UNIVERSITY OF CAMBRIDGE

Office of Scholarly Communication

Reward, reproducibility and recognition in research - the case for going Open

Eleventh Annual Munin Conference on Scholarly Publishing http://site.uit.no/muninconf/
21 November 2016

Dr Danny Kingsley
Head of Scholarly Communication
University of Cambridge
@dannykay68
Slides - http://www.slideshare.net/DannyKingsley/reward-reproducibility-and-recognition-in-research-the-case-forgoing-open

The problem

Researchers are in a rat race to stay ahead

Image by Danny Kingsley

Today's talk

- How research is measured
- The problems this causes
- A proposed solution
- Implementation challenges
- Caveat: This mainly refers to the STEM experience

The coin in the realm of academia

Image Flickr – Leo Reynolds

Steele, C., Butler, L. and Kingsley, D. “The Publishing Imperative: the pervasive influence of publication metrics” Learned Publishing, October 2006 Vol 19, Issue 4, pp. 277-290. 10.1087/09531510677869075 1/epdf

Journal Impact Factor

Impact Factor for 2015 is

- Number of citations in 2014 of articles published in 2012-2013 divided by:
- Number of articles published in the journal in 2012-2013

- In 2016 *Nature* has a JIF of 41.456. This is supposed to mean that over the past 2 years, Nature articles have been cited, on average, about 41 times each

Issues with the JIF

- Only a selection of journals
- Some disciplines badly represented
- English language bias
- North American bias
- Timeline
- Measuring the vessel, not the contents!
- Uneven distribution.
  - Argument that we should be making non-citation levels available 10.1186/1471-2288-4-14

Journals banned from the JIF list

Image Danny Kingsley

- Journals are removed because of:
  - Self-citation
  - Citation stacking – where journals cite each other
  - Requirements to cite from within the journal
- 2013 – 66 journals
- 2012 – 51 journals
- 2011 – 34 journals

http://blogs.nature.com/news/2013/06/new-record-66-journals-banned-for-boosting-impact-factor-with-self-citations.html

Backlash

Science Home News Journals Topics Careers

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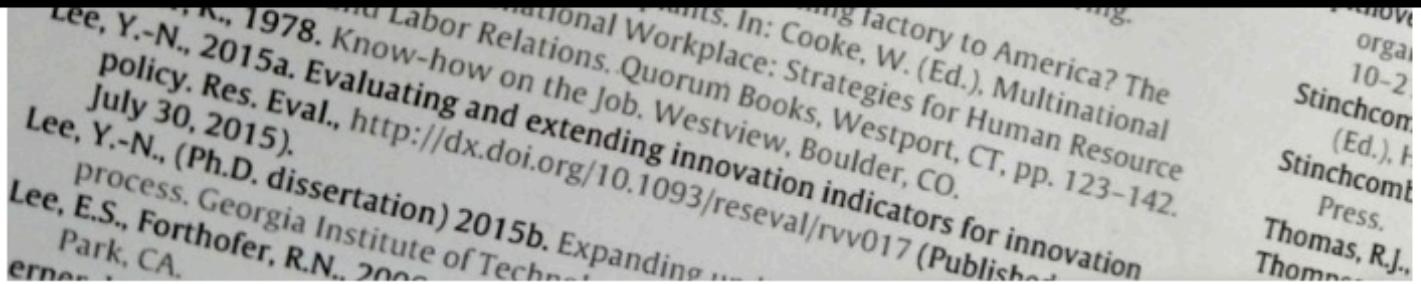
397



Citation lists are key to calculating journal impact factors. David Malakoff

Hate journal impact factors? New study gives you one more reason

By John Bohannon | Jul. 6, 2016 , 4:30 PM

Scientists have a love-hate relationship with the journal impact factor (JIF), the measurement used to rank technical journals by prestige. They have come to use it not only for deciding where to submit research papers, but for judging their peers, as well as influencing who wins

http://www.sciencemag.org/news/2016/07/hate-journal-impact-factors-new-study-gives-you-one-more-reason

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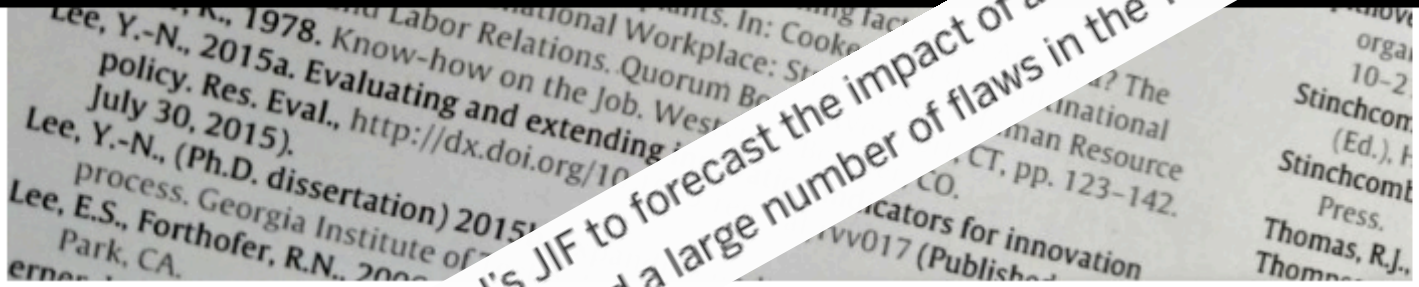


Citation lists are key to calculating

David Malakoff

Hate journal impact factors? New study gives you one more reason

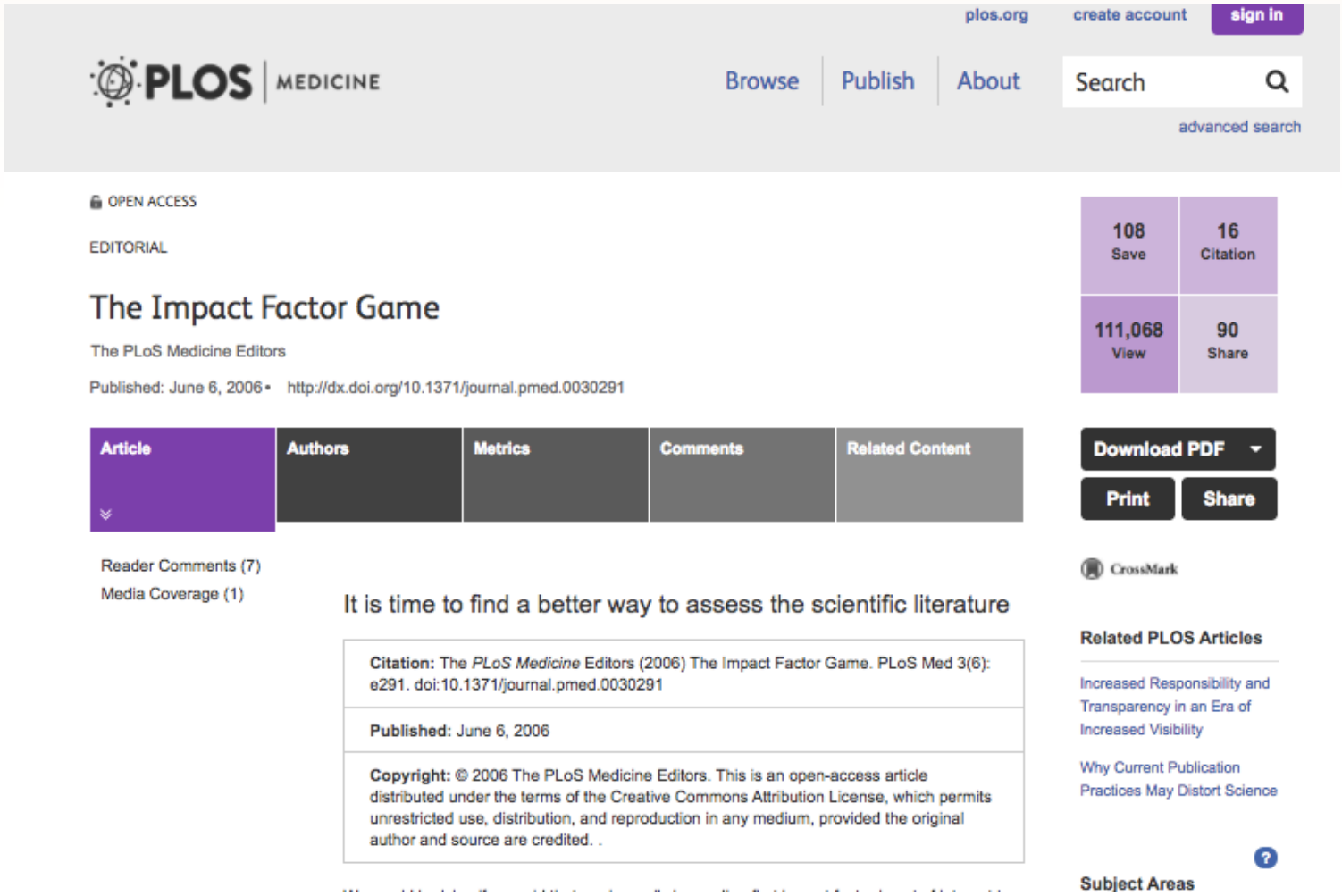
non | Jul. 6, 2016 , 4:30 PM

average number. So trying to use a journal's JIF to forecast the impact of any particular paper is close to guesswork. The analysis also revealed a large number of flaws in the Thomson

Scientists have a love-hate relationship with the journal impact factor (JIF), the measurement used to rank technical journals by prestige. They have come to use it not only for deciding where to submit research papers, but for judging their peers, as well as influencing who wins

http://www.sciencemag.org/news/2016/07/hate-journal-impact-factors-new-study-gives-you-one-more-reason

Backlash



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EDITORIAL

The Impact Factor Game

The PLoS Medicine Editors

Published: June 6, 2006 • http://dx.doi.org/10.1371/journal.pmed.0030291

Article Authors Metrics Comments Related Content

Reader Comments (7)

Media Coverage (1)

It is time to find a better way to assess the scientific literature

Citation: The *PLoS Medicine* Editors (2006) The Impact Factor Game. PLoS Med 3(6): e291. doi:10.1371/journal.pmed.0030291

Published: June 6, 2006

Copyright: © 2006 The PLoS Medicine Editors. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. .

108 Save | 16 Citation | 111,068 View | 90 Share

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Why Current Publication Practices May Distort Science

Subject Areas

http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030291

http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030291

We are stuck

The insistence on the need to publish novel results in high impact journals is creating a multitude of problems with the scientific endeavour

Image by Danny Kingsley

Problem 1: Data Excuse Bingo

My data contains personal/sensitive information	My data is too complicated	People may misinterpret my data	My data is not very interesting
Commercial funder doesn't want to share it	We might want to use it in another paper	People will contact me to ask about stuff	Data Protection/ National Security
It's too big	People will see that my data is bad	I want to patent my discovery	It's not a priority and I'm busy
I don't know how	I'm not sure I own the data	Someone might steal/ plagiarise it	My funder doesn't require it

Data Excuse Bingo created by @jenny_molloy

Incompatible!

My data contains personal/sensitive information	My data is too complicated	Pec mis r	is y ng
Commercial funder doesn't want to share it	We might want to use it in another paper	Pe cor to ask about stuff	on/ National Security
It's too big	Peopl see th data i		It's not a priority and I'm busy
I don't know how	I'm no I own the data	might steal/ plagiarise it	My funder doesn't require it

My data is not very interesting

Someone might steal/ plagiarise it

Data Excuse Bingo created by @jenny_molloy

‘Someone might steal/plagiarise it’

‘A second concern held by some is that a new class of research person will emerge — people who had nothing to do with the design and execution of the study but use another group’s data for their own ends, possibly stealing from the research productivity planned by the data gatherers, or even use the data to try to disprove what the original investigators had posited. There is concern among some front-line researchers that the system will be taken over by what some researchers have characterized as “research parasites.”’

