Open methods: bringing transparency to research metrics

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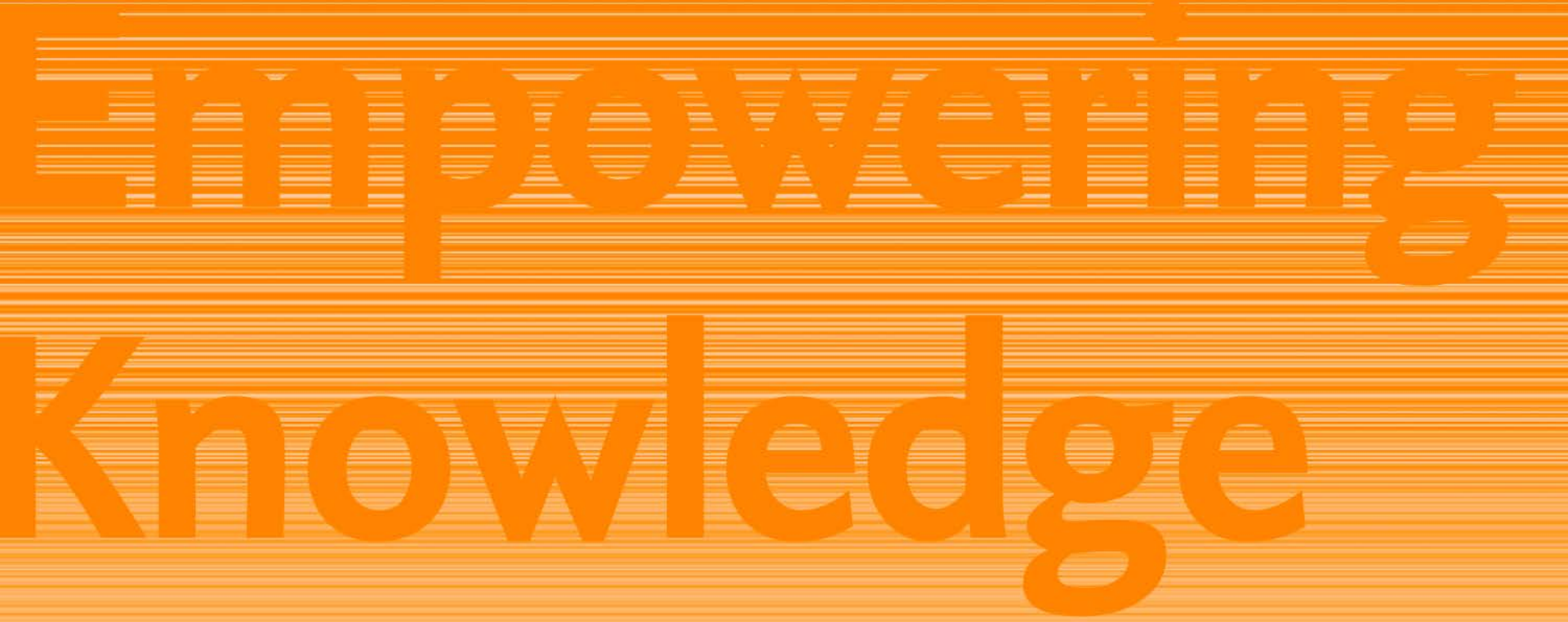


November 2014

Science 2.0: an evolution of research

- Research is changing in a bottom-up process driven by
  - *Growth in number of researchers*
  - *Significant increase in research production*
  - Emergence of new research powerhouses e.g. Asia
  - *Increasing predominance of data-intensive research, and availability of (low cost) digital technology*
  - The growing and increasingly pressing demand for solutions to Grand Challenges (e.g. climate change, food shortage) and the societal expectation that research should deliver
  - The growing scrutiny with regard to research integrity and to the accountability of research within societies
- 'Science 2.0' is therefore understood as a systemic change in the modus operandi of doing and organizing research

Based on European Commission public consultation document: http://ec.europa.eu/research/consultations/science-2.0/background.pdf

Science 2.0: a revolution of research?

