EDITORIAL

(wileyonlinelibrary.com) doi: 10.1002/leap.1495

The past, present and future of publishing: Observations to celebrate ALPSP's 50th year

Pippa Smart

Pippa Smart

Editor in Chief Learned Publishing, UK

ORCID: 0000-0002-5528-4704

E-mail: editor@alpsp.org

No matter how innovative the technology, journals remain a place where researchers can walk hand in hand from today to tomorrow.

This year marks ALPSP's 50th birthday, and in celebration of this, we decided to ask some influential people for their views on publishing. Working closely with Laura Dormer and Todd Carpenter, we invited several people to give us their thoughts on a range of questions about the past, present and future of scholarly, and society, publishing. I also took the opportunity (since this is my last editorial as Editor-in-Chief) to add my perspectives as well. If you are unfamiliar with any of our contributors, you can read about them at the end of the article. Enjoy!

WHAT HAS CHANGED?

Richard Fisher: I do think that what we have unquestionably seen over the past 50 years is (howsoever paradoxically) both globalization and fragmentation, and it does seem to me that the path—OK motorway—of (primarily) English-language scholarly STEM publishing is increasingly divergent from the country footpath of polylingual scholarly AHSS publishing. This is in part about 'the Open', and 'Data', and 'Reproducibility' but only in part. The fact that policy makers and research funders (perhaps especially in Europe) have only really seen the motorway, and cared about its upkeep, has broadened this divergence.

Sally Morris: Facilitated by online access, the rise of freely available preprint databases, and (partly as a publisher response to these) author-side funded free-to-read journals, has been a massive shift. According to one researcher I quizzed recently, he values both—preprints in order to get hold of the latest findings, and the published journal (whether or not free-to-read) for the fact that the article has been peer-reviewed. He does, however, resent the high author charges for publication in some of the top journals.

Josh Nicholson: Let me caveat this by saying that I have only really ever interacted with research when it was already online. I think scholarly publishing didn't actually change so much when transitioning from print to online. I often compare Einstein's 1916 paper predicting gravitational waves to the 2016 paper from CERN detecting gravitational waves to make this point. Despite 100 years in between publications and the transition from print to online, they look remarkably the same.

Even the most notable recent changes in our industry are not necessarily new or because of the web. Preprints, which have exploded in recent years in biomedical publishing, have long been a tradition in physics, and really they are not so different from a publication.

Niamh O'Connor: There are a quite a few worth noting! Enabled by the move online, we saw emergence of the Open Access (OA) movement. The initial aim of this was to 'open' the literature and allow everyone to access research outputs—at the time primarily articles. With the move to OA came a change in business models where instead of paying for a product ('the journal'), payment was made for a publishing service—so aligned with the move to 'servitization' seen in the wider economy. Building on this, the megajournal (PLOS ONE being the first) fundamentally changed perception and practice around publication criteria. Both in terms of focus on work being 'correct' in the initial iteration, now on methodological and ethical rigor, and in terms of removing scope boundaries and allowing research in all fields of research to be published in a single journal. This is particularly important for interdisciplinary research.

And now we are seeing a transition to an Open Science ecosystem, explicitly acknowledging the interdependence of contributions to research and discovery. The 2021 UNESCO recommendation on Open Science 'outlines a common definition, shared values, principles and standards for open science at the

international level and proposes a set of actions conducive to a fair and equitable operationalization of open science for all'. Open Science allows and encourages us to rethink how we share and consume research to make that move from the constraints of the physical format and take advantage of the opportunities provided by a digital world—and there is a long way to go yet!

Robert Parker: One massively significant change we have seen in the past 50 years is the internationalization of journals (in that more journals now have a broader or different international author base). Society leaders/governance/membership in the 1980s were generally UK focussed and this was reflected within their publishing programmes. It took a while for this to change and to recognize the importance of internationalization, both to delivering the mission and keeping up with competitors. But this was not always an easy change/shift for societies to make. There was a massive impact from the ibclusion of including journal editors from different regions. This was also happening outside the United Kingdom at the same time of course, with many European countries merging journals and/or creating new international collaborations. In some cases, these international journals are considered more attractive and superior to regional journals. An equally important change is the shift from the journal being the 'one-stop-shop' for publication to an environment where there are many groups offering author services, from pre-submission (writing a paper, preprints), peer-review services, through to promoting published articles.

Pippa Smart: In the (almost) 40 years that I have worked in publishing I have seen dramatic changes. My first decade was in production and the changes there were seismic. But the most important changes, I believe, are ones of perception and expectation. We now expect journals to provide a fully international window into research with contributions from all regions. We expect to be able to access research from around the world through a single platform (usually Google as the first port of call). We no longer trust authors but demand increasing levels of proof (e.g., data availability) and checks (e.g., plagiarism) to ensure they comply with ethical and other practices. I have also observed that the move towards greater internationalization has led to the western model being considered the 'gold standard' of scientific communication Not that I am complaining since this is my own base, but I am concerned about the exclusion of national journals which cannot meet the 'metrics criteria' and so fail due to lack of support.

