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The Immediate Practical Implication of the Houghton Report:

Provide Green Open Access Now

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Among the many important implications of Houghton et al's (2009) timely and illuminating JISC analysis of the costs and benefits of providing free online access ("Open Access," OA) to peer-reviewed scholarly and scientific journal articles one stands out as particularly compelling: *It would yield a forty-fold benefit/cost ratio if the world's peer-reviewed research were all self-archived by its authors so as to make it OA.*

There are two ways to make research OA:

- (i) Authors can make their own peer-reviewed journal *articles* free for all online by depositing their final revised drafts in their own institution's OA repository or in a central OA repository immediately upon acceptance for publication. (This is also called "Green OA.") All the costs of publication continue to be paid through institutional journal subscription fees.
- (ii) Journals can convert to the OA publication model: The journal itself makes its published articles free for all online and all publication costs are paid by the author (or the author's institution or funder) through individual publication fees, per article published, instead of through multiple institutional subscription fees, per journal subscribed to. (This is called "Gold OA.")

There are many assumptions and estimates underlying Houghton et al's modelling and analyses, but they are for the most part very reasonable and even conservative.

This makes their strongest practical implication particularly striking: The 40-fold benefit/cost ratio of providing Green OA is an order of magnitude greater than all the other potential combinations of alternatives to the status quo analyzed and compared by Houghton et al.

This outcome is all the more significant in light of the fact that self-archiving already rests entirely in the hands of the research community (researchers, their institutions and their funders), whereas OA publishing depends on the publishing community. Perhaps most remarkable is the fact that this outcome emerged from studies that approached the problem primarily from the standpoint of the economics of *publication* rather than the economics of *research*.

It would be churlish to cavil at the minor details of such a historically important and welcome report. The following points are raised only in order to reinforce the understanding of what the report means, and not to imply that there is any reason at all to doubt its substantial implications – the first and foremost of which is that Green OA self-archiving should be implemented as expeditiously as possible by the world research community.

1. Green/Gold Order and Interaction Effects. The “deconstructed” or “overlay” journal “model” (Smith 1999) is a bit of a misnomer for what might be better understood as certain classical publishing functions that are likely to be made redundant, hence obsolete, by Green OA itself:

Peer-reviewed journal publishing consists of three principal components and their associated costs: (1a) producing, distributing and archiving the print edition, (1b) producing, distributing, hosting and archiving the online edition, and (1c) providing peer review (including some substantive editing and copy-editing).

If universal Green OA self-archiving (with its benefit/cost ratio of 40) turns out to co-exist peacefully with subscription publishing in the long term -- as a supplement to ensure access for all users whose institutions cannot afford subscription -- then that's all there is to it (Berners-Lee et al 2005).

If not, then certain further developments are likely to follow (Harnad 2001). Note, however, that the premise here will be that universal Green OA comes first, provided by the research community, which applies Houghton et al's finding that it can begin generating a forty-fold benefit by providing immediate Green OA:

If, in addition to the research community providing universal Green OA, publishers voluntarily elect to convert to Gold OA publishing (thereby adding the further benefits of Gold OA publishing to the benefits of Green OA) – or if publishers are induced to convert to Gold OA because Green OA causes cancellation pressure that makes subscriptions unsustainable – then there is the further question of what products and services Gold OA publishing will continue to provide, alongside the universal Green OA provided by researchers (and their institutions and funders).

It is hard to imagine that the market will support individual author-side Gold OA publication fees *per article* high enough to continue paying for the print-edition costs of all the (formerly) subscribing universities. It is far more likely that Gold OA publishing will jettison print publication (1a) altogether (and individual users will decide for themselves whether they want to print off a hard copy locally).

By much the same reasoning, it is unlikely that the individual author-side Gold OA publication fees will stretch to cover any unnecessary costs of producing an online edition. With all the peer-reviewed final drafts of all articles already free for all online in the form of Green OA, it makes more sense to make the host Green OA repository itself the “locus classicus” for the canonical (online-only) “version of record.” Offloading this further burden (of producing, hosting and archiving an online edition) (1b) from Gold OA publishers to Green OA repositories leaves journals with only one essential service to perform: *peer review* (including any requisite substantive editing and copy-editing) (1c) (Harnad 1996, 1998).

That means that Gold OA journal publishing, alongside universal Green OA self-archiving, is likely to consist solely of peer-review, its outcome certified by the journal’s name and track-record, exactly as now. The publisher-provided print and online editions, and their associated costs, will simply have been rendered unnecessary and redundant by Green OA itself (Harnad 2009).

