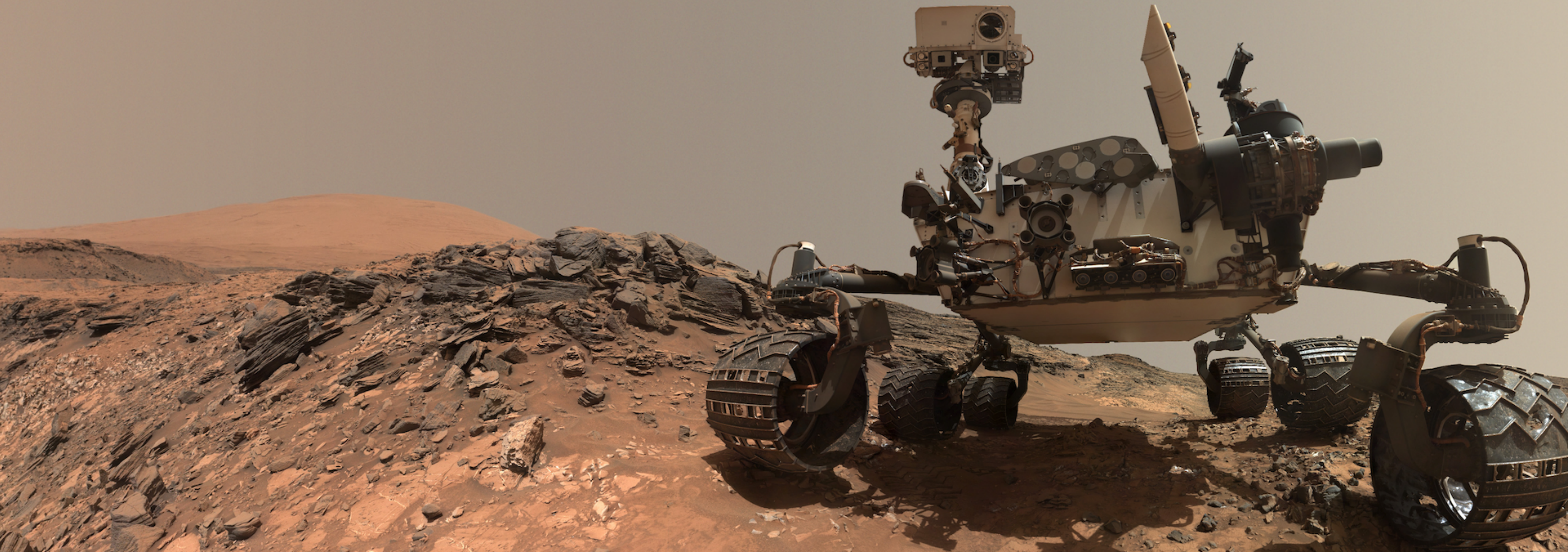


# Open access – an academic perspective

Stephen Curry | Professor of Structural Biology | Imperial College London | Coimbra Workshop | 4 Nov 2016





# The big question

**How do we set Open Access to be the default?**

(Or, how to we get academics to take open access policies seriously?)

