

Worldwide open access: UK leadership?

The web is destined to become humankind's cognitive commons, where digital knowledge is jointly created and freely shared. The UK has been a leader in the global movement toward open access (OA) to research but recently its leadership has been derailed by the joint influence of the publishing industry lobby from without and well-intentioned but premature and unhelpful over-reaching from within the OA movement itself. The result has been the extremely counterproductive 'Finch Report' followed by a new draft of the Research Councils UK (RCUK) OA mandate, downgrading the role of cost-free OA self-archiving of research publications ('green OA') in favor of paying subscription publishers over and above subscriptions, out of scarce research funds, in exchange for making single articles OA ('hybrid gold OA'). The motivation of the new policy is to reform publication and to gain certain re-use rights (CC-BY), but the likely effect would be researcher resistance, very little OA and a waste of research funds. There is still time to fix the RCUK mandate and restore the UK's leadership by taking a few very specific steps to clarify and strengthen the green component by adding a mechanism for monitoring and verifying compliance, with consequences for non-compliance, along lines also being adopted in the EC and the US.

Since the beginning of the open access (OA) movement a decade ago, the UK has been its leader¹ even though it only produces about 6–8% of the world's research output². The UK has now resolved to make all of its research output OA within two years³, but it can only do this – and it can only maintain its leadership role in worldwide OA – if it clarifies and strengthens its new Research Councils UK (RCUK) OA mandate⁴.

To explain OA, the UK's leadership and the RCUK's policy flaw, we have to define ten terms. They are all simple to understand, and once defined, can be quickly put together to explain the problem with the RCUK policy, as well as the solution:

- **open access** (OA) refers very specifically to online access, immediately upon publication, to peer-reviewed research journal articles (not other kinds of content, such as books or research data)
- **gratis OA** means free online access, worldwide
- **libre OA** means free online access, worldwide, plus various re-use rights (such as data mining, remix and republication rights)
- **open data** (not the same as OA!) means free online access to research data (not journal articles) plus various re-use rights (such as data mining, remix and republication rights)
- an **open license** can specify the re-use rights (e.g., via various Creative Commons licenses)
- **gold OA** means OA (whether gratis or libre) provided by the publisher
- **green OA** means OA (whether gratis or libre) provided by the author, by self-archiving the final, refereed draft in an institutional repository
- an **institutional repository** is an online website hosted by a research institution (usually a university) in which authors can deposit their published articles as well as make them OA⁵
- an **OA mandate** is a requirement, by a researcher's institution or funding council (or both) to make published articles OA⁶



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- an **OA embargo** means an interval of various lengths (from 6–12 months, to many years) during which the publisher's copyright transfer agreement may forbid authors to make their articles OA.

Now it is easy to explain the problem as well as the solution.

The reason that research is publicly funded, conducted and published is so that the findings can be accessed, used, applied and built upon, advancing research productivity for the benefit of the public that funded it.

This is very different from other kinds of content, published for royalty income rather than for research progress. Researchers' careers and funding depend on the uptake and impact of their findings. Study after study has found that OA significantly increases research uptake and impact^{7,8}.

Yet, despite OA's benefits, most researchers (80%) in most fields do not make their articles OA unless either their institutions or their funders (or both) mandate (i.e., require) this^{9,10,11}. The reason researchers do not provide OA unless mandated to do so, despite the benefits, is complex. However, a big factor is fear of negative consequences from their publishers. OA mandates from their institutions and funders quell these fears. They also overcome inertia.

OA mandates are in many ways extensions of 'publish-or-perish' mandates:

You are employed and funded to conduct and publish research so it can be used and applied. Putting it in a desk-drawer instead of publishing it is a barrier to usage – and, for much the same reason, so is making it accessible only to journal subscribers rather than to all potential users.

