

## The changing landscape of research metrics



<http://www.fameimages.com/tim-berners-lee-olympics>

**Professor Stephen Curry**  
Imperial College London

## Measurement (and metrics) have their uses...



<http://www.aronline.co.uk/blogs/news/news-uk-car-manufacturing-enjoys-bumper-2013/>



<https://www.nuh.com.sg/patients-and-visitors/patients-and-visitors-guide/choice-of-accomodation/ward-types.html>

...but where are the limits?

The *Times Higher Education* World University Rankings

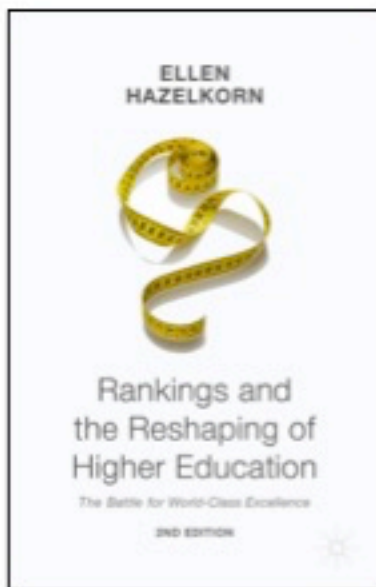
## World University Rankings 2013-2014

1	California Institute of Technology (Caltech)	United States	94.9
2	Harvard University	United States	93.9
2	University of Oxford	United Kingdom	93.9
4	Stanford University	United States	93.8
5	Massachusetts Institute of Technology (MIT)	United States	93.0
6	Princeton University	United States	92.7
7	University of Cambridge	United Kingdom	92.3
8	University of California, Berkeley	United States	89.8
9	University of Chicago	United States	87.8
10	Imperial College London	United Kingdom	87.5
11	Yale University	United States	87.4



# Metrics and the academy

ocomstypewriter.org/scurry



San Francisco  
**DORA**  
Declaration on Research Assessment

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

## Sick of Impact Factors

Posted on August 13, 2012 by Scurry

I am sick of impact factors and so is science.

The impact factor might have started out as a good idea, but its time has come and gone. [Conceived by Eugene Garfield](#) in the 1970s as a useful tool for research libraries to judge the relative merits of journals when allocating their subscription budgets, the impact factor is [calculated](#) annually as the mean number of citations to articles published in any given journal in the two preceding years.



## 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.

## My Word

### The mismeasurement of science

Peter A. Lawrence

Answer from the hero in Leo Szilard's 1948 story "The Mark Gable Foundation" when asked by a wealthy entrepreneur who believes that science has progressed too quickly, what he should do to retard this progress: "You could set up a foundation

release. The song writers would soon find that producing junky Christmas tunes and copying up to DJs from top radio stations advanced their careers more than composing proper music. It is not so funny that, in the real world of science, dodgy evaluation criteria such as impact factors and citations are dominating minds, distorting behaviour and determining careers.

Modern science, particularly biomedicine, is being damaged by attempts to measure the quantity and quality of research. Scientists are ranked according to these measures, a ranking that impacts on funding of grants, competition for posts and

Lawrence, P. A. (2007) *Curr. Biol.* 17, R583–5.

**COMMENT**

**The Leiden Manifesto for research metrics**

Use these ten principles to guide research evaluation, says Diana Hicks, Paul Wouters and colleagues.

**D**epending on how you define it, the impact factor is either a useful tool for research libraries to judge the relative merits of journals when allocating their subscription budgets, or a metric that distorts behaviour and determines careers. The impact factor is calculated annually as the mean number of citations to articles published in any given journal in the two preceding years.

**10** principles to guide research evaluation, says Diana Hicks, Paul Wouters and colleagues.

**1** Do not use journal impact factors or journal rankings to evaluate research performance. Use them only to support the operation of journals. In 2015, the European Commission will phase out journal impact factors, and the UK Higher Education Funding Council will phase out journal impact factors in 2016. The Leiden Manifesto will support the development of alternative metrics for research evaluation.

