

The UKRI logo consists of the letters 'UK' stacked above 'RI' in a white, bold, sans-serif font, set against a dark blue square background.The Research England logo features a stylized orange and red geometric shape resembling a square with a diagonal cut, positioned to the left of the text.

Research
England

Four trends shaping the future of research evaluation

Steven Hill, Director of Research

The LIS-Bibliometrics 10th Anniversary Conference
02 March 2020

The future of research evaluation

- This presentation is about
 - **Trends** and **drivers** that will influence the future
- This presentation is **not** about:
 - Future Research England policy or practice on research assessment
 - High-level direction or detailed implementation of any future national research assessment following REF 2021

Recent evidence on the future of research evaluation



Sources:

- <https://doi.org/10.7249/RR3200>
- https://www.elsevier.com/_data/assets/pdf_file/0003/898005/Research_Futures_full_report_Feb2019.pdf
- <https://demos.co.uk/project/research-4-0-research-in-the-age-of-automation>

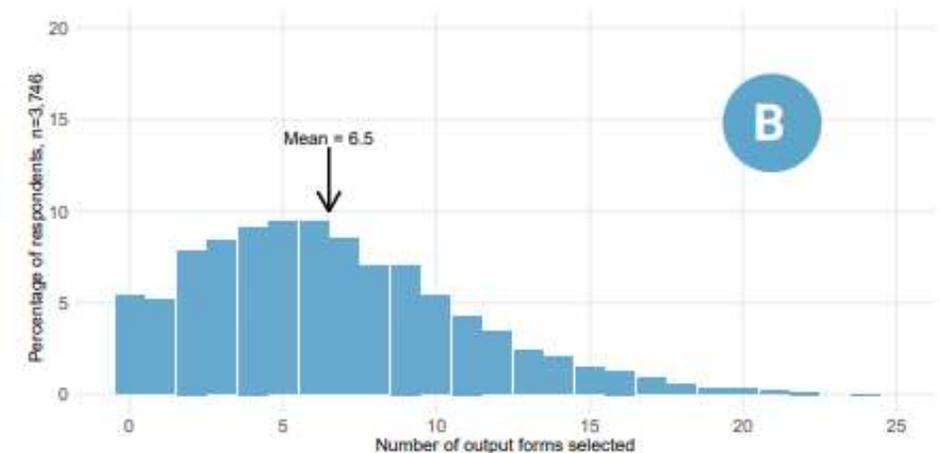
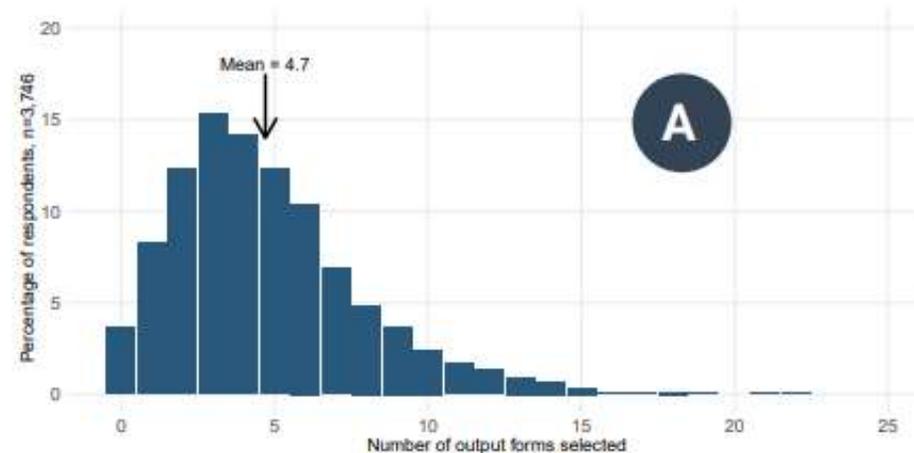
Four trends shaping the future of research evaluation

- The nature of research outputs is changing
- Insight from the citation network is increasing in sophistication
- There is an increasing focus on the culture of research
- Artificial Intelligence has the potential to revolutionise research assessment