Helen Zhang: In the past 50 years, digital innovation has changed publishing rapidly, mainly in two regards. The first is that the existing certified publishing form is no longer limited to scholarly journals, but includes preprints, Open Data, and platforms such as Open Research Europe. The second major change is an increasing demand to validate research integrity or credibility with checking tools such as plagiarism checkers (e.g., Similarity Check), and systems to correct and report on problems (e.g., RetractionWatch). This has resulted in growing calls for publishers to consider transparency, from the research process to peer review. Journal publishers, it seems, will have more to do in future. In fact, it seems that more work is required to adopt digital innovation whilst publication itself appears increasingly risky.

IS PUBLISHING RESISTANT TO CHANGE?

Richard Fisher: Thinking briefly about developments in academic and learned society book publishing over the past 50 years, what strikes me are the very strong continuities of practice—most obviously the survival of print as a primary mode of distribution, which received a massive fillip from the growth of short-run printing technologies two decades ago, coterminous with the development of online bibliographic search facilities. Google and Amazon have been (by far) the two most important external innovators in this sphere, with (e.g.) library supply utterly transformed by global expectations of speed and service driven, fundamentally, by the Amazon retail offer.

Although it is true that there is resistance to change in the 'products' we produce, there has been a large change in the market. When ALPSP began, a university system like California would spend 50% of its revenues on the acquisition, curation and preservation of 'books'' broadly defined, which have always been a central mode of AHSS scholarly communication. That figure is now closer to 5%. In sum, STEM is far more dominant in increasingly globalized research networks than it has ever been before. Given the numerous articulated worries about the 'decline of science' and 'lack of public trust in science' (driven in part by the advent of social media), there is a very important and poorly understood paradox here.

Niamh O'Connor: When journals moved online, rather than re-think approaches and processes, the familiar 'physical' procedures and formats were recreated in a digital environment. While some of this was undoubtedly because that's what people 'knew', there were some good reasons to do this—the points of value that had evolved to meet the requirements of the research community needed to be preserved and the signals of trust upon which researchers relied needed to be maintained. So this initial move did not result in the level of disruption that some might have anticipated.

However, these have become entrenched for a variety of reasons including research assessment practices, the cost both financial and in terms of resources required for changing systems and the tie-in of many publisher business models to the article and the Version of Record. There is also a lot of inertia and risk aversion in our ecosystem.

We need a radical reinvention to fundamentally change the system and develop signals of trust appropriate to a digital age. To embrace openness, and transition to publishing as a process integrated with the research process, which supports the advancement of usable, trustworthy knowledge and enables global participation and has associated business models that are inclusive and equitable.

Sally Morris: Nearly a decade ago, my co-authors and I predicted, in *The Handbook of Journal Publishing* [Cambridge University Press; see chapter 13, 'The future of scholarly communication'], that scholarly communication would evolve to reflect the dynamic, interconnected nature of scholarly activity, and that journals would in turn need to evolve to reflect this. While I've

been out of the field since, it seems to me that the evolution of scholarly communication has been slower than one might have expected, and journals have thus not yet been forced into radically reimagining their role.

Why the resistance? I suspect it may be partly to do with the way that academics, and their institutions, still gain 'brownie points' through publication in highly rated journals. It may also have to do with the fact that reimagining the successor(s) to journals is something that existing journal publishers, comfortable with their healthy (if perhaps declining) profits, are disinclined and perhaps unable to do. The kind of new thinking, and new skills, that are needed will more likely come from outside the traditional publishing world.

Josh Nicholson: I think scholarly publishing has resisted big changes, some of that for good reason. For example, it's amazing that publishing has focused on persistence, archivin, and good metadata, making it as easy to discover and cite a paper from 1665 as it is from 2022. This is a good thing that should probably not change too much. However, there could have been more improvement in the types of papers we publish, integrating our data better, and giving researchers incentives to produce not just 'positive' results. As we have seen in other industries, big changes in information dissemination can have big consequences—not always beneficial, and sometimes leading to misinformation and polarization of communities (News, for example). I think the adoption of big changes in scholarly publishing has a high bar, and rightfully so: research publishing is important.

Still, there is room for new types of articles and new methods of evaluation, but these are mostly constrained by social structures, not technology. Of course, I am hoping that our work at scite and the introduction of 'Smart Citations' will be a big change for our industry. Citations, a core part of scholarly publishing, have largely been unchanged since the launch of the Science Citation Index decades ago, but have always been accepted as a limited measure. But if we can avoid hiding citations behind a number and provide context (such as our citation statements) we can hugely improve the benefits. This is a big change and I think the benefits may ripple out to other citation indices.

