet," Clinton said, his eyebrows arched as he neared the punchline. "Good luck! That's sort of like trying to nail jello to the wall." CNN quotes this and says, "In the decades since that speech, Clinton's jello comment has become a something of a dark joke among internet freedom advocates as China continued to build up the Great Firewall."

idea and it seems entirely possible that at some point we will see national or regional networks being disconnected from the internet.

Cyberattacks and terrorism aside, authoritarian governments clearly want to control dissidence and prevent their citizens from accessing or publishing content online that the regime does not like (not least criticism of it) and to limit their ability to collaborate, both internally but also externally with critics of the regime.

We have, however, to be open to the idea that governments who choose to censor the internet may be doing so because they want to defend their country's distinctive cultural, ideological and religious differences, as much as to control citizens' speech or filter out dissent. It may simply reflect a desire to prevent "contamination" by foreign cultures and values.[174]

Indeed, it is possible that the majority of citizens of some countries do not actually want culturally offensive, criminal in intent, or dangerous in design content to flow freely through their part of the network. As noted earlier the world is still heterogeneous and cultural and national sensibilities vary between countries, regions and ethnic and religious groups, many of whom will have very different views on what is acceptable.

As such, moves to block content and services on the internet, or completely disconnect from it, may simply reflect a national rejection of the hegemonic nature of a global network still to a great extent controlled and dominated by the US – a rejection, that is, of the internet's powerful homogenising effect. That alone could prove sufficient to fracture the internet, particularly if current legislative attempts to block and filter content and services are deemed inadequate.

What is clear is that many countries have come to resent both the technical and cultural dominance the US continues to have over the internet and social media. As *Fast Company* points out, many countries do not want to have to rely on a Web "predominantly built on technology and infrastructure made by US companies and controlled by US tech giants – in other words, an internet that exports American influence and soft power around the world."

It was partly for this reason that some countries developed their own non-Western social media platforms – e.g. China's Sina Weibo and Baidu, and Russia's VK service.

It was the emergence of social media that really brought home to the world the homogenising nature and hegemonic effect of the internet – with monoculturalism an unspoken assumption of those who created and continue to manage the internet and primary social media platforms.

Social media is perhaps the best example of the problem here. These platforms were by and large created by a small group of young and unrepresentative – mainly US-based – entrepreneurs who have proved happy to exploit their users in an irresponsible and unrepentant way in order to enrich themselves. Indeed, even in the US there are now concerns about the negative consequences of the social and cultural bias of social media. As the *New Yorker* put it when discussing the development of Twitter, "Since the 2016 election, it has grown increasingly clear that allowing young, mostly male technologists to build

[174] Iran's prosecutor-general has compared the internet to a "slaughterhouse" and said that "Blasphemy, anti-national security teachings, and destroying the identity of the youth are among issues we face in cyberspace."

largely unregulated, proprietary, international networks might have been a large-scale, high-stakes error in judgment."[175] The issue today, of course, is how and whether one can row back from that error.

Also relevant here is that all the major social media services are built on proprietary platforms laid over the open infrastructure of the internet. As such, their rise has come at the expense of openness. The internet was created using open transparent standards and software and data that is portable, extensible and interoperable. Social media platforms have turned much of the Web into a series of proprietary platforms. As *Wired* put it in 2010, "Today the Internet hosts countless closed gardens; in a sense, the Web is an exception, not the rule."

We can see the same process taking place in the scholarly communication space as a result of the "rise of the platforms" (of which more later).

Be that as it may, as cultural beliefs, traditions and political differences come into conflict the temptation to hit the internet off switch can only grow, and it seems entirely possible that the network will end up balkanised. Reporting on recent developments in Russia, *SecurityInfoWatch* said, "Russia's attempt to create a network separate from the rest of the world is unprecedented."

One of the most likely reasons for a splinternet is that the internet has turned out to be one of the most effective tools for spying and surveillance. And the extent to which this has been happening became evident in 2013, when Edward Snowden revealed the way in which the US[176] was surveilling not just hostile states, but its allies (including individual politicians) as well as its own citizens.

I don't know whether Merkel's proposal for a separate European internet has been progressed, but to discover that an ally and supposed friendly state is spying on you is a very good reason to consider – as Trump puts it – "closing that internet up in some way."

Interestingly, in November Merkel called on the EU to assert "digital sovereignty" by developing its own platform for managing data, rather than rely on US-based cloud services run by Amazon, Microsoft and Google. The *FT* commented, "Her speech, at an employers' conference in Berlin, shows the extent to which the information economy is emerging as a battleground in the EU-US trading relationship."

Another compelling reason for countries to seek cyber sovereignty is concern about law and order. Speaking to *E&T* in 2018, security researcher Lee Munson suggested that, for better or worse, Western countries will likely start to mimic some aspects of digital authoritarianism, including creating national cyber boundaries. The aim, he added, would be "to ensure their local laws can be effectively enforced and citizens protected."

Unsurprisingly, law enforcement agencies are sympathetic to this idea. Speaking to *E&T* in 2017, UK Chief Constable Michael Barton argued that it is time for democratic nation states to think about "reasserting sovereignty" over the internet within their territories. "I think the

[175] Of Facebook, Zuboff points out that the founders were themselves adolescents and emerging adults. "They designed practices from an imagined universe of adolescent users and college students, and those practices were later institutionalised for the rest of us, reducing the world to a tally of 'friends' who are not friends and 'likes' that provide a continuous ticker of tape of one's value on the social market."

[176] And the UK of course.

concept of the World Wide Web without frontiers needs to be challenged," he said, "it is perfectly possible for nation states to reassert their sovereignty. One of the biggest problems police forces have when investigating the internet is its international nature."

In short, geopolitical issues aside, governments of all stripes are warming to the idea of building walls around their section of the network. Speaking to the *Financial Times* earlier this year, Michael Posner, professor of ethics and finance at NYU's Stern School of Business (and former Obama administration official) said that given the way the internet has developed he expects we will see "each government deciding what is illegitimate or not. And you end up with what Iranians have called the 'halal internet' – where [each country] decides what is kosher or not."

Of course, blocking content and services is one thing, creating a separate network is another but, like trade wars, internet balkanisation would probably be an infectious process. Either way, the signs of cyber walls going up (and calls for them to be erected) are there for all to see. The day of the digital Iron Curtain may be approaching.

As populism grows and trade wars escalate and as countries begin to seek cyber sovereignty, we are driven back to Hook's suggestion that international collaboration and open access are co-dependent. While Hook provided evidence that both have grown in recent years, he was looking through the rear-view window. Looking through the windscreen the situation looks far less upbeat. Indeed, as one commentator has put it, "free exchange and mobility in higher education and science now face an existential threat."

One problem for the research community is that OA advocates and scholarly publishers are currently so distracted by the details of open access (who should pay APCs? How much should they pay? Should APCs rather be abandoned? Is a PAR better than a RAP? What licensing should be used for OA papers etc. etc.?) that they seem to be oblivious to the shifting political sands on which they are building their hopes for an open access future.[177] The geopolitical forces at play today seem more likely to see international collaboration fall rather than grow. Yet so far as I can see, no one in the OA movement is giving much thought to this possibility, or to the likelihood that the internet could fracture.

The fact is that the internet is the product of a different age and a specific culture, as is the BOAI. Given today's rising international tensions, the increased resistance to US dominance of the internet, and a growing desire for cyber sovereignty is it not silly to assume that the internet of tomorrow will be the internet of yesterday, or even the internet of today.

Overstating the situation?

Doubtless there are those who would still assert, with Friedman, that the combined forces of globalisation and the web are acting "like nutcrackers to open societies". But the evidence does not support this. Not only are countries failing to become open societies, but we have seen a growth in authoritarianism and what the Internet Society calls "digital authoritarianism." A splinternet might seem a possible next step.

[177] When someone asked on the Scholcomm mailing how universities are responding to the Droegemeier letter a couple of librarians posted some links, but no one addressed the larger issues the letter raises.

There are, however, sceptics who maintain that a splinternet is unlikely. While conceding that we could see regional webs emerge, Rajneesh Narula of the Henley Business School, suggested to *Fast Company* that any talk of a splinternet overstates the situation. As he put it. "Economics always wins over nationalism."

On the other hand, one could argue that the isolationism enabled by the Chinese GFW has been economically beneficial to the country. After all, the Chinese network is to a great extent a cut off from the rest of the world. As the *Washington Post* points out, "With nearly one quarter of the global internet population (700 million users), the internet behind the GFW can be considered a 'parallel universe' to the Internet that exists outside."

Or as the *New York Times* puts it. "Today, the Chinese internet at first glance doesn't look much like the one the rest of the world uses. It has different platforms, ideals and business strategies, all tended carefully by censors."

Thus, while the GFW may not be a completely separate network today its partial disconnectedness is a deliberate part of China's economic policy. The GFW is not just a censorship tool,[178] it is also a component of what the US refers to as China's "predatory trade practices". It has helped China limit and control foreign competition as it builds up its own technology companies. It has enabled China to hot house its own companies in a protected environment.

As Wikipedia puts it, "The Great Firewall is a form of trade protectionism that has allowed China to grow its own internet giants. [179] Or as the *FT* puts it, the GFW is "the world's biggest non-tariff trade barrier."

The *NYT* goes on to argue, however, that GFW has mostly been one-sided. "American chips and software power Chinese servers and mainframes. China has been a big revenue driver for Apple, Oracle, Intel, Qualcomm and other big names in tech. Much of this was by necessity, since China couldn't make all this stuff itself, but it still gave American companies a role in the direction of the Chinese digital future."

But is not this one-sidedness sound strategy? After all, it has allowed China to use and learn from US technology while creating its own. The US complains that this has been based on predatory trade practices, and intellectual property theft. But the US has been happy to use cheap Chinese labour to assemble it tech gadgets, not least the iPhone. If this has helped China benefit from technology transfer it is a price that the US has apparently agreed to pay.

The American Interest refers to this as China's "Attract, Access, Adapt" policy. In addition, it says, China has been able to benefit from structural changes in the global economy, including the fragmentation of global supply chains.