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<http://www.nature.com/news/0/bttonmetrics-the-leiden-manifesto-for-research-metrics-1.17352>

# The Metric Tide

Report of the Independent Review  
of the Role of Metrics in Research  
Assessment and Management

July 2015

## UK HEFCE Metrics Review 2014-15

Chair: **James Wilsdon**, University of Sussex.

### *Funders*

**Dr Liz Allen** (Head of Evaluation, Wellcome Trust)

**Dr Ian Viney** (Head of Evaluation, MRC) – representing RCUK

**Dr Simon Kerridge** (Director of Research Services, University of Kent)

**Dr Steven Hill** (Head of Research Policy, HEFCE)

### *Learned Societies*

**Professor Richard Jones FRS** – representing the Royal Society

**Professor Roger Kain FBA** – representing the British Academy

### *Publishers*

**Sir Philip Campbell** (Editor-in-Chief, Nature)

### *Academics*

**Dr Eleonora Belfiore** (University of Warwick)

**Professor Stephen Curry** (Imperial College London)

**Jane Tinkler** (LSE; Parliamentary Office of Science & Technology)

### *Bibliometricians*

**Professor Mike Thelwall** (University of Wolverhampton)

**Professor Paul Wouters** (Uni of Leiden)

# An open and robust process

- Broad terms of reference
- Open call for evidence, meetings & workshops
- Transparent: inputs & outputs published in real time
- In-depth review of the bibliometrics literature
- Quantitative correlation exercise relating REF outcomes to indicators of research





## Main findings

- The description, production and consumption of 'metrics' remains **contested** and open to **misunderstanding**.
- Peer review, despite its flaws and limitations, continues to command widespread support across disciplines.  
**Metrics should support, not supplant expert judgement.**
- Inappropriate indicators create **perverse incentives**, can be gamed, and may lead to **unintended consequences**.
- **Metrics should be used responsibly**: based on **open data** and used in a **context-sensitive manner** (e.g. with respect to disciplinary and researcher diversity)



newsblog  
Nature brings you breaking news from the world of science

News & Comment > News Blog > Post

Record number of journals banned for boosting impact factor with self-citations

29 Jun 2012 | 19:53 GMT | Posted by Richard Van Noorden | Category: Science communication

More research journals than ever are boosting their impact factors by self-citation.

INFORMING RESEARCH CHOICES: INDICATORS AND JUDGMENT

The Expert Panel on Science Performance and Research Funding



Council of Canadian Academies  
Conseil des académies canadiennes

Science Advice to the Public Interest

## Recommendations: Language

The research community should develop a more sophisticated approach to the contribution and limitations of quantitative indicators.

*Indicators, not metrics?*

## WORLD VIEW

A personal take on events



### We need a measured approach to metrics

Quantitative indicators of research output can inform decisions but must be supported by robust analysis, argues James Wilson.

**M**etrics evoke a mixed reaction from the research community. A commitment to using data and evidence to inform decisions makes many of us sympathetic to, even enthusiastic about, the prospect of granular, real-time analysis of our own activities. Excitement cannot take full advantage of the possibilities of big data, then who can?

If we only have to look at the blunt use of metrics such as journal impact factors, h indices and grant income targets to be reminded of the pitfalls. Some of the most precious qualities of academic culture resist simple quantification, and individual indicators can struggle to do justice to the richness and plurality of our research. The often, poorly designed evaluation criteria are distorting behaviour and determining careers. At their worst, metrics can contribute what James Williams, the former Archbishop of Canterbury, calls a "new barbarity" in our universities. Metrics hold real power: they are constitutive of values, identities and livelihoods.

Since April 2014, I have chaired an independent review of the use of research metrics for the UK government. This week, we publish the findings (<http://www.acas.ac.uk/indicators>).