Robert Parker: When I started my first job in scientific publishing in June 1985 I was told there was a serials crisis and journals had only 2–5 years before they would be replaced with the next thing. The state of our journals wasn't great (especially in terms of backlogs and times to publication), and some bad decisions had been made around things like including emerging scientific areas in the journals. This sort of thing was pretty much the norm in society journals at the time, I believe, and had made the space for others (Robert Maxwell, etc.) to provide journals and services that were (or at least appeared to be) more focussed on what authors wanted. This led to a long period of 'evolve or die' for society publishing and I suspect the late 1980s saw the height of society journal closures, journal mergers, and societies giving up self-publishing to partner with commercial publishers. Then the electronic revolution looked as if it would bring really ground-breaking changes in the way that knowledge was disseminated. However, the massive growth of authorship in developing international markets (particularly in China and India) led, I believe, to a slowing of change. This was because there was a revitalized emphasis from these communities to use the sort of indicators and metrics that were very much established as inputs, very often in a very direct way! In 1985, the RSC published only 3312 articles, and a few tens of these were from China; in 2021 RSC published 36,068 articles, 42% of which were from China. The scale of change in world authorship is phenomenal.

I think there are too many groups trying to re-invent publishing; however, most 'traditional' publishers are perhaps looking to see demand from their authors and customers (who in turn seem fairly comfortable with the status quo) before they make any radical changes. I suppose it depends on who the 'we' is in the question—start-up companies in the publishing environment might well answer this one very differently from large, well established publishers. From a journal author/reader perspective, maybe there is an element of 'if it ain't broke, don't fix it'?

Andrew Preston: Dramatic market changes can't be scheduled. They happen when the market is ready, and don't often present in the way you'd expect. One of those shifts is underway right now and has the potential to be monumental: spurred by COVID, researchers have become accustomed to sharing and discussing their research online via video, but we can't anticipate where this will lead, and what effect it has on the traditional journal and on science communication. Researchers have specific requirements—making content findable, indexable, and citable—that can't be met with typical consumer video solutions because it's still far easier to read a PDF than consume a raw video and far better to meet potential collaborators at a conference than on Zoom. But within these challenges lies the potential to unlock new approaches to scientific communication and community in the 21st century and open up new modes of operation for societies and publishers (the traditional hubs for academic communities). The key? Investment in tools and technology that support researchers' shift to online video. This is our mission with my startup, Cassyni.

Pippa Smart: There was a great deal of talk in the late 1990s and early 2000s about how the digital revolution would change the scholarly article (see Sally Morris' editorial 'Is the journal article fit for purpose, or stuck in the past?' https://onlinelibrary.wiley.com/doi/10.1087/095315108X378703). But since then the changes have been incremental. I often wonder why this is, and I suspect it is due to two reasons. The first is that the package which forms a journal article is fit for purpose—it has clear content signalling, and where improvements can be made (reference linking remains my favourite) they are. The second is that whatever great ideas publishers may come up with, these have to fit with what academia wants and its own internal validation systems. These systems (regardless of the press releases made) are still based on the standard indexes and citation metrics—more so in the emerging regions. This inevitably blocks or dramatically slows the introduction of innovative new models such as F1000Research. Until academia (and I mean throughout the world) changes its own systems, publishing (and researchers) won't be free to innovate.

Helen Zhang: It may be appropriate to quote Hegel here: 'What is rational is actual and what is actual is rational'. And it is true that the peer-reviewed journal model has survived for

hundreds of years to today's 90,326 scholarly journals listed in Ulrich (http://ulrichsweb.serialssolutions.com/search/-1616811946). For example, the IMRAD format has been proven desirable by the scientific community; peer review repeatedly scores as important by the scientific and publishing community for ensuring the quality and integrity of academic communication. So, I think that academic publishing (in the form of the STEM journal) hasn't been reshaped by the 21st century because its elements—from the format to the journal's certification—is recognized as a form of authority for science communication. Hegel's rational theory can be exemplified by scholarly publishing especially as we celebrate ALPSP's 50th anniversary (Fig. 1).

COMMERCIALIZATION AND CONSOLIDATION

Richard Fisher: The fact that far too much power is concentrated in the hands of a few commercial interests is deepening the divide between English language STEM publishing and polylingual AHSS publishing. But to see (as too many 'schol comm' participants seem to do) a straightforward 'university v publishers' binary as the determinant framework of scholarly communication in 2022 is to miss something very important: conflicts within and between universities (by function and by discipline) are far more significant, and in turn these conflicts are played out within and between academic publishers themselves.