The next stage of China's strategy became apparent in 2015, when it launched its Made in China 2025 initiative. The aim is to make the country more self-sufficient by increasing Chinese-domestic content of core materials – to 40 percent by 2020 and 70 percent by 2025.

[178] John Lanchester has also described the GFW as considerably more than a blocking and filtering too. And he has said it is more than just a separate network.
[179] E.g. Tencent, Alibaba, and Baidu. China has its own version of many foreign web properties, for example: Tencent Video (YouTube), Tencent Weibo (Twitter), Qzone (Facebook), WeChat (WhatsApp), Ctrip (Orbitz and others), Zhihu (Quora).

And the focus is on high-tech fields, including the automotive and aerospace industries, and semiconductors, IT and robotics.

In other words, China first set out to learn from foreign technology companies in order to build its own industries. Now it is moving up the value chain and competing directly with the United States and the rest of the world. The aim today presumably is to become a global technology leader. And companies like Huawei would seem to demonstrate the success of this strategy.

We might also want to challenge the claim that a splinternet is unlikely because any country disconnecting from the internet would pay a heavy economic price from another perspective. Even if it is true, it overlooks the fact that in populist eras a desire for independence, self-determination and self-assertiveness can take precedence over simple economic calculations – as the whole Brexit drama surely demonstrates.

In the case of the US, *amour proper* clearly also comes into play in the trade wars it has embarked on. While most (if not all) economists argue that trade wars hurt both sides, America is not only seeking to rebalance trade but to maintain its dominant position in a world that now contains a hugely successful and assertive China. US pride is at stake and Trump's actions are intended to flex US muscles to assert itself more powerfully on the world stage.

Understating the situation?

As I have said, this text is speculative. We cannot know where we are headed. Nevertheless, I believe OA advocates ought to be spend more time thinking about possible futures and with a broader perspective than who is going to pay APCs – something they have been very bad at doing to date.

In fact, some believe that current speculation about a splinternet downplays rather than overstates the situation. This at least would seem to be the view of Dame Wendy Hall.[180] Writing on the blog of the Centre for International Governance Innovation (CIGI), Hall argues that the term splinternet "understates the divisions" that the internet faces since it is already splitting. "Viewed through a geopolitical lens, the monolithic, unchanging internet dissolves into at least four," she says.

Citing a paper she co-authored last year, Hall describes these four different internets in this way: First, she says, there is, "what we call the 'open internet' of Silicon Valley", which welcomes decentralisation and the openness and freedom it allows.

Second, there is the regulated "bourgeois internet" we see emerging in Europe. Third, is the "commercial internet" which, says Hall, is "supported particularly by Donald Trump's administration and other Washington policymakers", who prize the innovation facilitated by data collection and oligopoly but resist the West Coast vision.

[180] Hall is Director of the Web Sciences Institute and Professor of Computer Science at Southampton University. We could note that the University of Southampton was instrumental in the development of open access, and both OA advocate Stevan Harnad and Tim Berners-Lee are associated with the University's computer science department.

Finally, she says, there is the "authoritarian internet" championed by Beijing. This, says Hall, uses the technology of the internet not so much to encourage innovation and freedom but to "monitor and influence social interaction to address security, social cohesion, health and wellbeing, transport or climate change".

Hall makes the key point that these internets are now pulling against one another in a way that could "see the internet's essential openness threatened." For instance, she says, the internet consists of a delicate network of systems, protocols, standards, hardware and organisations. As national, cultural and political forces pull in different directions, she says, we could see the internet start to fracture at the technical level. At some point, therefore, the component parts and standards of the internet could cease to be interoperable.

Indeed, the seeds of such a split are evident in the row over Huawei and 5G. US attempts to ban Huawei, suggests the *FT*, could lead to a fracturing of global standards and thus a bifurcated market, "much as China's great firewall has created a 'splinternet' of what was conceived of as borderless cyber space."

Such a possibility is more likely given that China is seeking to subvert not just the international rules-based system and attitudes to human rights, but also global technical standards. The latter is the focus of the China Standards 2035 project, which includes attempts to set the standards for 5G, and to develop standards for things like UVH and AI. If successful in this, China would not only be less reliant on foreign technology but could hope to write/rewrite international standards to suits its needs.

Hall stresses that in defining the different internets she sees her aim is to be descriptive not to judge. "This is not an anti-Chinese argument. Beijing is entitled to regulate as it sees fit, and all governments find the authoritarian internet attractive to some extent."

That's a fair point. We are, however, bound to wonder what the likely consequences would be if China succeeded in imposing its view of the world on other countries, both in terms of human rights and technology. As noted, China is currently building a frightening surveillance society and exporting the technology to do it to other countries so that they can do the same to their people.[181] Last year, for instance, it was reported by the US Council on Foreign Relations that China is providing the Zimbabwean government with facial recognition software. This, notes the CFR, is being presented by Beijing as a case of 'win-win' diplomacy. "Chinese AI companies get to train their algorithms on Africans to diversify their datasets and Zimbabwe gets to use cutting edge tech to monitor its population. Similar deals have been signed in Angola and Ethiopia."

Chinese citizens face an extreme degree of monitoring and social control today and this looks set only to increase in intensity as its social credit system (a national reputation system based on mass surveillance) is rolled out. Police are already using real-time facial recognition technology to identify and shame jaywalkers. This is expected to be extended to include sending instant fines by text.[182] And even the scantiest knowledge of the way in which the Uighurs are being treated in China should give us all pause for thought.

[181] And Huawei seems to be part of this process too.

[182] Of direct relevance to the scientific community, China is seeking to address research misconduct by linking it to the social credit system. As this article puts it, "academic misconduct could be punished by a comprehensive list of penalties, resulting in a kind of accountability system that has never been seen before all over the world

The extent to which China can succeed in imposing either its view of the world or its standards on everyone else remains unclear. It could, however, see international standards start to fracture, not least because the US (and doubtless most in the West) are determined to resist Chinese ambitions here, citing amongst other things security issues. It seems we may be looking at an emerging standards war and a splinternet might seem all the more likely as a result.

If it were to occur, a splinternet would doubtless be a gradual process. Today governments are focused on blocking unwelcome or illegal content. If current attempts prove inadequate, we will surely see more draconian laws introduced. In Egypt the government recently passed the Anti-Cyber and Information Technology Crimes Law. This not only allows the authorities to block websites considered "a threat to national security" or the "national economy" but individuals who visit these websites can face steep fines and penalties. This suggests that the law will target not just the owners of banned websites but those who visit then.[183]

Such drastic action may not be palatable for countries in the West. But this could make a splinternet more likely, on the grounds that it could be presented as a less oppressive approach. As such, authoritarian and democratic countries could end up in the same place. In other words, if attempts to tame the Web with legal remedies prove inadequate governments may conclude that the only solution is to disconnect from the global internet in some way. Another possibility is that we could see a series of tit-for-tat responses as governments deny other countries (or foreign-based services) access to their part of the network, before eventually de-coupling all together.

A further possibility is that new trade deals could be negotiated in which access to a country's section of the internet and its citizens is offered as part of the package. As *Fast Company* puts it, we could see "the formation of digital access pacts, essentially trade deals granting one country access to another country's national intranet and its users". Perhaps the recent Digital Trade Agreement between the US and Japan is moving the world in this direction.[184] However, some countries – e.g. China and India – have said they are not willing to engage in these kinds of arrangements, preferring "data localisation".

So, where does this leave the OA movement? The assumption of BOAI was that the internet would not, and could not, be undone, and that there would always be a seamless uncensored global network that anyone could access. As such, the belief was that anyone would be able to make their research papers and data available on the network in the knowledge that these would be freely accessible to anyone in the world with an internet connection. And it was assumed that this openness and the sharing and collaboration it enables would grow exponentially as the world wired up and OA went mainstream.

Above all, it was argued that one of the main beneficiaries of open access would be researchers in the Global South. OA advocates still maintain this. Writing in PNAS cOAlition S members asserted: "As research funders, we are dedicated to serving the research

[183] On an open access mailing list recently, an Egyptian citizen posted a message critical of the Egyptian government. Shortly after, the poster asked for the message to be taken down on the grounds that it could lead to a prosecution for the political opinions expressed it.

[184] Amongst other things, the agreement prohibits "data localisation measures that restrict where data can be stored and processed." I.e. sign this and you allow our companies to export the data they collect on your citizens.

community, but we are equally committed to ensuring that the access to outputs from the research that we fund is made open, globally, and without delay, so as to benefit humanity at large."

Co-chair of the Plan S Implementation Task Force David Sweeney went further, saying that the aim of Plan S is to ensure that "the developing nations who may struggle at the moment to pay subscriptions will have this material to read freely."

These statements assume that the internet will remain a global open platform of course. They also skate over the issue of how researchers in developing nations can afford to make their own research available if the world shifts to pay-to-publish, which seems the inevitable outcome of Plan S. What will have been gained if paywalls are replaced by publication walls? Does this arrangement not assume that all researchers in the Global South need is access to research produced in the North, not the ability to share their own research in international journals?

Moreover, in light of a recent comment from the European Commission's open access envoy Jean-Claude Burgelman we are bound to question European claims that it wants to make research available to developing nations. Those countries unwilling to introduce OA policies like Plan S, Burgelman suggested, could be prohibited from accessing the content of those countries who have done so (notably Europe). This would be achieved courtesy of a solution that the *THE* described as geo-specific access models[185] (or as Lisa Hinchliffe dubbed it "geowalling").[186] In other words, those unwilling to follow Europe's OA lead will be blocked from freely accessing European research.[187] This is surely a splinternet by any other name, and completely at odds with the BOAI vision. What benefit can open access offer the Global South if paywalls are replaced by national firewalls/geowalls?

However, there are other threats to the open access movement that I think we need to consider.

What then of open access?