- Discourse and influence is becoming more open
- Cloud-based technology means massive digital infrastructures are available to all
- 'Science 2.0' can be seen as a re-structuring of the research infrastructure

Possible implications of Science 2.0

- How research is conducted
- Potential benefits for innovation and the economy through the uptake of results by businesses
- Maybe a considerable societal and economic impact through increased engagement of the public
- Increase in transparency and openness of the international research system

Based on European Commission public consultation document: http://ec.europa.eu/research/consultations/science-2.0/background.pdf

Implications of the migration

- Evidence for migration can be seen in data from social networks
- Alternative metrics
  - Scholarly activity
  - Social activity
  - Scholarly comments and reviews
  - Mass media
- Citation-based metrics

The increasing number of perspectives

- Funders
- Institutions
- Researchers
- Publishers
- Bloggers
- Advocates and lobbyists
- Trolls
- Citizen scientists…

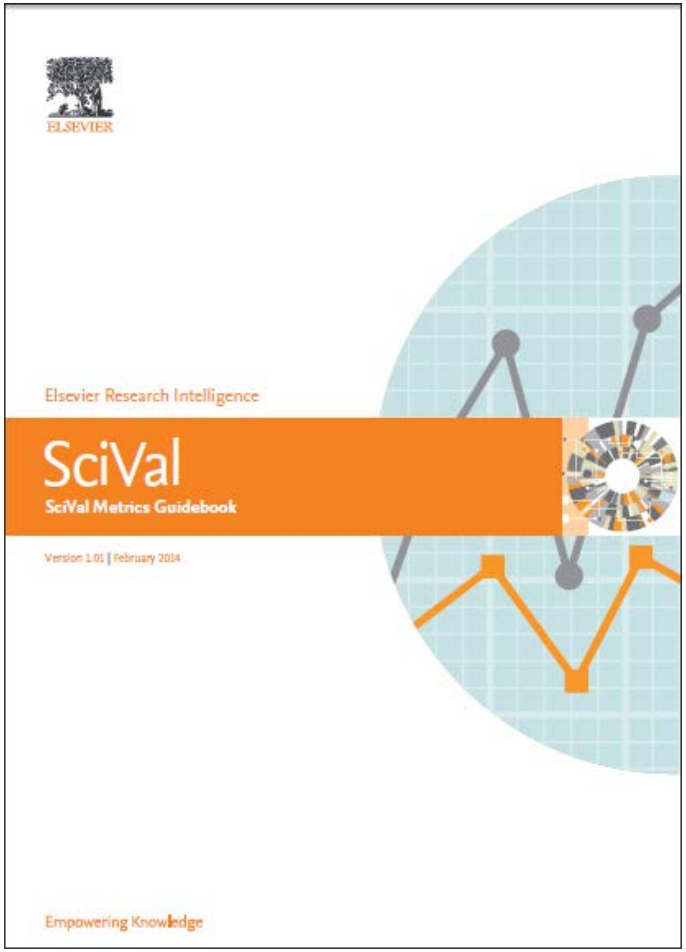
- … all asking questions

One number to rule them all?

- Metrics has to get more sophisticated
- We prefer to work with a “basket of metrics”, that can be used intelligently by the questionnaire
- Eg, “understanding internationalization”
  - Subject matter
  - Co-authorships
  - Readership
  - Funding
  - Location
  - Citation
  - Social reach
  - Scholarly reach
  - Policy

The importance of open methods

- Data-source agnostic
- No black box
- Community driven
- Agreement on question, vocabulary and the form of the answer!
- Validation by research



http://www.elsevier.com/online-tools/research-intelligence/resource-library/resources/scival-metrics-guidebook

Shall I compare thee to a summer's day?

- A metric in action
- Institution A uses Database W to compute its "impact"
- Institution B uses Database S to compute its "impact"
- The same methodology, different data, so the comparisons aren't valid
- But Institution A can compute values for Institution B, using Database W
- And Institution B can compute values for Institution A, using Database S
- And now we can have a qualified conversation
- And Databases W & S might be compared!