They will feed into how British funding bodies will design the next round of research assessment in universities, which is used to allocate around £1.6 billion (£182.3 billion) of funding each year. And they will be of interest to any scientist who feels the rising tide of metrics lapping at their ankles. For the research community still has the ability and opportunity — and now a serious body of evidence — to influence how this tide washes through higher education and research.

One certainty is that the tide — and so the fear — of metrics will continue. There are growing pressures to audit and evaluate public spending on higher education and research, and policy-makers want more strategic intelligence on research quality and impact. Institutions need to manage and develop their strategies for research, and at the same time compete for prestige, students, staff and resources. Meanwhile, there is a massive increase in the availability of real-time big data on research uptake, and in the capacity of tools to analyse them.

In a positive sense, wider use of quantitative indicators, and the emergence of alternative metrics for societal impact, could support the transition to a more open, accountable and robustly funded research system. Yet only a minority of the scientists we consulted supported the increased use of metrics. It is clear that across the research community, the description, production and consumption of metrics remains contested and open to misunderstanding.

Our conclusion is that metrics should support, not supplant, expert judgement. Peer review is not perfect, but it is the best form of academic governance we have, and it should

remain the main basis by which to assess research papers, proposals and individuals.

Quantitative indicators can meet their potential only if they are underpinned by an open and interoperable data infrastructure. How underlying data are collected and processed — and the extent to which they remain open to interrogation — is crucial. Without the right identifiers, standards and semantics, we risk developing metrics that are not contextually robust or properly understood.

Universities, funders and publishers need to harmonise their systems of data capture. And they need to make it easier to find and assess fragmented information about research — particularly about funding. If metrics are to be reliable, and not add administrative burdens, the priority for the community must be the widespread introduction of unique identifiers, such as ORCID tags, for individuals and research works.

It is tempting to hold down complex judgements to simple scores and numbers, but there is legitimate concern that some quantitative indicators can be gamed, or lead to unintended consequences. Personnel managers and recruitment or promotion panels should be explicit about the criteria they use for decisions about academic appointments and promotions. These criteria should be founded in expert judgement and may reflect both the academic quality of outputs and wider contributions to policy, industry or society.

Such decisions will sometimes be usefully guided by metrics, if the measures are relevant to the criteria in question and are used responsibly. Article-level citation metrics can be useful indicators of academic impact as long as they are interpreted in the light of disciplinary norms and

with due regard to their limitations. Journal-level metrics, such as impact factors, should not be used in this way. To reduce the likelihood of abuse, publishers should stop their unhealthy emphasis on the journal impact factor as a promotional tool.

The research community needs to develop a more sophisticated and nuanced approach to metrics. (Then using the term 'metrics' is a problem, because it implies precision and objectivity. 'Indicators' is better.) This caution is crucial, and I write Nature's readers to share good and bad uses of metrics at our new blog [www.ResponsibleMetrics.org](http://www.ResponsibleMetrics.org). Borrowing from the Library Review's 'Bad Sex in 30 Seconds' award, every year we will award a 'Bad Metrics' prize to the most egregious example of an inappropriate use of quantitative indicators in research management. Sadly, I imagine there will be plenty to choose from. ■

James Wilson is professor of science and democracy at the University of Sussex, UK, and chair of the Independent Review of the Use of Metrics in Research Assessment & Management. e-mail: [j.wilson@sussex.ac.uk](mailto:j.wilson@sussex.ac.uk)

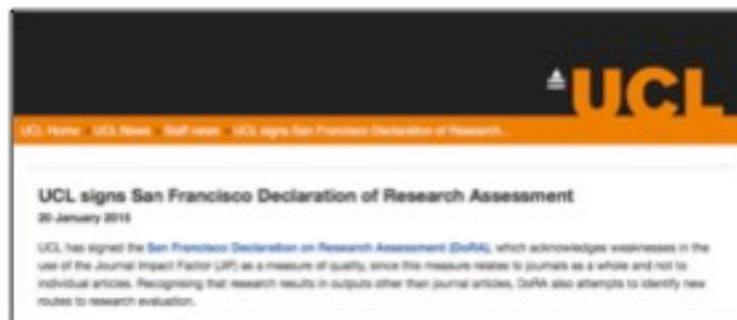
THERE IS LEGITIMATE CONCERN THAT SOME QUANTITATIVE INDICATORS CAN BE GAMED.