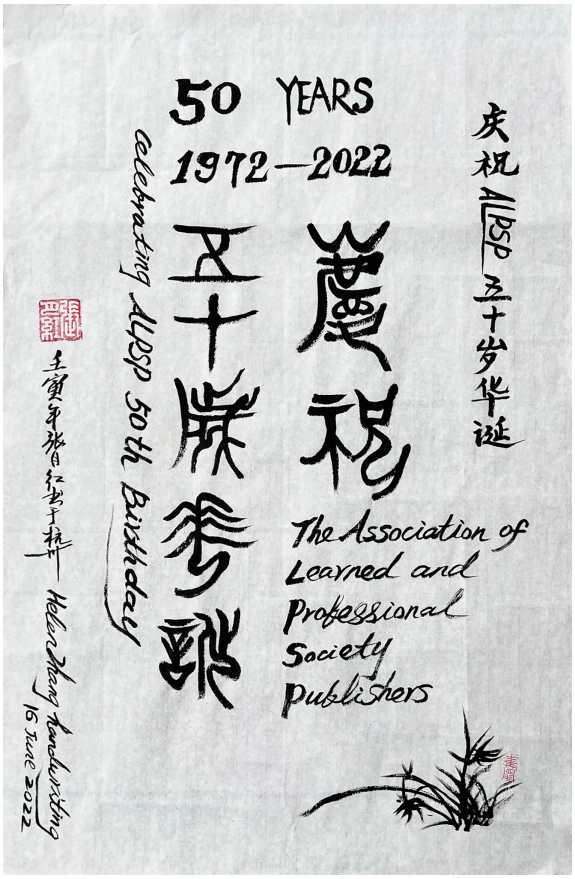

FIGURE 1 Congratulations to ALPSP, drawn by Helen Zhang.

Sally Morris: The imbalance between large and small publishers has been exacerbated since the advent of e-journals, with the ability of the big players to offer packages of all their journals—saving libraries time, and possibly money (but alternatively, taking up more of their available, dwindling, funds). It is difficult for smaller publishers to compete in this environment unless they can group together, as ALPSP tried to do with the 'ALPSP Learned Journals Collection'. Unfortunately, this initiative was stymied by another consequence of consolidation—the failure of the subscription agent through which the collection was offered.

Josh Nicholson: I do think market consolidation by a few companies is a problem because when a company or companies own a huge market share, there is little reason for them to innovate. Why change something that is working for you? With more competition, just like in nature, we see more diversity of outcomes and stronger ideas and tools. With that said, I think this is where start-ups have an opportunity. Big companies move slow and generally don't have an appetite for risk, which creates room for new entrants to compete with them. Given big incumbents' control over the market, it's not easy, but that control and size is a double-edged sword. As Ashish from our team recently said in an internal chat, '11 days for a big company is like 1 hour for us'. It's true! We don't need meeting after meeting or signoff after signoff to do something, we just do it.

Robert Parker: I think market consolidation is a problem, as a diverse publishing sector brings more choice and innovation. To some extent, society publishers have fed into this consolidation as many manage their programme via partnerships with large commercial publishers. This model has many advantages for small societies, both allowing them to tap into services that they cannot provide and providing a guaranteed revenue stream. For many societies it has enabled them to continue publishing their journals, delivering against their mission to disseminate knowledge (in that specific way of journal publishing) when otherwise they might not have been able to. The guaranteed, predictable revenues must also have allowed some to fulfil other parts of their mission and plan expenditure in advance that would otherwise have been impossible.

The market consolidation we see now, is less around content and more about researcher workflow services with the larger commercial companies buying smaller start-up organizations to build these capabilities. Some are rethinking what a publisher does; others are rebranding to be more than a publisher. Much of this is being driven by the desire of the larger publishers not only to own or be part of the researcher's publishing workflow but to be involved with the entire end-to-end researcher workflow.

Pippa Smart: There are benefits in consolidation, although it may appear that these benefits are mostly realized by the consolidated companies. Publishing is no different to other industries in respect to commercialization and consolidation and is following the same trajectory towards a landscape of few behemoths and many small companies, with the mid-sized rarely able to survive. The move of publishing into a commercialized space (which started

prior to the 50 years that ALPSP has been in existence) has brought it into conflict with the ideal of the gift economy (free content, free review in return for career validation), but this is one of the unforeseen results of the demands made on publishing and publishers. Commercial publishers offered solutions which academia wanted but either did not want to invest in or felt unable to. As the saying goes, be careful of what you wish for.

Helen Zhang: There have been many acquisitions in recent years, and mergers are often seen as a general trend as David Crotty pointed out in two papers; 'Life in a Liminal Space; Or, The Journey Shapes the Destination' (2022: https://scholarlykitchen.sspnet.org/2022/01/13/life-in-a-liminal-space-or-the-journey-shapes-the-destination/) and 'Market Consolidation and the Demise of the Independently Publishing Research Society' (2021, https://scholarlykitchen.sspnet.org/2021/12/14/market-consolidation-and-the-demise-of-the-independently-publishing-research-society/). I was surprised that academic publishing did not seem to escape the market model, the survival of the fittest, because we have so many small publishers—how can they survive? Will it end up with the big fish eating the little fish, monopolized by a few wealthy publishers?