Snowball Metrics recap

The origins of Snowball Metrics

Snowball Metrics

Competitive award won by Imperial College London and Elsevier to **investigate the state of research management** in the UK

Clear trends were voiced:

- *"Unless you have [data] you cannot **make informed decisions**; you would be acting based on opinions and hearsay."*
- *"[There is little] **thought leadership and knowledge development** around best practice."*
- *"The **principle drivers for our systems are often external**… but they shouldn't be… a research strategy should… be developed… to respond to our strengths and the external environment, our systems should be defined to run our business."*

Report available at http://www.snowballmetrics.com/wp-content/uploads/research-information-management1.pdf

University recommendations

Snowball Metrics

1

"The lack of a long-term vision makes it hard to… co-operate within a university let alone across the sector."

Universities and funders should work more collaboratively, and develop stronger relationships with suppliers

"Universities should work together more to make their collective voice heard by external agencies."

"Suppliers do not know what research offices do on a daily basis." "How educated are we at asking suppliers the right questions?"

2

"Someone needs to take ownership of the process: it is impossible to please all of the people all of the time so somebody needs to be strong enough to stand behind decisions and follow through."

"It would be great if the top five [universities] could collaborate."

Snowball Metrics project partners

Snowball Metrics

UK group

UNIVERSITY OF CAMBRIDGE

UCL

UNIVERSITY OF LEEDS

UNIVERSITY OF OXFORD

Imperial College London

University of BRISTOL

Queen's University Belfast

University of St Andrews

ELSEVIER

US group

University of Michigan
University of Minnesota
Northwestern University
University of Illinois at Urbana-Champaign
Arizona State University
MD Anderson Cancer Center
Kansas State University

Australia/New Zealand group

University of Queensland
University of Western Australia
University of Auckland
University of Wollongong
University of Tasmania
Massey University
University of Canberra
Charles Darwin University

Snowball Metrics in a nutshell

Snowball Metrics

Vision: Snowball Metrics enable benchmarking by driving quality and efficiency across higher education's research and enterprise activities, regardless of system and supplier

- **Bottom-up initiative**: universities define and endorse metrics to generate a **strategic dashboard**. The community is their guardian
- Draw on all data: **university, commercial and public**
- Ensure that the metrics are **system- and tool-agnostic**
- Build on **existing definitions and standards** where possible and sensible

euroCRIS
Current Research Information Systems

casrai
Connecting Research

HIGHER EDUCATION STATISTICS AGENCY

National Science Foundation
WHERE DISCOVERIES BEGIN

Main roles and responsibilities

Snowball Metrics

- **Everyone covers their own costs**
- **Universities**
  - **Agree the metrics to be endorsed** as Snowball Metrics
  - **Determine methodologies** to generate the metrics in a commonly understood manner to enable benchmarking, regardless of systems
- **Elsevier**
  - **Ensures that the methodologies are feasible**
  - **Distribute the outputs** using global communications networks
  - **Day-to-day project management** of the global program
- **Outside the remit of the Snowball Metrics program**
  - **Nature and quality of data sources** used to generate Snowball Metrics
  - **Provision of tools** to enable generation and use Snowball Metrics