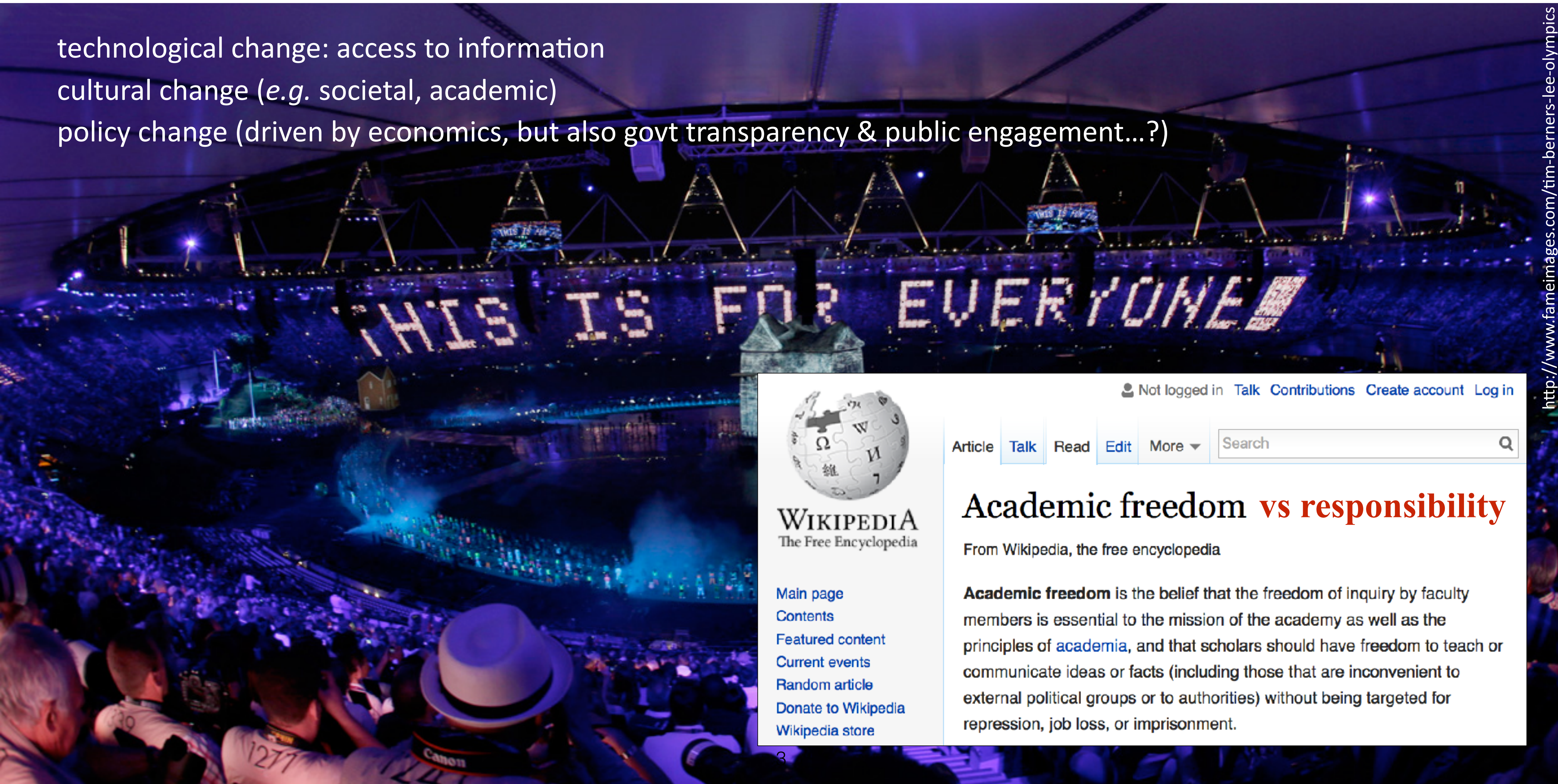


# Open access – a good fit to academic culture but there are tensions

technological change: access to information

cultural change (e.g. societal, academic)

policy change (driven by economics, but also govt transparency & public engagement...?)



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## Academic freedom **vs responsibility**

From Wikipedia, the free encyclopedia

**Academic freedom** is the belief that the freedom of inquiry by faculty members is essential to the mission of the academy as well as the principles of [academia](#), and that scholars should have freedom to teach or communicate ideas or facts (including those that are inconvenient to external political groups or to authorities) without being targeted for repression, job loss, or imprisonment.



# Researchers are focused on research...





SEARCH

Home



WHAT'S HOT AND COOKING IN SCHOLARLY PUBLISHING

AUTHORITY, AUTHORS, BUSINESS MODELS, COMMERCE, CONTROVERSIAL TOPICS, COPYRIGHT, ECONOMICS, ETHICS, INNOVATION, LIBRARIES, OPEN ACCESS

## Scholarly-Communication Reform: Why Is it So Hard to Talk About, and Where are the Authors?

POSTED BY RICK ANDERSON · MAY 16, 2016 · 11 COMMENTS

**FILED UNDER** AUTHORS, LIBRARIES, OPEN ACCESS, PUBLISHERS, REFORM, SCHOLARLY PUBLISHING, SCHOLARSHIP

Readers of the Scholarly Kitchen (or of any number of professional listservs, magazines, journals, etc.) may have noticed that questions about scholarly-communication reform tend to be, shall we say, vexed and controversial. Having participated in these conversations for 20 or so years now, and having recently gotten home from a conference that dealt specifically with such questions, I've been thinking a lot about why feelings run so high when we talk about them. I think some of the reasons would include the following:



Source: pickthebrain.com

- They are tied up in troublesome questions of right and wrong.** When Person A speaks of the public's right to have access to scholarly products that were created on the public's dime, he's invoking a moral principle: that charging for access to such products



# Some researcher reactions to open access...

See it primarily as a service to science (so what's the problem?)

Does the public need access? Are they capable of understanding?

Ask patient groups, citizen scientists, science bloggers, journalists...

Are open access mandates an infringement of academic freedom?



<https://www.know.nl/en/news/publications/opening-the-book-on-open-access>



# Researchers are sympathetic but compliance and costs are issues



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Subject search and browse: 

Physics

 Search Form Interface Catchup

25 Jan 2016: A project update, including a brief summary of activities in 2015, has been posted

1 Jan 2016: New members join arXiv Scientific Advisory Board

See cumulative "What's New" pages. Read robots beware before attempting any automated download

Physics

Astrophysics (astro-ph new, recent, find)

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Includes: Lattice QCD; Lattice Gauge Theory

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StephenCurry

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Open access scientific publishing

Wellcome Trust will penalise scientists who don't embrace open access

Wealthy medical charity says it will withhold researchers' final grant payments if they fail to make their results open access



Only 55% of the research papers funded by the Wellcome Trust are currently open access. Photograph: Alamy

Alok Jha, science correspondent

Thursday 28 June 2017 09:00 BST

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The Wellcome Trust plans to withhold a portion of grant money from scientists who do not make the results of their work freely available to the public, in a move that will embolden supporters of the growing open access movement in science. In addition, any research papers that are not freely available will not be counted as part of a scientist's track record when Wellcome assesses any future applications for research funding.

Open access publishing

Developing an Effective Market for Open Access Article Processing Charges

Bo-Christer Björk and David Solomon

March 2014

Can we make open access cost-effective?



