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Is free inevitable in scholarly communication?

The economics of open access

In this article I would like to make the case that a change in the delivery of scientific content and in the business models for delivering scholarly communication was inevitable from the moment journals moved online, even if much of this change is yet to come. By applying a thesis put forth by Chris Anderson in his 2009 book *Free,*[1] I will argue that given that scholarly journals are now digital products, they are subject to very different economic principles and social forces than their print ancestors.

"Zero is inevitable"

Anderson's thesis on competition and pricing in the digital market begins with Bertrand economics, which states that in a competitive market, the price of a product will move toward the marginal cost of producing an additional good. This principle has largely held true for material products where consumers can substitute goods. As Anderson points out, something quite strange happens when we try to apply this principle in the digital marketplace. Because the costs associated with bandwidth, storage, and processing are being reduced by approximately 50% every year, digital products get cheaper every year, and indeed have become so cheap that the marginal cost is so small as to render it near to impossible to measure. Today one bit has a near zero price tag. It is for this reason the default price of a digital product is zero: zero is inevitable. Even in areas where there is no competition, digital products will move towards a zero price tag because the cost of entry in this marketplace is low, and as such any great idea will meet with competitors shortly after its debut.

Scholarly journal articles are no different from any other digital product with respect to distribution costs. As such, one can argue that our product is also subject to the "zero is inevitable" rule of pricing. This is not to say that there are not costs involved in producing the article online that users see, download, quote, print out, semantically mine, etc. In addition to staffing and other overhead costs, there are also a number of fixed article and page-related costs (e.g., copyediting, language editing, typesetting, etc.) that must be covered in some way. The point is that these are largely fixed costs that are the same regardless of whether one user finds and downloads a given article or if 5 billion users find and download it. The marginal cost of adding one additional user is for all practical purposes, zero. In this context, charging for access as such involves charging for that which does not cost.

Enter new business models

The paradox facing scholarly communication today is this: the marginal cost of adding one additional (or 1 million additional) user(s) is

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more or less zero; at the same time, resources are consumed in the process of producing what users find online. Whether for profit, non-profit, large or small, publishers must have the resources to produce the first copy of an article and all that goes with it (not to mention further research and development). The challenge of the digital marketplace, as Anderson points out through a large number of examples, is to identify new and creative ways to build businesses and revenues around giving products away. In the case of scholarly publishing, giving away products amounts to open access, and the question is how to "give away" articles yet stay in business.

Inventing and redefining business models in order to give products away involves rethinking what one is actually producing and offering to the marketplace. Software might be given away, for example, while the company producing it makes money by offering services to customize and maintain systems that use that software (think Linux). Simon Fraser University's (SFU) development of Open Journals System (OJS)[2] is one example of this. SFU developed OJS as an open source software, available to anyone to use and download without charge. A majority of users will choose to use the software as is, or customize it using their own skills due to budgetary constraints. At the same time, SFU offers hosting, support, and programming expertise for those in need or willing to pay. It is not necessary for every user to purchase services, only a large enough percentage to recover costs. My own company, Co-Action Publishing, uses SFU's services extensively. By offering a product that can substitute for commercial services to electronically manage peer review and production processes, SFU has simultaneously given something away yet created a need for their unique expertise to make it work even better for individual users. These services no doubt make a nice financial contribution to SFU's annual operations and allow for the continued existence of the free product.

The introduction of article processing charges (APCs), as first implemented by BioMed Central (BMC) and Public Library of Science (PLoS), is one means of introducing an alternative business model to support scholarly communication. Here we see an example of rethinking what publishers offer the market. At Co-Action Publishing, we apply APCs for some of our journals (we call them publication fees). Like our colleagues at BMC, PLoS, Hindawi, Copernicus, and others, we regard our work as a service to authors. This is where competition is—in providing customers (authors) with a preferred service at the right price. Although most authors we serve pay for these charges out of a research grant or from a central fund, they will be making a choice on how to spend the funding available to them.

Because there are no additional costs for additional users, we have moved the payment mechanism away from that element in the publishing process that is near zero in cost (digital distribution of articles), and instead applied it to a stage of publishing where we are in fact consuming resources (for preparation of manuscripts for publication and other work). Thus, the article as such is demonetized. Under these conditions, it is then in our interest as an open access publisher to reach the biggest possible market. Anderson summarizes Google CEO Eric Schmidt's coinage of the term "max strategy" saying, "Take whatever it is you are doing and do it at the max in terms of distribution. The other way of saying this is that since marginal cost of distribution is free, you might as well put things everywhere."[3] Not only is wide distribution a service to our authors, as the number of people who are reading our content grows, it becomes increasingly likely that enough of them will also submit an article to a journal that is accepted by an editor, and for which we can charge a fee and recover our costs.

Repositories in the digital marketplace

One of the most contested topics in scholarly communication today is that of authors' self-archiving in institutional repositories.

Rigorous dialogues are taking place over which versions can be deposited, after what embargo periods, and at what cost. For subscription publishers, repositories represent a cannibalistic threat to their publications and therewith revenue streams. Moreover, many argue that the final accepted version of an article embeds work carried out by the publisher and as such cannot be used without financial compensation.

For open access, publishers self-archiving is largely unproblematic. In fact, repositories help support a max strategy. Open access publishers are quite happy for the version of record to be deposited since the work involved in creating the initial digital file has already been compensated for. DOIs for citation purposes ensure that regardless of where the version is found the citations to that article are captured. From this perspective, repositories can provide an additional marketing channel to attract readers and potential authors who will pay for the publisher's services.