Having explored the current geopolitical environment (as I see it) I want to focus in on the current situation with regard to open access, notably initiatives like Plan S and OA2020[188] [189] and the current fad for "transformative agreements". The latter are also referred to as Read and Publish (RAP) or Publish and Read (PAR) agreements (I shall henceforth refer to them collectively as PARs).[190] Plan S is mainly being driven by governments and their funding

[185] Burgelman made a similar comment about the European Science Cloud in 2018.
[186] Hinchliffe also points out that geowalling would make a nonsense of the Plan S requirements regarding both CC BY and hybrid OA.
[187] This idea was initially proposed in a UK HEPI Occasional Paper in 2015, and proposed again by Elsevier in 2017. Ironically, it was initially proposed as an April Fool's joke on *The Scholarly Kitchen* in 2012. How long before it becomes reality?
[188] OA2020 is focused on "flipping" the world's subscription journals to open access, an objective that would surely lead to a predominantly pay-to-publish environment.
[189] cOAlition S and OA2020 have issued a joint statement with a view to negotiating "transformative agreements" for a transition to open access.
[190] I shall use the term PAR in this document to cover all three types, on the grounds that the emphasis and end goal is one in which the default is for authors to be able to publish OA. RAPs and transformative agreements are meant to be a waystation on the route. See the primer here.

agencies, with the aim of forcing researchers to embrace open access. OA2020 is an initiative of the German Max Planck Society with the aim of forcing legacy publishers to flip their journals to OA. PARs meanwhile are being driven primarily by libraries and library consortia, also with the aim of achieving a global flip. Since Plan S looks likely to be implemented primarily by means of transformative agreements, the end point for all three will be the same.

Transformative agreements are viewed as a vehicle for transitioning the world from the traditional subscription model (in which institutions pay to read research papers), to an OA model (in which institutions pay fees to publish research papers). Since publishers have over the years acquired huge amounts of paywalled content PARS provide both access to the publisher's paywalled content *plus* publishing rights for authors. Such broad-brush explanations, however, obscure the fact that there are no officially agreed definitions here yet and each deal is different. For the moment, therefore, they are controversial, complex and hugely time-consuming to negotiate – as the standoff between UC and Elsevier indicates.[191] In fact, PARs may not scale as currently conceived, because publishers will not want to negotiate bespoke deals for every institution or consortium. Rather, they will likely start offering institutions pro forma contracts. The key point, however, is that (as things stand) Plan S, OA2020, PARs are all taking us to the same end point: a world of universal pay-to-play publishing.

True, cOAlition S and OA2020 pay lip service to alternative OA models, but the aggressive timescale they have set (2021) and the strict Principles and Implementation Guidelines they insist on, will, for all practical purposes, surely mean that pay-to-play OA becomes the norm.[192] One irony here is that the very publishers that open access advocates have for so long vilified will be embedded in the new regime, and in such a way that they will be able to continue charging a level of fees for their services that librarians have long maintained are unsustainable.[193]

The push for PARs assumes that all nations are equally willing and/or able to negotiate them, and that everyone is willing to move to a pay to publish system. It also assumes that small publishers and societies are equally able to negotiate PARs.[194] In short, there is an assumption that a balance of power, wealth, values, priorities and objectives exists between nations and between publishers. This assumption is surely wrong and divisive. PARs are in effect seeking to force homogeneity on a heterogeneous world.

As noted, for those in the Global South it will mean that today's paywalls will be replaced by tomorrow's publication walls, leaving many unable to publish in international journals (of which more later).[195]

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[191] See video here for more information.

[192] As Eduardo Aguado López and Arianna Becerril García put it, "Plan S has stated that it is not focused on delivering only one business model for scholarly communication. However, Article Processing Charges have been the only model clearly identified for financing."

[193] These agreements will likely morph into open access Big Deals, where institutions and consortia pay APCs in bulk.

[194] Information Power has produced a Report and Toolkit designed to enable them to engage in PARs. Time will tell if this is realistic.

[195] OA advocates argue that this problem can be avoided by means of APC waivers. But leaving aside the haphazard and inequitable way in which these are managed, researchers in the Global South are looking for

This leaves me to conclude that the OA movement is likely to splinter at some point. If it does, we will surely see the scholarly communication system at large splinter too.

However, the future of scholarly publishing will surely depend to a great extent on what China does – not least because it is now the second largest publisher of research papers in the world[196] and expected soon to overtake the US as the world's top economy. Doubtless for this reason, members of cOAlition S were initially keen to suggest that China was planning to sign up to the plan.[197] Indeed, it was striking to see the way the coalition was grasping at straws when Plan S was launched, and doubly striking to see them shout down those who sought to draw attention to the gap between Europe's and China's value systems.

Be that as it may, the reality is that (as yet at least) China has not signed up to Plan S and it is far from clear that it ever will. True, some Chinese librarians have expressed an interest in both Plan S and OA2020, but these are librarians not the Chinese government, or a government funder. When one of those librarians was asked if China was going to sign up, he replied, somewhat gnomically, "Whether or not you sign up to Plan S is not a test."

In a subsequent message posted on the GOAL mailing list, the same librarian again expressed support for Plan S but again did not confirm that China plans to sign up. What he posted was a response from Chinese librarians that asked for a number of changes to Plan S – changes related to licensing[198] and to the use of ORCIDs for instance.

Disappointment at China's failure to sign up has doubtless been that much greater for the coalition in light of the reluctance of the US to date to do so. When asked about Plan S the director of the US Office of Science and Technology Policy (OSTP) Kelvin Droegemeier indicated that, quite apart from anything else, the implications Plan S has for academic freedom are unacceptable to the US.[199] "One of the things this government will not do is to tell researchers where they have to publish their papers," Droegemeier said. "That is absolutely up to the scholar who's doing the publication. There's just no question about that."[200] [201]

Reading the Chinese librarians' text, one is reminded of Bloomberg's "imbalance of values" and tempted to conclude that China's interest in open access is one-sided; or at least confused. What they are clear about is that there is a strong desire for the Chinese research community to, as they put it, "have our copyrights back".

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equality, not charity. I have explored this here. It also ignores the fact that other authors are being asked to fund every waiver. (see also footnote 216)

[196] Scimago reports a figure of 534,879 papers in 2017.

[197] What was offered was support for European efforts with Plan S, not a commitment to sign up to it.

[198] E.g. "We support that open access publications are made under open licenses. We support the use of the CC BY license as the preferred one but recommend that other CC licenses also be allowed as compliant to Plan S."

[199] This is because Plan S aims to ban hybrid OA and so will dictate in which journals researchers can publish.

[200] This goes to the notion of academic freedom, which is valued more highly in the US. Even so, the researchers who published an open letter in response to Plan S viewed the plan as a "serious violation of academic freedom" in the European context too. This has to some extent been addressed in Plan S's update guidelines, but only partly.

[201] We should note, however, that the National Cancer Institute (NCI) has said it will require immediate open access to the peer-reviewed publications it funds. As has the NIH Heal (Helping to End Addiction Long-term) Initiative. But this is envisaged as being achieved by means of green OA rather than gold OA.

What China clearly wants is for paywalls to go away, not least because most of its institutions cannot, or will not, pay subscriptions. The Chinese librarians reported that the international publisher with the largest customer base in China has no more than 500 customers and "most of the provincial research academies, and local research parks where enterprises and start-ups are concentrated, have no access to international subscription journals such as *Nature*, *Science* or *Cell*, even the papers funded by Chinese public investment."

As the librarians point out, therefore, paywalls seriously limit Chinese scholars' and entrepreneurs' access to international research. "We used the data from 2016 to have an analysis of the possible benefits from open access as demanded by Plan S or OA2020 carried out. The first direct benefit will be that those blocked from access, 95% of the whole national innovation system, would now have access and the increased R&D and productivity are tremendous."

They added: "The secondary 'indirect' benefit would be that, when we have our copyrights back and have the XML full-text copies, the capacity for verification, reproducibility, and data mining would be enhanced greatly."

Finally, they said, "The third-level 'indirect' benefit would be the opportunities to connect the digital entities traditionally buried within the full text to all the intelligent sensing objects, objects in IoT (Internet of Things), and smart societies, to help the development of smart industries and smart services, with goal of a smart society."

In other words, access to the world's research would not only assist China's research efforts, but allow it to mine international research, and thus enhance its ability to become a leader in IoT and AI technologies.

But while Chinese librarians are supportive of Plan S's desire to tear down paywalls it is far from clear that the country is willing to contribute financially towards that goal. After all, if most Chinese institutions are currently either unable or unwilling to pay subscriptions, why would they be willing or able to pay APCs?

That is presumably why China has been far more focused on green OA. It has introduced a number of green OA policies mandating its researchers to make their research available in online repositories. The same is true of the US, where the 2008 NIH Public Access Policy settled on a green OA strategy. From the point of view of the US government, this strategy has changed little. Certainly, there has been much less interest in pay-to-publish at a government level and thus of Plan S.

The attraction of green OA is that it allows researchers to publish in international journals at no cost and then make their research freely available by posting copies to an institutional repository.[202] We have to ask why Chinese researchers would want to pay to publish these papers if they can already make them freely available? True, they would be able to retain their copyright if they paid for Gold OA, but at what price? So, while China is keen to see all international research made OA it is far from clear why it would want to start paying to publish.

[202] Generally, after an embargo.

This seems even less likely if we consider the findings of a briefing paper produced by Information Power. This indicates that China would have to pay more than most countries if it signed up to Plan S and started to pay APCs. In other words, OA would be a far more expensive option for China than the current subscription system. As the authors explain, "China gets a good deal on subscriptions which does not reflect its fast-growing proportion of global research outputs. For this reason, a change to some form of pay-to-publish system might cost China considerably more than it currently pays to read."[203]

We must therefore doubt that China is willing to pay APCs in order to make OA a reality. Using Cambridge University's figures – which estimate the average APC at $2,323 per paper – and noting that Scimago lists 599,386 papers by Chinese authors for 2018, a world of universal OA would seem to imply that China would have to pay some $1,392,373,678 a year for pay-to-publish OA.[204] This must represent a serious sticking point and is presumably why China has not joined cOAlition S.

This draws our attention to the fact that that the OA movement has only recently taken on board that for research intensive institutions OA is a more expensive option than the subscription system. As a Wiley executive has pointed out, in an author-pays model the researcher has to bear the cost both of the production and the publication costs of their research. As such, they have to subsidise the cost for consumers (readers). "Not surprisingly, this will affect producer-heavy geographical regions differently from consumer-, or reader-, heavy ones."