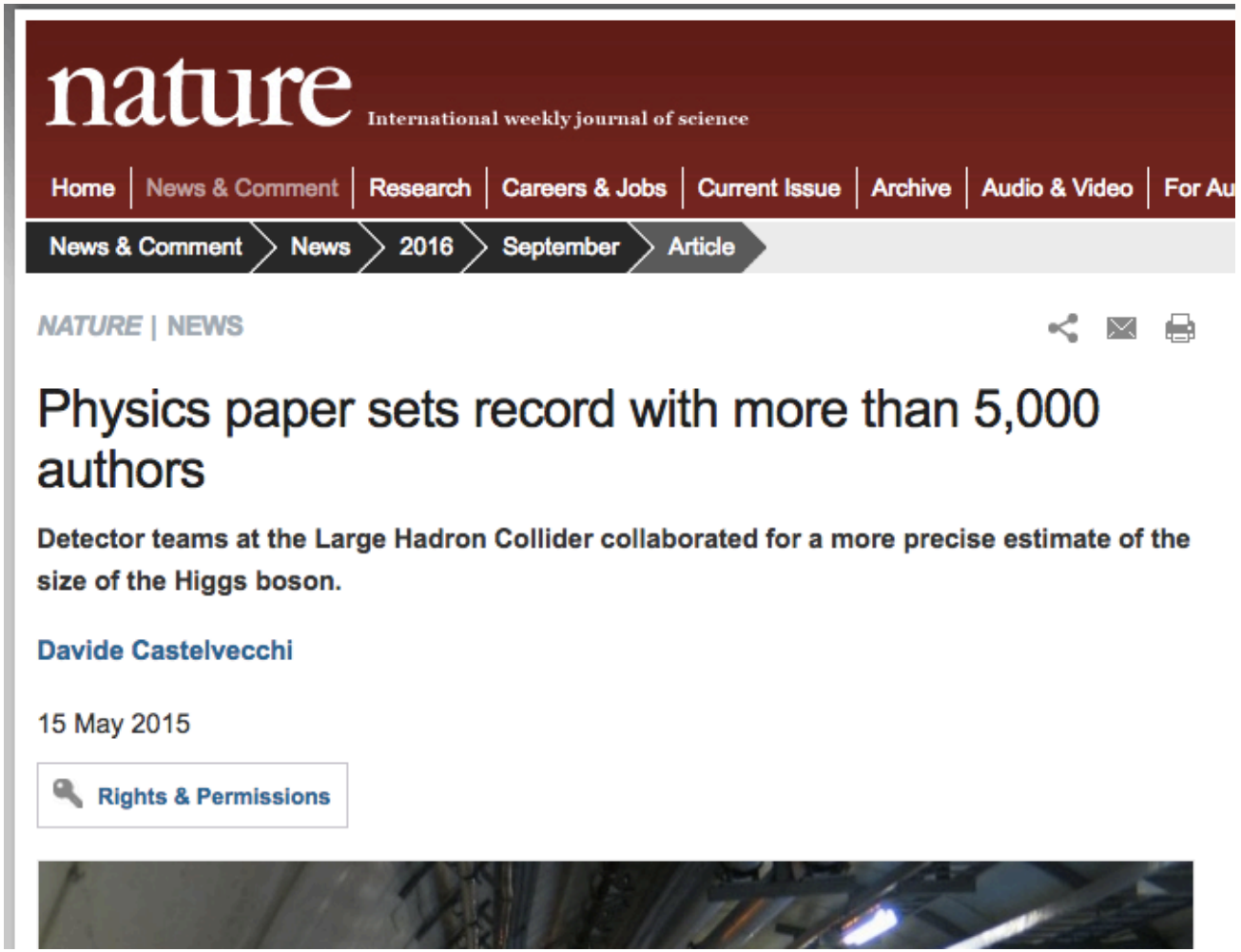
EDITORIAL ‘Data Sharing’, Dan L. Longo, M.D., and Jeffrey M. Drazen, M.D. N Engl J Med 2016; 374:276-277January 21, 2016 DOI: 10.1056/NEJMe1516564

Problem 2: Hyperauthorship

24 of the 33 pages of this paper listed the over 5,000 authors (nine pages are the paper itself)

http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.114.191803

Storm of protest



nature International weekly journal of science

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News & Comment › News › 2016 › September › Article

NATURE | NEWS

Physics paper sets record with more than 5,000 authors

Detector teams at the Large Hadron Collider collaborated for a more precise estimate of the size of the Higgs boson.

Davide Castelvecchi

15 May 2015

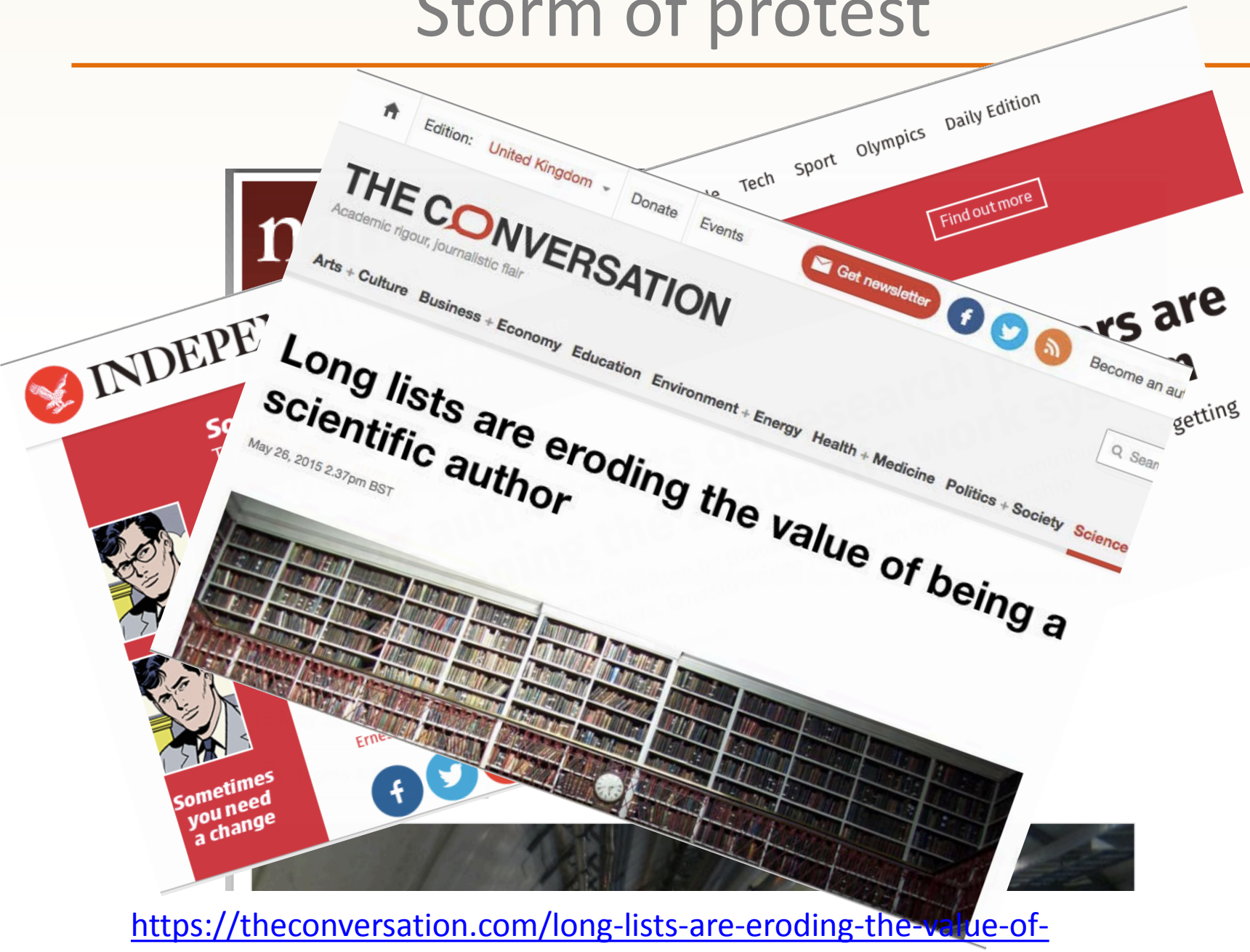
Rights & Permissions

http://www.nature.com/news/physics-paper-sets-record-with-more-than-5-000-authors-1.17567

Storm of protest

http://www.independent.co.uk/news/science/long-author-lists-on-research-papers-are-threatening-the-academic-work-system-10279748.html

Storm of protest



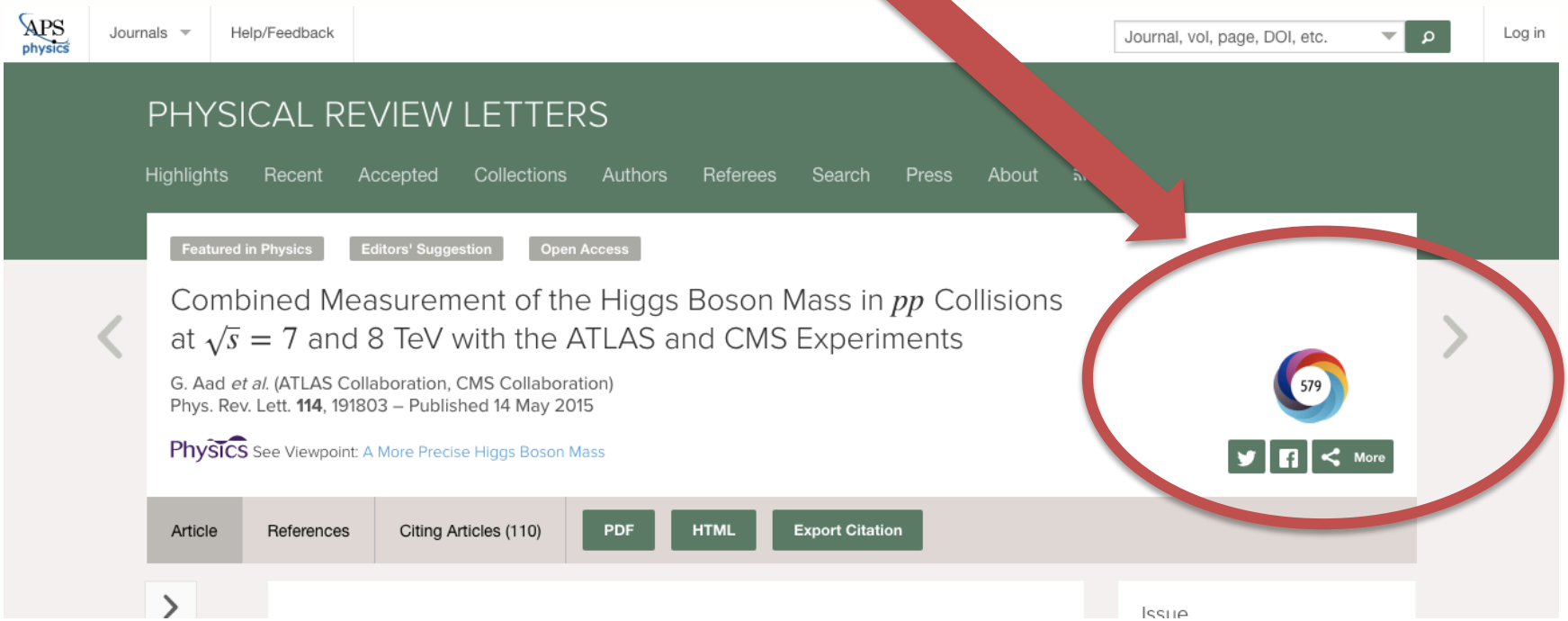
https://theconversation.com/long-lists-are-eroding-the-value-of-being-a-scientific-author-42094

Storm of protest

https://www.timeshighereducation.com/news/mass-authorship-destroying-credibility-papers

