

## Publish or Perish — Self-Archive to Flourish: The Green Route to Open Access

by Stevan Harnad

**Europe is losing almost 50% of the potential return on its research investment until research funders and institutions mandate that all research findings must be made freely accessible to all would-be users, worldwide.**

It is not the number of articles published that reflects the return on Europe's research investment: A piece of research, if it is worth funding and doing at all, must not only be published, but used, applied and built-upon by other researchers, worldwide. This is called 'research impact' and a measure of it is the number of times an article is cited by other articles ('citation impact').

In order to be used and built upon, an article must first be accessed. A published article is accessible only to those researchers who happen to be at institutions that can afford to subscribe to the particular journal in which it was published. There are 24,000 research journals in all today, across all research fields, worldwide, but most institutions can only afford a small fraction of them. In paper days, authors used to supplement this paid access to their articles by mailing free reprints to any would-be users who wrote to request them. The online age has now made it possible for authors to provide limitless free 'eprints' by 'self-archiving' electronic versions of their own final drafts on their own institutional websites for all potential users worldwide who cannot afford the journal version.

The online-age practice of self-archiving has been shown to increase citation impact by a dramatic 50-250%, but so far only 15% of researchers are actually doing it. Yet two recent UK international surveys have found that 95% of authors would self-archive – but only if their research funders or their institutions require them to do so (just as they already require them to 'publish or perish'). The solution is accordingly obvious:

After lengthy deliberations first initiated in 2003 by the UK Parliamentary Select Committee on Science and Technology, Research Councils UK (RCUK) have

proposed to adopt a policy requiring UK researchers to deposit, on their university's website, the final author's draft of any journal article resulting from RCUK-funded research. The purpose of the proposed policy would be to maximise the usage and impact of UK research findings by making them freely accessible on the web ("open access") for any potential users in the UK and worldwide who cannot afford paid access to the published journal version. How would a similar policy maximise the return on Europe's public investment in research?

It is not possible to calculate all the ways in which research generates revenue. A good deal of it is a question of probability and depends on time: Although everyone thinks of an immediate cure for cancer or a cheap, clean source of energy as the kind of result we hope for, most research progresses gradually and indirectly, and the best estimate of the size and direction of its progress is its citation impact, for that reflects the degree of uptake of the research results by other researchers, in their own subsequent research. Citation impact is accordingly rewarded by universities (through salary increases and promotion) as well as by research-funders (through grant funding and renewal); it is also rewarded by libraries (through journal selection and renewal, based on the journal's average citation "impact factor"). Counting citations is a natural extension of the cruder measure of research impact: counting publications themselves ("publish or perish").

If citations are being counted, it is natural to ask how much they are worth.

For the United States in 1986, Diamond estimated the marginal dollar value of one citation as ranging from \$50-\$1300 (US), depending on field and number of citations. (An increase from 0 to 1 cita-

tion is worth more than an increase from 30 to 31; most articles are in the citation range 0-5.) Taking only the most conservative low-end of this range (\$50), updating by about 170% for inflation from 1986-2005 and converting to Euros, this would yield 73 Euro as the marginal value of a citation to its author today. Self-archiving, as noted, increases citations by 50%+, but, as also noted, only 15% of the articles being published are being self-archived today. Readers can calculate for their own respective countries a conservative estimate (50% citation increase from self-archiving at 73 Euro per citation for 85% of their own country's current annual journal article output) of the total annual loss of revenue to their country's researchers for not having done (or delegated) the few extra keystrokes per article it would have taken to self-archive their final drafts.

But this impact loss translates into a far bigger one for their country's tax-paying public, if we reckon it as the loss of potential returns on their annual research investment: If a country invests R billion Euros in its research, this translates into the loss of  $50\% \times 85\% = 42.5\%$  or close to R/2 billion Euros' worth of potential citation impact simply for failing to self-archive it all. It is as if someone bought R billion Euros worth of batteries and lost 42.5% of their potential usage simply for failing to refrigerate them all before use. And that is without even considering the wider loss in revenue from the loss of potential practical usage and applications of each nation's research findings in Europe and worldwide, nor the still more general loss to the progress of human inquiry.

The solution is obvious, and it is the one the RCUK is proposing: to extend research's existing universal 'publish or perish' requirement to 'publish and also self-archive your final draft on your in-

stitutional website'. Over 90% of journals are already 'green' on author self-archiving; two international author surveys report that over 90% of authors will comply; and the actual experience of the five institutions that have so far already adopted such a requirement (CERN, University of Southampton ECS, Queensland University of Technology, University of Minho, University of Zurich) tends to bear this out.

The time for Europe to close its own 50%-250% research impact gap is already well overdue. All of Europe should immediately follow the UK model, adopting the web-age extension of "publish or perish" policy to: "publish and self-archive on the web." This tiny and very natural evolutionary step will not only be of enormous benefit to Europe's researchers, its institutions, its funders, and its funders' funders (ie, the tax-payers), but it will also be to the collective advantage of global research progress and productivity itself, and the object of emulation worldwide.

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**Links:**

- Ulrich's periodical directory: <http://www.ulrichsweb.com/>
- Statistics provided by the Association of Research Libraries: <http://fisher.lib.virginia.edu/arl/>
- Self-Archiving FAQ: <http://www.eprints.org/openaccess/self-faq/>
- Institutional Archives Registry: <http://archives.eprints.org/eprints.php?action=browse>
- Comparing the Impact of Open Access vs. Non-OA Articles in the Same Journals, D-Lib Magazine, June 2004: <http://eprints.ecs.soton.ac.uk/10207/01/06harnad.html>
- Swan, A. (2005) Open access self-archiving: An Introduction. Technical Report, JISC, HEFCE: <http://eprints.ecs.soton.ac.uk/11006/>
- Recommendations for UK Open Access Provision Policy: <http://www.ecs.soton.ac.uk/%7Eharnad/Temp/UKSTC.htm>
- UK Research Councils' Position on Access to Research Outputs: <http://www.rcuk.ac.uk/press/20050628openaccess.asp>
- Effect of open access on citation impact: a bibliography of studies: <http://opcit.eprints.org/oacitation-biblio.html>
- Carr, L. and Harnad, S. (2005) Keystroke Economy: A Study of the Time and Effort Involved in Self-Archiving: <http://eprints.ecs.soton.ac.uk/10688/>
- Journal Policies - Summary Statistics So Far: <http://romeo.eprints.org/stats.php>

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