This is an issue not just at the country level, of course, but at the institutional and library consortium level too – a point made by the Executive Director of OhioLINK, Gwen Evans on *The Scholarly Kitchen*. Whether gold OA advantages or disadvantages a university or university consortium, she noted, will be based on whether it is a "*Publish*" or a "*Read*"[205] university or consortium.

It also suggests that the University of California is being unrealistic (or plain naïve) in demanding that Elsevier charge it less for a Read and Publish agreement than it has been paying for a subscription Big Deal. The university boasts that it generates nearly 10% of all published research in the United States. By rights, therefore, it should expect to pay more rather than less in an open access regime.[206] [207]

This truth was conceded in Germany earlier this year when a new Read and Publish deal with Springer was announced. Horst Hippler, the spokesman for Projekt Deal negotiating team and former president of the German Rectors' Conference explained, "those research institutes that

[203] In fact, the librarians' comments suggest that China does not subscribe to many journals.
[204] The latest figures from the Wellcome Trust suggest an average of 2,803€, or £2,400.
[205] Here Evans is classifying a *Read* institution as one that publishes less than the average number of papers and a *Publish* institution as one that publishes more than the average.
[206] UC says it is simply seeking to end "double dipping". As Jeff MacKie-Mason explained to UC Board of Regents' Academic and Student Affairs Committee in July: "The UC Libraries pay $40M in annual subscriptions so that we can read published research. In addition, a small number of UC authors independently pay $10M a year for their articles to be published open access." But this does not obviate the fact that as a research-intensive institution UC should expect to have to pay more in an OA world, even as it complains that the current subscription system is unaffordable. Nor is it clear that UC is funding all the APCs its researchers incur, many will presumably be paid by external funders and agencies.
[207] Some funders – e.g. The Gates Foundation – pay APCs direct to publishers of course. But this could present a threat to library budgets if the university seeks to recoup some of that funding for other things.

publish a lot will in the future have to pay more. Those that publish nothing will have to pay nothing."

Interestingly, the University of California has responded by proposing that "*Read*" institutions subsidise "*Publish*" institutions. For the moment UC appears to have persuaded all the other universities in California to help it in its fight with Elsevier. But can we really expect *Read* institutions to be willing to subsidise the publishing activities of *Publish* institutions going forward? Publishing consultant Michael Clarke thinks not. Either way, is this a fair arrangement? Does it not imply that in an OA world, readers in the Global South would be expected to subsidise wealthy *Publish* institutions in the Global North?

Open China?

At this point, it seems logical to ask whether China's interest in OA demonstrates a commitment to openness or simply a desire to have free access to research produced in other countries. In fact, the evidence suggests that openness is anathema to China. This is a country, after all, that keeps very tight control over what information its citizens can access and publish and with whom and how both citizens and researchers can collaborate.

It is also clear that China's censors are keen to control what scholarly content is made available, and not just in Chinese publications but in Northern-based international scholarly journals too. For instance, we have seen recent demands that foreign journals censor content that the Chinese state does not like. Over the last year or so a number of Western-based publishers have been instructed that when they make their journals available in China they must exclude articles whose content the Chinese government disapproves of. Springer Nature, Taylor & Francis and Cambridge University Press have all faced such demands – with only CUP apparently resisting (although only after it faced pushback from the research community).[208]

More recently, Holland-based Brill announced that it has terminated the relationship it had with Beijing-based Higher Education Press to distribute four China-focused journals following reports that Chinese censors had removed an article from one of the journals.

Marijk van der Wende has also pointed out that all scientific data in China has to be submitted to government-sanctioned data centres before appearing in publications. "This is in contrast to the EU's promotion of open access, open science, and feeds into concerns about mutual academic integrity and academic freedom". Here again we bump up against the imbalance of values between East and West.

And as we noted earlier, the *New York Times* has reported that China is unlikely to relax the tight regulations that block multinational companies from moving data they gather on Chinese customers' purchases, habits and whereabouts out of the country. Why? At least partly presumably because China will be conscious that if it permits these data to be exported, foreign companies will be better able to compete on a level playing field with Chinese companies. As we have seen, China much prefers to protect itself from raw market forces. If they have exclusive access to data Chinese companies will be better able to create superior AI products, along with all the other smart technologies expected to shape and control the world in the 21st Century.

[208] See also here.

In saying this I am (like Wendy Hall) not seeking to judge China.[209] I am making the point that the West has for too long clung to what now seems to be a naïve view/fantasy that there is some balance of values between China and the West, or that China can be persuaded to sign up to liberal democracy and the international rules-based system cherished by the West – if only the West continues to cajole and/or bully it into changing its ways. The OA movement seems to be particularly vulnerable to this kind magical thinking.

Those in the West who want to believe that China is an advocate for the principles of openness enunciated in BOAI, therefore, might want to reflect more on what the country does than what it says.

What seems clear is that China's *modus operandi* is authoritarian censorship and control (of information and people), not the free flow of information from-all-to-all as envisaged by BOAI and cyberlibertarians like Barlow. China also appears to have little interest in the notion of academic freedom, a principle the West views as fundamental to the research process and to innovation,[210] and which I have suggested is crucial for the sharing and collaboration that open access requires.

As David Stilwell, an assistant secretary in the US State Department's bureau of East Asian and Pacific Affairs put it to *Forbes*: "On American campuses, scholars from around the world enjoy academic freedom and open access. But in China, speech and topics are restricted, and the flow of information and scientific data has become a one-way street. Research in China has become more difficult, with American academics experiencing a variety of barriers including censorship, visa issues, lack of access to archives, and attempts to control agendas. It is difficult to move forward in true bilateral partnership amid such a huge discrepancy in academic freedom."

More significant, perhaps is that in China political orthodoxy often appears to trump scientific facts. This might seem to be implied in the leaked Document 9. It is also a principle that President Xi Jinping appears to have made explicit when speaking to a symposium of teachers earlier this year.[211]

However, it would be wrong not to point out here that there are signs that the West is itself moving in the direction of censorship and political control. Aside from what we see going on in countries like Poland and Hungary, the world currently has a US President who is happy to brand as "fake news" any reporting he disagrees with, to block or delete data that does not suit his agenda, and to withdraw funding from research he does not like.[212]

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[209] I am not saying I don't have strong views about the current situation in China (not least to the Uyghurs) but I feel this is not the place to rehearse them.

[210] These issues have been discussed in a recent report by Scholars at Risk.

[211] As he put it, "Thought on socialism with Chinese characteristics for a new era should be used to educate people and guide students to strengthen their confidence in the path, theory, system, and culture of socialism with Chinese characteristics and to boost patriotism." See also this comment on Xi Jinping: "To create a culture based on 'market socialism with Chinese characteristics,' Xi Jinping asserted political control over higher education in 2016 in a widely-publicized speech that put ideological and political work at the heart of university education to promote socialism. Xi also expressed a desire that Chinese colleges and universities be 'guided by Marxism' to become 'strongholds that adhere to Party leadership'."

[212] And who is happy to suggest that his supporters might "demand" that he remains president for more than two terms.

Is this not as much of an attack on academic freedom and Western values as China demanding that papers it does not like are removed or hidden from sight? I leave readers to judge, but I wonder if we are not all headed down an authoritarian road.

In addition, we have begun to see papers in Western journals retracted as a result of death threats; we have seen scholars dismissed as a result of open letters attacking them and their research; and we have seen professors dismissed for the content of fictional works they have published. We have also seen a researcher investigated for quoting James Baldwin's use of N-word in order to make a teaching point, and a professor at Reading University face rape threats and have urine poured under her office door for suggesting that government proposals on how people can change their sex might affect women's rights. This was accompanied by demands that she be sacked for her views.

Likewise, we see a growing trend in universities for no-platforming, excessive use of safe spaces[213] the emergence of "bias response teams" and what has been dubbed "academic mobbing". And we have seen the censoring of ideas that vocal advocacy groups dislike. We have also seen the launch of a new journal founded in order to provide scholars with a forum where they can publish controversial ideas anonymously in order to avoid such personal attacks.

We might also want to consider that the West Coast internet (with its foundational assumption that content and services on the network should all be free) has given rise to surveillance capitalism. Unlike in China (where the surveillance is undertaken by the state) this consists of corporations doing the surveillance. Who is to say that over the long run this will not prove just as intrusive and anti-democratic as the surveillance activities of the Chinese state? One could also argue that it is being done in a more hidden and non-transparent way than in China. Either way, as Zuboff points out, both models are "profoundly antidemocratic."

Might it be that in a few years' time Western values and actions will have moved somewhat closer to those of China or Russia? Yale professor Timothy Snyder has suggested that it is the deliberate policy of Russia to push Western nations down this road. And he fears that it could happen. "History, which for a time seemed to be running from west to east, now seems to be moving from east to west."[214]

Russian President Vladimir Putin certainly believes this is the direction of travel, declaring that liberalism[215] has "outlived its purpose", has 'become obsolete' as a political philosophy, and is a spent ideological force.

Leaving aside issues of democracy and human rights, the attacks on academic freedom we see today could prove highly damaging for the global research endeavour. Let's recall, academic freedom is based on the principle that researchers need to be free to engage in critical thinking, intellectual inquiry and empirical observation without government or

[213] See also.

[214] *On Tyranny: Twenty Lessons from the Twentieth Century*, Timothy Snyder, Page 96, 2017 (Kindle)

[215] The differences between liberalism, classical liberalism, political liberalism, economic liberalism, and neoliberalism. I suspect Putin here has in mind more political liberalism than liberalism. Neoliberalism has been described as essentially hyper-capitalism, in which everything becomes subject to the market. This is how I understand it when I use it in this text.

institutional interference or censorship, even where it involves taking a critical view of the institution or government. If researchers lose this independence we are vulnerable to what Steven Pinker has variously characterised as "pluralistic ignorance" and "collective delusion". The 20th Century taught us that when political diktat trumps scientific fact we are susceptible to disasters like Lysenkoism (see also here).

To my mind, this is why academic freedom needs to be viewed as essential to the kind of collaboration and sharing that BOAI assumed. Open access without academic freedom leaves us as vulnerable to Lysenkoism as was Soviet Russia. Open access without academic freedom is simply not enough.