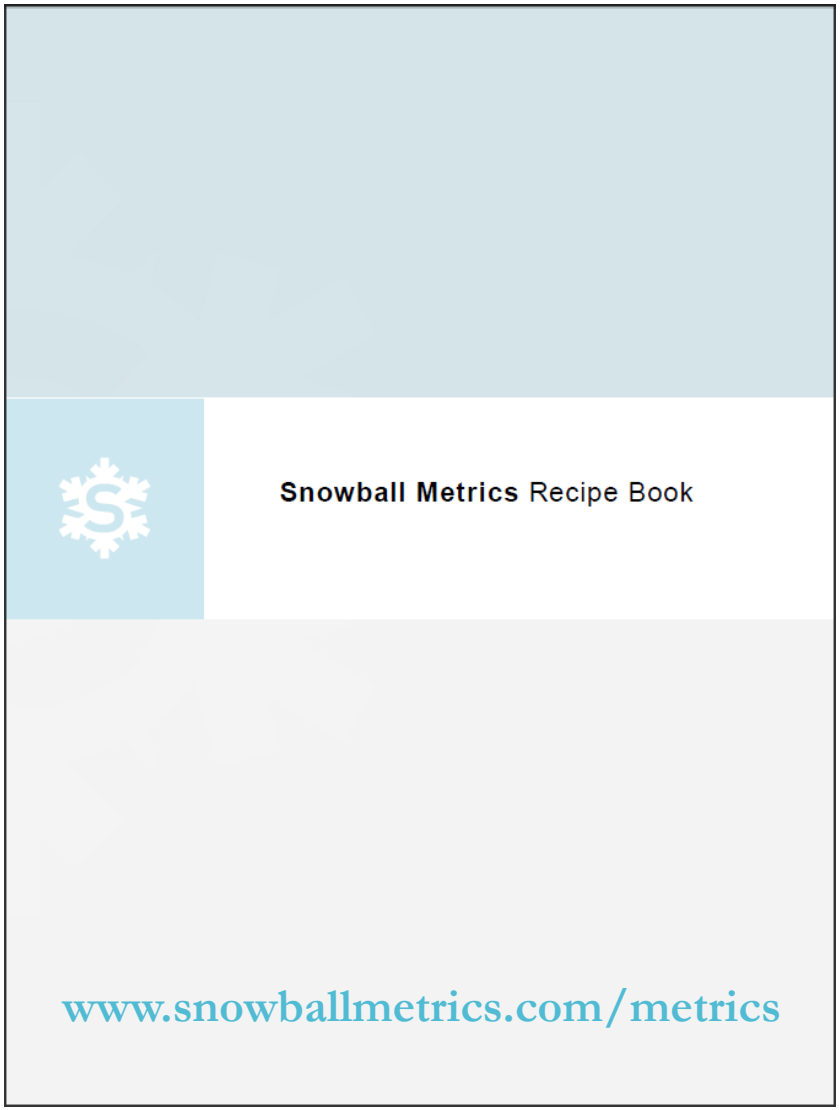
The output of Snowball Metrics

Snowball Metrics

"Recipes" – free, agreed and tested metric methodologies – are the output of Snowball Metrics

From Statement of Intent:

- Agreed and tested methodologies… are and will continue to be **shared free-of-charge**
- **None of the project partners will at any stage apply any charges for the methodologies**
- **Any organization can use these methodologies for their own purposes, public service or commercial**



Statement of Intent available at http://www.snowballmetrics.com/wp-content/uploads/Snowball-Metrics-Letter-of-Intent.pdf

Recipe book version 2

Enormous flexibility in understanding performance is possible from this "basket" of standard metrics, especially with the "slicing and dicing" that can be applied

	Research Inputs	*Research Process*	*Research Outputs and Outcomes*
Research	**Applications Volume** **Awards Volume**	**Income Volume** **Market Share**	**Publications & citations** • Scholarly Output (enhanced) • Citation Count • Citations per Output • *h*-index • Field-Weighted Citation Impact • Outputs in Top Percentiles • Publications in Top Journal Percentiles **Collaboration** • Collaboration • Collaboration Impact • Academic-Corporate Collaboration • Academic-Corporate Collaboration Impact **Societal impact** • Altmetrics • Public Engagement
Enterprise Activities/ Economic Development	• Academic-Industry Leverage • Business Consultancy Activities	• Contract Research Volume	• Intellectual Property Volume • Intellectual Property Income • Sustainable Spin-Offs • Spin-Off-Related Finances
Post-Graduate Education			