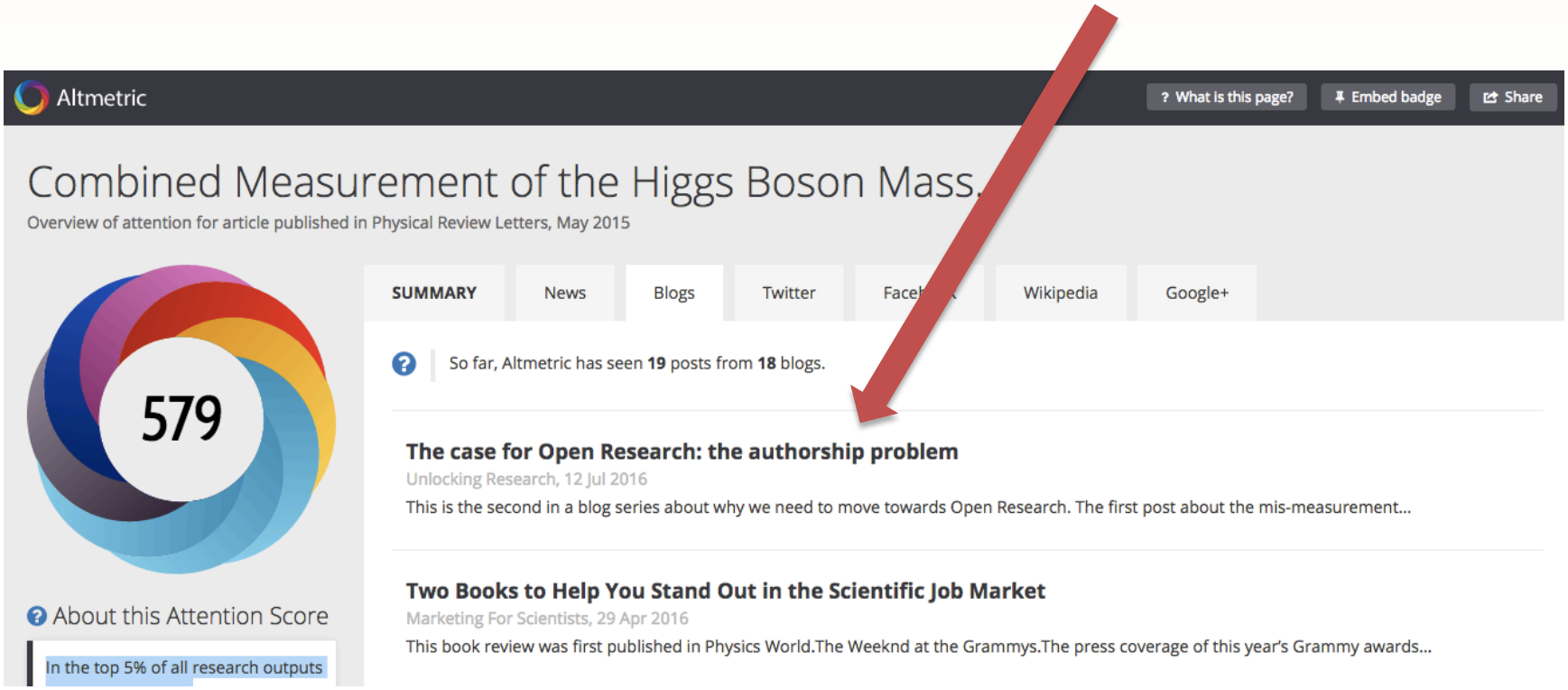
Speaking of other ways of measuring…

This Altmetrics score of 579 is “in the top 5% of all research outputs scored by Altmetric”



http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.114.191803

Blogged because of author list!



https://aps.altmetric.com/details/3997327/blogs

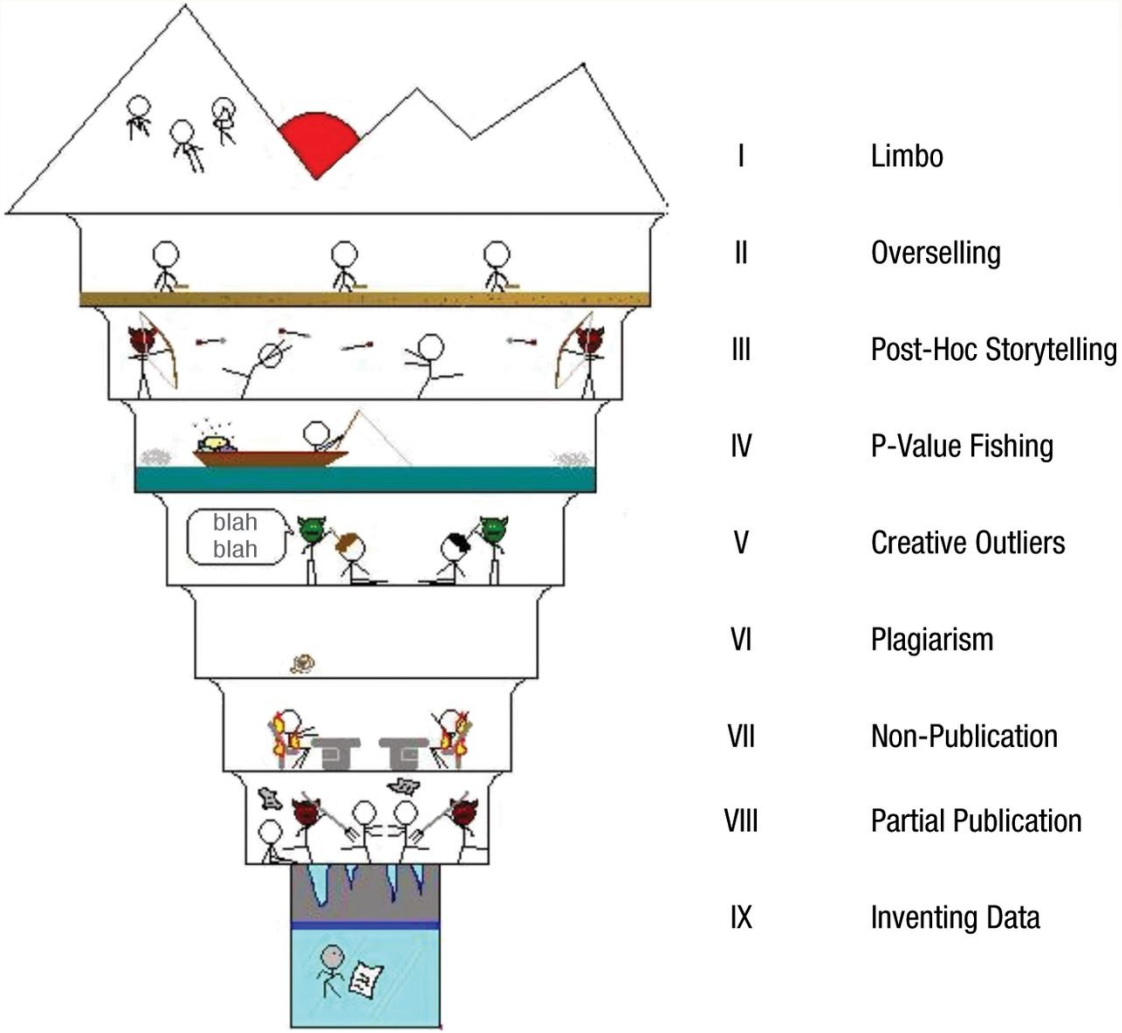
Problem 3: Reproducibility

Scientists are very rarely rewarded for being right, they are rewarded for publishing in certain journals and for getting grants.

Image by Danny Kingsley

The nine circles of scientific hell

(with apologies to Dante and xkcd)



Neuroskeptic Perspectives on Psychological Science 2012;7:643-644

Oh dear

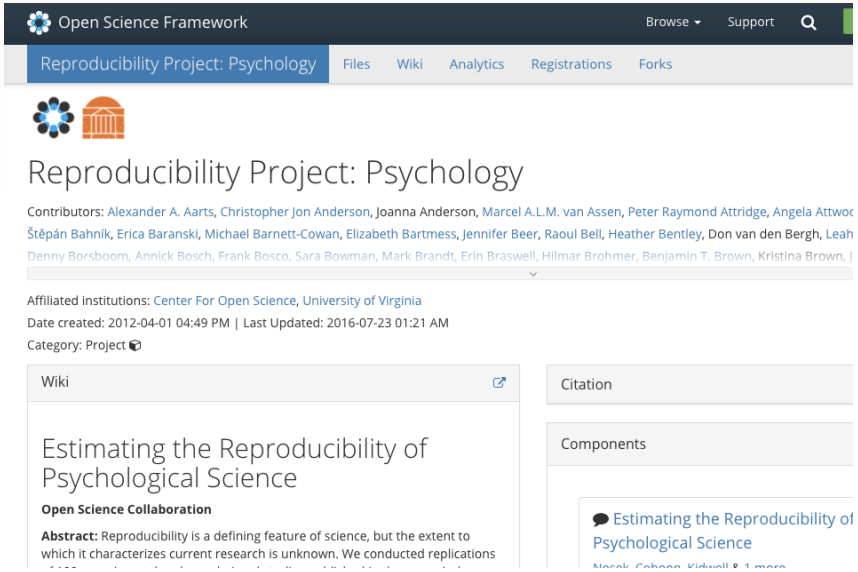
"Simulations show that for most study designs and settings, it is more likely for a research claim to be false than true."

http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0020124

Reproducibility project

Conducted replications of 100 experimental and correlational studies published in three psychology journals using high-powered designs and original materials when available.

- Replication effects = half the magnitude of original effects (substantial decline)
- 97% of original studies had significant results
- 36% of replications had significant results



https://osf.io/ezcuj/

Breaking news – 1 November 2016


SAGE journals

JOURNAL OF HEALTH PSYCHOLOGY

Home | Abstract | PDF | Current Issue | All Issues | OnlineFirst

'PACE-Gate': When clinical trial evidence meets open data

Authors

Abstract

Science is not always pla… storm of controver… determine i… PAC… …effecti… …discovered tha… …ing a freedom of inform…

…cognitive behavioural therapy …

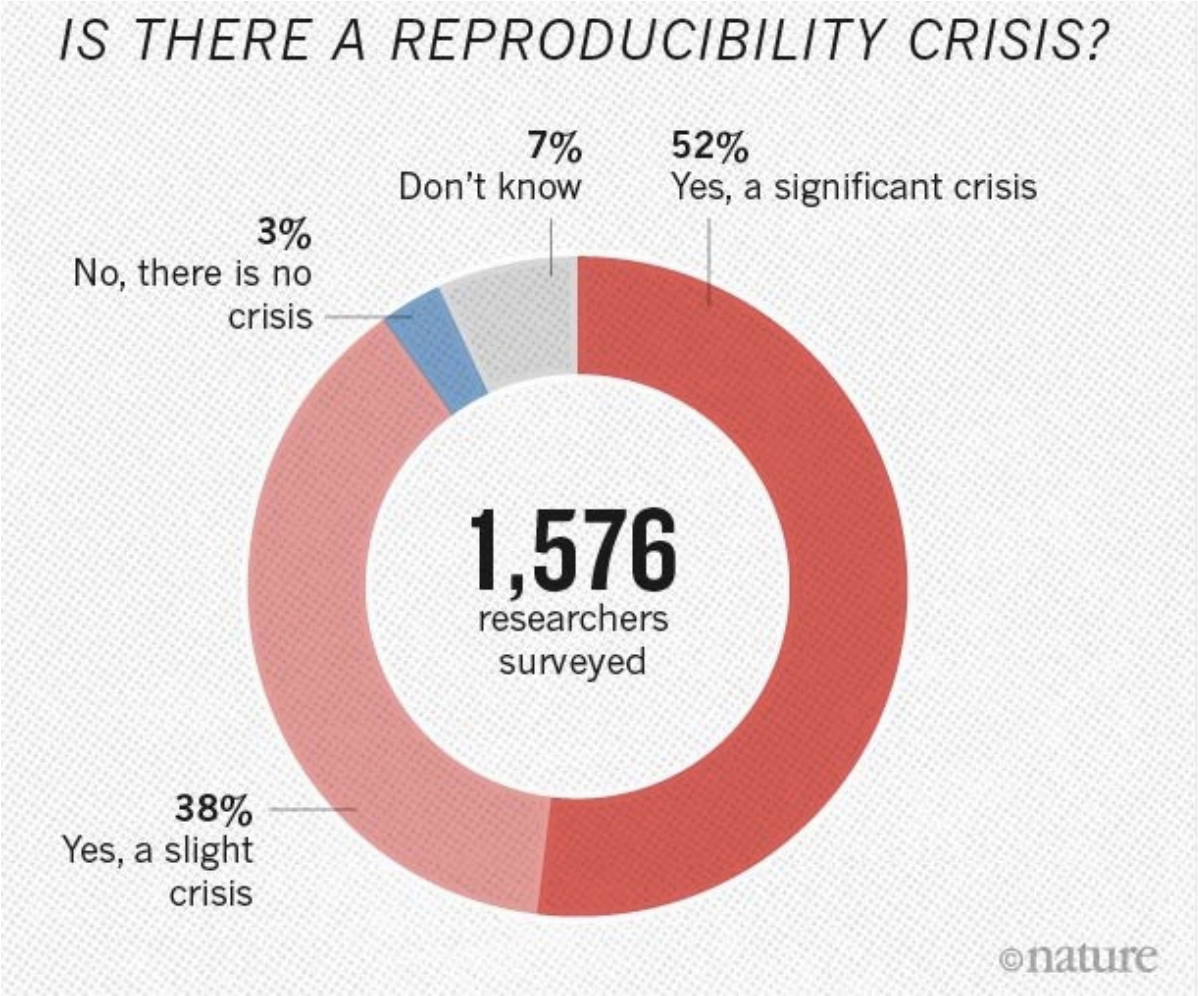
…release of data from the largest clinical trial of psychotherapy tr… …ssional defensiveness. The data were only released after a protracted… release their data. Upon release, re-analysis showed that the levels of impr… report (White et al., 2011a) and other related publications. The released d… comparison to standard medical care (SMC) and adaptive pacing therapy (…

Patient groups and independent experts have remarked that without data a… evidence that CBT and GET are effective treatments for CFS. Instead, pati… the benefits of CBT and GET. This editorial considers the ramifications of th… therapies.