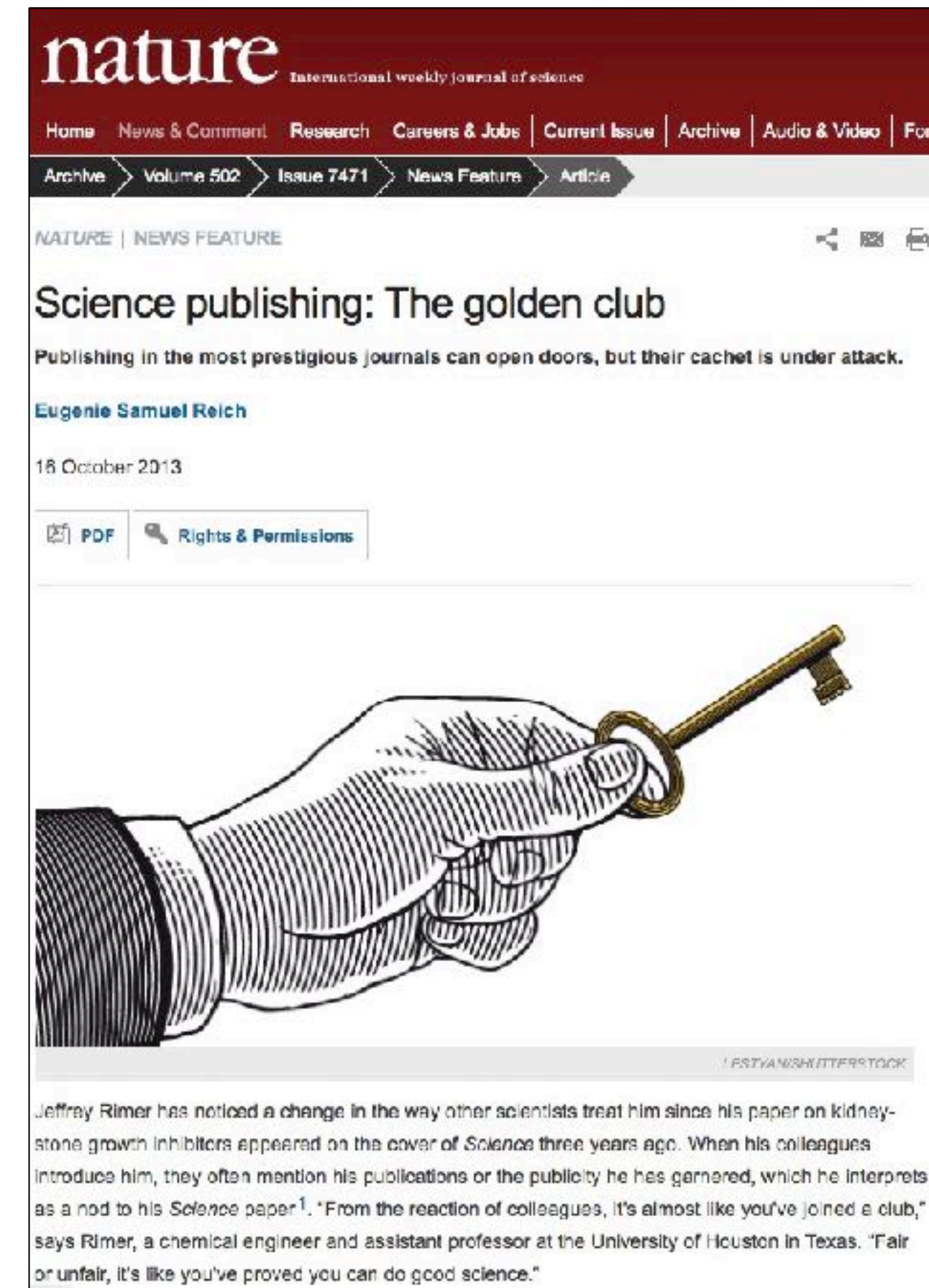
# Cost-benefits of journals (and their impact factors)



Nature Communications - \$5200

Cell Press - \$5000

Science Advances (w. CC-BY) - \$4600



We academics like journals: disciplinary support, filtering, reputation & career points...

...but we need to think hard about the costs of the present system



# Full analysis needs to encompass all the costs

## Costs:

Speed

Reproducibility

Journal bias to novel, positive results

Scientific fraud...



<http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001747>



<http://iai.asm.org/content/79/10/3855.full>

**Issues of trust and reliability:** can they be addressed via open access, open review, open data?



**The problems are well known – but how do we change behaviour?**



# Declarations are not enough

*We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are life, liberty and the pursuit of happiness.*

Hancock, J. *et al.* (1776)



“The principle that the results of research that has been publicly funded **should** be freely accessible in the public domain is a compelling one, and fundamentally unanswerable.”

Dame Janet Finch (2012)



“All scientific papers **should** be freely available by 2020...”

Commissioner Carlos Moedas (2016)

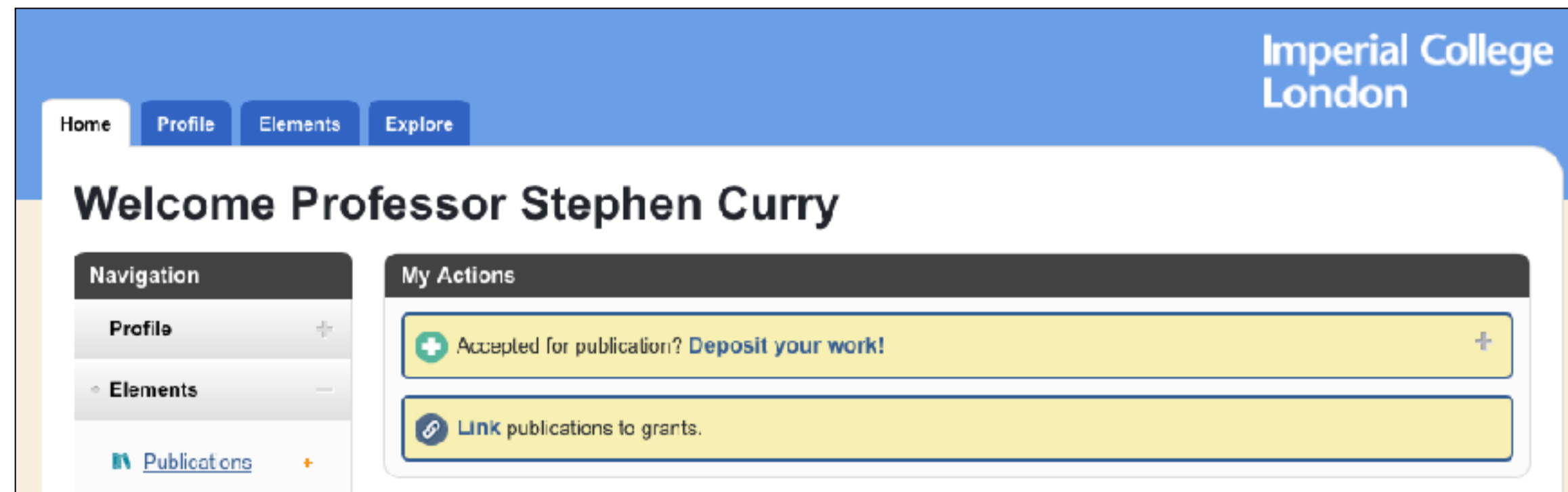




# Policies can help, but need careful handling & communication...

## Policy for open access in the post-2014 Research Excellence Framework

Updated July 2015



## Open access to research publications

Independent advice

Professor Adam Tickell  
Provost and Vice-Principal, University of Birmingham  
Chair of the Universities UK Open Access Coordination Group

**From April 2016:** To be eligible for submission to the post-2014 REF, authors' outputs **must** have been deposited in an institutional or subject repository."

