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Innovation and service in scientific publishing requires more, not less, competition

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Competition in the science, technology and medicine (STM) publishing market is a major driving force for innovation, and anything that reduces competitive forces will degrade scholarly communication. Advocates of PubMed Central (PMC) and the Public Library of Science (PLS) believe that scientific articles should become free to one and all soon after publication. Their noble aspiration, however, risks catalysing the dissolution of the present complex system of scholarly communication. The irony is that this would hit hardest the not-for-profit scientific society publishers, whose motive is to serve academia. Their position against the large commercial publishers who compete with them for authors and readers would be reduced, with negative consequences for universities - the principal consumers of scientific information - and science in general.

The chain of producers and consumers involved in STM publishing is complex. Assessing the implications of the PLS and PMC initiatives and other proposed strategies for scholarly communication requires an understanding of the roles of these players, and the interplay and forces among them that ultimately shape and define the state of scholarly publishing.

At one extreme are the 'irresponsible' commercial publishers whose primary interest is to make big profits. At the other are the advocates of free access such as PMC and the PLS who believe that scientific articles should become free to one and all soon after publication.

Between these forces lie the responsible publishers and, at the core, the universities and scholarly societies. Responsible publishers provide services to science while making profits that can be considered reasonable. The universities are home to the originators of much of the scientific literature and, through subscriptions paid by their libraries, the source of much of the money that keeps the current system afloat. Many of the scholarly societies - whose memberships are often largely based in universities - publish not to generate profits but as a service to their memberships and academia. Scholarly society publishers and for-profit publishers compete for authors, readers and institutional subscribers.

In the search for solutions to the problems and challenges facing scientific publishing, we at HighWire Press believe that the not-for-profit publishers are a key, and too-often neglected, link in this complex chain. Over the past six years, society publishers have experimented with various business models to recoup the costs of simultaneous Internet and traditional publishing while tentatively adapting to survive what most realize will be an inevitable transition from print to an Internet-only future. These experiments, and the accompanying Internet innovations, are responsible acts of stewardship of the assets of the scholarly societies by professionals serving scientific communities at the behest and approval of the members of those communities.

From 'Sputnik' to the 'serials crisis'

Research universities and scientific societies woke up late to fundamental changes in the chain of scholarly communication caused by the 'commodification' of STM articles. That realization took between 15 and 20 years to develop, and finally crystallized in the early 1980s. The commodification has perturbed a complex system of checks and balances for funding and evaluating contributions in scholarly publishing. This 'system' had evolved from natural relationships based on motivations of service arising among scholarly communities, organized across disciplines for teaching, research and community services in the form of universities and organized in a complementary matrix as scholarly societies by disciplinary specialities (see box).

Universities as subscribers are engaged in a balanced exchange of money for refereed and edited scholarly information with society publishers, who are 'responsible', in that they are directly accountable to their members and in large part to their institutional subscribers. Most scholarly societies are cost-recovery publishers, if even that.

The huge investments in basic research prompted both by the Second World War and the Western response to the launch of Sputnik, resulted in a flood of articles in new disciplines, topics and methods. In general, scholarly societies responded slowly to this twigging and cloning of disciplines, maintaining conservative definitions of what constituted appropriate subjects for the journals they already published.

Many for-profit publishers, however, seized the opportunity both to provide what was a greatly expanded population of researchers, with new outlets for their articles in these new areas, and to publish new journals on rapidly expanding 'classic' subjects. The system of checks and balances in science held but was fed by a widened array of refereeing panels that grew with each new journal published; something which in itself is no bad thing.

Some of the for-profit publishers, such as the late Robert Maxwell, recognized that scientific information was an excellent means to secure large profits. They paid nothing for articles - as is true for society publishers - but could charge premium prices, to institutional subscribers, their principle customers.

Over the past three decades, journal prices have increased annually at multiples of inflation rates or any other measure of economic growth. The 'irresponsible' publishers have persuaded institutional buyers, mainly librarians, that their articles are commodities with extra value in their timely delivery; items of commerce. They have enjoyed increasingly large profits on journal articles. This has been perfectly legal and from the publishers' and their shareholders' perspectives quite a good thing.