By contrast, consider China's academic publishing landscape: the government-affiliated China Association for Science and Technology (CAST) formulated a group of plans (2013–2023), to support the internationalization of STEM English-language journals, from the financial expenditure (total about 264 million dollars) to the policy (from the journal excellence programme to founding new journals, for example, 30–50 new STEM journals each year). As reported by South China Morning Post on 6 June 2022 'China plans sweeping makeover of academic journals to raise the profile and influence of domestic scientific research', in which, Zhang Yuzhuo, vice-president of CAST, in a conference stressed 'the group's plan includes adding 50 new academic journals in 2023 as part of state-backed efforts to promote Chinese academic journals around the world, and the next step is to accelerate the reform of scientific and technical journals and their digital development. In addition, China is also expected to allow a number of English-language journals abroad to be registered in the country'. According to Zhang, this would be a big breakthrough in light of the government's rigid control of publications (https://www.scmp.com/tech/policy/article/3180640/china-plans-sweeping-makeover-academic-journals-raise-profile-and).

Currently Chinese academic journals are far from being competitive in the international publishing market, but with support of the Chinese government they may become highly competitive in the future. Given the increasing monopoly and concentration of the western publishing industry, what values can we predict to dominate academic publishing next? Where is the market? Let's see what happens.

IS THE LEARNED SOCIETY JOURNAL AN ANACHRONISM?

Richard Fisher: Where the publishing programmes of learned societies sit in this emerging new world depends, to a very large extent, on their disciplinary orientation, and STEM and A&H societies confront very different versions of the future, with the always-underarticulated social sciences somewhere in the middle. The American Chemical Society and the Royal Historical Society both publish scholarly material, but there any similarity pretty much ends. Learned society journals will remain valid and resonant (and perhaps especially in AHSS) where they remain resonant and relevant to the scholarly communities they serve. If not, they will disappear. Nothing (including the most venerable societies and presses) in scholarly communication has to exist, although structures of credentialism innately skew scholarly ecosystems in favour of the survival of the former.

Much emphasis at present (not least in research funding) is placed on the development of alternative infrastructures for scholarly communications, outwith legacy commercial interests. 'Community governance'—of a sort of which historically learned societies have been a principal embodiment—is the aspiration, but (increasingly) community governance is across state and/or national frontiers (in contrast to the national or regional orientation of most learned societies), and such an aspiration therefore confronts real and pressing and as yet unresolved political challenges. The impact of Coalition S was unquestionably a function of its relationship to senior policy actors within a powerful political entity, the European Union.

However, learned societies and their journals are not without critics, and they have been increasingly challenged, not least by members of the academic library community. The library community has responded critically to the funding structures of these societies as they have grown up over the past two generations, and the reliance of the larger ones on very significant journal subscription revenues to support a gamut of society activities. Indeed, the survival of journal subscription revenues, has been (in its own way) as surprising as the survival of academic printed book revenues.

Niamh O'Connor: I don't think it is, or at least not more than the concept of a journal is an anachronism. But I think what a journal is and what it signifies is different from what it used to be. Traditionally, journals' primary purpose was a means of organizing, controlling and monetizing the dissemination of research. They also enabled 'gate-keeping' to retain knowledge within boundaried 'elite' communities. Today, journals serve a range of other purposes directly addressing the needs of researchers. Primarily, they offer an opportunity for researchers to self-identify as belonging to a particular community and be part of shaping their field. And they remain central to our system in part because of metrics, research evaluation and perceptions of quality associated with particular journals, or brands.

Whether through a society, or other community-led publisher, the involvement of a research community in assessing and curating (i.e., selecting in this context) work that is rigorous and appropriate for reading and has potential for re-use in relation to their field of expertise, continues to be very valuable. The tension in the system between researchers, institutions, funders and publishers can be beneficial in maintaining a healthy balance and creating a system that adds to more than the sum of its parts.

I do think it's important that societies recognize the role(s) their journal(s) play in the communities of researchers who read, review and publish in them. The role of journals as the revenue driver for societies is changing. As Hetan Shah, former CEO of the Royal Statistical Society and now CEO of the British Academy said in his Plenary Presentation at the ALPSP Conference in 2017, learned societies 'do not have a right to exist'. This is equally true for society journals—and for any journal! As the role of journals as the main revenue stream for many societies changes, there is an opportunity to think about the role of their journal(s) to support the evolution of research sharing and re-use, assessment and curation in line with the future needs of their communities.