The nature of research outputs is changing

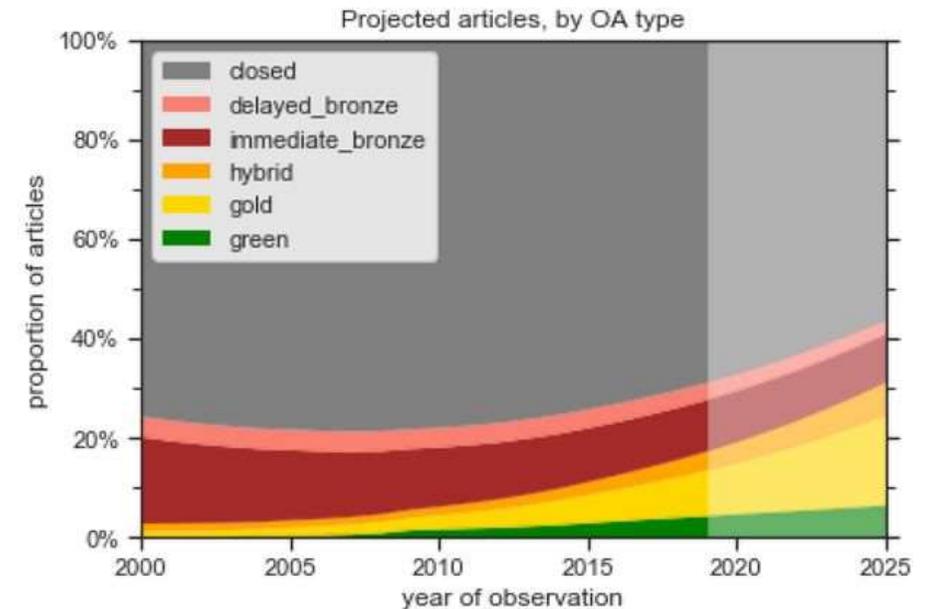
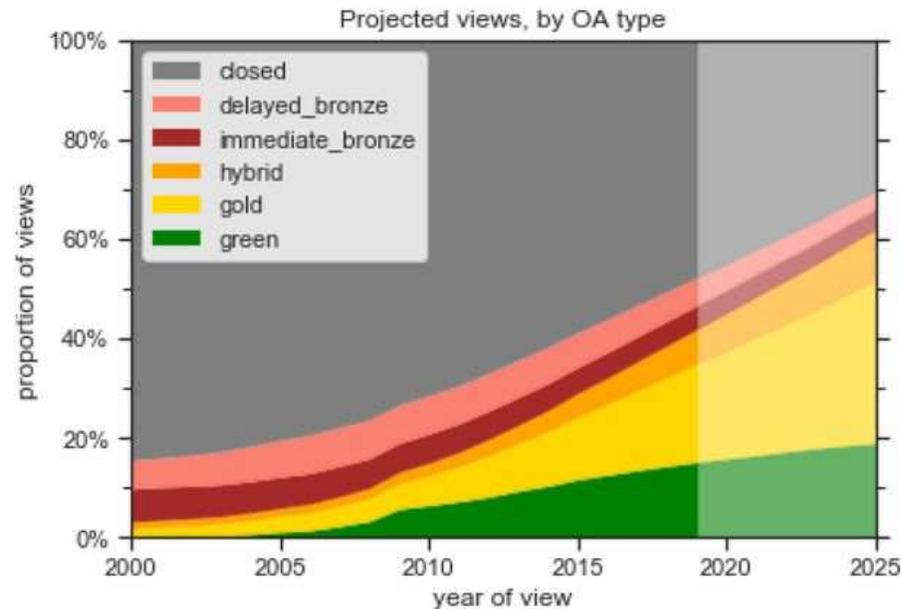
- Diversity

Figure ES.2: Number of different forms of output that researchers produce now (A) and expect to produce in the next 5 to 10 years (B)