The only kind of OA that can be mandated by institutions and funders is green OA (self-archiving in the author's institutional repository). Institutions and funders cannot mandate that journals must convert from subscription publishing (currently about 80% of the world's 28,000 peer-reviewed journals across all disciplines and languages) to gold OA publishing (about 20%^{12,13}). Nor can institutions and funders dictate in which journal researchers should publish on the basis of the journal's business model, rather than the journal's track-record for quality. (However, if any extra funds are available to pay for gold OA, funders and institutions can certainly offer them to researchers who have a suitable gold OA journal in which they wish to publish by choice.)

So the UK's global leadership in OA comes from the fact that the world's first green OA mandates, both institutional mandates¹⁴ and funder mandates¹⁵, were adopted in the UK¹⁶. As a consequence, the UK has the largest proportion of institutional and funder mandates in the world¹⁷ and has provided the first free repository software (EPrints)^{18,19}, the first OA policy model^{20,21,22,23} as well as many of the OA supporting tools and services now being used worldwide²⁴.

The UK's green OA rate (about 30%) is also 10% higher than the global baseline of about 20%^{25,26}. This is nevertheless still far too low, since 60% of subscription journals already endorse immediate green OA and about 30% more endorse green OA after a 6–12 month embargo²⁷. The reason for the shortfall is that the first RCUK mandate had no mechanism for monitoring and verifying compliance, hence no consequences for non-compliance. Such a carrot/stick mechanism clearly needs to be provided.

Now that the UK has decided that it wants 100% of UK research output to become OA within the next two years, this could be accomplished by upgrading the existing²⁸ green OA mandate with the following compliance verification mechanism:

1. All articles must be deposited immediately upon acceptance for publication (and deposited by their authors, not by their publishers!). Publisher embargoes can apply only to the date on which the deposit is made OA, not to the date on which the deposit is made.

"... despite OA's benefits, most researchers (80%) in most fields do not make their articles OA unless either their institutions or their funders (or both) mandate ... this."

"... the first RCUK mandate had no mechanism for monitoring and verifying compliance, hence no consequences for non-compliance."

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2. Deposit must be in the institutional repository, not institution-external. This makes each UK institution responsible for monitoring and verifying timely compliance with the funder mandate while also motivating each institution to adopt a complementary institutional green OA mandate of its own, for the rest of its research output, funded and unfunded, in all disciplines.
 3. Repository deposit needs to be designated as the sole mechanism for submitting publications for research assessment, for competitive funding, for grant fulfillment and for institutional performance assessment. All RCUK grant applications and renewals must include the URL for the OA deposit whenever citing or listing published articles resulting from RCUK-funded research.
 4. Institutional repositories must provide depositors with rich online feedback and statistics on the usage, uptake and citations of their work²⁹.

RCUK can easily upgrade its existing green OA mandate to this simple, cost-effective compliance verification mechanism.

Instead, however, RCUK³⁰ has proposed a new mandate, designed with the aim of inducing journals either to convert to gold OA or to reduce their green OA embargoes (if they wish to keep publishing the UK's 6% of world research output). The proposed mandate forbids RCUK authors to publish in a journal unless it either offers libre gold OA (with a CC-BY license) or green OA (with an embargo of no more than 6–12 months).

In addition, there is a highly ambiguous clause³¹, which seems to state that if the journal offers both the libre gold and 6–12 green, the RCUK author may only choose the (paid) gold option, not the (free) green option:

'...papers must be published in journals which are [RCUK]-compliant... [a] journal [is RCUK]-compliant... if...(1)... [it] offers [gold OA, CC-BY].. Or (2) where [it] does not offer option 1... [it] must allow... [green OA, 6-12]'

This last clause unfortunately has perverse consequences³², which were not noticed by RCUK (Table 1). Far from inducing journals to convert to gold OA or to reduce their green OA embargoes to 6–12 months, it provides *subscription* journals with an irresistible incentive to offer 'hybrid gold OA' as an added option, at an added cost, and to increase their green embargoes beyond RCUK's limit!