Recipes in first recipe book

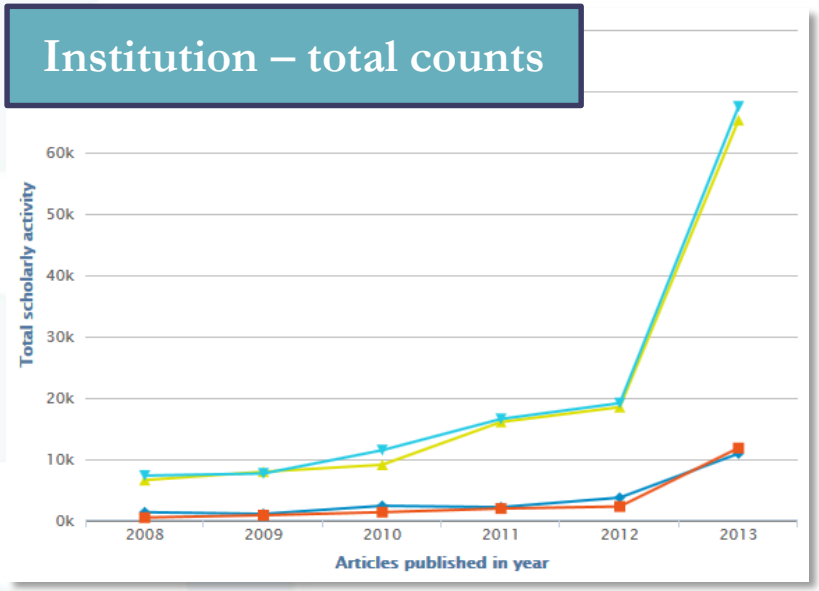
Recipes added in second recipe book

New: altmetrics recipe

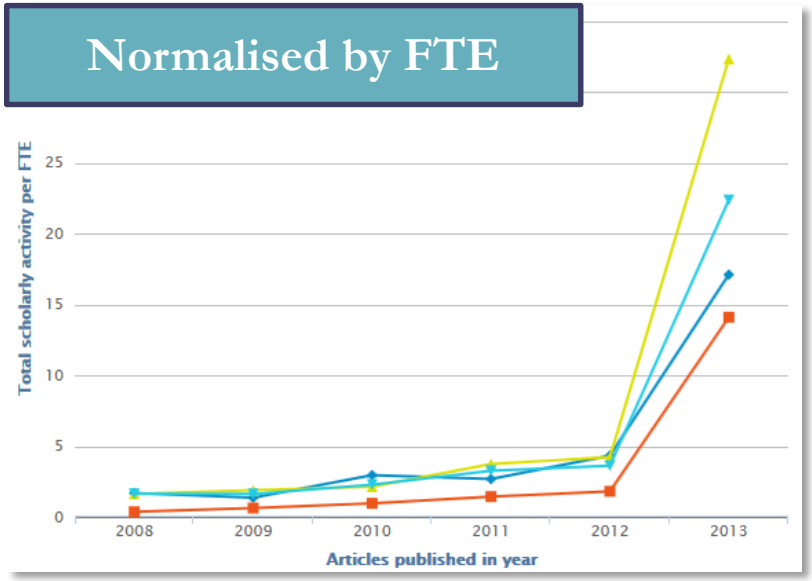
Altmetric: Scholarly Activity flavour

Snowball Metrics

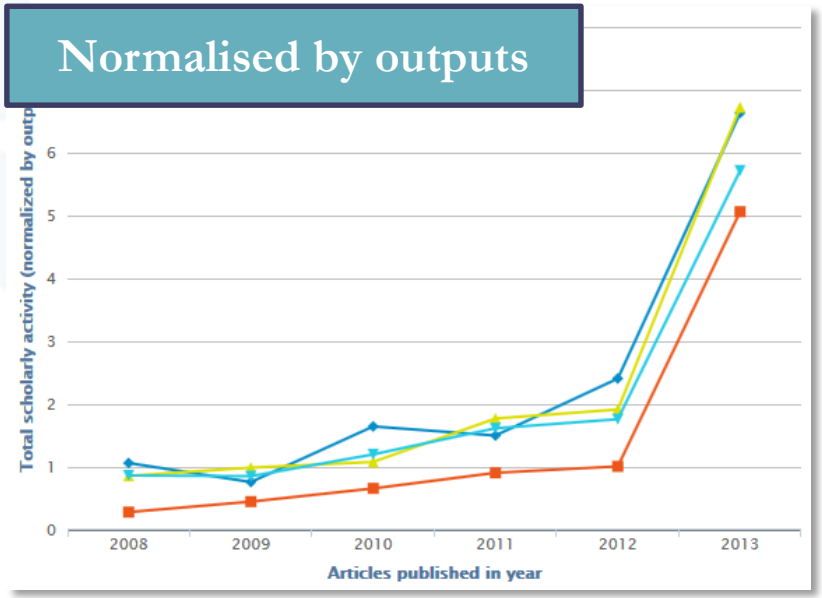