These publishers have assembled and are assembling - through mergers, acquisitions and coercive contracts with groups of scientists serving on editorial boards - larger percentages of the number of STM journals in many subject areas in order to continue to extract ever-larger portions of university libraries' acquisitions budgets year after year. They use their larger share of journal titles as an inducement to scientific authors to contribute (a wonderfully apt term) to their journals rather than to those of responsible STM publishers, including especially those of scientific societies.

Such 'irresponsible' publishers, however, strain the resources of universities and scholarly societies, and have caused the so-called 'serials crisis' where libraries have had to pay more and more while being forced to subscribe to fewer and fewer journals. This in turn has reduced access to both STM

and other scholarly information at a great many universities. The actions of these publishers also strains - if not attacks - the symbiotic relationships of scholarly societies and universities, and the resulting supply of manuscripts leading to refereed, edited and published articles.

One could rightly argue that university libraries ought to become better consumers and manage their acquisitions budgets better, for example by refusing to subscribe to the publications of lesser value. Other library initiatives, such as the Scholar's Forum, the 'Tempe Principles' and the array of activities of the Association of Research Libraries fail to promote better informed and more aggressive consumer behaviours in assessing the costs and benefits of their STM subscriptions.

One initiative, the Scholarly Publishing and Academic Resources Coalition (SPARC), seeks to encourage competition by creating cheaper alternatives to specific high-priced titles. But this has had the effect of stimulating the creation of yet more journals, with many libraries subscribing to both the high-priced title and its new competitor. If the SPARC approach is to work by providing cheaper alternatives, then libraries should now decide to manage their acquisitions budget better by supporting SPARC titles and not subscribing to the more expensive counterparts brought out by the irresponsible publishers.

Scholarly society publishers strike back

The launch of Internet publishing of scientific journals in the mid-1990s could have (and still might) allowed redress of the competitive balance between scholarly societies as publishers, and profit-gouging for-profit publishers. Scholarly societies and universities rapidly realized that the Internet could provide a functional counterweight to the economic debacle in the chain of scholarly communication caused by commodification.

Internet publishing has also introduced substantial changes in the way research information is discovered, retrieved and used, while online research communities offer new opportunities for competition. From its inception in 1995, HighWire Press has worked with and for responsible publishers, most of them scholarly societies, to try to make responsible publishers more competitive in the marketplace for authors, readers and institutional subscribers.

PMC and the organizers of the PLS proposals threaten to create another strain on the resources and services of universities and scholarly societies. All of their rejoinders notwithstanding, nothing the PMC or PLS has done will have much effect on irresponsible publishers unless they decide to deposit their articles in PMC and agree to the PLS 'rules' - this is a most unlikely, and even suicidal, event.

Advocates of PMC and the PLS, argue that scientific articles should be 'free.' They seem to be asserting that publishers should receive recompense not for the article per se, because these are provided free by scientists, but for added value, as though all the work publishers perform gathering, organizing, editing, marketing and distributing articles are not aspects of value.

Such advocates, like the 'irresponsible' for-profit publishers, also believe that it is the most recent scientific articles that are especially valuable. They also consider, as do responsible and irresponsible STM publishers, that article manuscripts should be provided without charge to the publisher. Unlike some publishers, both PMC and PLS seek to limit the time that any publisher would have exclusive rights to distribute articles they publish. But PMC and PLS err in that they consider indiscriminately all groups of STM publishers as players in a commodities game, and do not appear to be concerned about the serious impact their actions may have on the not-for-profit societies and thus on universities.

'Free' may cost scholarly publishing dearly

If PMC and PLS were to succeed in their aims, they could weaken the competitive position of scholarly societies vis-à-vis irresponsible publishers. One of PMC's rules is that publishers who agree to join must make their articles available free once these are more than 12 months old - it prefers that articles are made free on publication, or within six months.

As Ann Okerson points out in her contribution to this forum, this demand - as well as the PLS's proposed boycott - risks putting pressure on the resources of scholarly societies. This would weaken the scholarly societies financially and reduce the competitive position of these cost-recovery publishers as desirable outlets for scientific authors. Those who would stand to gain would be the large commercial publishers who compete with them for authors and readers, and who have deeper pockets. As the publications of scholarly societies declined, the dependency of universities on publications of those for-profit publishers that are 'irresponsible' would increase.