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[go.nature.com/5lqjw](http://go.nature.com/5lqjw)



## Recommendations: Principles

HE leaders and research funders should develop a **clear statement of principles** on their approach to research management and assessment, including the role of indicators.



UCL Home UCL News Staff news UCL signs San Francisco Declaration of Research Assessment

### UCL signs San Francisco Declaration of Research Assessment

20 January 2015

UCL has signed the [San Francisco Declaration on Research Assessment \(DoRA\)](#), which acknowledges weaknesses in the use of the Journal Impact Factor (JIF) as a measure of quality, since this measure relates to journals as a whole and not to individual articles. Recognising that research results in outputs other than journal articles, DoRA also attempts to identify new routes to research evaluation.



THE HIGHER EDUCATION ACADEMY

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HOME > WELCOME WARNING ABOUT METRICS MORASS

### Wellcome warning about metrics morass

Altmetrics forum weighs the value of impact data from blogs, 'tlikes', web traffic. Paul Jump reports

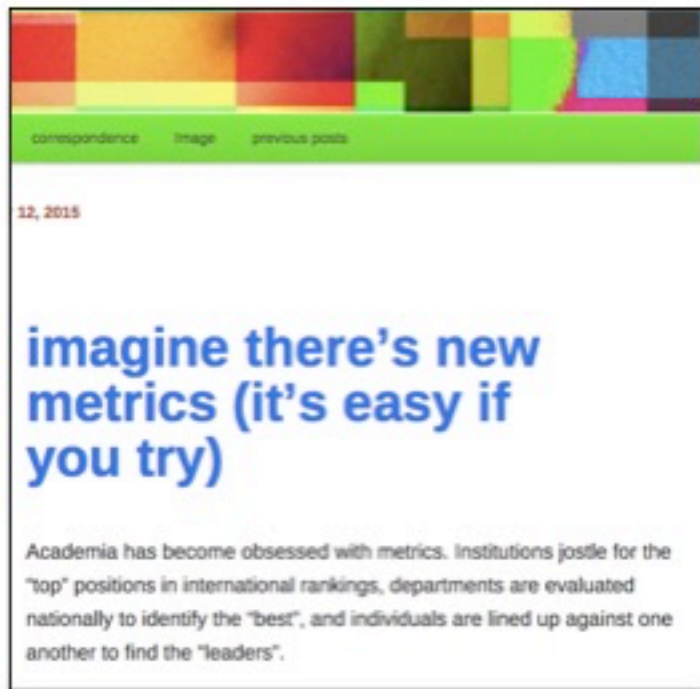
OCTOBER 2 2014

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## Recommendations: Mindfulness

Research managers, administrators, recruiters, promotion panels *and* researchers should all be mindful of the limitations of metrics/indicators

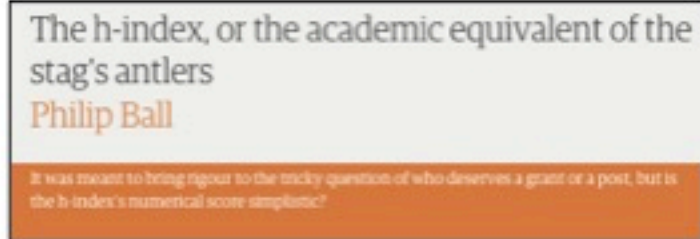
A screenshot of a blog post header. At the top is a decorative banner with a grid of colorful squares in shades of red, orange, yellow, green, blue, and purple. Below the banner is a light green navigation bar with the text 'correspondence', 'Image', and 'previous posts'. The main content area has a white background. The date '12, 2015' is displayed in red. The title 'imagine there's new metrics (it's easy if you try)' is in large blue font. Below the title is a paragraph of text in black font.