- 6.24 A case could be made that the UK's "strong policy preference for Gold" is limiting the decision making agency of researchers and therefore limiting price differentiation within the Gold publishing marketplace. Observers have posited that the wide variety in APC prices and their general convergence suggests that APC prices might not be grounded in the actual cost of producing an article but are perhaps reflections of what the market can bear.<sup>34</sup>



# Good practices don't spread by themselves

## (or by exhortation, or by sanctions...)

*Why was Anaesthesia adopted more rapidly than Antisepsis?*

“**First**, one combatted a **visible and immediate problem** (pain); the other combatted an invisible problem (germs) whose effects wouldn't be manifest until well after the operation.

“**Second**, although both made life better for patients, **only one made life better for doctors.**”

“**People talking to people is still how the world's standards change.**”

ANNALS OF MEDICINE JULY 29, 2013 ISSUE

## SLOW IDEAS

*Some innovations spread fast. How do you speed the ones that don't?*



By Atul Gawande

Why do some innovations spread so swiftly and others so slowly? Consider the very different trajectories of surgical anesthesia and antiseptics, both of which were discovered in the nineteenth century. The first public demonstration of anesthesia was in 1846. The Boston surgeon Henry Jacob Bigelow was approached by a local dentist named William Morton, who insisted that he had found a gas that could render patients insensible to the pain of surgery. That was a dramatic claim. In those days, even a minor tooth extraction was excruciating. Without effective pain control, surgeons learned to work with slashing speed. Attendants pinned patients down as they screamed and thrashed, until they fainted from the agony. Nothing ever tried had made much difference. Nonetheless, Bigelow agreed to let Morton demonstrate his claim.



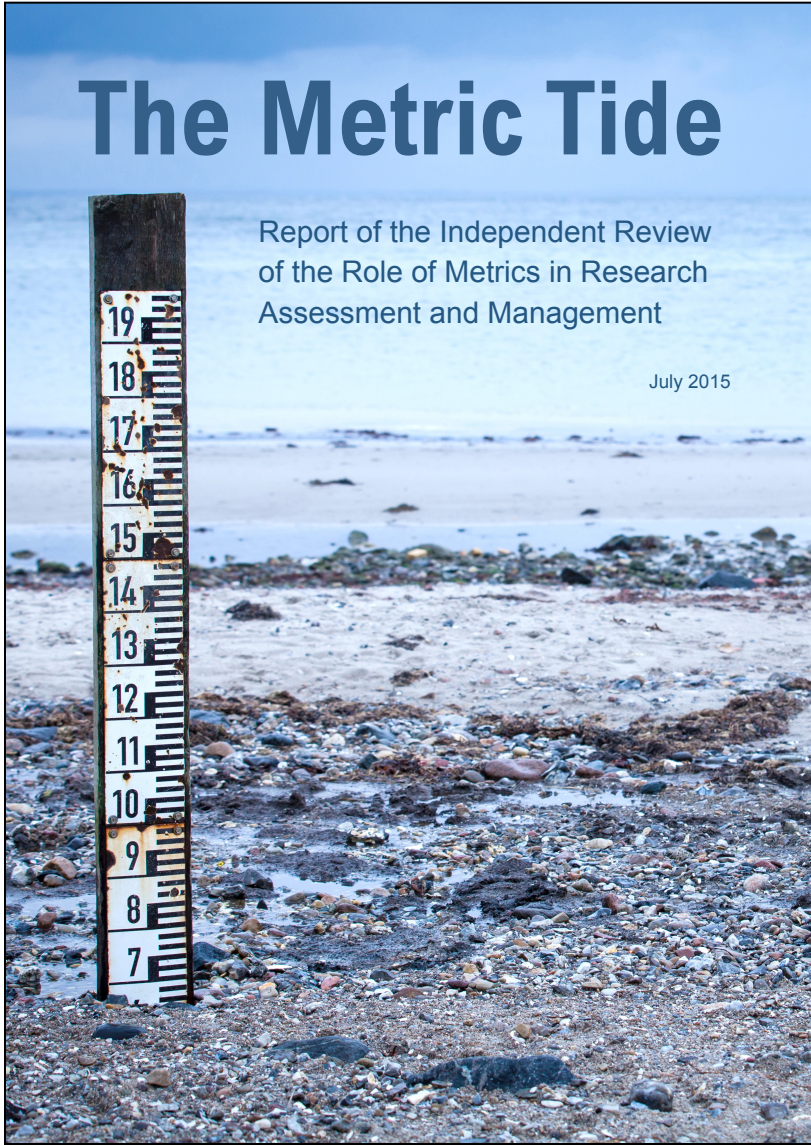
*We yearn for frictionless, technological solutions. But people talking to people is still the way that norms and standards change.*

ILLUSTRATION BY HARRY CAMPBELL




# Academic initiatives to combat cultural impediments

PNAS



Can openness change behaviour?



bioRxiv

beta










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A simple proposal for the publication of journal citation distributions

 Vincent Lariviere,  Veronique Kiermer,  Catriona J MacCallum,  Marcia McNutt,  Mark Patterson,  Bernd Pulverer,  Sowmya Swaminathan,  Stuart Taylor,  Stephen Curry

doi: <http://dx.doi.org/10.1101/062109>

This article is a preprint and has not been peer-reviewed [what does this mean?].

Abstract

Info/History

Metrics

Supplementary material

Preview PDF

Abstract

Although the Journal Impact Factor (JIF) is widely acknowledged to be a poor indicator of the quality of individual papers, it is used routinely to evaluate research and researchers. Here, we present a simple method for generating the citation distributions that underlie JIFs. Application of this straightforward protocol reveals the full extent of the skew of these distributions and the variation in citations received by published papers that is characteristic of all scientific journals. Although there are differences among journals across the spectrum of JIFs, the citation distributions overlap extensively, demonstrating that the citation performance of individual papers cannot be inferred from the JIF. We propose that this methodology be adopted by all journals as a move to greater transparency, one that should help to refocus attention on individual pieces of work and counter the inappropriate usage of JIFs during the process of research assessment.