Sally Morris: for learned societies, journals have long been just one part of their function—albeit one which certainly used to raise valuable funds to redirect into other areas. Societies' function, as I see it, is to bring together, and facilitate communication between, their members. I believe that journals will remain part of this provided they keep pace with the way that society members actually work and communicate, in this interconnected electronic world. Societies should be uniquely well placed to identify change in their members' behaviour—to keep their finger on the pulse, as it were.

Josh Nicholson: I think societies are very important in the research world and will continue to be so, or at least I hope they will. I finished my PhD about seven years ago, and some of my fondest memories were from attending the American Society for Cell Biology conference each year. It allowed me to present my work to my peers, hear about new studies, and network. I think research societies' importance cannot be overstated, and I am sure this will continue to be true despite changes in the publishing model.

Robert Parker: I don't feel this argument holds true—societies publish to further their missions, although this may flex/adapt/change depending on business models and researchers needs (i.e., OA—which is extremely challenging to smaller societies, but they have innovated to manage their OA transitions). This does not diminish the role of societies in working with their communities to disseminate knowledge in the form and format the community wants. In addition, many or most professional bodies are limited to benefitting individual members only if that benefit also advances the mission of the society.

Societies have, unfortunately, not really come together to share infrastructure etc., and thereby achieve economies of scale. I used to think that the market consolidation part would 'force' societies to do this more, but it has not really: maybe it is easier for most to work with a commercial partner than other societies? Perhaps this is because the competition can be most keenly felt between society publications in cognate areas published by different societies.

Anthony Watkinson: Publishers and their representative societies need to truly recognize that they (like libraries) exist as intermediaries for researchers. Learned society publishers ought to be in a good place to do what scholars want and need but my experience as a commercial publisher and the evidence of history is that in the past the demand for new outlets for new disciplines was catered for by others—primarily commercial publishers who reaped rewards from doing this [see chapter 18 on journals of *The Cambridge History of the Book in Britain* volume VII]. For much of my career many of those researchers who came to us with a wish to start a new journal for a new sub-discipline, did so because their ideas were ignored by the relevant societies or the editorial policies of their journals. However, this was the past. At the launch of HighWire Press by Stanford University Library we were told that its mission then was to prevent learned societies to have to sell out to major publishers to get online.

My observation now is that large and small self-publishing societies can react to changing circumstances successfully and listen to their wider membership in developing their programme. There is a future in this.

Pippa Smart: The society journal has radically changed in the past 50 years, and—at the risk of upsetting some ALPSP members—I struggle to see the continued rationale for categorizing them as such in many cases. A society journal was originally envisaged to serve its members by publishing their work and providing member access to relevant content. But most society journals now seek to publish good content from anyone, to disseminate to everyone, and no longer provide privileged access to members. Whilst the journal aims and objectives may align with those of the society, there are frequently other, non-society, journals which cover the same area. In other words, learned society journals have simply become scholarly journals which happen to be owned by the society and publish in the same discipline as that society There are—of course—some journals which deserve the identity of a 'society journal' because of the way they are managed, but frequently societies outsource so much of the journal (not only publishing, but also editorial management) that they have simply become a product from which the society benefits (by association and from income).

THE FUTURE

Richard Fisher: As a onetime historian, I want to stress continuities, as much as changes, in responding to Learned Publishing's very stimulating set of questions. Looking forward, my very simple view is that if learned society publishers are still doing something useful for their members, and that utility must include a strong element of 'community embodiment', then they will survive and flourish. But the big and expanding professional battalions of STEM will deviate still further from the volunteer and (I fear) probably declining forces of AHSS, to the inevitable detriment of both: I suspect (and certainly hope) that learned societies in AHSS will still be publishing edited and curated content long after their STEM cousins have transformed their orientation to a very different set of research workflow imperatives, in which the publication of content looms relatively small (except, of course, for the authors of said content…).

Josh Nicholson: I think machines, specifically powerful deep learning models, are going to have a big impact on research publishing. I think this changes the landscape of science publishing

not just for societies but for all. Increasingly we will need to know how to trust machine-generated, machine-reviewed, and machine-driven research. Perhaps, societies work as a Trustmark and balance against machines and their increasing influence in research publishing.