Challenge for the Global South

I have said that the way OA is developing in the Global North is bad news for the Global South and I have suggested that it could see both the OA movement and scholarly communication splinter.

Of course, open access has always been a contested area and members of the OA movement have always been a fractious bunch. They have constantly wrangled over terminology and strategy, and even over what exactly OA is! But by seeking to force a Northern-based model of OA on the global research community OA2020, Plan S and the push for PARs would seem in danger of causing a geographical rift. Rather than helping to "*lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge"* these initiatives seem more likely to disenfranchise the developing world and usher in a new era of academic neo-colonialism.

For researchers in the Global South there are two particularly troubling issues. The first is that a pay-to-publish model would be prohibitively expensive and so threatens to push them further into the scientific periphery.

Certainly, researchers in the developing world are appalled at the thought of having to find $1000s every time they want to publish a paper in an international journal. This is just not viable for them. As Egyptian librarian Mahmoud Khalifa put it to me, "If I need to publish a paper internationally, and the APCs are $2,000, I have to pay 35,000 LE! This is roughly equivalent to the salary of a professor for 6 months."[216] [217] A recent study found that 60% of researchers in the Global South who paid an APC had had to fund it themselves. This is not sustainable over time.

Unsurprisingly, Plan S has been widely criticised in the Global South, with the most organised resistance to date coming from Latin America. Commenting on Plan S, Arianna Becerril-García of the Autonomous University of the State of Mexico, and co-founder of AmeliCA, has said: "If the focus of any new initiative is on replacing the model of paying-to-

[216] OA advocates argue that most publishers offer waivers for those in the developing world. In my view the problems with this argument were made clear in a letter to *Nature* Indian researcher Raghavendra Gadagkar in 2008. Pay-to-publish, he concluded, "does more harm than good in the developing world." (see also footnote 195)

[217] See also the poster here for more a comparison of monthly salaries in the Global South compared to APC prices.

read with one based on paying-to-publish, it will inevitably create an unsustainable and non-inclusive system."

And it's not as if the alarm bells were not ringing before cOAlition came up with Plan S. At a regional assembly of Ibero-America and Caribbean countries in 2017, for instance, a number of national organisations signed a public statement warning that "an OA expansion policy, through the payment of APC fees, is impossible to undertake from a financial point of view for the participant countries."[218] For this reason, the signatories advised universities in the region not to "create grants to pay a publication in OA-APC magazines." [219]

The second issue is the insistence by OA advocates in the North (and now cOAlition funders) that research papers should be made available with a CC licence attached.[220] Many researchers find CC BY to be problematic but it is especially problematic for those in the Global South. This too was a known issue before Plan S. It was highlighted in January 2018, for instance, by a group of regional Latin American organisations [221] who were sufficiently concerned that they signed the Declaración De México. This warned that if CC BY becomes the norm it will "end with effects contrary to its initial objectives".[222]

Developing nations see this as very much a North/South issue, not least because they fear it will allow large legacy publishers based in the North to capture and monetise research published in the Global South. For this reason, the signatories of the Declaración De México advised authors and publishers in the region to abjure CC BY in favour of the CC BY-NC-SA[223] licence.

Nevertheless, cOAlition S members continue to insist that all scholarly papers funded by them should be made available with CC BY or CC0 licence attached.[224] As such, Plan S hopes not only to force all international journals to flip to pay-to-publish but to make CC BY the norm. While this might (arguably) be accepted by European researchers (for articles but not monographs), many in the Global South have very good reasons to be concerned about it.

OA advocates insist that using liberal licences like CC BY is necessary in order to prevent publishers acquiring exclusive rights in the papers they publish[225] – a practice, they say, that is inherent to the traditional publishing system and which allows publishers to privatise

[218] This consists of group of Latin American organisations that includes CINCEL, CONRICyT, ibict and CONICYT
[219] This last part might be better translated as, "We recommend that institutions do not create funds to pay to publish in APC-funded OA journals."
[220] This was later extended to read "the publication must be openly available immediately with a Creative Commons Attribution license (CC BY) unless an exception has been agreed by the funder."
[221] Including Latindex, Redalyc, CLACSO, and ibict.
[222] A recent Taylor and Francis study found that researchers "least preferred" licence is CC BY, with most preferring CC BY-NC-ND.
[223] In other words, a license that prevents third parties using a work for commercial reasons without permission, and requiring them to licence any derivates using the same CC BY-NC-SA licence – what is referred to as a viral licence.
[224] Plan S requires use of CC BY 4.0, CC0 Public Domain, or CC BY-SA 4.0 Share-alike. It does not allow for an NC option. This was, however, later extended to read "the publication must be openly available immediately with a Creative Commons Attribution license (CC BY) unless an exception has been agreed by the funder." No one wants to have to rely on such arbitrary decisions.
[225] In the subscription system authors are required to assign copyright to the publisher. In a CC BY environment authors retain copyright but licence the content to the publisher. In effect, they are licensing it to the whole world, retaining only the right to be acknowledged as the author.

publicly funded research and then sell access to it back to the research community by means of ever more expensive subscriptions. Instead, they say, funders should require authors to retain copyright in their papers and insist that a CC BY licence is attached. Only in this way, they say, can publishers be prevented from appropriating research.

But is that right? CC BY and CC0 licenses allow *anyone* to reuse the content, including for commercial purposes. Publishers may not be able to acquire exclusive rights, but they will still be able to monetise research papers, and indeed put them behind new paywalls.

Thus in an OA world in which CC BY was the norm the northern-based publishing oligopoly (who already have huge databases of research in which the own exclusive rights) would be able trawl the web (and other publishers' sites) for CC BY-licensed content, combine it with their exclusive content, wrap additional services around the combination and then sell that aggregated package back to the research community in the form of new value-added services. Importantly, large international publishers based in the North would be able to capture and monetise any research produced in the South with a CC BY or CC0 licence. This is what Declaración De México sought to prevent. I have outlined this scenario in more detail here.

Moreover, we can be sure that over time legacy publishers will develop ever more sophisticated search products and proprietary infrastructure around OA content. As such, they will be able to offer exclusive packages that include CC BY content on a pay-to-access basis. Researchers unable to buy access to these databases will be at a significant disadvantage.

This suggests that Plan S, OA2020 and PARs will facilitate the creation of a wave of new subscription services built around OA content, opening the gates to a new form of digital enclosure. As Leslie Chan has put it, "They [legacy publishers] are using data extraction as a new form of capital accumulation and rent-seeking, which is further fuelling inequality, and diminishing epistemic diversity and social inclusion."

Funder insistence on CC BY reminds us that for governments open access is not viewed as a moral issue but a way of boosting the economy by helping companies develop new products without having to do the research themselves or pay to access it. As librarian Lisa Hinchliffe noted on Twitter, open access will be "an amazing gift to commercial entities who currently pay large amounts to read but don't really publish."

As it happens, there are implications here for the Global North too – as the controversy that surrounded the launch of the Open Research Library (ORL) by Knowledge Unlatched (KU) demonstrated. ORL is a new KU service designed to hoover up OA books from the Web and aggregate them into a proprietary platform. To fund this (and make a profit) KU is selling membership subscriptions.[226] That is, libraries are asked to subscribe to the platform hosting this captured content.[227] News of the launch of ORL was greeted with some consternation by

[226] On launch KU said, "The hosting of all book content is free of charge. In order to finance the ongoing technical costs Knowledge Unlatched will initiate a partner project to secure the necessary funding." The web site, however, indicates that prices for a basic membership starts at $1,200 per annum.

[227] As publishing consultant Joe Esposito points out, "I wonder if some of the people who use these [CC BY] licenses have actually thought through their implications. The entire point of the CC BY license, which is preferred by many OA advocates, is to let anyone do anything they like with the licensed content as long as they provide proper attribution. Permitted uses include aggregating content for commercial purposes." This, of course, is exactly why the Declaración De México rejects CC BY licences.

OA advocates, who view it as an attempt by KU to profit from content whose creation it contributed nothing to.

We could note in passing that at least one legacy publisher (Elsevier) insists that even when they publish open access, authors must sign an exclusive agreement in which "authors have copyright but license exclusive rights in their article to the publisher", including "the right for the publisher to make and authorise commercial use". This might seem to make a mockery of the openness called for by BOAI.[228] (Dove Press appears to operate similar terms for many of its papers).

OA advocates maintain that once a CC BY-licensed work has been posted on the Web it cannot be appropriated as there will always be at least one free copy on the network. There might seem to be two flaws to this argument. First, if the alternative source does not persist, legacy publishers are likely to become the only source. This suggests that if small start-up publishers fail and disappear legacy publishers could end up with a *de facto* monopoly of the content in any case.

Second, we need to factor in the added value and convenience that large paid-for services are able to provide. Anyone can search across the internet for OA content, but that content will be widely dispersed across 1,000s of institutional repositories, publisher websites, preprint servers etc. etc. Individual users needing to, say, undertake a literature search will find it very difficult to track down all relevant papers in order to get a full picture. By contrast, legacy publishers have huge databases of aggregated content and sophisticated discovery tools to sift and sort the content. So the real value will lie in discovery services. And if legacy publishers start to syndicate content the publishing oligopoly will likely be able to offer access to most if not all the research corpus. Who would want to drive to a mom and pop store twenty minutes down the road if they can go to a superstore two minutes away and have access to a huge inventory and the latest technology to identify and pick the desired product? And while today legacy publishers tend to offer basic search services at no cost, when the moment is right they will surely start to charge.

Unfortunately, this is the future that Plan S and PARs looks set to bequeath to the world.

The launch of ORL suggests that liberal licensing has serious implications not just for the Global South, but for the research community at large. Apart from anything else, it will allow any CC BY licensed content to be enclosed in a proprietary infrastructure – a process that has been dubbed openwrapping.[229] As a 2015 blog post put it "Everything we have gained by opening content and data will be under threat if we allow the enclosure of scholarly infrastructures".

[228] The point is that even in a pure OA world content is king. Consider this comment from Elsevier's Chief strategy officer Andrew Matuch explaining why Elsevier is not a pure play software company: "I travel there [Silicon Valley] at least once or twice a year and then talk to the startups that try to shake up the industries in which we operate. I always come back from there with a broad smile. Because although they are super enterprising and motivated, every presentation ends with the comment that they need our content and data to expand further. And that is exactly what it is all about: you can have the best technology, you also need the content and data. With this combination we add value for our customers."