In this extraordinary case, patients discovered that the treatments tested had much lower efficacy after an information tribunal ordered the release of data from the PACE trial to a patient who has requested access using a freedom of information request.

http://m.hpq.sagepub.com/content/early/2016/10/27/1359105316675213.full

Crisis?

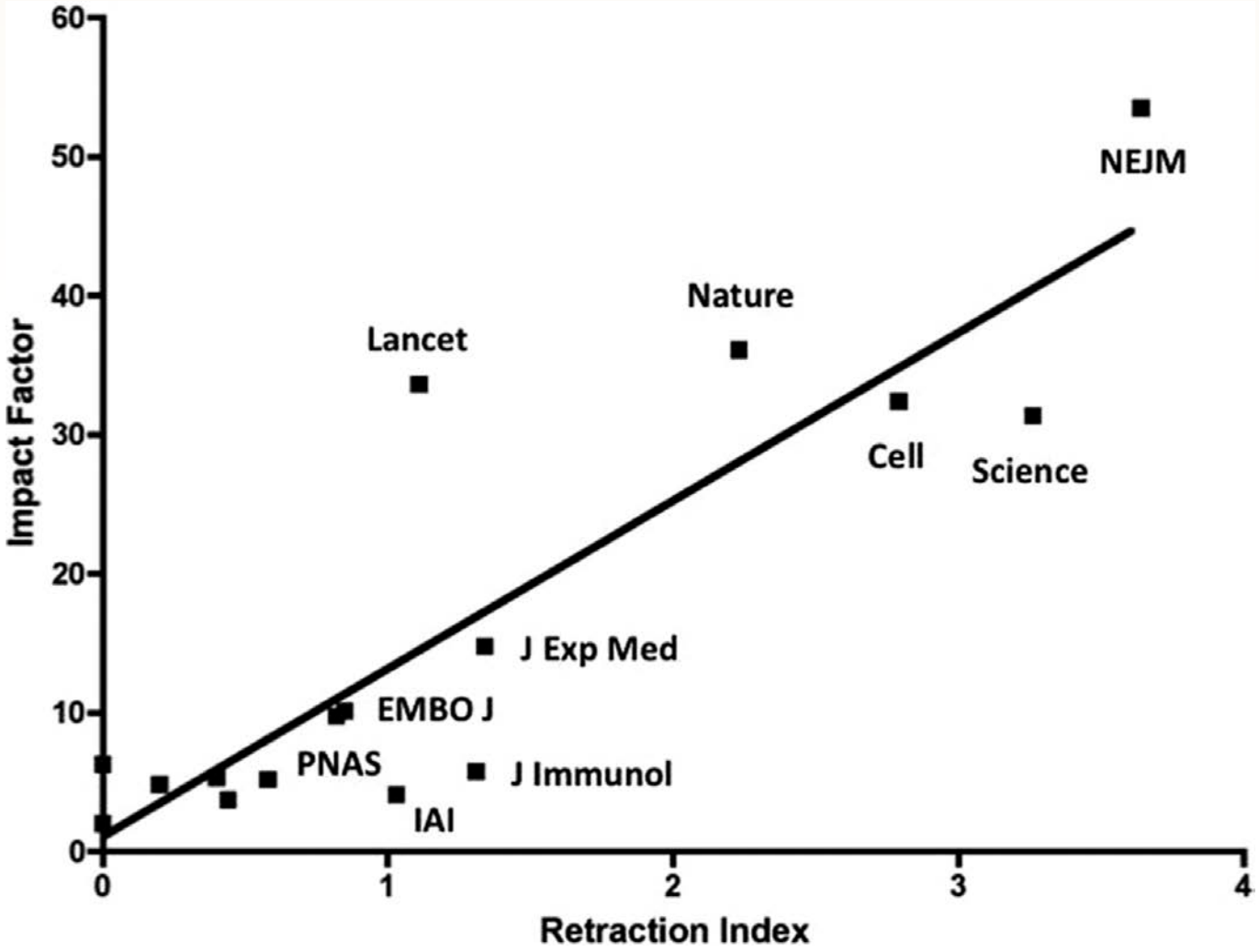


Nature, **533,** 452–454 (26 May 2016) doi:10.1038/533452a
http://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-1.19970

Problem 4: Retraction

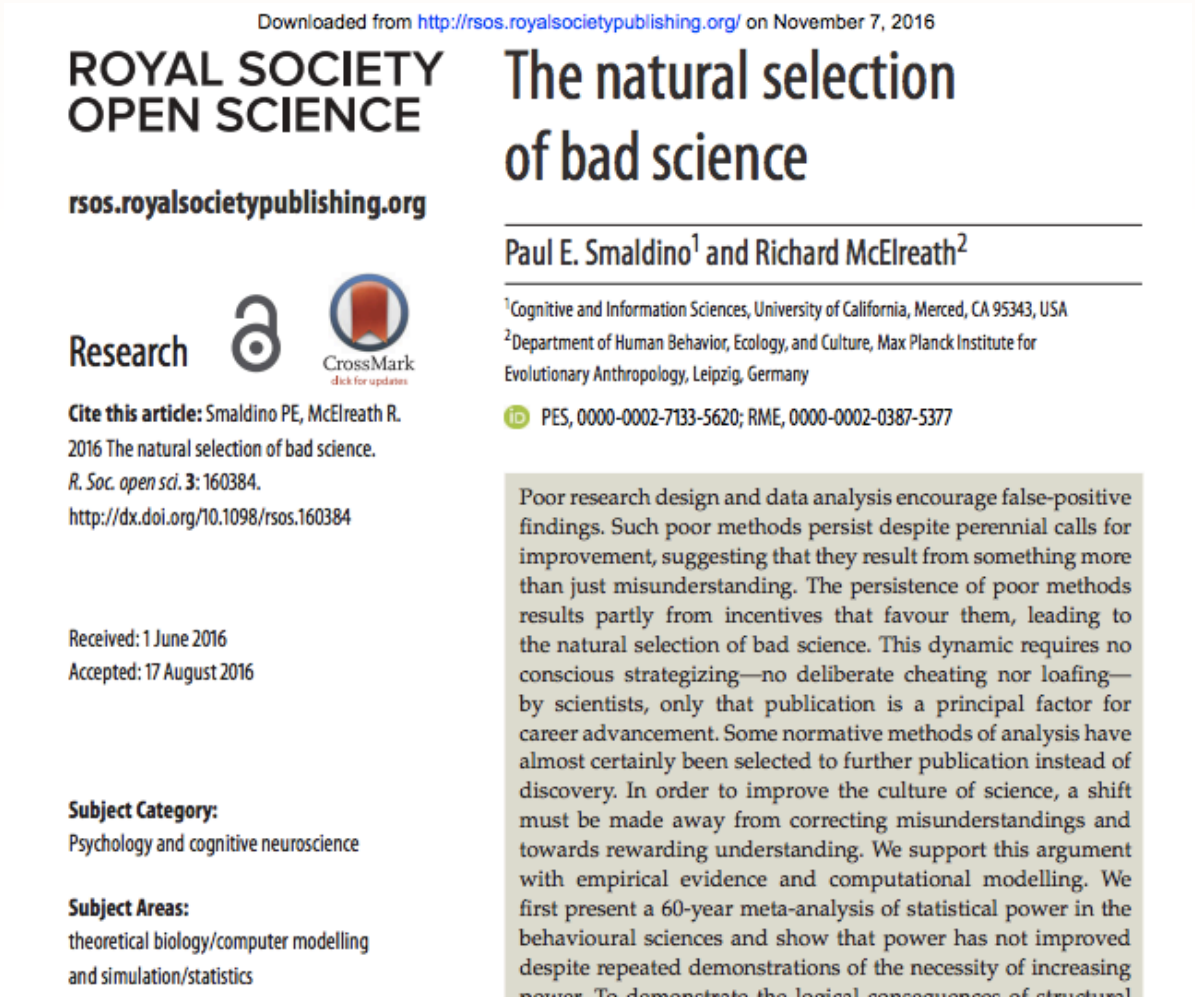
- According to Retraction Watch there are 500-600 retractions a year
  - http://retractionwatch.com/
- In 2014 a 14-month investigation by the publisher SAGE uncovered a fake peer-review scam involving hundreds of fraudulent and assumed identities. **A total of 60 research articles published over the past 4 years in the *Journal of Vibration and Control* (*JVC*) were retracted**.
  - http://www.sciencemag.org/news/2014/07/updated-lax-reviewing-practice-prompts-60-retractions-sage-journal
- Only 5% of publicly available versions (non-publisher websites) of retracted works have a retraction statement attached
  - http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3411255/

Correlation between impact factor and retraction index.