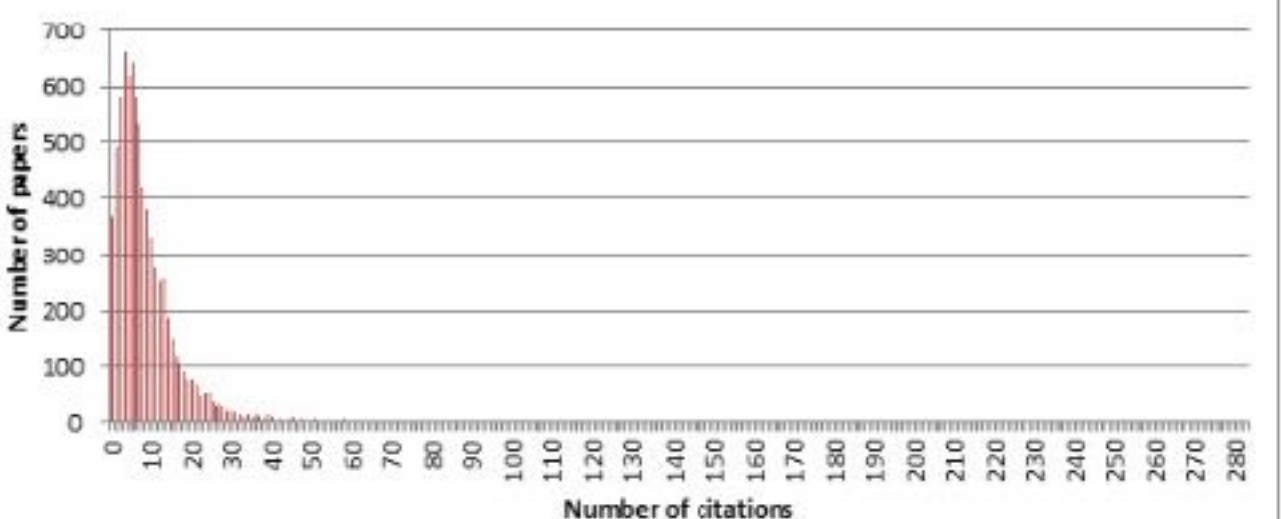
Impact factor: a measure of the frequency with which the “average article” in a journal has been cited in a particular year or period. The journal impact factor is calculated by dividing the number of current year citations to source items published in that journal during the previous 2 years.

Immediacy index: the average number of times an article is cited in the year it is published.

Cited half-life: the number of years, going back from the current *Journal Citation Reports* (JCR) year, that account for 50% of citations received by the journal in the current JCR year.

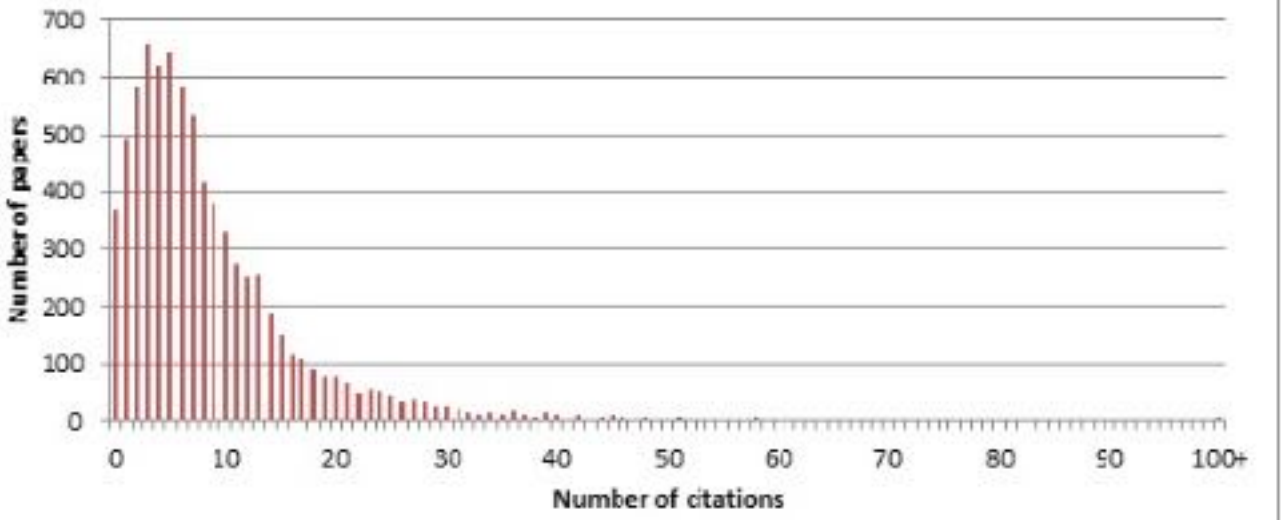
PNAS Citation Distribution 2013–2014

0–283 Citations



PNAS Citation Distribution 2013–2014

0–100+ Citations



Citation distribution: the distribution of citations to articles over the previous 2 years that contributes to the current JCR year’s impact factor.

See “A simple proposal for the publication of journal citation distributions,” by Vincent Lariviere, Veronique Kiermer, Catriona J MacCallum, Marcia McNutt, Mark Patterson, Bernd Pulverer, Sowmya Swaminathan, Stuart Taylor, and Stephen Curry. BioRxiv. Posted July 5, 2016. <http://dx.doi.org/10.1101/062109>.