[229] Open source software appears to be suffering from the same phenomenon.

When the OA movement became aware of the dangers here, it launched a number of initiatives aimed at creating alternative (open) infrastructure services able to compete with publishers – e.g. SHARE, SCOSS, ScholarlyHub and IOI.[230] The likelihood that any of these (or all combined) will be able to catch up and compete effectively with publishers, however, seems remote. Commenting on a recent MIT Press study that surveyed these initiatives *The Scholarly Kitchen* noted that MIT had discovered they were not even co-operating effectively. As *TSK* explained, the report found, "a nearly total lack of coordination and integration across individual (in some cases competing) initiatives."

The greatest challenge these initiatives face, however, is that publishers have far greater financial resources. This truth became all too apparent recently when ScholarlyHub reported that after two years of unsuccessfully trying to obtain funding it had had to give up the ghost [the link has now gone dead]. A similar fate appears to have befallen Pubfair, which likewise failed to obtain funding. Even where funders provide money for infrastructure (which they are reluctant to do), they do not like to commit long-term. Achieving sustainability is a huge (and probably impossible) task for these initiatives.[231] KU, we could note, began life as a non-profit but had to reinvent itself as a for-profit in order to get the funding it needed.

A further threat comes from the increasing interest the FAANGS are showing in the scholarly communication market. A recent paper pointed out that "complex digital tools and rapidly growing electronic databases require advanced computing skills." As a result, it added, "internet-based mega-companies such as Google, Amazon, Facebook and Apple may become interested in spearheading further transformation and outcompete current stakeholders in scholarly communication and develop more user-friendly tools. Such developments could potentially lead to a few large entities controlling the gateways to scientific knowledge, a sobering thought."

In fact, it is generally agreed that the publishing oligopoly already has this degree of control. And it now seems unlikely that OA can fix the problem. In addition, Microsoft and Google are already well embedded in the scholarly communication market, with Microsoft Academic and Google Scholar for instance. And in 2018 we saw the launch of Google Dataset Search.[232] While this provides free access to data, points out Peter Kraker, it is a proprietary and closed service.

Like Google Scholar and KU, Dataset Search is a further example of a for-profit company harvesting and leveraging publicly funded information that has been made freely available on the Web for the benefit of its shareholders. As Kraker puts it: "Google is capitalising on a movement that they have contributed nothing to."

What the research community needs to do, suggests Kraker, is to create an open and community owned alternative service to Dataset Search. Unfortunately, he adds, funders, research administrators and infrastructures are currently content to leave it to Google. "This is

[230] As this article concludes, "The odds currently are stacked against academy-owned, academy-governed groups. And while tenacity and willpower and in some cases, outrageous talent, have led to some significant success stories, I worry that we're relying too much on these traits and too little on our collective capacity for action."

[231] Some background on the challenges such services face is available here.

[232] From Wikipedia: "Google Dataset Search is a search engine from Google that helps researchers locate online data that is freely available for use."

highly problematic, especially since we have discussed the problems of lock-in effects and other negative outcomes of proprietary infrastructure for years now."

In the hope of galvanising his colleagues Kraker launched the #DontLeaveItToGoogle campaign. But the likelihood that the research community will be able and/or willing to develop services able to compete effectively with behemoths like Google is surely laughable.

Another consequence of the FAANGS entering the market is that they will bring surveillance capitalism to the scholarly communication space, a development likely to expand as journals start to wrap advertising around their journals. In addition, we will likely see growing use of datawalls that require users to give up personal information in order to gain access to scholarly content. Publishers and aggregators will therefore be able to monitor users and their usage and exploit and sell the harvested data in ways users may not be aware of and would surely deprecate if they knew.

As Richard Jefferson puts it, "Imagine the most advanced scholars, science and technology thinkers and creators in the world – literally millions of them – letting an enormous multinational know what they know, what they don't know, what they're interested in, who they know, what their knowledge journey is and where they're going. And letting that knowledge – vastly more valuable in the aggregate – become privatised, monetised and used to advance the very power and privilege that many of them decry?"[233]

And with universities digging their heels in on the costs of PARs Elsevier is now saying that it will provide 100% open access in return for access to the universities' (meta)data. This must increase concern not only about surveillance capitalism but also "vendor lock in." We might also need to anticipate a future in which the entire research life cycle ends up privatised. **(Please see footnote)**[234]

Elsewhere, new entrants like Academia.edu (which promotes itself as a provider of open access services) are busy building subscription services around open scholarly content and ResearchGate has obtained a patent for linking documents to citations. For its part, Elsevier has obtained a patent for managing peer review.

This comes at a time when the US is reconsidering whether genes can be patented and patent wars have erupted over gene editing tools like CRISPR, a development, says PLOS co-founder and editor-in-chief of OA journal eLife, that is destroying the soul of academic science.

Here perhaps is the key point: the open access, open science and other open movements have given too little thought to the fact that they have perforce to operate in a neoliberal world, a world in which commercial enclosure is a natural instinct and invariable endpoint, regardless of whatever high-sounding claims researchers might make about laying the foundation "*for uniting humanity in a common intellectual conversation and quest for knowledge*".

Today it surely requires a very large dose of doublethink, or self-blindness, to maintain that Plan S, PARs and Northern-style OA are on track to realising the BOAI vision. As the author

[233] Jefferson operates Lens, an online database of research papers, patents etc. That is to say, he has a dog in this race.

[234] Please note that after I published this document Elsevier's Tom Reller responded by saying that this is not correct, that there is no "in return", and pointed me to this tweet.

of this paper puts it, we are told that "scientific literature and data ought to be given out for free, while knowledge produced under patents, or subject to commercial exploitation, is exempt from the requirements of open science. The fruits of scientific research are thus provided for free to businesses, which can then draw from it to develop commercial products that will be brought to the market in a re-enclosed form."

Open access is also assisting in the ongoing process of proletarianising researchers. Compelled to comply with OA mandates that ratchet up the bureaucratic scrutiny they are subjected to, researchers are discovering that open access has become a new tool for increasing the level of micromanagement they are forced to undergo (as I have discussed here).

Ulrich Herb refers to this as data capitalism, in which the proletarianisation of researchers is facilitated by for-profit companies creating "operating systems with highly integrated services" that monitor scientists' workflow. The captured data is then used to create new products, which are sold to "science bureaucracy as a tool for recruitment and research planning."

Elsewhere, David Golumbia has said: "The very point of OA, despite what its advocates claim, is to entirely brand the labour of intellectuals as unproductive vis-à-vis capital, and therefore to make available for exploitation that labour by everyone but the labourer,"

Golumbia's view of open access, suggests Enrico Natale "bears disturbing similarity to the 'free' Internet economy, where contents and data generated by users are given out for free in exchange for access and services. The data is then privately exploited for their corporate interest by a handful of dominant players with massive computing power."

This is a long way from the vision articulated by early advocates of OA, open data and open science and irreconcilable with the BOAI vision. But it is fast becoming the reality that OA advocacy has enabled.

Northern-style open access looks set to operate much in the way international capitalism does – in so far as it will homogenise the research and scholarly communication processes, and in a way that pushes those in the Global South further into the periphery. "There is today a real risk that the epistemological and linguistic plurality of science so essential for sustaining a worldwide innovative research activity could disappear," says Florence Piron, a professor in the Department of Information and Communication at Laval University in Quebec. "In other words, one consequence of an intensified open access environment could be to reinforce a homogenous unilingual type of science publication at the expense of the ecology of locally relevant knowledge."

Open access split?

This larger problem has perhaps been implicit in the OA movement from day one. But Plan S has made it explicit, attempting to foist on the world a model of OA that is proving illogical, unfair and divisive. From the perspective of the South this amounts to little more than "economic discrimination", and it is for this reason that many in the developing world are concluding that rather than ape the Global North they need to focus on creating their own national and regional models and strategies, both for OA and for scholarly communication more generally.

Fortunately, they have something to build on: unlike the research community in the Global North, the developing world has not outsourced much of its journal publishing to for-profit companies and there remains a strong tradition of universities and societies running and managing their own journals. In the wake of Plan S, therefore, we are seeing a new focus on preserving, developing, extending and promoting national journals and publishing platforms.

With this aim in mind, in November 2018 the Latin American OA portal Redalyc (in partnership with UNESCO and CLACSO) launched AmeliCA. The aim is to propagate models more suited to the needs of the Global South – notably scholar-led university and society-based journals run on a non-profit basis. This is being promoted very much as an alternative to Plan S.

Last year AmeliCA produced a video directly contrasting the cOAlition S approach with the one it favours. Where Plan S is seeking simply to regulate commercial agreements, the video explains, AmeliCA is focused on "building an infrastructure from and for the academy." [Google Translate]

What is needed, adds AmeliCA is "a new configuration of strategies, in response to the international, regional, national and institutional context" to ensure there is a scholarly communication infrastructure able to include rather than exclude those in the South – one offering "a collaborative, sustainable, protected and non-commercial open access solution for Latin America and the Global South."[235]

How successful AmeliCA will prove remains unclear. But it underlines the level of concern in Latin America today that the current trajectory of Northern-style open access will further marginalise the Global South – increasingly turning what was historically an essentially self-managed system into an all-encompassing neoliberal marketplace. Rather than delivering on the BOAI promise of removing epistemic injustice, Plan S will simply migrate this injustice to the OA environment.

Concern is also spreading beyond Latin America. In April, UNESCO announced the launch of the Global Alliance of Open Access Scholarly Communication Platforms (GLOALL). This brings together a group of scholarly platforms based primarily in the Global South[236] – with the aim of facilitating the "democratisation of knowledge generated in ALL places, subjects and languages." Amongst other things, GLOALL members want to see the development of multilingual scholarly communication standards, products and services.

This would seem to fit with the aims of the French-initiated Jussieu Call for Open science and bibliodiversity (two of which signatories were involved in the launch of GLOALL).