correspondence Image previous posts

12, 2015

### imagine there's new metrics (it's easy if you try)

Academia has become obsessed with metrics. Institutions jostle for the "top" positions in international rankings, departments are evaluated nationally to identify the "best", and individuals are lined up against one another to find the "leaders".

A screenshot of a blog post header. The background is a light grey gradient. The title 'The h-index, or the academic equivalent of the stag's antlers' is in black font. Below the title is the author's name 'Philip Ball' in orange font. At the bottom is an orange bar with white text.

The h-index, or the academic equivalent of the stag's antlers

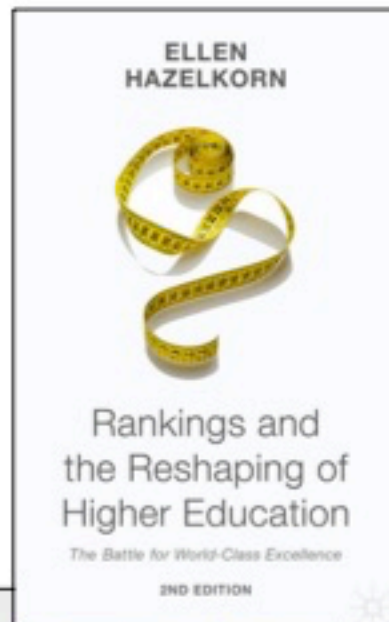
Philip Ball

It was meant to bring rigour to the tricky question of who deserves a grant or a post, but is the h-index's numerical score simplistic?

## Recommendations: Transparency

Data providers, producers of university rankings and publishers should strive for greater transparency – acknowledge limitations and uncertainties, and provide access to the data.

Research information should be open and trustworthy.



The image is a screenshot of a social media post from 'Reciprocal Space'. At the top, there's a header with the text 'Reciprocal Space' and a navigation bar with 'Home' and 'About Reciprocal'. Below the header is a photograph of a large, reflective, metallic sphere (The Bean) in an urban setting. Underneath the photo is a text area with a quote: 'Data not shown: time to distribute some common sense about impact factors'. Below the quote, it says 'Posted on June 23, 2015 by Reciprocal'. At the bottom, there's a link: 'It's that time of year when all clear-thinking people die a little inside: the latest set of journal impact factors has just been released.'.



## Gender issues

...any system of assessment based on total citation numbers (such as an h-index) was likely to **favour more established researchers**

...need to **humanise** the metrics debate (context is paramount)

Consideration should be paid to the **potential to change** systemic and researcher behaviours...

For early-career researchers, **metrics can shape** the character of academic practice.



## Finally... some thoughts

**Trouble with good intentions:** “Pretty curious” (EDF); “Science: it’s a girl thing!” (EU)

**Trouble with girls – and social media:** “It was an unbelievably stupid thing to say. You can see why it could be taken as offensive if you didn’t know Tim...”

**Trouble with perception:** In 1990, 14% of crystallographers were female; some reckoned field to be “saturated with women”.

**Trouble with majorities:** Men have to be involved in this issue, but dominant group lacks awareness of the perspective of women’s experiences



Photo: Kathleen Lathrop was one of the first women to be elected to the Royal Society.

### Women in crystallography

Georgina Ferry celebrates the egalitarian,  
collaborative culture that has so far produced two  
female Nobel prizewinners.



Thank you

<http://www.hefce.ac.uk/pubs/rereports/Year/2015/metrictide/Title,104463,en.html>