# Academic initiatives to combat cultural impediments

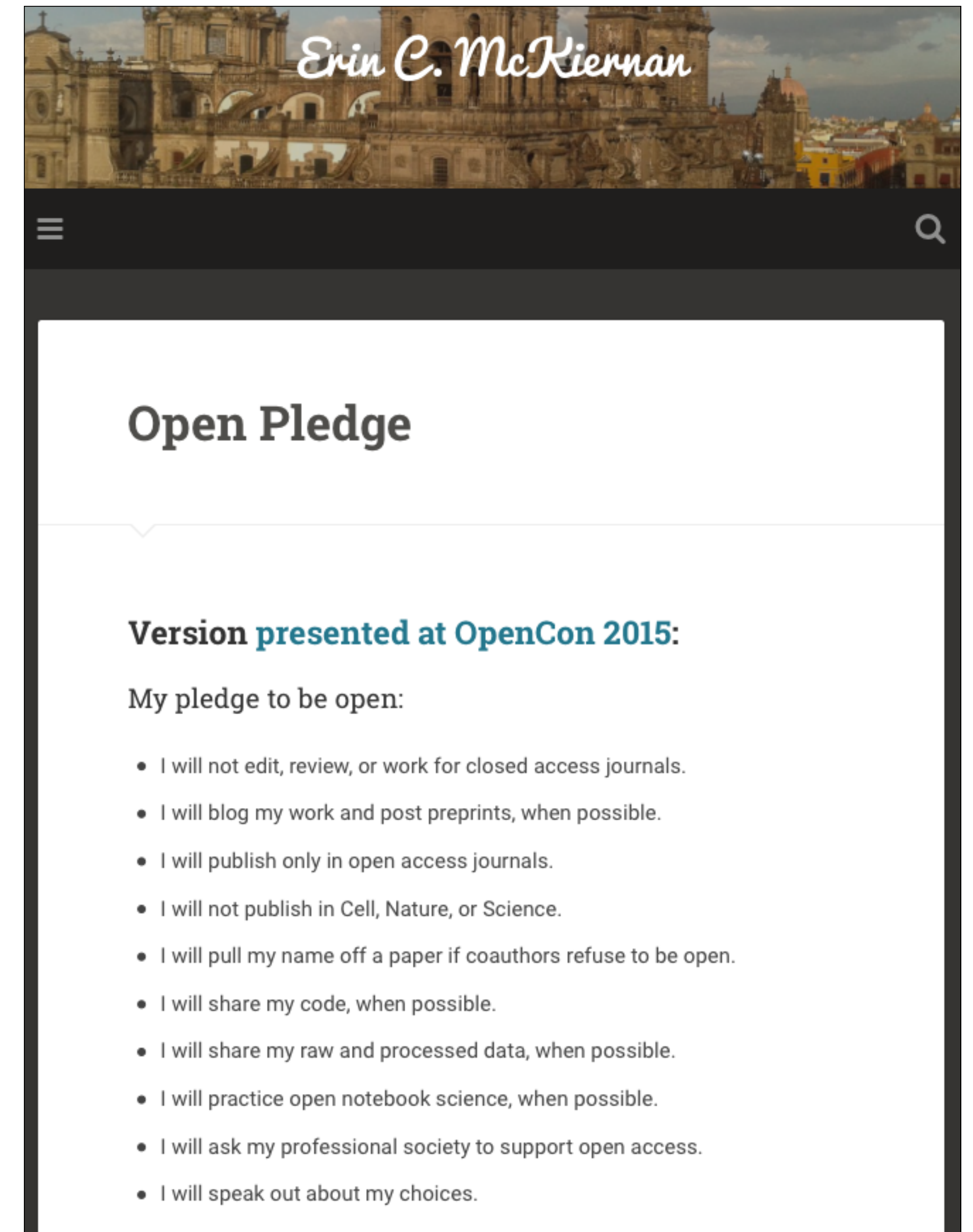
## Mike Taylor

“It feels morally wrong, given the capacity we have to do that, not to do it.”

<https://www.jisc.ac.uk/news/its-stupid-that-we-care-about-labels-so-much-24-oct-2016>



Alexandra Elbakyan



<https://emckiernan.wordpress.com/pledge/>



# Institutional initiatives



## Fewer numbers, better science

Scientific quality is hard to define, and numbers are easy to look at. But bibliometrics are warping science — encouraging quantity over quality. Leaders at two research institutions describe how they do things differently.

<http://www.nature.com/news/fewer-numbers-better-science-1.20858>

## Evaluating how we evaluate

Ronald D. Vale

Department of Cellular and Molecular Pharmacology and the Howard Hughes Medical Institute, University of California, San Francisco, San Francisco, CA 94158

**ABSTRACT** Evaluation of scientific work underlies the process of career advancement in academic science, with publications being a fundamental metric. Many aspects of the evaluation

Vale, R. D. (2012) *Mol Biol Cell* **23**, 3285–3289.

## Researcher assessment at UMC Utrecht

1. Research, publications, grants
2. Managerial responsibilities & academic duties
3. Mentoring & teaching
4. Clinical work (if applicable)
5. Entrepreneurship & community outreach