Likewise, we are seeing a growing sense in Africa that – rather than insisting researchers obsess on trying to publish in international journals – governments and funders should be encouraging them to think locally and create and support national or regional journals and publishing platforms, and to do so in a coordinated way. The Academy of Science of South

[235] A little confusingly, in May AmeliCA and the African Open Science Platform, signed the São Paulo Statement on Open Access.
[236] Including those based in Latin American and Africa, but also Japan and France

Africa has suggested that what South Africa needs is a smaller set of sustainable high-quality local scholarly journals. These, it added, should all be online and open access and hosted and indexed on local services like SciELO SA.[237]

As pushback against Northern-style OA grows I expect to see more calls for diversity (and bibliodiversity), and increased resistance to a homogeneity that prioritises the interests of the Global North while marginalising the Global South.

Indian scholar Vandana Shiva talks of what he calls the 'monoculture of the mind', a mindset that "treats diversity as disease and creates coercive structures to remodel this biologically and culturally diverse world of ours on the concepts of one privileged class, one race and one gender of a single species."

For all that, the Global South is clearly conflicted. Earlier this year, for instance, the Principal Scientific Advisor to the Indian government K. VijayRaghavan announced on Twitter that India was joining join Plan S. [238] This led to some pushback – see, for instance, here, here and here – and my take here).[239]

Perhaps in response to this pushback, when VijayRaghavan gave an Open Access Week lecture he said, "We are not committed to whatever Plan S does or does not do." In subsequent interviews he has clarified that India will not now be joining Plan S, but that future directions "will be entirely determined by the interests of Indian academia and of India". It appears this will be by means of a "One Nation-One Subscription" model with "capped subscription charges". In addition, the aim is to enter into OA publishing agreements that have "capped article processing charges". Exactly how realistic this is, and how it might work in practice remains unclear.

And in June, an EU report indicated that Argentina has agreed to join cOAlition S. This immediately saw a robust rejoinder from Argentinian researchers (see also here). Time will tell if Argentina does indeed sign up.

These tensions are not new: When in 2014 Brazilian OA advocates discovered their government was planning to outsource over 100 Brazilian journals to a legacy publisher in order to "internationalise" them there was immediate pushback – which appears to have successfully halted the process.

Also of note, in 2015 SciELO[240]adopted CC BY as its favoured licence, putting it at odds with the Declaración De México. And to the disapproval of AmeliCA, SciELO has agreed with Clarivate Analytics to build the SciELO Citation Index. This, says AmeliCA, has the effect of "drawing its journals into the system of impact factors and rankings by letting a for-profit company take advantage of information processed with public resources from Latin America." More strikingly, SciELO has begun to introduce APCs in order to fund the cost of translating papers into English.[241]

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[237] Or in international indexes that screen out predatory journal publishers.
[238] All we were told was that India will negotiate ACP fee that will be "normalised to India."
[239] Further confusing the situation AmeliCA has subsequently indicated that Indian journals will be made available in the Redalyc system – although it may just be on journal.
[240] The South American Scientific Electronic Library Online and OA publisher.
[241] More here.

What we appear to be witnessing are the first signs that both the OA movement and the larger scholarly communication system are beginning to splinter. Europe's recent proposal for geo-specific open access surely demonstrates as much. Essentially, it reads as an attempt to punish those who don't sign up to Europe's model of OA. As Sara Rouhi puts it, "Geo-walling feels like yet another instance of resource-rich regions dictating to other parts of the globe how they are expected to 'play' in the global scholarly ecosystem, rather than the collaborative approach — oft-discussed but not nearly as often implemented — of an inclusive ecosystem that takes into account all global scholarly communities — not just those with the most resources."

East or West?

It seems sensible to ask whether it would be a good or a bad thing if scholarly communication and OA splintered? In light of the current geopolitical environment and the evident renewed desire for greater heterogeneity in the world – for individuals, countries, regions, societies and cultures – to try and squeeze scholarly publishing into a single global homogeneous system based on a model proposed by Europe (with no prior consultation) might not be wise. Either way, we must doubt that such a system would be equitable. Would it not inevitably be controlled by the privileged for the benefit of the privileged, and to the disadvantage of the less privileged?

We have learned that attempts to internationalise systems like education and research tend to favour the wealthy and powerful. It is usually they who propose and design the system and they who tend to set the rules. And they do so (consciously or not) in a way the preserves their power and privileges. Those without money and power are usually left outside with their noses pressed against the window. cOAlition S's attempts to introduce a global pay-to-publish OA system would seem to be a case in point.

Similar issues have arisen in the internationalisation of higher education space. Hans de Wit has pointed out that "internationalisation" inevitably sees existing power structures and vested interests embedded in the new system. Moreover, he says, internationalisation is an inevitably coercive process. As he puts it, "international partnerships, rankings and language policies have unequal power dimensions in which the Global South is operating in a coerced way." He adds, "Over the past decades, most scholarly and public attention with respect to internationalisation in higher education has focused on the Western world, with little attention being paid to the implications of colonisation."

The University of Pretoria's Chika Sehoole has therefore suggested that it is necessary to address issues of equity and fairness first. As he says "a prerequisite for mutually beneficial partnerships in higher education" would require the "asymmetries" in international trade and financial flows to first be redressed.

For its part, OA is also an increasingly coerced process. Individual researchers are now coerced by their institutions, research institutions are coerced by governments and funders, and cOAlition S wants to coerce other countries to adopt a system that will benefit the Global North to the disadvantage of the Global South. In addition, of course, Plan S was designed around the STEM disciplines but the arts, humanities and social sciences are being coerced into squeezing themselves into the same template, despite that template being inappropriate for HSS.

Given its global ambitions can we expect China to play an important role in OA and scholarly communication? One would certainly expect so. We should not doubt it wants to play as large a role in the science sphere as it clearly wants to play in the economic and political spheres. Earlier this year *Nature* reported that China's President Xi Jinping has made it clear that science is one of the central pillars of the BRI. And courtesy of its Alliance of International Science Organizations in the Belt and Road Region (ANSO) China is providing both financial support and organisational assistance to research projects in BRI countries. As a result, added *Nature*, the country has emerged "as the scientific partner of choice for a large swathe of the developing world."

Nature added: "Whereas previous generations of researchers in Africa, Asia and, to some extent, South America trained in Western countries and had their intellectual roots there, the same cannot be said for the current generation."

In other words, China is pushing an alternative globalisation agenda – one that has been dubbed Sinocentric globalisation. And as noted, this is based on alternative values and goals to those promulgated by the West. Developing nations may therefore feel the need to choose between the Western road to the future or the Eastern road. As *Nature* points out, many countries in the Global South are choosing to partner with China – to date, 152 countries and international organisations have signed up to BRI.

Does China offer a better form of globalisation for the developing world than that on offer from the West? That is far from clear, not least because as, Marijk van der Wende points out, it is hard to tell how "globalisation with China's characteristics" aligns with issues of human rights, rule of law and civil society.

Nature points out that some believe those low- and middle-income countries who have signed up to BRI, "are sleepwalking into the arms of an authoritarian and neo-colonial state, and that everything else, including technology agreements and research alliances, are part of that trajectory."

If correct, this suggests that partnering with China could mean becoming financially dependent on a country with no meaningful commitment to openness.

But the truth is that whether they opt for an Eastern model or the Western model developing countries could become victims of academic neo-colonialism. The dilemma for the Global North, especially the EU, is that China has shown itself keen to recruit poorer countries from Central and Eastern Europe to the BRI. When it was announced earlier this year that Italy was joining the BRI, some panic ensued in Europe, with concern expressed that China is seeking to drive a wedge between European nations. *Nature* reports that when three days after Italy joined French President Emmanuel Macron met Xi in Paris he promised "more cooperation, but also said that Europe expects its major partners to 'respect the unity of the European Union and the values it carries in the world'."

Here perhaps is further evidence that the North has been wrong-footed by China. But one is tempted to suggest that Europe has brought this dilemma on its own head. It has failed to look after EU countries properly when they got into financial difficulties – most notably with Greece. This was surely a strategic error. Might Europe be in danger of making a similar strategic error with Plan S?

To explore this further, let's speculate that China decided to offer a competing model for scholarly communication and open access and ask if, in doing so, it would be likely to offer a solution more in line with the objectives of BOAI. Personally, I am sceptical. I have suggested China doesn't really value openness, either in society generally or in the science and research spheres. Critics believe that countries signing up to BRI could end up so indebted that they have to forfeit intellectual property, land and assets to China.[242] Indeed, this appears already to be happening with Greece again the victim.[243]

Rather than facilitating greater openness and mutual sharing, therefore, China might seem more likely to appropriate assets, research and innovation from its partner countries. "In this narrative," says *Nature,* "struggling nations are sagging under billions of dollars of debt to China and are giving away the keys to untold amounts of economically valuable and sensitive resources – from oceanic-current readings to biological samples to next-generation communication systems."

So, what could this mean in the context of scholarly publishing? I have said that this document is speculative. What follows is particularly speculative and I make no assertion that the scenario I lay out below will ever come about. I nevertheless want to map it out in order to suggest how an initiative like Plan S could backfire in today's geopolitical moment.

Let's consider, for instance, the recent launch of *CCS Chemistry* – a new English-language OA journal published by the Chinese Chemical Society (CCS). In their May news brief Clarke & Esposito noted that the title is "the first noteworthy English-language journal to be published by a Chinese society and as such marks an arrival of sorts on the international publishing stage."

CCS describes *CCS Chemistry* as a diamond OA journal, in so far as it charges neither subscriptions nor APCs. The latter characteristic, suggest Clarke & Esposito, could see it draw in manuscripts that were traditionally submitted to the many chemistry journals based in North America and Europe.

One could envisage a situation in which China launched many more English-language journals like *CCS Chemistry*. In fact, it seems it has been doing so for at least three years. In 2016, *THE* reported that new English-language journals were "springing up like mushrooms" in China. If Plan S triggers a global flip to pay-to-publish there will surely be a large number of publishing refugees unable to afford APCs. If these Chinese English-language journals charged neither *publish* nor *read* fees they would be very attractive to these refugees, especially those based in the Global South. This might seem all the more likely given that cOAlition S is pushing The Declaration on Research Assessment (DORA), which aims to promote a culture in which research is assessed "on its own merits rather than on the basis of the journal in which the research is published."