Returning to subscription publishers, we could ask, on the basis of Anderson's thesis, whether repositories are as great a risk to publishers' businesses as subscription publishers believe them to be. A forthcoming report from the PEER project might provide some answers to this question.[4] A scenario less threatening to fee-based publishers could involve the typical model of freemium or versioning; whereby users can choose to take advantage of a free basic version of something, or pay a fee to experience the product with more premium services and advantages.

For example, anyone can use Skype to call other Skype users for free, but I have chosen to pay for a Skype-generated telephone number and purchase Skype credit that allows me to ring landlines and mobile telephones. Free versions often act as marketing devices for the version that costs. Repositories might represent a basic version of a service to an author (the possibility of depositing a flat word doc or PDF), while the article on the publisher's platform is a premium version with added features such as semantic searching, the publisher's work to distribute the article, etc. that add value to the author's work, and which he or she may be inclined to pay for.

Seriously?

The above argument might work for new or lesser known journals, but what is the likelihood of a journal like the *Lancet* or *Nature* moving to open access? Librarians, after all, still feel the pressure to subscribe to these and similar top tier journals regardless of their price tags, and authors are still publishing there to maximize their "impact." At its core the scholarly economy is a reputation economy in which prestige ranks before all else. Even those scholars who proclaim to despise impact factors and the like are subjected to a system of tenure and rewards that is built upon prestige as measured using such bibliometric devices.[5]

Top tier journals have a marginal utility due to their high impact factors and the reputations they have built up over many decades. As long as the marginal gains of publishing in these journals are so much greater than for journals with similar scope, and as long as other competing top tier journals are not open access, they will continue to be able to charge a price for access and will attract researchers' best work—even in the online environment.

This is why the development of prestigious open access journals is important for the future of open access publishing. As an initial strategy, PLoS developed a few flagship journals that were designed to challenge the prestige of top tier journals in medicine and biology.

Today *PLoS Medicine* and *PLoS Biology* are top-ranked in their fields. Because PLoS also wishes to challenge the current system of rewards, the impact factors of these journals are not published on the Web sites nor noted in marketing materials. Nonetheless publishing authors learn of them and can take advantage of them by submitting their work. Other top-ranking open access journals also exist,

including *BMJ* and more specific titles such as BMC's *Malaria,* which has been ranked number one by science citation reports in tropical diseases, and the *Journal of Medical Internet Research (JMIR),* a scientist-published journal that managed to knock its Elsevier-published competitor from the top spot in its category of citation rankings.

The recently announced general medicine open access journal to be published on behalf of the Wellcome Trust, Howard Hughes Foundation, and Max Planck Institute represents yet another challenge to top tier journals that are holding onto their subscription plans. The funders' announcement states that the journal will look to "attract the most outstanding science for publication…", suggesting that it will look to compete with traditional journals in traditional medicine.

Because this journal will carry the names of prestigious funders, it stands a good chance of quickly gaining impact. Such new journals are possible because the costs of entering the digital marketplace are much less than the costs of the physical marketplace were. With greater competition, top tier journals may increasingly feel the gravitational pull of free.

For journals along all tiers, time will tell whether free is inevitable in scholarly communication. As Anderson emphasizes, free does not mean there are no resources consumed in producing that which is found online. As publishers move forward in the digital environment, I expect that we will see new services and tools developed by publishers and others in order to meet the challenges of offering free content while remaining in business.

Notes

1. Chris Anderson, *Free. How today's smartest businesses profit by giving something for nothing* (Hyperion: New York, 2009).

2. See http://pkp.sfu.ca/?q=ojs.

3. Anderson, 123.

4. PEER (www.peerproject.eu) stands for Publishing and the Ecology of European Research, and is a project cofunded by the European Union. The aim of the project is to "investigate the effects of the large-scale, systematic depositing of authors' final peer-reviewed manuscripts on reader access, author visibility, and journal viability, as well as on the broader ecology of European research.

5. An interesting point that I learned from Anderson's book is that the Google page rank concept was inspired by the impact factor ranking in academia.

6. "Leading research organisations announce top-tier, open access journal for biomedical and life sciences," www.wellcome.ac.uk/News/Media-office/Press-releases/2011/WTVM051897.htm.

("BiblioBouts" continued from page 635)

2. Alison J. Head, "How Do Students Conduct Academic Research?" *First Monday* 12, 8 (2007), firstmonday.org/issues/issue12_8/head/index.html.

3. Jeffrey Knapp, "Google and Wikipedia: Friends or foes?" *Teaching generation M.,* edited by Vibiana Bowman Cvetkovic and Robert J. Lackie (New York: Neal-Schuman, 2009), 157–178.

4. Head Allison J. and Michael B. Eisenberg, "How Today's College Students Use Wikipedia for Course-related Research," *First Monday* 15, no. 3 (2010), firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2830/2476 (accessed April 18, 2011).

5. "BiblioBouts: Instructor FAQ," bibliobouts.si.umich.edu/instructorFAQ.html (accessed April 18, 2011).

6. To play the BiblioBouts demonstration game, use the Firefox browser, navigate to http://bibliobouts.org and into Email: enter demo@bibliobouts.org (minus the quotes and into Password: enter demo (minus the quotes). Contact us anytime at info@bibliobouts.org.