"The journal stands to enhance its total income by 6% at UK expense by simply offering a hybrid gold OA option ..."

Why? One need only do the arithmetic: suppose a journal's total subscription income is £X and it publishes N articles per year. The journal stands to enhance its total income by 6% at UK expense by *simply offering a hybrid gold OA option* – i.e., any author has the option of either paying nothing (for subscription publication) or paying for gold OA – at a price of £X/N per article (which works out to about £1,000–£3,000 per article, the usual gold OA publication fee today). And, to make sure RCUK authors must pick the gold option, *the journal need merely raise any green OA embargo to at least 13+*:

Perverse effects of proposed RCUK mandate:
■ encourage (hybrid) gold
■ increase green embargoes
■ increase worldwide publisher revenue 6% (at the expense of UK tax-payers and UK research)
■ pay subscriptions + 6% for OA to UK output
■ handicap worldwide green OA mandates for access to non-UK output (94%)
■ needlessly divert and waste scarce UK research funds to pay publishers more
■ needlessly constrain author journal choice and academic freedom
■ resentment, resistance and non-compliance from UK researchers
■ needlessly lose UK's leadership role in OA and another decade of local and global OA

Table 1. Perverse effects of proposed RCUK mandate.

17 The RCUK requirement to pick paid gold over free green whenever both are offered would already have guaranteed that RCUK authors must pay for gold if it is offered, regardless of embargo length. But RCUK has since conceded that although gold is RCUK's preference, authors may choose either green or gold if both are offered. So a hybrid journal can instead increase its embargo length, to ensure that the only way an RCUK author can publish is by paying for the gold.

What induced RCUK to propose a policy with such perverse consequences? As I noted, Finch/RCUK's hope to force journals to convert to gold if they wanted to retain their UK authors – but the reckoning had been that that would be 'pure' gold. What was not taken into account was the easy and cheap way for a subscription journal to add 6% to its annual income without having to convert at all: simply offer a hybrid gold option, which just amounts to a CC-BY license.

"...it is gratis OA that is the urgent necessity, for all users lacking subscription access ..."

There was also a conflation of the need for open data with the need for OA: for open data, re-use rights (such as data mining, remix and republication) and corresponding open licenses are an urgent necessity – *but data face no embargoes or copyright obstacles from publishers.*

For OA, in contrast, it is gratis OA that is the urgent necessity, for all users lacking subscription access, and publisher embargoes and copyright obstacles need to be taken into account. For most fields, the call for libre OA and an open license is neither urgent nor even necessary. RCUK inadvertently conflated the need for open data with the need for OA to articles, concluding that libre gold OA was as urgent and necessary as open data – and worth paying publishers 6% over and above what the UK and the rest of the world are already paying them in subscriptions.

Nor did RCUK reckon with the prospect of author resistance to restrictions on their choice of journal, or resentment at the diversion of scarce research funds to pay publishers extra for gold OA, or outrage at having to choose the paid-gold option over the cost-free green option even when RCUK does not subsidize the gold OA fee.

But perhaps the most important perverse consequence that RCUK failed to anticipate was the global effect that encouraging publishers to offer hybrid gold OA and to lengthen their green embargoes would have on green OA mandates. The rest of the world, which produces 94% of the world's research output, is unlikely to have either the resources or the inclination to increase by 94% the subscription income it is already paying to publishers – instead of relying on cost-free gratis green OA mandates. And this RCUK-induced global dampening of green OA and green OA mandates by extended embargoes would rebound on the UK, for UK researchers don't just need to make their own 6% of research output OA: they (and UK industry) need access to the rest of the world's 94% of research output too.

All of this can be very easily remedied.