Such a strategy would allow China to accumulate a lot of scholarly content from around the world. This could be aggregated in a centralised national database to compete with the platforms of the publishing oligopoly.[244] Again, China already seems to have such a

[242] Critics believe that what happened to the Greek port of Piraeus is instructive here. And Venezuela had to sell 10% of its stake in an oil joint venture to a Chinese oil company when it could not pay its debts.
[243] This is often referred to as debt-trap diplomacy, or debt-dependency diplomacy.
[244] The European idea of geo-specific access models could prevent this, but at what price to the open access project?

centralised database – in the shape of the China Academic Journals Full-text Database (CJFD). This is part of the China National Knowledge Infrastructure (CNKI) and currently hosts 67 million full-text articles. (By comparison ScienceDirect hosts 12 million items and Sci-Hub 76 million). I don't know how much of the content is in English (or languages other than Chinese), but it would appear that CNKI is also running the Journal Translation Project. This currently plans to translate 400 journals with 20,000 articles in English by 2020. I don't know what the plans might be beyond 2010.

Like legacy publishers, China could also harvest the growing amount of CC BY licenced scholarly content becoming available on the Web, both content published in international journals in the North, plus any CC BY licensed content published in national journals in the South. To this it could also add preprints and green OA articles. Again, this might seem more attractive given that Plan S insists that all papers placed in repositories (green OA) must be immediately available and with a CC BY licence attached. One can envisage China creating a kind of legal Sci-Hub.

And here it gets particularly interesting: *CCS Chemistry* describes itself as a diamond OA journal, but it appears to be acquiring the copyright in the papers it publishes – see, for instance, here and here. And these papers appear to be being published on an all rights reserved basis.[245] OA advocates have suggested that this makes the papers in the journal bronze OA rather than diamond OA. Either way, *CCS Chemistry* appears to be acquiring ownership of the research it publishes in the manner that subscription journals have traditionally done.[246] While currently the journal operates no paywall, could it not put one in place at some point? And since it owns the copyright could it not seek to prevent third parties from mining the papers it publishes.[247]

The decision by CCS to buy into the ChemRxiv preprint server is also interesting in this respect. CCS is now a "co-owner" of the service and presumably it could add many chemical papers from ChemRxiv to its national database.[248]

The speculative scenario I am suggesting is that China could build up a large portfolio of English-language journals and offer to publish papers at no cost (while acquiring the copyright in them). For researchers this could offer an attractive alternative to Plan S. Moreover, the strict guidelines that Plan S has published might seem to make the logic of doing this compelling.[249] But what would be the likely consequences?

In such a scenario one could envisage three possible routes for researchers in the Global South: they could take the Western road and risk seeing their research captured and monetised by the publishing oligopoly; they could partner with China and face similar risks; or they could join with AmeliCA and other like-minded developing countries to create

[245] Perhaps this is the norm for Chinese society journals. *Acta Geodaetica et Cartographica Sinica* published by the Chinese Society for Surveying, Mapping and Geoinformation also appears to assume the copyright is transferred to it. Although it then publishes the papers CC BY-NC-ND and there seems to be an implication that authors get royalties.

[246] And indeed, many still do.

[247] The law around TDM is not fully clear today

[248] Today the papers in ChemRxiv all appear have a CC BY-NC-ND licensed attached, presumably with the authors retaining copyright – although this might seem to imply otherwise.

[249] Elsewhere the speculation is that China is planning to take a geowalled approach, although if true what that might mean is unclear to me.

independent national and/or regional initiatives that offered a "third way". Whether the last option offers a viable long-term solution I do not know.

It is not immediately apparent to me that globalisation (East or West) promises an attractive future for the Global South, economically or scientifically. It is also not clear to me that either holds out much hope of achieving the objectives of BOAI, or that either road would nurture the international collaboration that Hook suggests open access requires if it is to prosper. Likewise, it is not clear to me that academic freedom can prosper in either the West or the East as things stand.

Interestingly, it would seem to be Europe that is currently driving the Western model of globalisation. After all, Trump is not a globalist. As he put it recently, "The future does not belong to globalists. The future belongs to patriots. The future belongs to strong, independent nations". On the other hand, of course, he clearly wants to remain a superpower and to lead the world. speaking about 5G, Trump said, "We cannot allow any other country to outcompete the United States in this powerful industry of the future … The race to 5G is a race that we must win."

We have, however, to wonder if Europe's globalisation effort is stable and durable. As things stand, it looks set to lose the UK, and it recently blocked the entry of Albania and North Macedonia into the EU, despite the two countries undertaking a number of reforms that the EU had demanded for entry. If the EU fails to look after its allies, turns potential members away, and threatens to punish those who do not sign up to initiatives like Plan S what will be the long-term consequences? Meanwhile, China is chipping away at its weaker members.

On the larger stage, there are grounds to believe that the split we see emerging between East and West is likely to widen. This would have implications for national economies, for political developments, for technology, for the internet, for science and for open access. As former UK Prime Minister Gordon Brown has put it, we face the possibility of "one world, two systems".

In none of the scenarios I have outlined can I see the BOAI goal of "*uniting humanity in a common intellectual conversation and quest for knowledge"* being realised – unless something changes.

We can but hope

I have in this document suggested that the goal of achieving universal open access looks today as though it may have been unrealistic. I have suggested that the research community failed to appreciate the costs of online publishing, and I have suggested that we all failed to anticipate the likely outcome of creating a largely unregulated open network. I have also suggested that OA advocates failed to anticipate the unintended consequences of their advocacy. They likewise failed to appreciate that changes in the geopolitical situation could make the aspirations outlined in BOAI moot. And I have questioned whether these aspirations are in any case realisable in the neoliberal environment of the Global North. I have also suggested that were China to offer an alternative route to open access it is unlikely it would lead to a better outcome. And I have noted that there is a desire in the Global South to develop what I referred to as "a third way" but we cannot know how successful that might be. I have also suggested that there must be some doubt as to whether a fair and equitable global system of scholarly communication is even possible in today's political environment.

Finally, I have raised the possibility that, for a number of reasons, we may in any case see a pushback against open access.

I want to finish by returning to my opening question. OA advocates have been celebrating an OA tipping point. But while we could indeed be approaching a tipping point it may not be the tipping point that OA advocates anticipate, but one that takes us in a very different direction. As things stand, the current result of the University of California's confrontation with Elsevier is that the publisher has cut off access to ScienceDirect. Rather than help realise the BOAI vision, this has vastly increased the *accessibility* problem for UC faculty – and we are now seeing pushback from UC students over this. UC's expectation is evidently that Elsevier will eventually give UC what it wants. But it is hard to see the publisher agreeing to a price that would solve UC's *affordability* problem – unless UC can persuade less privileged institutions to subsidise its publishing activities or if it is prepared to hand over internal data to the publisher in a way that would increase Elsevier's control of scholarly communication.[250]

Meanwhile, Plan S continues to struggle to sign up new funders, even as it loses members (here and here), and potential members (India). The plan also continues to face criticism, pushback and scepticism. Meanwhile, in proposing a geo-specific access model in order to twist the arms of other countries, the European Commission's open access envoy appears to have cast doubt on the EU's claim that it is concerned to ensure that developing countries have equal access to its research. And proposals to create geowalls surely make a mockery of the BOAI goals.

On the other hand, Plan S appears to have so alarmed publishers that (Elsevier apart) they are rushing to sign PARs with universities and consortia. Either way, UC's rebellion and Plan S would appear to be leading in the same direction: a pay-to-publish open access future for international scholarly publishing. But we have to ask whether this can deliver on the promise of the open access movement. OA was meant to solve both the *affordability* and the *accessibility* problems. Today it is far from clear that the *affordability* problem will be solved. More striking, we could see the *accessibility* problem worsen, as paywalls give way to national firewalls and/or datawalls. Meanwhile, for those in the Global South, paywalls are giving way to publication walls and there is now a threat of geowalls. So, I repeat my question: Could defeat be snatched from the jaws of victory? I have no answer to the question, but I feel it needs to be asked.

In short, it is hard not to conclude that those of us (yes, I include myself) who believed that open access was a no brainer in a networked world and that it would lead to a fairer and more equitable scholarly communication system now look both naïve and silly.

Open access was an uplifting and generous spirited vision, and the BOAI declaration was a compelling and poetic call to arms.[251] Poets, said Percy Bysshe Shelley in 1821, are the "the

[250] **See footnote 234.**

[251] As the late OA advocate Fred Friend put it to me in 2013, "The developing world was very much in our minds when we met to draft the BOAI, and the beauty of the BOAI text — not drafted by me! — never ceases to inspire me. It is still important to "share the learning of the rich with the poor and the poor with the rich", working to "lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge".

unacknowledged legislators of the world". A century later W H Auden, took a gloomier view, concluding that[252] "poetry makes nothing happen". Perhaps it would be more accurate to say that poetry can and does make things happen but often not in the way intended!

I want to finish by repeating that this document is speculative. I could be completely wrong in the differed scenarios I have sketched out. Nevertheless, I believe the issues deserve airing. Either way, it will be a sorry business if – after spilling so much (metaphorical) ink arguing over open access, and devoting so many hours debating the many small details of OA – the open access movement discovered that its project has been totally subverted, with no resolution of the *affordability* problem, and perhaps no satisfactory resolution of the *accessibility* problem either.

Perhaps populism and toxic nationalism will be put back in their boxes; perhaps Trump will fail to get a second term or be impeached. Perhaps the combination of Trump's trade war and economic slowdown in China will (after all) persuade the Chinese Communist Party to embrace liberal democracy and join with the West to create a fairer, more equitable world for all, including a global scientific endeavour in which no country or group is disenfranchised or left behind. Perhaps China will join cOAlition S and a new global non-profit, low-cost scholarly communication system based on diamond OA will emerge. Perhaps government intervention will allow the internet to become the free global network *sans* scammers, spammers and spies that its creators thought they were building and all moves towards a splinternet will splutter out.

In short, perhaps we might yet see an open access infrastructure created truly able to "*accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, make this literature as useful as it can be, and lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge"*.

We can but hope.

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[252] In his poem, *In memory of W B Yeats*.