Institution – total counts



Normalised by FTE



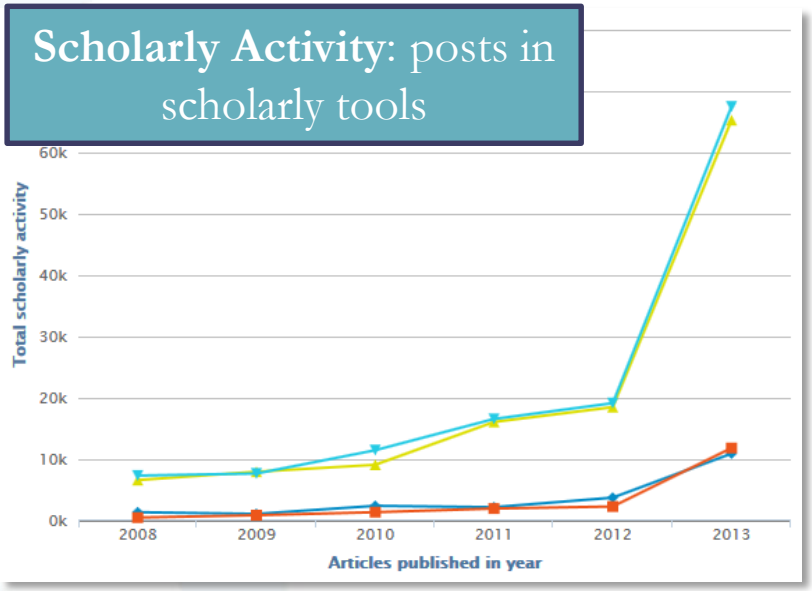
Normalised by outputs



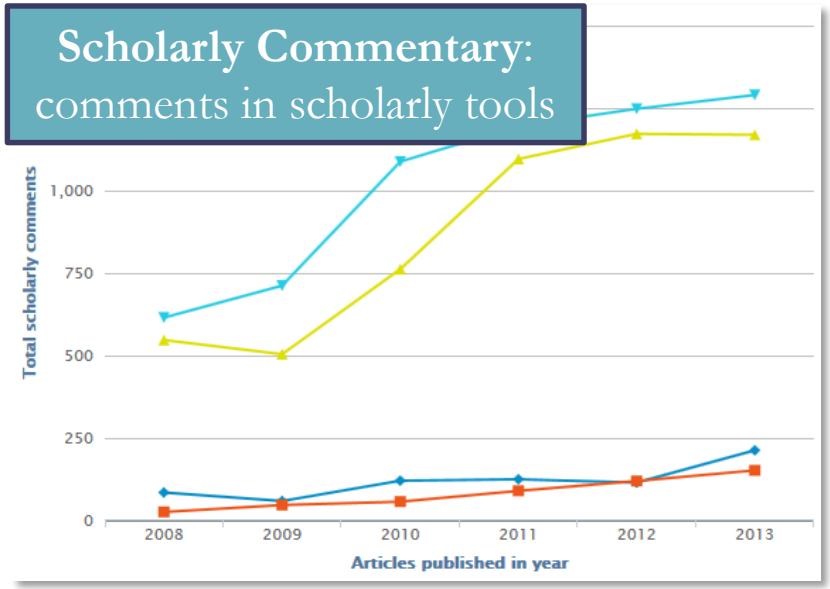
Snowball Altmetrics: 4 flavours

Snowball Metrics

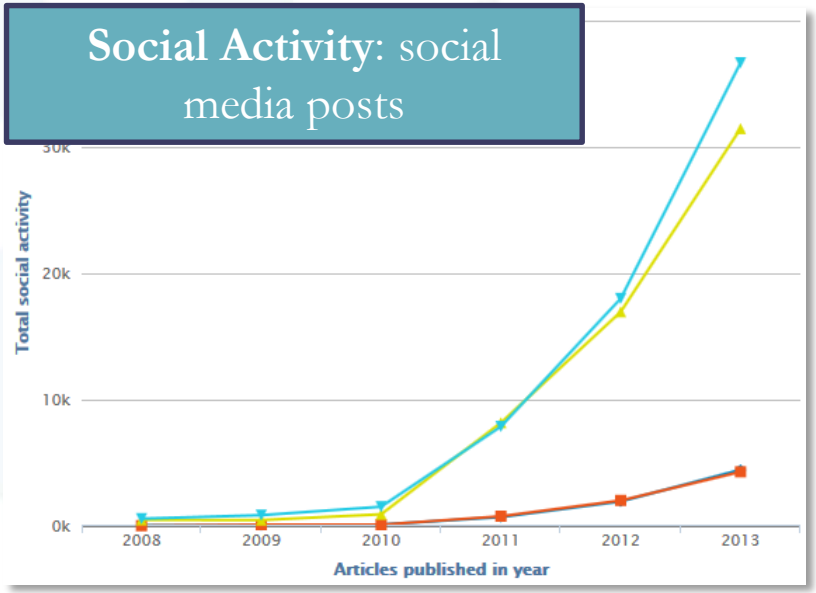