Sally Morris: In our aforementioned book chapter, we imagined how a scholar might work in 2060—given the slower than expected pace of change, it might indeed be 2072. Here's what we envisioned:

> [The scholar] speaks to her paperback-sized BrainBox™ [sounds rather like Alexa!]: 'What's been done in the last five years on reversing the symptoms of Alzheimer's?' A voice responds: 'Thirty-nine articles, ten datasets, fifty communication streams – what do you want to see?' The scholar replies, 'Give me the details of the top five articles.' [we didn't say how 'top' might be measured…]. The screen displays the bibliographic details, plus number of downloads and citations, for five articles. [Curiously, we didn't mention whether or not the articles had been peer-reviewed.] She selects article number three, and the display changes to the section headings of the article. The scholar says 'abstract' – then 'conclusions', then 'methods'. She decides she wants to see the data, and is presented with a toolkit for searching and manipulating the authors' vast dataset. Then she says she wants to look at what other people have said about the work, so she says 'follow-up', and gets a thread of video discussion posts. She posts a short public video comment of her own; she also records some private notes; one of the earlier commentators immediately comes back to her and they start an interesting discussion.

In the immediate future, though, I realized from my conversation with the medical researcher that while readers are well aware of the role and importance of peer review, peer review is, frustratingly, the only value-add they really see in the published journal article. And yet, in addition to facilitating (though not actually carrying out) peer review, publishers spend a great deal of time and trouble—and thus cost—in turning the original submitted version into something more useful. It's not only editing in the traditional sense—making the meaning crystal clear to the reader (particularly important if the author is not writing in her native language), and perhaps going further in terms of correcting/standardizing linguistic style (perhaps unnecessary, if we're honest). Publishers also have at their disposal tools for detecting issues, which peer reviewers might not be able to spot, such as plagiarism of text, or manipulation of illustrations.

But in addition, to make the article fully linkable to and from the wonderful network of information which the Internet affords, non-textual material has to be embedded and labelled, and references have to be verified (a surprising number can contain errors) and linked, for example through the DOI system. References don't, however, necessarily need to be standardized in the journal's preferred format—causing authors extra work which so irritated my medic friend mentioned above; that is something which publishers could easily stop insisting upon.

In a perfect world, links need to continue to function in perpetuity (it is very interesting to check the links in some of Stevan Harnad's own freely available early articles, and to find how many of those no longer work!). This means that they must be continually checked, ideally automatically (as happens with websites), and—the more difficult task—the new destination found. And for the article to be linkable from elsewhere, it in turn needs to have the appropriate 'hooks' (such as a DOI) in the right databases. Perhaps in future some or all of these tasks may be automated; for now, though, publishers are doing them—but nobody knows!

I concluded that, right now:

- Publishers should not spend time (and money) doing more than essential text editing;
- Publishers should save authors (and themselves) work by ceasing to insist on a standard 'journal style', particularly for references;
- And most important: publishers need to find ways of making their essential but invisible tasks—e.g., making articles linkable to and from the scholarly web—visible, so that we don't risk being the baby that gets thrown out with the bathwater.

Robert Parker: I very much hope that the scientific (and other) record will be in safe hands as well as developing positively in all those ways we imagine now and haven't yet imagined. I also hope that societies remain relevant through proper engagement with their respective communities and have a great role in the evolution of dissemination of knowledge for the good of all.

Pippa Smart: As I come to the end of my tenure as editor of *Learned Publishing*, and look back on my career, I find the future harder and harder to predict—although my opinions are at risk of becoming more entrenched. About 15 years ago, I envisaged a future where all articles would be published free for all, and then journals would select the 'best' articles for inclusion, thus providing a layering of access: everything free, with an option to pay for a filter of the best or most relevant. I wasn't alone in this idea of course. To some extent, this has come true with the recent rapid growth of preprints. However, the pressure for journals to also be open access challenges my prediction of value-added filters which have a value worth paying for (by the consumers). But, on balance (and given that I am able to be controversial since this is my last editorial!), I think I will stick to my earlier prediction: I can see a future in which the traditional two-tier situation for the richer and poorer nations and disciplines sadly continues. However whereas in the subscription world only the rich can access most research, in the new world anyone can read everything (if they have time) but the better-supported nations/institutions will pay someone to filter the content for them. I don't think the APC model will survive because it is inherently biased towards the richer disciplines and countries (and support for cash-strapped researchers will always be limited) and therefore I wonder if

the push for journals to be open access will survive. So, in my crystal ball, I see journals continuing as filters for 'validated' content but that they will revert to subscription access (perhaps by a different name). And referring to my earlier comment about society journals, perhaps these might become more focussed on membership by providing privileged access to selected content.

Anthony Watkinson: ECRs (early career researchers) are the future of the research community and their views on what publishing should be could perhaps be taken as the likely future. They associate with words such as openness, sharing and transparency as ones they can buy into. There is little doubt in their minds that the open access is the default business model but the 'traditional' mode of formal communication (journal articles) is still considered central and likely to continue. They don't see peer review as perfect but have no agreement on how it could be reformed. They rarely mention learned societies which perhaps calls the future of these venerable institutions into question. They hate APCs and will only publish OA if they get the money from funders or universities—will this change the business models of the future? Green OA/self-archiving does not resonate so will this continue? Though they complain about the high profits of some commercial publishers, attempts to contrast learned societies (good) with commercial companies (bad) does not strike a chord. Where this will lead publishing in the next 50 years, I cannot speculate.