Gargouri et al³³ tested the Finch hypothesis using data from ROARMAP institutional green OA mandates and data from ROAR on institutional repositories. They found that deposit

Mandate strength	
12	immediate deposit + performance evaluation (no waiver option)
9	immediate deposit (no waiver option)
6	six-month delay allowed (no waiver option)
3	12-month delay allowed (no waiver option)
3	rights-retention with waiver option
2	deposit if/when publisher says it's OK
1	no requirement: just request, recommendation or encouragement
0	no policy in ROARMAP

Table 2. Mandate strength.

number and rate is significantly correlated with mandate strength (classified as 1–12: see Table 2): The stronger the mandate, the more the deposits. The strongest mandates generate deposit rates of 70%+ within two years of adoption, compared to the unmandated deposit rate of about 20% (Figure 1). The effect is already detectable at the national level, where the UK, which has the largest proportion of green OA mandates, has a national OA rate of 35%, compared to the global baseline of 25%³⁴ (Figure 2).

The conclusion is that, contrary to the Finch hypothesis, green open access mandates *do*

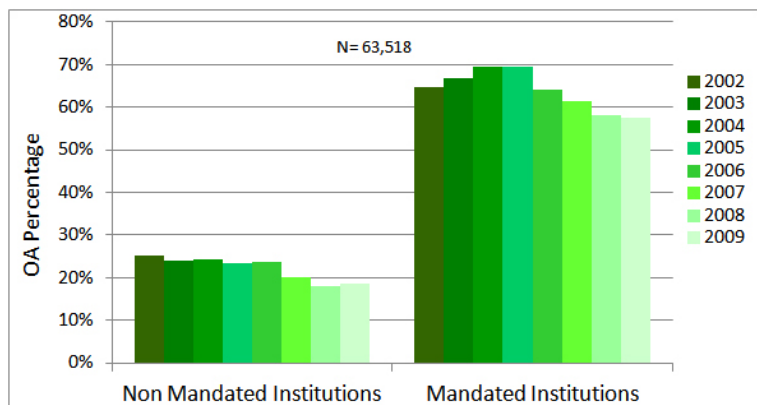


Figure 1. An effective green OA mandate generates 70%+ OA within two years, and continues to climb toward 100% thereafter.

Source: Gargouri, Y, Lariviere, V, Gingras, Y, Brody, T, Carr, L and Harnad, S, Testing the Finch Hypothesis on Green OA Mandate Ineffectiveness, 2012; presented: Open Access Week 2012 (see ref. 26)