# We need to talk about open access as a good in itself

Peer review and scientific publishing  
Occam's corner

Stephen Curry  
@Stephen\_Curry

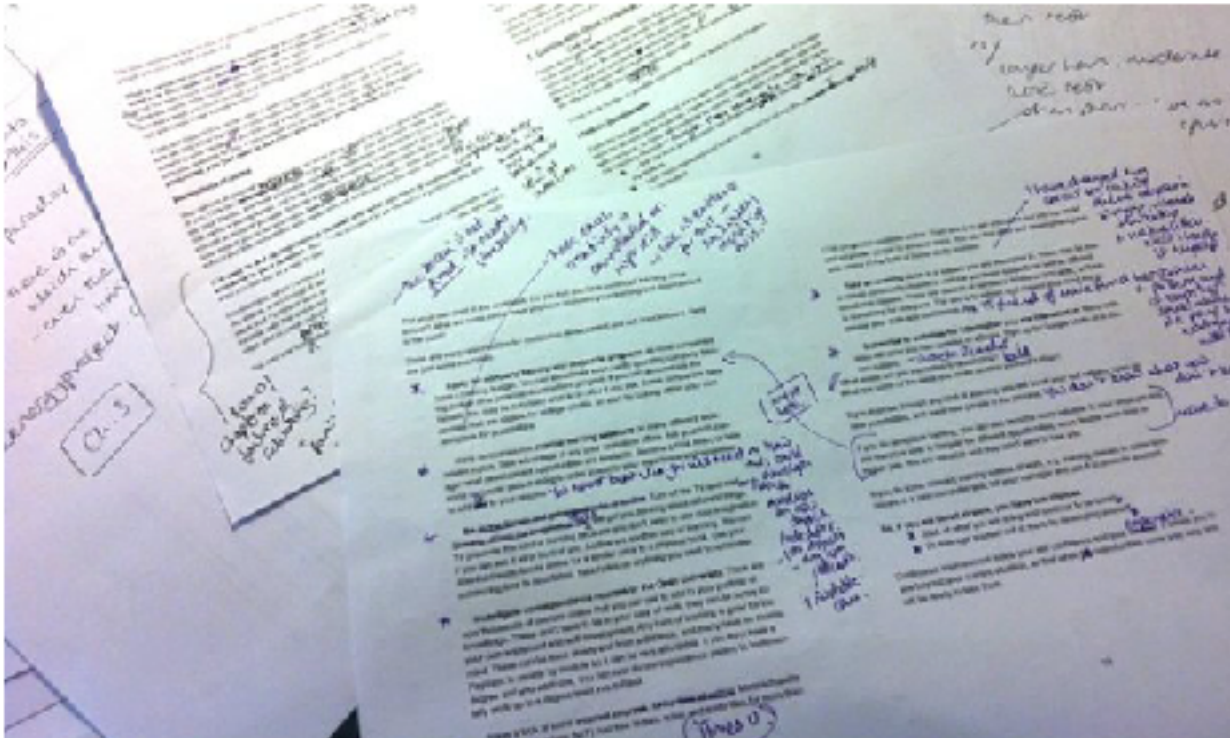
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## Peer review, preprints and the speed of science

Peer review is often claimed to be the guarantor of the trustworthiness of scientific papers, but it is a troubled process. Preprints offer a way out



Subediting ski.Is for writers Photograph: Joanna Penn/Flickr

A few weeks ago my collaborators and I submitted our latest paper to a scientific journal. We have been investigating how noroviruses subvert the molecular machinery of infected cells and have some interesting results. If it passes peer review, our paper could be published in three or four months' time. If it's rejected, we may have to re-work the manuscript before trying our luck with another journal. That will delay publication even further - it's not unheard of for papers to take a year or more to get out of the lab and into the world, even in the digital age.

Science  
Occam's corner

## Zika virus initiative reveals deeper malady in scientific publishing

Stephen Curry


Moves to speed up the release of Zika virus research in response to the public health crisis highlight a systemic failure in scientific publishing. Help could be at hand at the ASAPbio meeting today in the USA

Contact author  
@Stephen\_Curry

Tuesday 16 February 2016 11:54 GMT

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Tou far behi Photograph: VU

In respo now de Health publishers rapidly and

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WHEAT BLAST IN NEWS

The Daily Star - 'Wheat Blast' threatens yield in Bangladesh

YouTube - nTV News

Centre for Strategic & International Studies - Severe, Climate Change-driven Wheat Fungus Found in Bangladesh

Wheat blast is a fearsome fungal disease of wheat. It was first discovered in Paraná State of Brazil in 1985. It spread rapidly to other South American countries such as Colombia, Bolivia, Paraguay, and Argentina, where it infects up to 5 million hectares and causes serious crop losses. Wheat blast was also [detected in Kentucky, USA, in 2011](#).

Wheat blast is caused by a fungus known as *Magnaporthe oryzae* although scientists are still debating its exact identity. There is a risk that wheat blast could expand beyond South America and threaten food security in wheat growing areas in Asia and Africa.

Imperial College London

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MAY 12, 2016 AT 2:08 PM

## Even Psychologists Respond To Meaningless Rewards

All they needed to be more open with their data was the promise of a badge showing they did it.

By [Christine Eschwarden](#)

Filed under [Scientific Method](#)

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# We need to talk about open science as a good in itself

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PLANET FOUR: TERRAINS

OLD V

Principles for Predicting RNA Secondary Structure Design Difficulty

Jeff Anderson-Lee<sup>1,†</sup>, Eli Fisker<sup>1,†</sup>, Vineet Kosaraju<sup>1,2,†</sup>, Michelle Wu<sup>1,3,†</sup>, Justin Kong<sup>1,4</sup>, Jeehyung Lee<sup>1,4</sup>, Minjae Lee<sup>1,4</sup>, Mathew Zada<sup>1</sup>, Adrien Treuille<sup>1,4,5</sup> and Rhiju Das<sup>1,2,6</sup>

Eterna Players<sup>1,†</sup>

1 - Eterna Massive Open Laboratory

2 - Department of Biochemistry, Stanford University, Stanford, CA 94305, USA

3 - Program in Biomedical Informatics, Stanford University, Stanford, CA 94305, USA

4 - Department of Computer Science, Carnegie Mellon University, Pittsburgh, PA 15213, USA

5 - Robotics Institute, Carnegie Mellon University, Pittsburgh, PA 15213, USA

6 - Department of Physics, Stanford University, Stanford, CA 94305, USA

Correspondence to Rhiju Das: Department of Biochemistry, Stanford University, Stanford, CA 94305, USA.  
rhiju@stanford.edu  
http://dx.doi.org/10.1016/j.jmb.2015.11.013

Edited by A. Pyle

Abstract

Designing RNAs that form specific secondary structures is enabling better understanding and control of living systems through RNA-guided silencing, genome editing and protein organization. Little is known, however, about which RNA secondary structures might be tractable for downstream sequence design, increasing the time and expense of design efforts due to inefficient secondary structure choices. Here, we present insights into specific structural features that increase the difficulty of finding sequences that fold into a target RNA secondary structure, summarizing the design efforts of tens of thousands of human participants and three automated algorithms (RNAinverse, INFO-RNA and RNA-SSD) in the Eterna massive open laboratory. Subsequent tests through three independent RNA design algorithms (NUPACK, DSS-Opt and MODENA) confirmed the hypothesized importance of several features in determining design difficulty, including sequence length, mean stem length, symmetry and specific difficult-to-design motifs such as zigzags. Based on these results, we have compiled an Eterna100 benchmark of 100 secondary structure design challenges that span a large range in design difficulty to help test future efforts. Our *in silico* results suggest new routes for improving computational RNA design methods and for extending these insights to assess "designability" of single RNA structures, as well as of switches for *in vitro* and *in vivo* applications.