Helen Zhang: Driven by technological change and digital revolution, today's publishing era has undergone extremely drastic changes. Trying to imagine the publishing landscape 50 years from now is difficult for all stakeholders. Take AI for example, it is predicted that academic papers will be written by AI based on author's references. Can you believe it? I believe that today's technology is so advanced that you can't believe it! All of this has to be considered from the root of the question, what is the nature of academic publishing?

I personally believe that academic publishing which pays attention to the quality of academic output is still the eternal theme, and also the cornerstone of the survival of societies and journals.

The current research culture needs journals to support its rapid output, and scientists' core values (curiosity, scepticism integrity, evidence, etc.) are without agenda, because scientists really just want to understand the world (https://www.americanscientist.org/article/scientists-reflect-about-ethics-and-trust). So, no matter how innovative the technology, academic communities and journals have always been a home for scientists, where they can exchange ideas and walk hand in hand from today to tomorrow. In short, science needs us.

Of course, ALPSP and Learned Publishing will still be here in 50 years. It is said that no one can predict the future well, and maybe the publishing industry, too, must constantly venture into uncharted territory. However, the value of survival is a belief that one learns and fights for individually. Recently, I found the 2022 SSP's new core values 'Community: Inclusivity: Adaptability: Integrity', which made my eyes light up and I thought this is the future.

FINAL COMMENTS

As said at the start of this editorial, this issue marks the last one that I will oversee as Editor in-Chief. I have enjoyed 7 years with the journal, witnessed many changes, and worked with a large number of amazing authors, reviewers, and the editorial and publishing team. Laura Dormer, with whom I worked on this article is taking over and under her capable management I am sure the journal will thrive into the future—for a further 50 years at least.

My thanks to Laura and Todd for their help in identifying, inviting and collecting the contributions.

ABOUT THE CONTRIBUTORS

Richard Fisher: Richard Fisher has worked in scholarly publishing for nearly 40 years, working in various capacities with seven different university presses. He has also served two separate terms as Vice-President of the Royal Historical Society. In 2018, Richard was the recipient of the ALPSP Award for Lifetime Contribution to Scholarly Publishing.

Sally Morris: Sally Morris entered the world of publishing some 50 years ago, although she didn't find her true home in journals (and copyright) until about a decade later. She became CEO of ALPSP in 1998, and—when she retired in 2006—edited Learned Publishing for the following three years. These days her time is taken up with music, gardening and (when times permit) travel.

Josh Nicholson: Josh Nicholson is the co-founder and CEO of scite, a Brooklyn-based startup building the next generation of citations and the 2019 recipient of the ALPSP Award for Innovation in Publishing. Previously, he founded The Winnower and served as CEO of Authorea, two startups aimed at improving how researchers publish and collaborate. He also holds a PhD in cell biology from Virginia Tech, where he studied the effects of aneuploidy on chromosome segregation.

Niamh O'Connor: Niamh is Chief Publishing Officer at PLOS and was Chair of ALPSP from 2020 to 2022. Prior to PLOS, she worked at the Biochemical Society/Portland Press and the Royal Society of Chemistry in a variety of roles. She holds a PhD in chemistry from the NUI (UCC) and is fascinated by the influence of culture and context on scientific research.

Robert Parker: Robert has worked for the RSC for 37 years, mostly in publishing roles, including 'Head of House' until he became CEO of the society for 10 years. For the last two years he has been RSC's Ambassador to Europe and The Commonwealth and continues with roles on the Chemical Weapons Advisory Committee, EuChemS and the Science Museum Advisory Board. He was Chair of ALPSP 2008–2009.

Andrew Preston: Andrew is a co-founder of Cassyni, the tool that helps researchers to discover, run, publish, and cite academic seminars. Previously, he was an active researcher in physics, first as a PhD student at Victoria University of Wellington, then as postdoctoral fellow at Boston University. Andrew went on to

found Publons, which was acquired by Clarivate in 2017 and now serves more than 2 million researchers. At Clarivate, Andrew was also product director for Web of Science.

Anthony Watkinson worked in academic publishing (mostly STM) from 1971 but he started as a researcher and is now almost entirely an information scientist. He has been a member of ALPSP since 1998 (now on the training committee) and has been honoured by an ALPSP award. He has also been a librarian and a director of the Charleston Library Conference for several decades

Yuehong (Helen) Zhang: Helen Zhang was a member of the ALPSP Council between 2011 and 2016, and also a member of the Crossref Board from 2014–2017. She was the Chief Editor of Journal of Zhejiang University-SCIENCE for many years, and is currently is the Managing Editor of Bio-Design and Manufacturing.