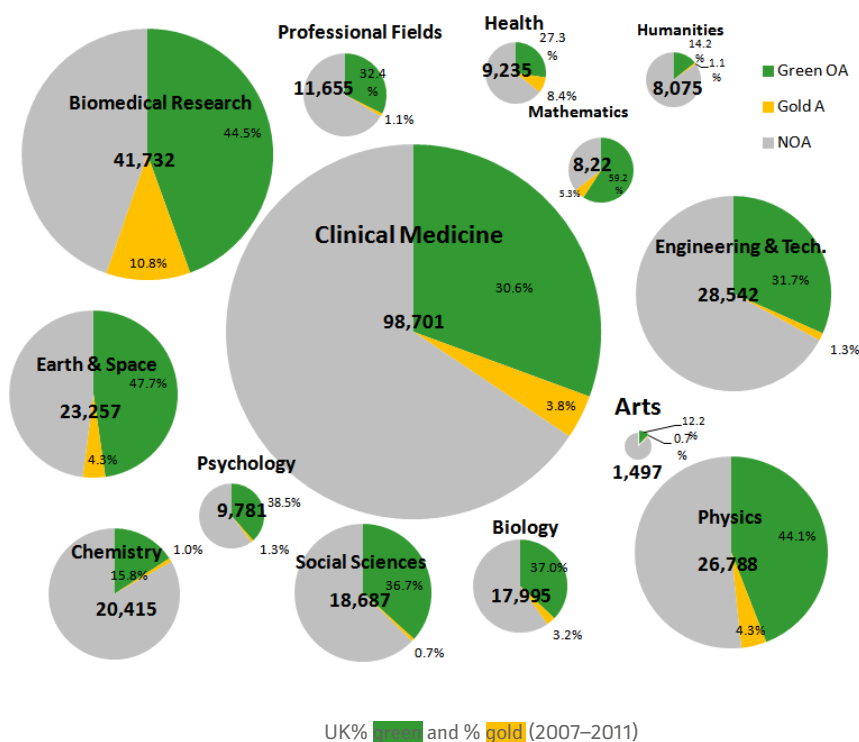


Figure 2. As in the rest of the world, most UK OA is green, not gold. UK green OA can be increased to 100% cost free, by mandating it. Gold OA can only be increased by both mandating it and paying publishers extra for it, over and above subscriptions

Source: Gargouri, Y, Lariviere, V, Gingras, Y, Carr, L and Harnad, S, Green and Gold Open Access percentages and growth, by discipline. In: 17th International Conference on Science and Technology Indicators (STI), Montreal, CA, 05 – 08 Sep 2012, 11pp (see ref. 9)

19 have a major effect, and the stronger the mandate, the stronger the effect (the Liege ID/OA mandate³⁵, linked to research performance evaluation, being the strongest mandate model). RCUK³⁶ (as well as all universities, research institutions and research funders worldwide) would be well advised to adopt the strongest green OA mandates and to integrate institutional and funder mandates as follows:

RCUK has already dropped the apparent requirement to choose gold over green when both are offered, leaving the green/gold choice to authors. It should leave journal choice to them too.

Second, RCUK should implement a compliance verification mechanism with the following eight essential conditions:

- 1) **immediate deposit** (even if *access* to the deposit is allowed to be embargoed: no delayed deposit)³⁷
- 2) of the **final peer-reviewed draft**
- 3) **on the date of acceptance** by the journal (which is marked by a verifiable calendar date);
- 4) the immediate-deposit must be **directly in the author's own institutional repository** (not in an institution-external repository)
- 5) so that immediate-deposit can be **monitored and verified by the author's institution** (regardless of whether the mandate is from a funder or the institution)
- 6) as a **funding compliance condition** and/or an **institutional employment condition**;
- 7) the institutional repository must be designated as the sole mechanism for submitting publications for institutional **performance evaluation, research grant applications** and national **research assessment**;
- 8) repository deposits must be monitored so as to generate **rich and visible metrics of usage and citation**, so as both to verify and reward authors for deposit and to showcase and archive the institution's and funder's research output and impact.

"... green open access mandates *do* have a major effect, and the stronger the mandate, the stronger the effect ..."

Such an integrated, maximized-strength mandate model should be adopted, complementarily and convergently, by all institutions and funders, in Europe and worldwide³⁸. The National Institutes of Health (NIH) in the US have begun strengthening their OA mandate compliance assurance mechanism³⁹. Harvard University's mandate^{40,41,42} could still benefit from some reinforcement. And, of course, Germany needs to realize that it is absurd to believe that it is the sole country in Europe where requiring deposit of publications in an institutional repository would be an unconstitutional violation of academic freedom⁴³.

An instance of mutually reinforcing funder and institutional policies is the FRS-FNRS policy⁴⁴ in Belgium.

In a series of economic analyses comparing the costs and benefits of green and gold OA^{45,46,47}, Houghton, Swan et al concluded:

'At the institutional level, during a transitional period when subscriptions are maintained, the cost of unilaterally adopting green OA is much lower than the cost of gold OA – with green OA self-archiving costing average institutions sampled around one-fifth the amount that gold OA might cost, and as little as one-tenth as much for the most research intensive university. Hence, we conclude that the most affordable and cost-effective means of moving towards OA is through green OA, which can be adopted unilaterally at the funder, institutional, sectoral and national levels at relatively little cost.'

With the simple modification of the RCUK policy described here, the UK can continue to lead the way to global OA.

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