Scholarly Activity: posts in scholarly tools



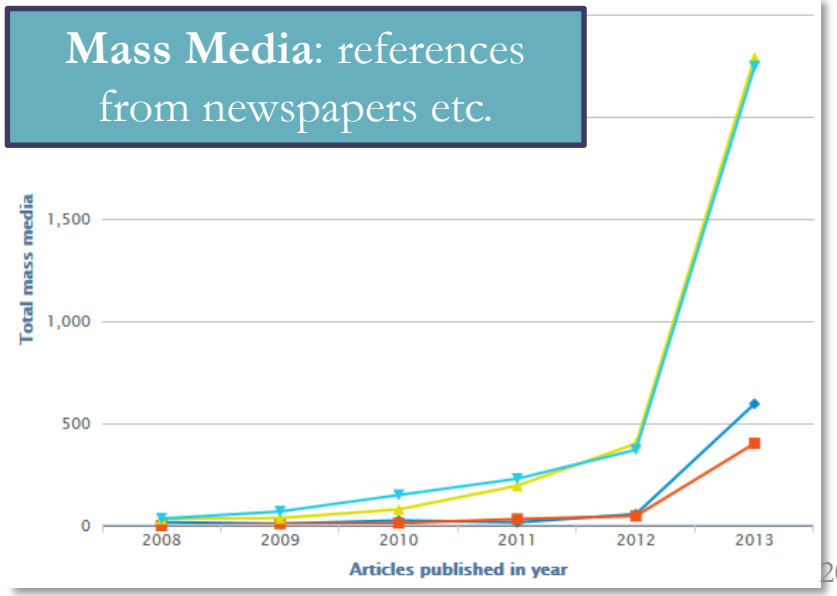
Scholarly Commentary: comments in scholarly tools



Social Activity: social media posts



Mass Media: references from newspapers etc.



Why the interest in altmetrics?