Ferric C. Fang, and Arturo Casadevall Infect. Immun. 2011;79:3855-3859

Problem 5: Poor science



ROYAL SOCIETY OPEN SCIENCE

rsos.royalsocietypublishing.org

Research

Cite this article: Smaldino PE, McElreath R. 2016 The natural selection of bad science. *R. Soc. open sci.* **3**: 160384. http://dx.doi.org/10.1098/rsos.160384

Received: 1 June 2016
Accepted: 17 August 2016

Subject Category:
Psychology and cognitive neuroscience

Subject Areas:
theoretical biology/computer modelling and simulation/statistics

The natural selection of bad science

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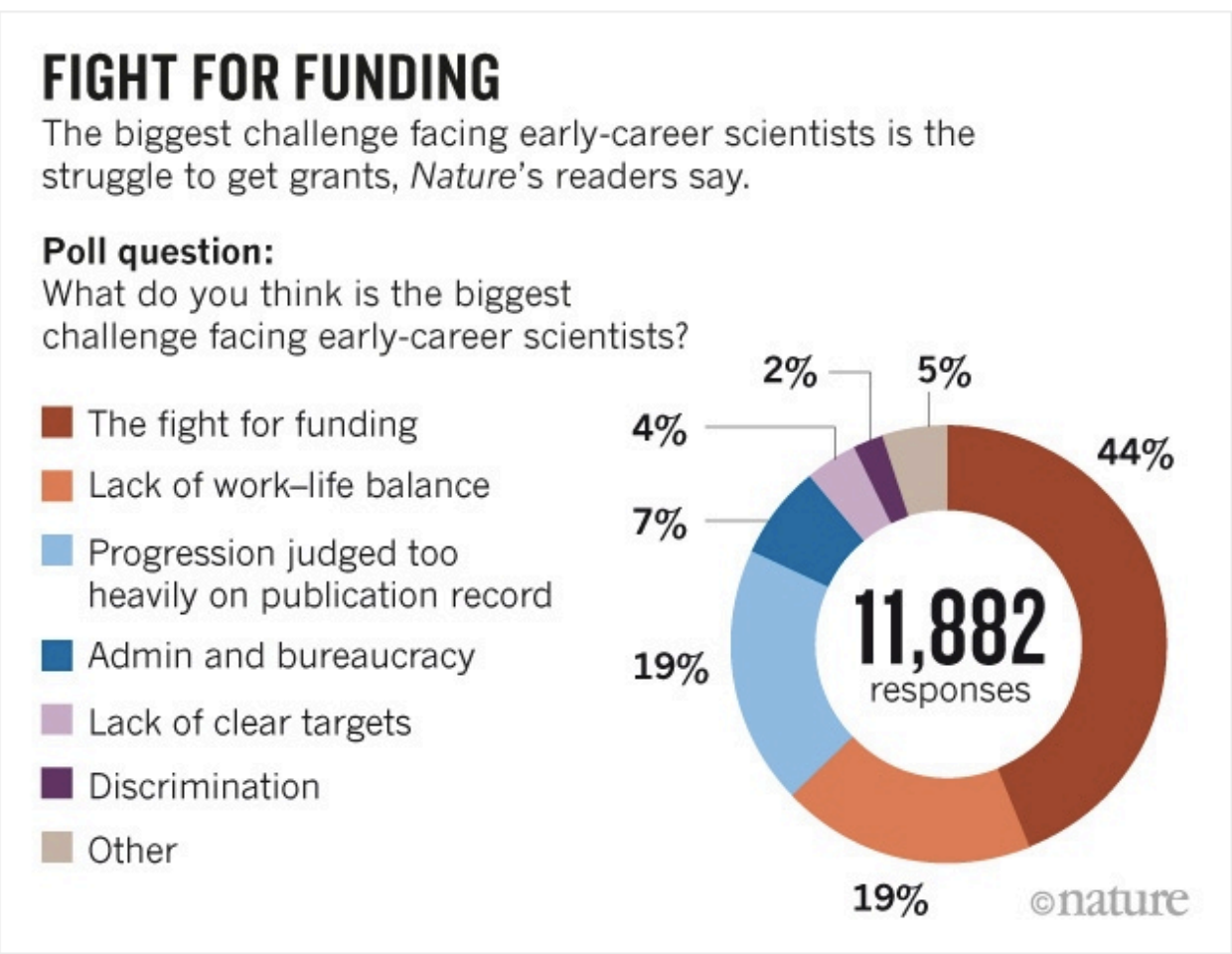
[2]Department of Human Behavior, Ecology, and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

PES, 0000-0002-7133-5620; RME, 0000-0002-0387-5377

Poor research design and data analysis encourage false-positive findings. Such poor methods persist despite perennial calls for improvement, suggesting that they result from something more than just misunderstanding. The persistence of poor methods results partly from incentives that favour them, leading to the natural selection of bad science. This dynamic requires no conscious strategizing—no deliberate cheating nor loafing—by scientists, only that publication is a principal factor for career advancement. Some normative methods of analysis have almost certainly been selected to further publication instead of discovery. In order to improve the culture of science, a shift must be made away from correcting misunderstandings and towards rewarding understanding. We support this argument with empirical evidence and computational modelling. We first present a 60-year meta-analysis of statistical power in the behavioural sciences and show that power has not improved despite repeated demonstrations of the necessity of increasing

http://rsos.royalsocietypublishing.org/content/royopensci/3/9/160384.full.pdf

Problem 6: Attrition crisis?



Hard work, little reward: Nature readers reveal working hours and research challenges, Nature News, 4 November 2016, http://www.nature.com/news/hard-work-little-reward-nature-readers-reveal-working-hours-and-research-challenges-1.20933

To recap

- Problem 1: Reluctance to share data
  - (all disciplines)
- Problem 2: Hyperauthorship
  - (Physics)
- Problem 3: Reproducibility
  - (Psychology, Neuroscience, Pharmacology)
- Problem 4: Retraction
  - (Biological and Medical Sciences)
- Problem 5: Poor Science
  - (Sociology, economics, climate science also vulnerable)
- Problem 6: Attrition
  - (all disciplines)
- This all comes down to the reliance on publication of novel results in high impact journals

Time for a change

 Image by Danny Kingsley

The whole outdated enterprise is kept alive for one main reason: the fact that employers and funders of researchers assess researchers primarily by where they publish. It's extraordinary to me and many others that the employers, mainly universities, outsource such an important function to an arbitrary and corrupt system.

'Richard Smith: Another step towards the post-journal world' BMJ blog, 12 Jul, 16

Solution

Photo from Flickr – by Andy

We distribute dissemination across the research lifecycle and reward it

- *The Case for Open Research* - series of blogs July & August 2016
  https://unlockingresearch.blog.lib.cam.ac.uk/?page_id=2#OpenResearch

Governments

http://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform

Governments

http://www.chiefscientist.gov.au/wp-content/uploads/20160716-NRIR-Capability-Issues-Paper-16-July-version-proposed-final....pdf

Governments

http://www.arc.ac.za/

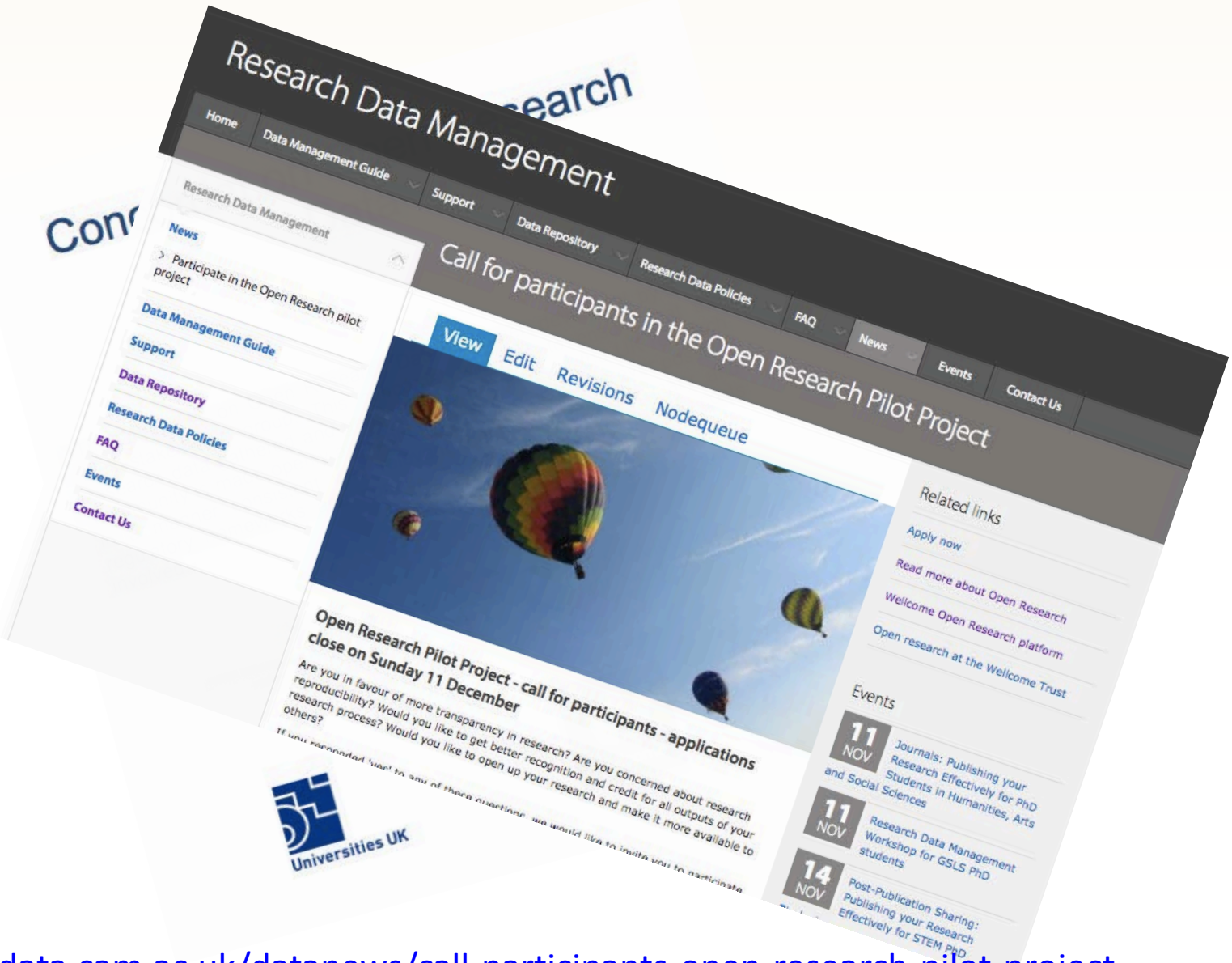
Governments

http://www8.cao.go.jp/cstp/sonota/openscience/150330_openscience_summary_en.pdf

Funders

http://www.rcuk.ac.uk/documents/documents/concordatonopenresearchdata-pdf/

Funders



http://www.data.cam.ac.uk/datanews/call-participants-open-research-pilot-project

Funders

Can publish data sets, case reports, protocols, null & negative results

wellcomeopenresearch.org/

Disciplines

Biomedical researchers	actively practice open research
Clinical researchers	practising open research
Population and public health researchers	experience challenges in data sharing that need addressing
Humanities researchers	have very little experience of data sharing and seemingly not much could motivate them to share their data
Social science researchers	little experience of data sharing and reuse and perceive minimal benefits from data sharing

Van den Eynden, Veerle et al. (2016) *Towards Open Research: practices, experiences, barriers and opportunities*. Wellcome Trust. https://dx.doi.org/10.6084/m9.figshare.4055448