A recent change in PMC's rules, announced in this forum, drops a previous requirement that participating publishers physically deposit their articles on a PMC central server. This may ease some of the concerns of responsible publishers, as it means they would keep their content on their own websites, and simply allow PMC to index their content.

As testified to by several of the contributions to this forum, the future directions of electronic publishing can only be guessed at, and we would be wise to keep open a diverse range of options. PMC, for example, seems devoted to its own standards of coding for electronic articles. At first sight that might be considered as a sensible first step toward creating a universal digital archive. However, it is unclear whether PMC and the National Library of Medicine (NLM) have addressed the many alternative proposed systems for preserving electronic literature - such as standards and systems for migration, emulation, encapsulation and various forms of conversion for physical storage. (For brief definitions of these terms see the website on the preservation of digital assets published by the National Library of Australia). Remarkably, PMC and NLM have not been prominent in the vigorous national and international debates over issues involved in the preservation of digital data.

Not far below the surface of the PLS argument, lurks the consequent demise of the entire scheme of scholarly communication as we know it today. Some of the public reactions of the PLS to the arguments made by responsible publishers indicate that many signatories to the PLS open letter are unaware of this implication.

Members of scholarly societies might ask themselves whether the PLS is a reaction to conservatism by their societies in managing and funding their programmes, including their publishing programmes, or some other social phenomenon. Scholarly societies themselves must be quicker and more responsive in serving the scholarly communication needs of newly developing sub-communities of scholars, if they are not to leave these opportunities open to predation by others with different motives.

Ironically, the combination of changes pursued by the PMC and the PLS could reduce the competitiveness of responsible publishers, and reduce their utility to universities and the scientific community. We need to recognize the effectiveness, efficiency and equitable balance in the value exchange between scholarly societies and universities, particularly in STM journal publishing. Moreover, a key objective should be to seek ways to improve the competitive position of scholarly societies and other responsible publishers - both in terms of economics, and Internet functionality - against that of irresponsible publishers. In this way, the beneficial effects of checks and balances in scientific scholarship can be reasserted, and the negative effect of the serials crisis redressed.

Box

Checks and balances: a brief summary of the essentials of the scholarly publishing system

The complex system of checks and balances for funding and evaluating contributions in scholarly publishing involves the following:
1. a scholar devises a hypothesis.
2. a scholar approaches a funding agency to get resources to test the hypothesis.
3. the funding agency asks its own staff and external specialists to review the hypothesis, the credibility of the scholar proposing the test, and the importance of the hypothesis from their own perspective of their slice of the scientific galaxy; this is a check in the system
4. if funding is forthcoming, the scholar performs the experiments to test the hypotheses, and prepares reports of results.
5. in the scheme of checks and balances, as I see it, in some disciplines, early versions of the reports, or preprints, are distributed to colleagues for comment and advice, as well as to speed up the process of communicating results.
6. reports of results of the tests are sent to peer-reviewed journals who expose these to scrutiny by qualified referees, who decide whether the scholarship and the tests are sufficient, and whether the article is likely to be of interest to readers of the journal; this is another check and is balanced vis-à-vis earlier and later checks, by being independent of these.
7. if accepted, the published reports become available to readers, who may make use of the results and experimental methods reported, or may replicate the same tests themselves; often there will be published commentary in later issues of the peer-reviewed publication, on the specific report, on the tests more generally, or on the wider topic.
8. libraries and individuals purchase subscriptions to the published reports that the consider most appropriate to their needs, whether as individuals or as agents working for communities; the libraries' versions are made very widely available, in print and if chosen, on-line; the choice to acquire the published reports is another check in the scheme, a sort of tertiary validation.
9. the scholar, having successfully obtained the research grant, and published peer-reviewed reports of the work supported by the grant, gains further academic credibility, and is in a better position to obtain funding for further research.
…the cycle continues *ad libitum* …

After 5 to 7 years of research and publication, the university-based scholar usually is in a position to undergo tenure review. Local and outside experts base their evaluation of candidates, largely on the ability of the latter to obtain funding, and on their contributions to the wellsprings of knowledge, measured in particular by the quality of the peer-reviewed and published reports of their scholarship. This is a fourth, higher-order, independent check in the system.