© 2015 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

These activities tell researchers about:  
New (non-traditional) audiences & scientists

Communication + Participation = **Public Trust**


17






# After Brexit, we need to reassert the values of the academy...



“People in this country have had enough of experts.”




**Glyn Davies**   
@glyndaviesmp







Personally, never thought of academics as 'experts'. No experience of the real world.

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 **Science**  
Occam's corner

### Scientific responses to Brexit have to be personal and political

Stephen Curry

The vote for Brexit was a shock to the scientific community on many levels. We need to be resolute and constructive in facing the challenges ahead



Regime change? Greg Clark leaves 10 Downing Street after being appointed as the new secretary of state for business, energy and industrial strategy - photograph: Ian Kitwood/Getty Images

 @Stephen\_Curry  
Friday 22 July 2016 08:22 BST

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Friday 24 June was one of the worst days of my life. I had feared a vote to leave in the UK referendum on EU membership, but clung optimistically to the uptick in the polls in the days immediately beforehand. Even so, I was taken by surprise at the strength of feeling that the result unleashed. My immediate reaction was shock and grief. David Cameron's perfunctory

We have to go public.  
We have to be open.



# Open access & open science: keep the faith – and keep talking about it

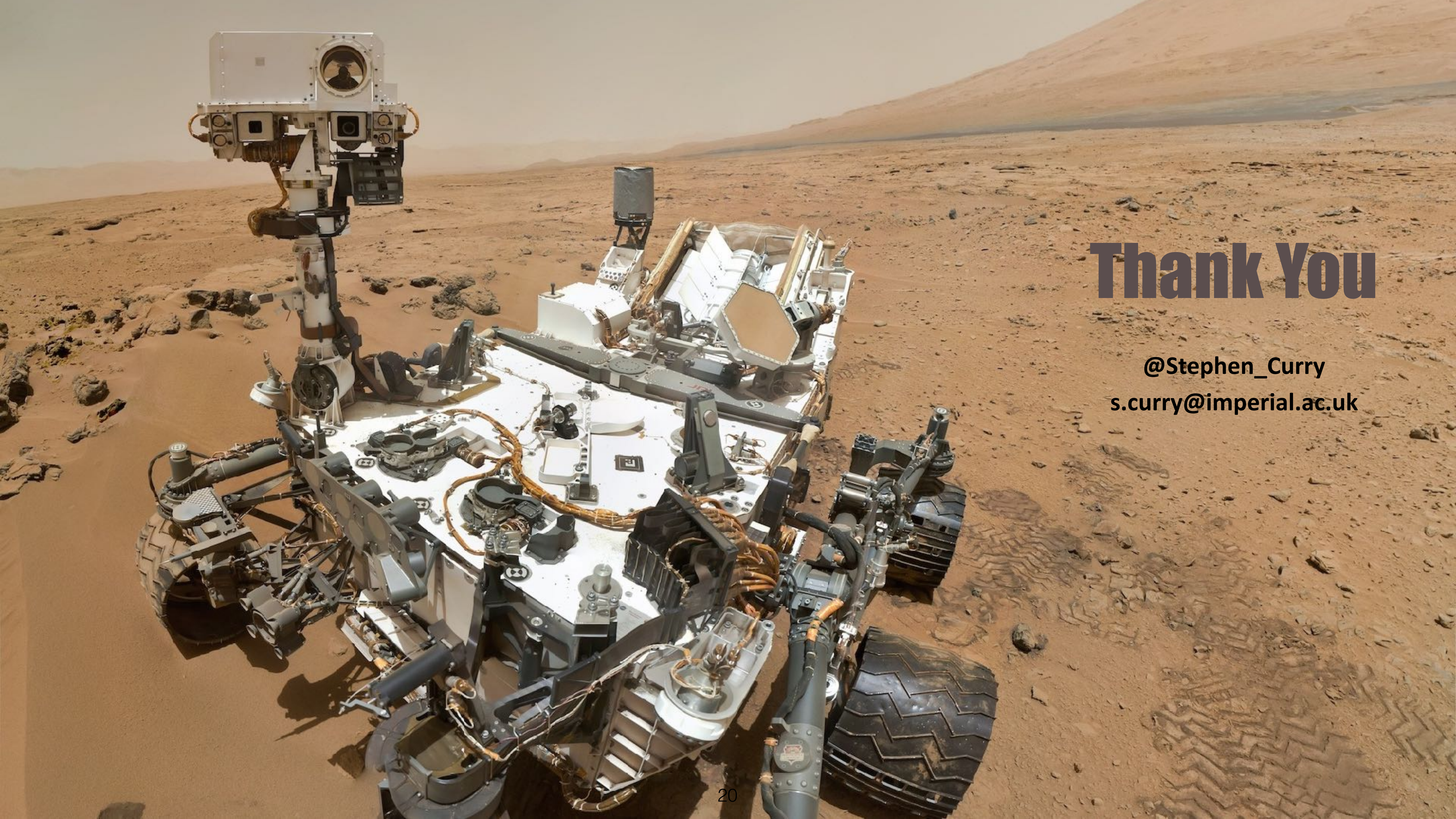
It's *not* the answer to everything but OA is an opportunity to show:

- that openness is part and parcel of the noble calling to be an academic
- how the academy is relevant to people's lives
- that we care about delivering value for money
- that open science is better science (e.g. how the transparency of openness leads to more rigorous research)

The incredulity of Saint Thomas, Caravaggio







# Thank You

@Stephen\_Curry

s.curry@imperial.ac.uk