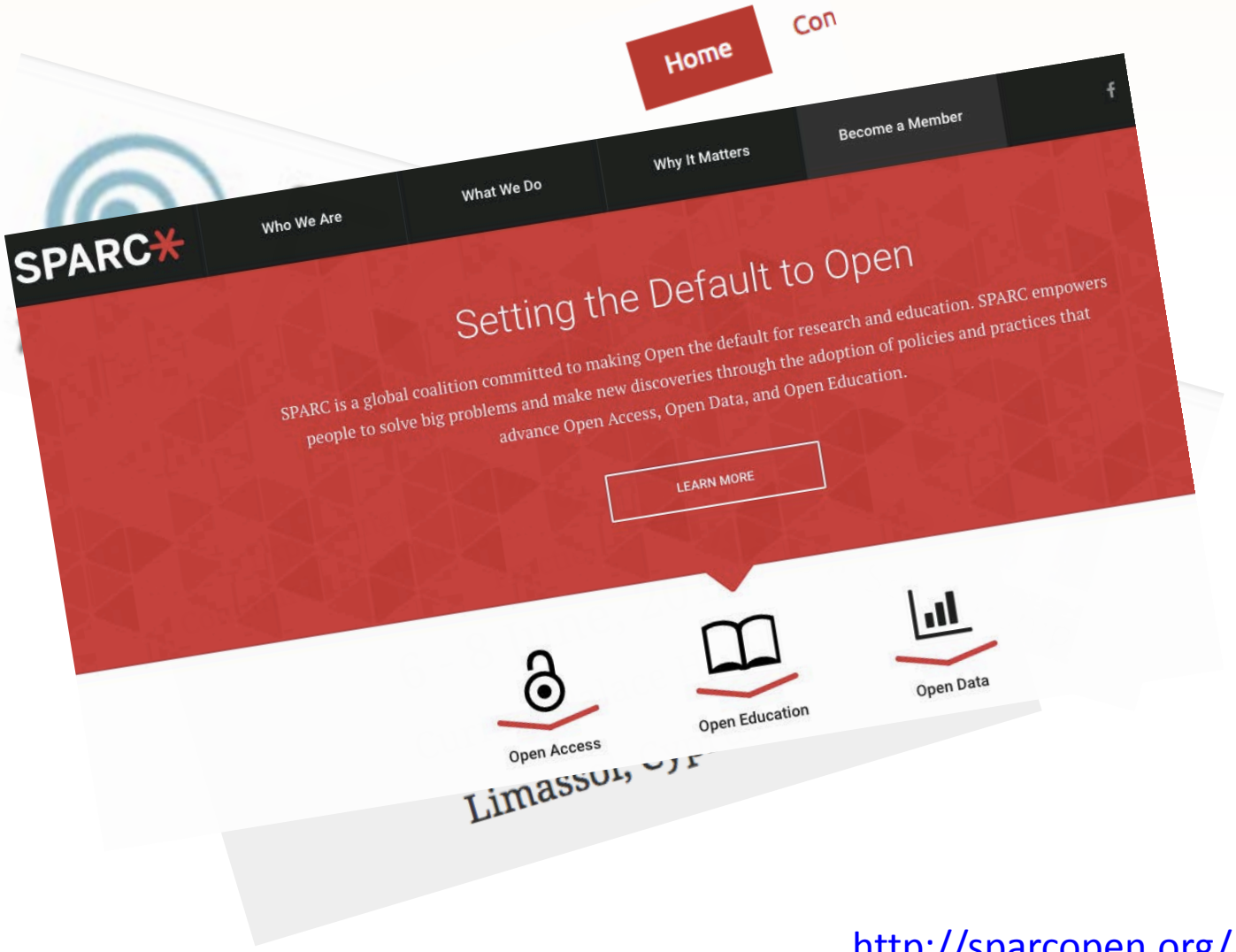
Community

http://elpub.net

Community

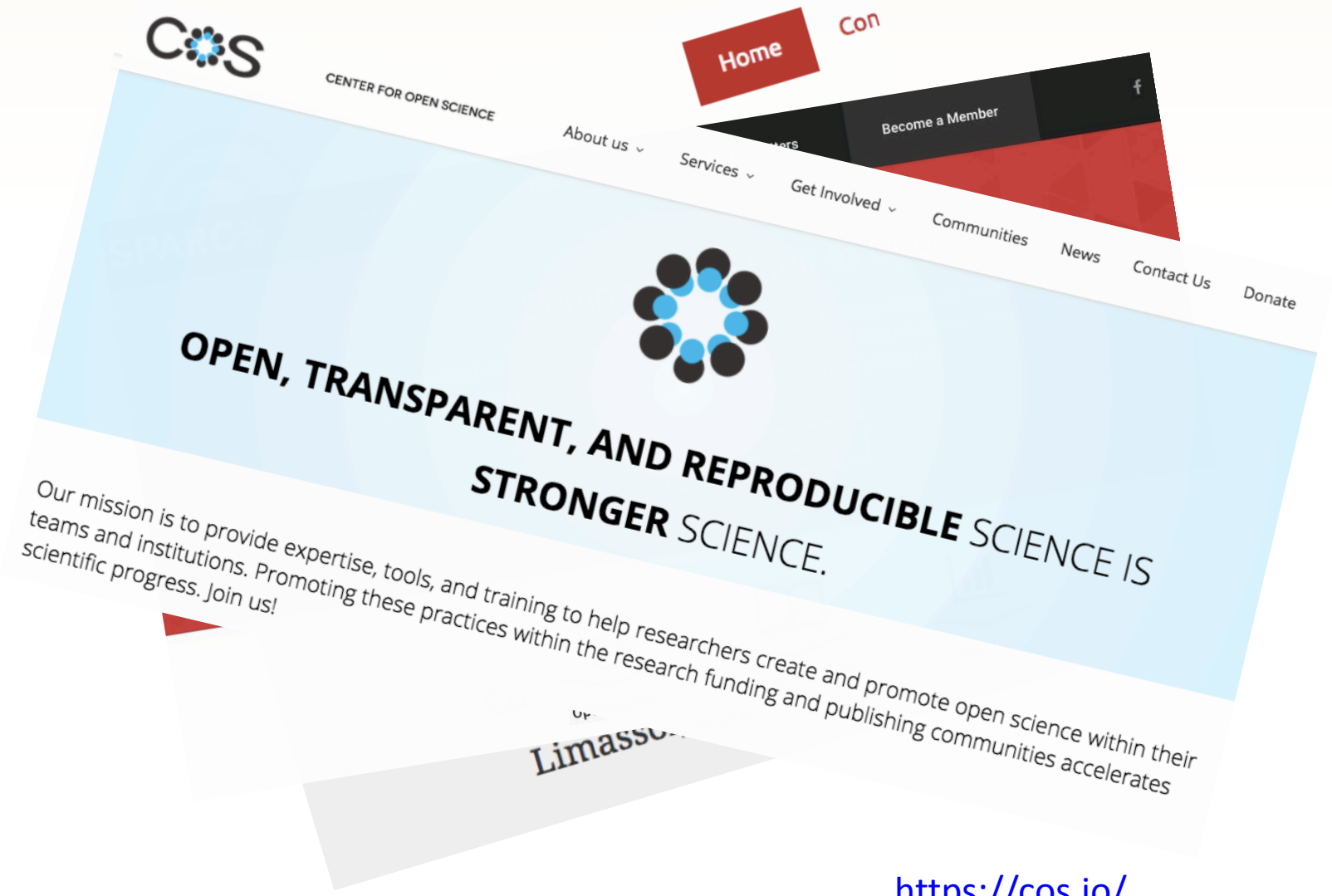
https://www.force11.org/about

Community



http://sparcopen.org/

Community



https://cos.io/

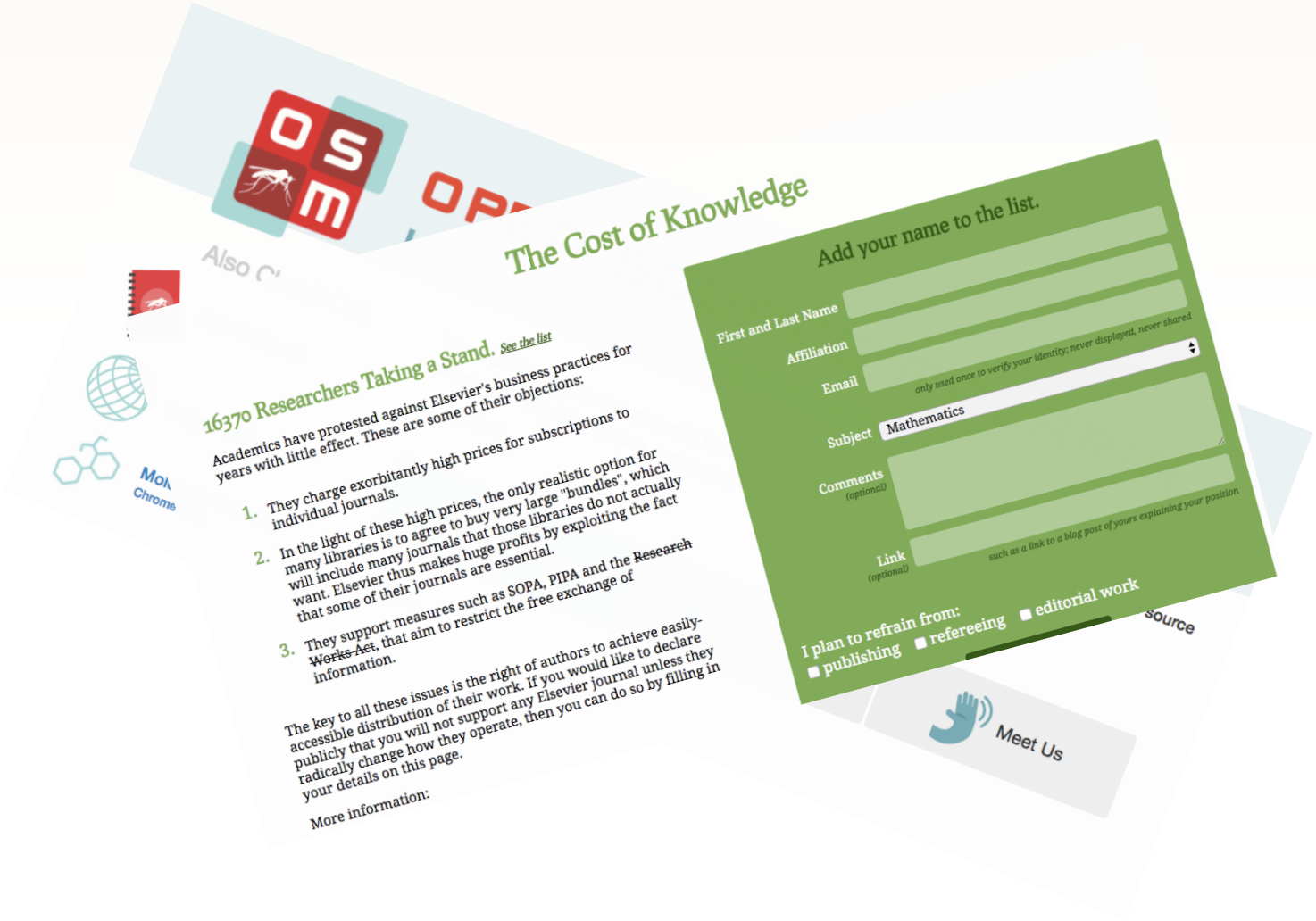
Community

http://www.opencon2016.org/

Individuals

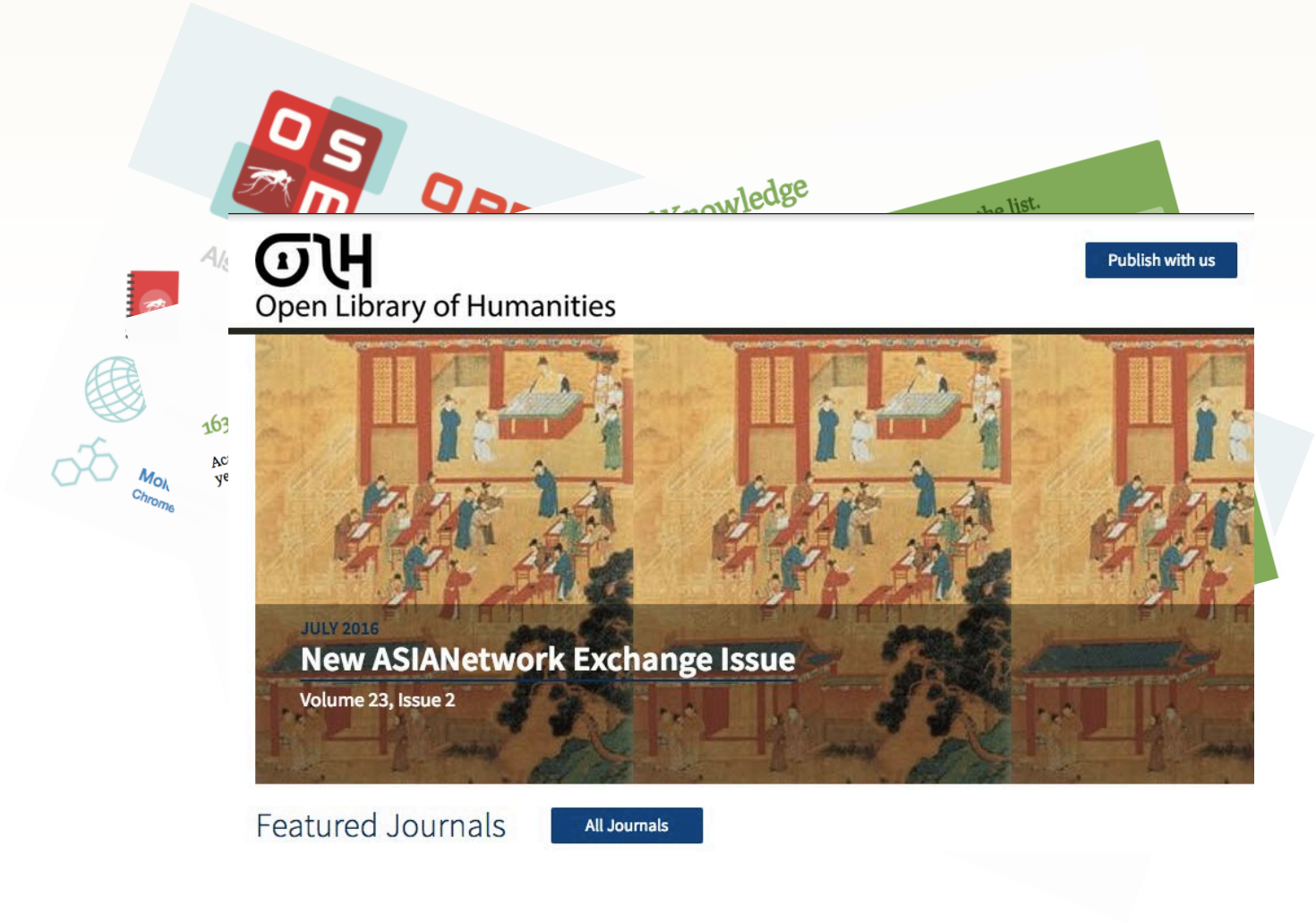
Matt Todd - http://opensourcemalaria.org/