Snowball Metrics

- Measures of engagement with the wider scholarly community
  - Scholarly Activity and Scholarly Communication
- Measures of engagement outside the academic sphere
  - Social Activity and Mass Media
- "*I firmly believe that altmetrics offer a* ***unique chance to bring Stem and non-Stem together again****. How better to build on the current process of the evaluation of research (and the recent introduction in the UK of impact assessment) than by gathering, publishing and analysing data on scholarly influence among the audience beyond the scholarly sphere?*"
- Part of the Snowball Metrics landscape that aims to provide the most complete picture of research performance possible

  "*I would argue that altmetrics alone in their current form cannot be used to judge the quality of research or its output... Nevertheless, pending on improving the underlying data sources, it is* ***likely that altmetrics will play a crucial role in informing the research assessment and impact agenda…***"

Quotes from **"Expanding altmetrics to include policy documents will boost its reputation", Juergen Wastl, Head of Research Information, University of Cambridge**, available at http://www.theguardian.com/higher-education-network/blog/2014/jul/23/expanding-altmetrics-include-policy-documents-boost-reputation?commentpage=1

Elsevier's approach to using research metrics

We must offer:

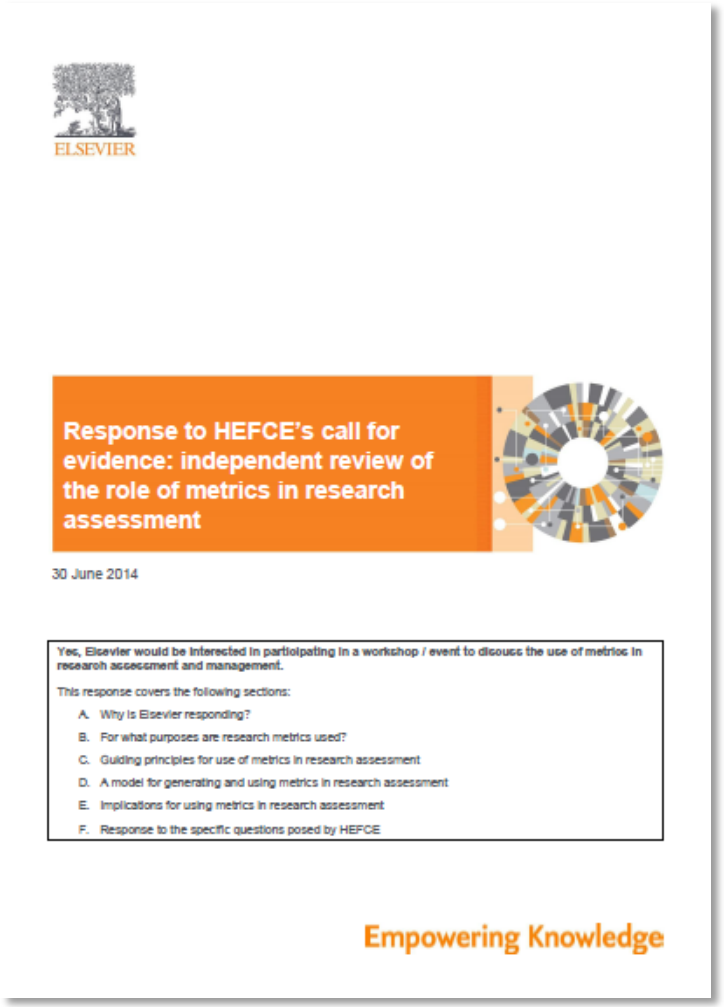
- A basket of metrics
- For all peers
- That can be generated in an automated and scalable way

When implementing / using metrics:

- Always use judgment with metrics
- There is no perfect or leading metric – always use at least 2
- Selection differs depending on the question
- Take variables into account
- We can't prevent stupidity or irresponsibility

Best practice

- Research community who judge and are judged should ideally define metrics
- No methodological black boxes – no exceptions
- Independent of business and access models
- No aggregate / composite metrics



http://www.elsevier.com/online-tools/research-intelligence/resource-library/resources/response-to-hefces-call-for-evidence-independent-review-of-the-role-of-metrics-in-research-assessment