Hence (contrary to what some publishers such as Ware & Mabe 2009 have suggested) Houghton et al are not *underestimating* but *overestimating* the asymptotic costs of Gold OA publishing, because they are not fully factoring in the Green/Gold interaction effect: the offloading, downsizing and cost-cutting made possible by Green OA. This is one of the reasons Houghton et al’s estimates are in fact conservative rather than radical. It is also one of the reasons why universal Green OA needs to precede Gold OA: To ensure that asymptotic Gold OA costs are minimized rather than left inflated by those current costs of products and services that Green OA itself will provide or render unnecessary. (The main reason Green OA needs to come first is of course that it is entirely within the hands of the research community, hence need not wait for publishers; Harnad 2007.)

None of this is captured or elucidated by the vague notion (not Houghton et al’s) of “deconstructed” or “overlay” journals. It does, however, reinforce Houghton & Oppenheim’s (2010) conclusion:

"These benefit/cost comparisons suggest that the additional returns to R&D resulting from enhanced accessibility and efficiency alone would be sufficient to cover the costs of parallel open access self-archiving without subscription cancellations (i.e. ‘Green OA’). When estimated savings are added to generate net costs there is a substantial increase in the benefit/cost ratios, and for both open access publishing and self-archiving alternatives (i.e. ‘Gold OA’ and ‘Green OA’) the benefits exceed the costs, *even in a transitional period* [emphasis added]. Indicative modelling of post-transition ‘steady-state’ alternative systems suggests that, once established, alternative open access

publishing and/or self-archiving systems would produce substantially greater net benefits."

2. "Permissions Costs": Houghton et al make estimates of what they call "permission" costs: the costs to the author, user, and user-institution of having to determine rights and to seek and sometimes pay for permission to access and use journal articles; and the cost to the publisher of having to monitor and manage permissions. Universal Green OA would moot most of these permission costs, because all articles would be online free for all. No permission needed for any individual user to access, read, link, download, store, print off or data-crunch the paper, any time, anywhere.

Some (not Houghton et al) have suggested that there are still further permission barriers that OA needs to eliminate. This has even led to the definition of two forms of OA: "Gratis OA" (free of online access barriers) and "Libre OA" (free of online access barriers as well as free of permission barriers). Apart from the right to republish (which is hardly necessary when a paper is already free for all online!) and the right to harvest, data-mine and republish or sell the results (which will undoubtedly follow naturally after universal Green OA), it is not clear that permissions are a problem once there is universal Green OA. Permission to re-use is, in contrast, a very real problem for *research data* and for *software*, but that is not an OA problem – though, again, universal Green OA will no doubt help pave the way toward a solution.

3. National OA and Central OA Repositories. Houghton et al make separate global and local (e.g. national) estimates of the economic benefits of OA. Although the local estimates are no doubt informative, there is a very real sense in which OA effects really only make sense globally: One can calculate how much a country would benefit from OA, but not without the assumption that all other countries provide OA, since few journals have articles only from one country. Hence a country can reckon its benefits from OA unilaterally, but OA itself cannot be provided unilaterally.

By a similar token, most of the use and benefits of OA are based on global search and access. Rarely will a user wish to search and access the scientific findings of only one country or only one institution. This means that whereas central harvesting for OA content is crucial for searching – and for this function, central repositories should be global ones, much the way google is – there are many reasons why self-archiving itself should be done locally, in the author's own institutional repository, with central repositories then harvesting across institutional repositories.

Not only does central harvesting of institutional repository content allow the (minimal) costs of repositories, self-archiving and storage to be distributed across institutions and their own existing infrastructure, but it also engages institutions (i.e., universities and research institutes) -- the universal providers of all of OA's target content (peer-reviewed journal articles; Harnad 2008) -- in hosting and managing their own research output and (most important of all) mandating deposit, i.e.,

mandating the Green OA that Houghton et al have demonstrated to generate a 40-fold benefit/cost ratio.

4. Benefits to Research & Development. Houghton et al use the Solow-Swan model to estimate OA's economic benefits to research and development (R&D). This estimate is again conservative, and all the more compelling for being so. What needs to be stressed, however, is that the primary motivation for providing open access to research is *OA's benefits to research*, in terms of enhanced accessibility, uptake, usage, applications, impact, productivity and progress, and their resultant benefits to the researchers, their institutions and funders – who provide the research – and to the tax-paying public that funds the funders and for whose benefit the research is being conducted (Harnad et al 2008; Hitchcock 2010).

In other words, the economic significance of OA is first and foremost in its implications for research, rather than for publishing (otherwise it is the tail wagging the dog!). After all, the alternative that turns out to have by far the highest benefit/cost ratio does not necessarily entail any change in publishing model: The current subscription model, supplemented by author self-archiving (Green OA). If, as is likely, universal Green OA eventually induces a transition to the Gold OA publishing model, Houghton et al show that there are still further economic benefits to be expected. But the most fundamental implication of the findings is clearly that the immediate benefits of Green OA are substantial, and that its costs minimal. The clear take-home message for the worldwide research community (i.e., researchers, their institutions and their funders) is accordingly that there is nothing to be lost and everything to be gained from providing Green OA forthwith.

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