Individuals



Tim Gowers - http://www.thecostofknowledge.com/

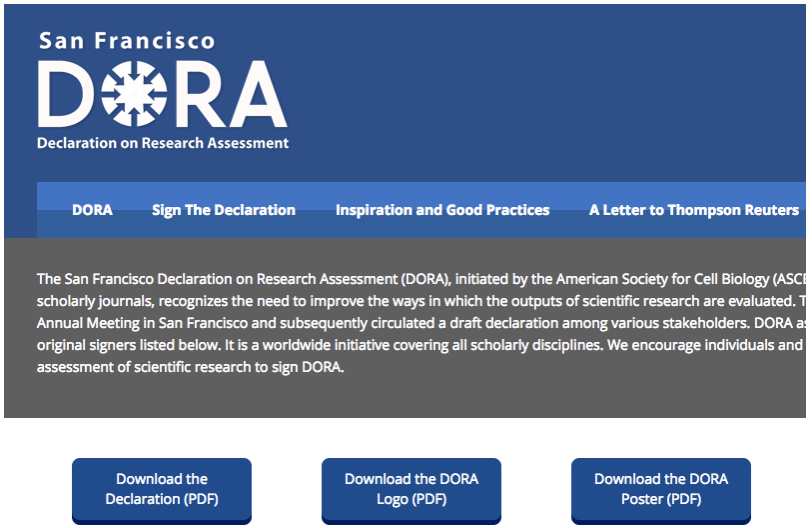
Individuals



Martin Paul Eve https://www.openlibhums.org/

Community action

- Themes
  - **Eliminate the use of journal-based metrics**, such as Journal Impact Factors, in funding, appointment, and promotion considerations;
  - The need to **assess research on its own merits** rather than on the basis of the journal in which the research is published; and
  - The need to **capitalize on the opportunities provided by online publishing**
  - >12,500 individuals & >900 organisations



San Francisco Declaration on Research Assessment

http://www.ascb.org/dora/

All the rage

arXiv.org

PeerJ Preprints - rapid communication & early findings

SOCARXIV
open archive of the social sciences

COGPRINTS
COGNITIVE SCIENCES EPRINT ARCHIVE

bioRxiv beta
THE PREPRINT SERVER FOR BIOLOGY

ACS Nano. 2016 Oct 25;10(10):9053-9054.

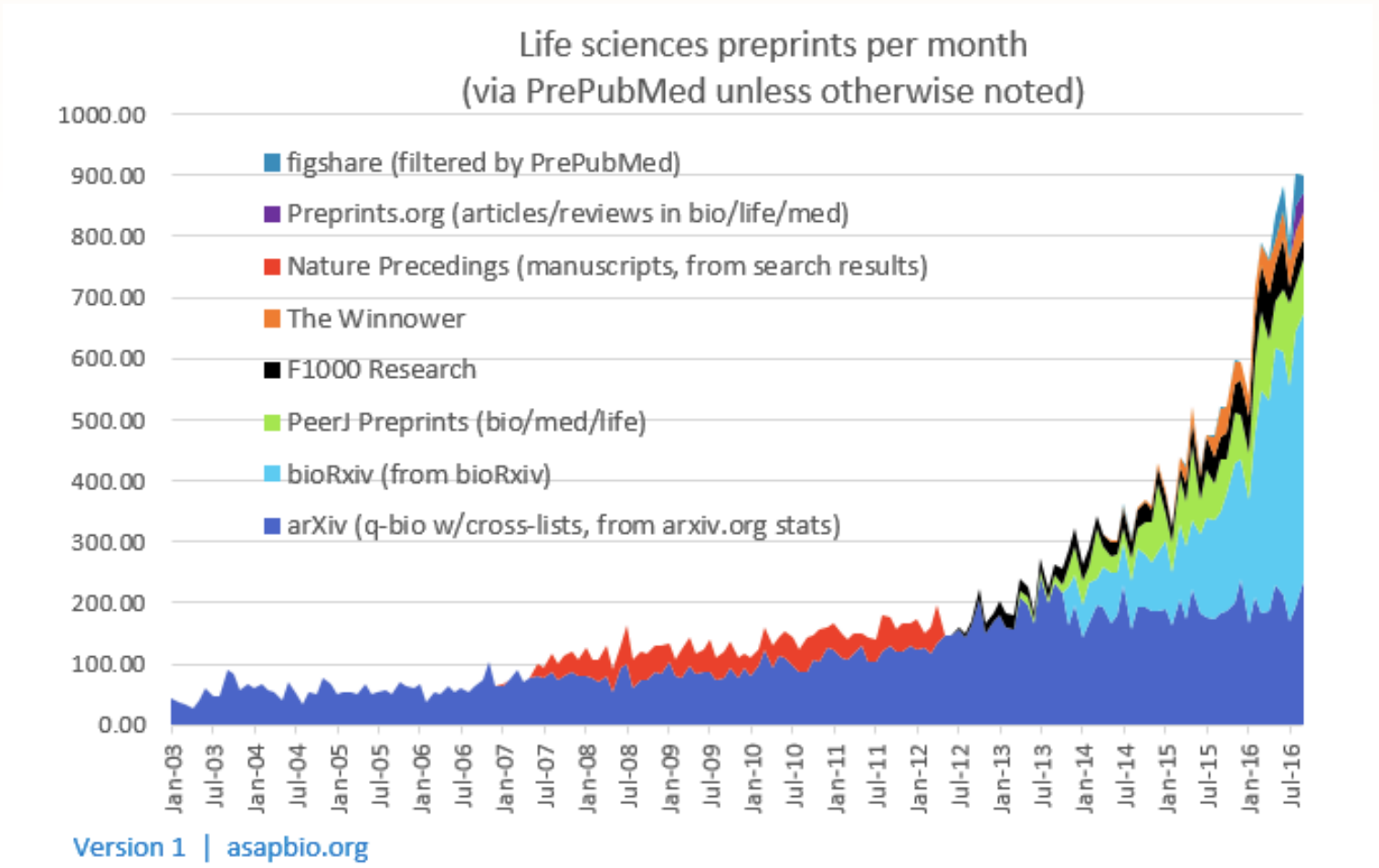
ChemRXiv: A Chemistry Preprint Server.

Kiessling LL, Fernandez LE, Alivisatos AP, Weiss PS.

PMID: 27776406 DOI: 10.1021/acsnano.6b07008

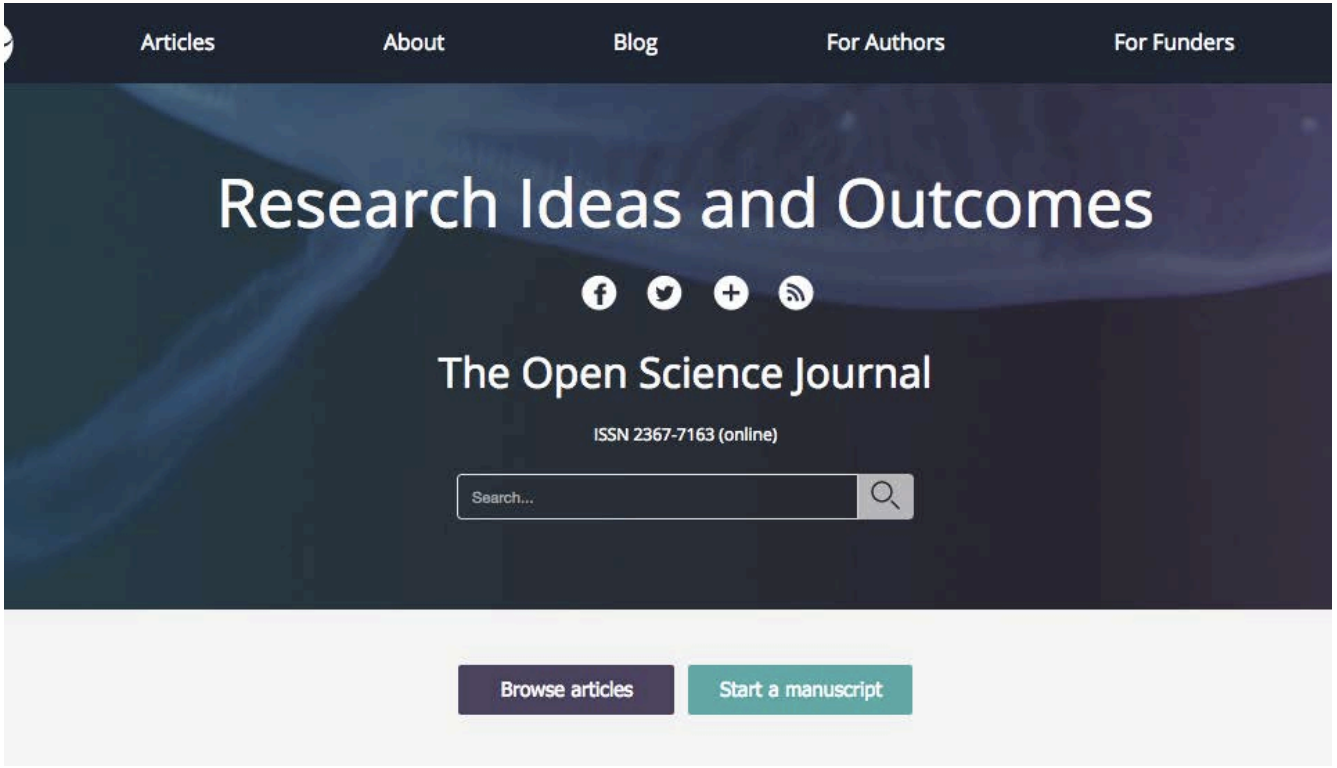
preprints

Dramatic growth



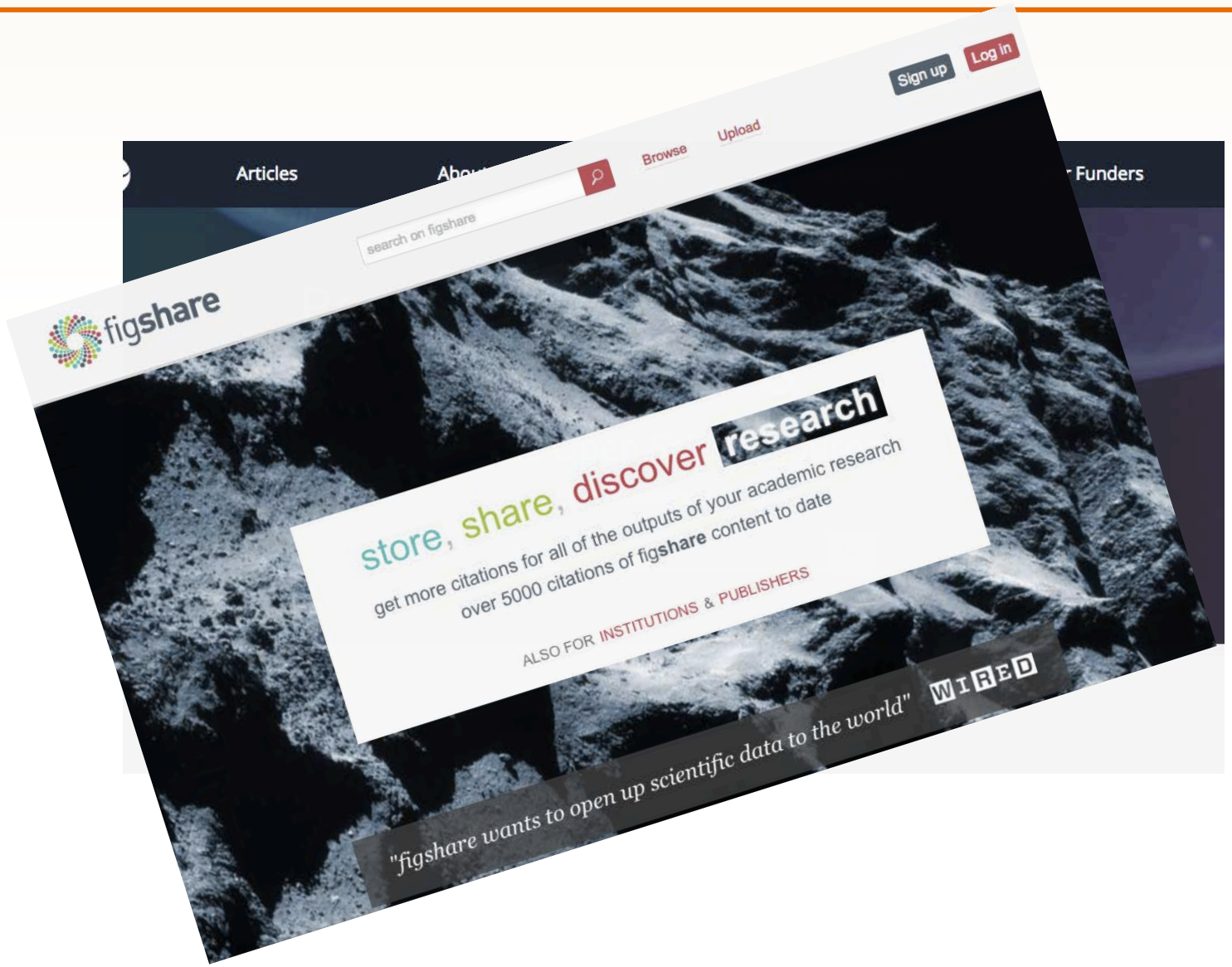
http://asapbio.org/preprint-info/biology-preprints-over-time

Publishing options



RIO Journal - http://riojournal.com/

Publishing options

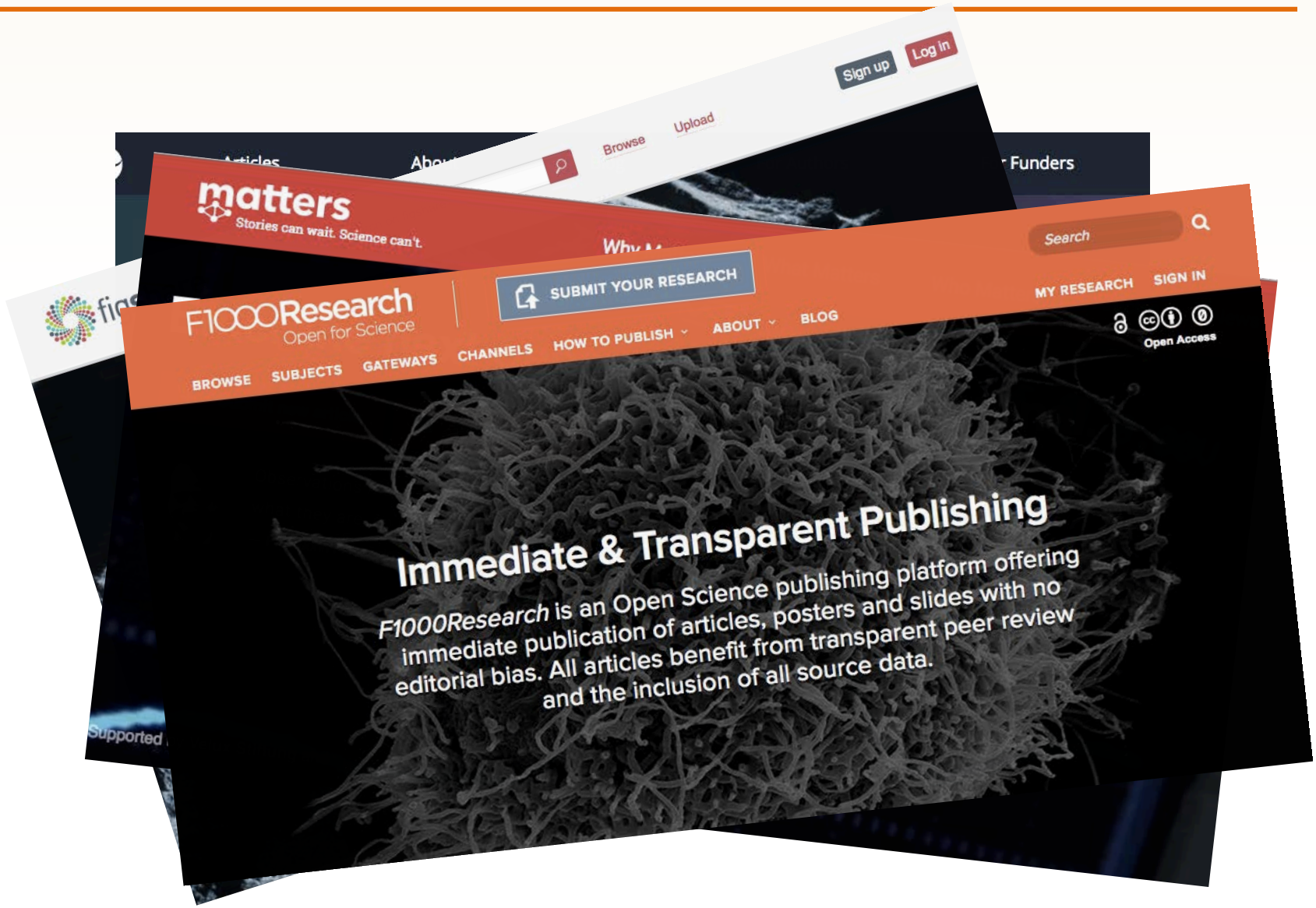


Figshare - https://figshare.com/

Publishing options

Matters - https://www.sciencematters.io/

Publishing options



F1000 - https://f1000research.com/

Publishing options

Missing Pieces: http://blogs.plos.org/everyone/2015/02/25/positively-negative-new-plos-one-collection-focusing-negative-null-inconclusive-results/

Publishing options

Registered Reports - https://www.elsevier.com/editors-update/story/peer-review/cortexs-registered-reports

Publishing options

GitHub- http://www.nature.com/news/democratic-databases-science-on-github-1.20719

Publishing options

PLOS Taxonomy of author contributions - http://journals.plos.org/plosone/s/authorship/?utm_source=plos&utm_medium=blog&utm_campaign=plos-1607-credit#loc-author-contributions

Recap

- There are many initiatives to open up aspects of research by:
  - Governments
  - Funders
  - Community organisations
  - Publishers
  - Individuals
- What about Institutions?

Institutions?

- “Improving the quality of research requires change at the institutional level”
  - Smaldino PE, McElreath R. 2016 The natural selection of bad science. R. Soc. open sci.3: 160384. http://dx.doi.org/10.1098/rsos.160384
- “Universities and research institutes should play a major role in supporting an open data culture”
  - Science as an open enterprise The Royal Society Science Policy Centre report 02/12 Issued: June 2012 DES24782https://royalsociety.org/~/media/policy/projects/sape/2012-06-20-saoe.pdf

Cautious

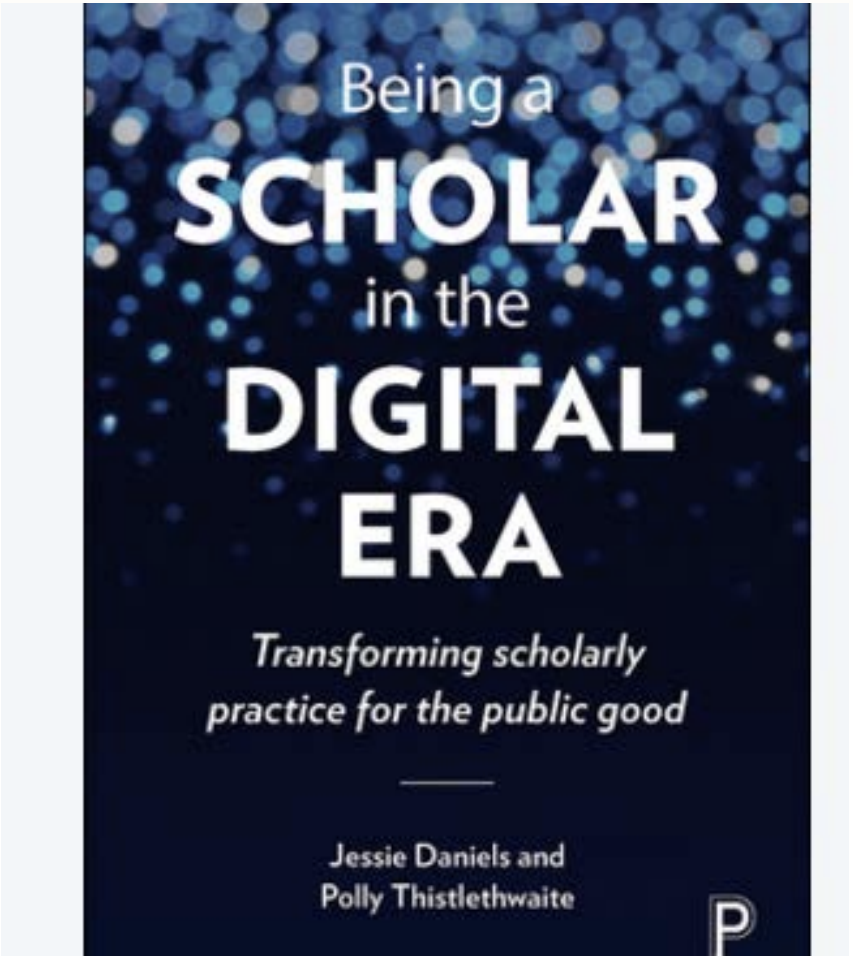
Image by Danny Kingsley

Resistance

- Generally institutions are reluctant to step up, partly because of the governance structure.
- **The nature of research itself is changing profoundly**. This includes extraordinary dependence on data, and complexity requiring intermediate steps of data visualisation. **These eResearch techniques have been growing rapidly, and in a way that may not be understood or well led by senior administrators.**
  - "Openness, integrity & supporting researchers" Emeritus Professor Tom Cochrane https://unlockingresearch.blog.lib.cam.ac.uk/?p=307

This is not easy

- "Academic administrators that I've talked to are genuinely confused about how to update legacy tenure and promotion systems for the digital era. This book is an attempt to help make sense of all this."
  - https://www.insidehighered.com/news/2016/10/06/qa-authors-book-scholarship-digital-era



Outliers

- Indiana University-Purdue University Indianapolis (IUPUI) –
  - Have included open access as a value in promotion and tenure guidelines (2016)http://crln.acrl.org/content/77/7/322.full
- University of Liege
  - "[The university] linked internal assessment to the scientific output stored in {repository] ORBi. Those applying for promotion have no choice but to file all their publications in full text." (2011) http://openaccess.eprints.org/index.php?/archives/853-The-Liege-ORBi-model-Mandatory-policy-without-rights-retention-but-linked-to-assessment-procedures.html

Research underway

- OOO Canada Research Network “Motivating Open Practices Through Faculty Review and Promotion - 25 October 2016
  - http://www.ooocanada.ca/motivating_open_practices_rpt
- NIH “Including Preprints and Interim Research Products in NIH Applications and Reports” – 6 October 2016
  - https://grants.nih.gov/grants/guide/notice-files/NOT-OD-17-006.html

Lots of work to be done

Image by Danny Kingsley

Questions/Discussion

Thanks!

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