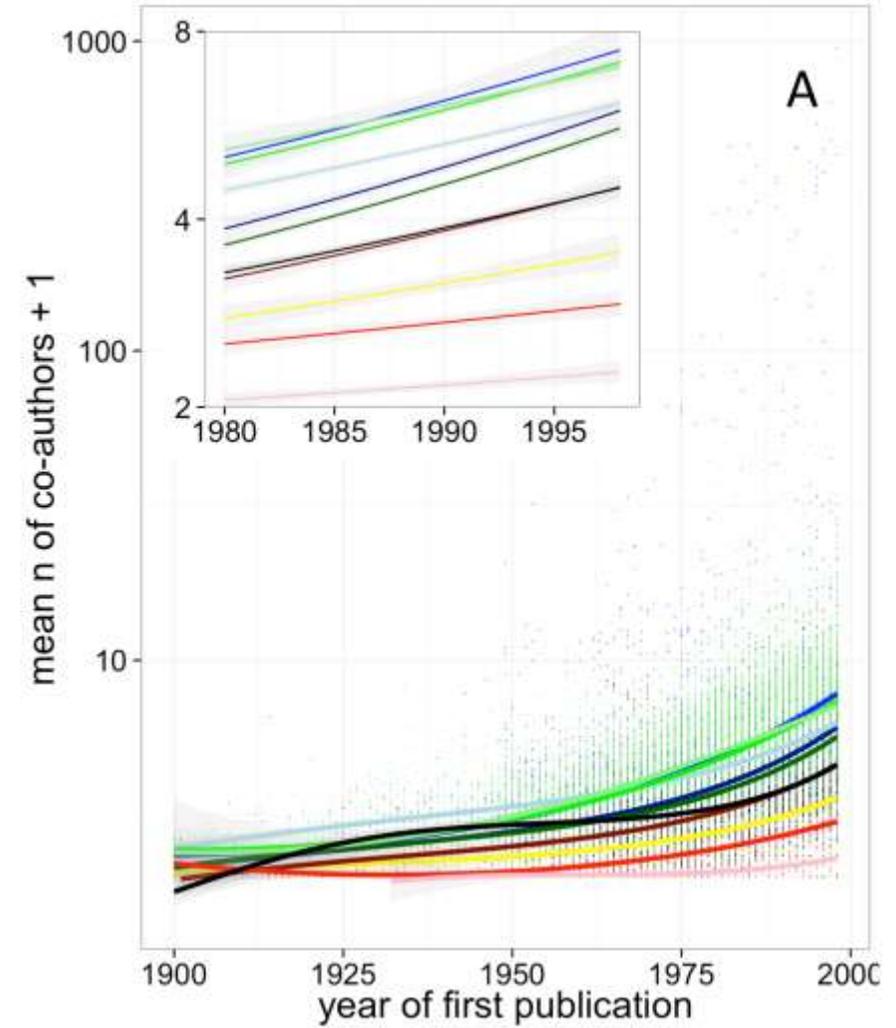
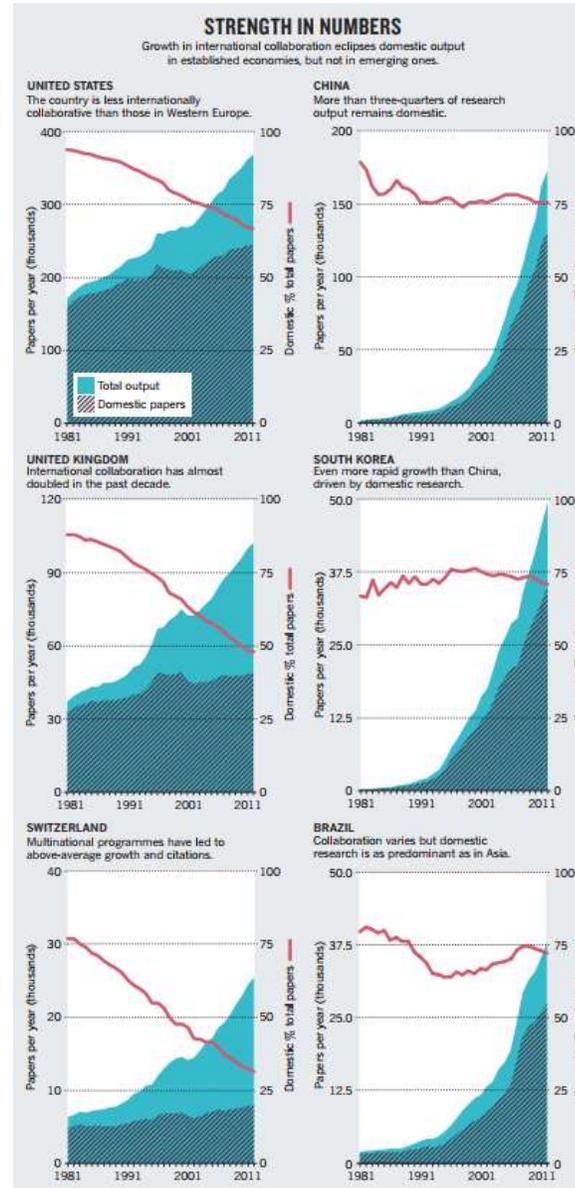
The nature of research outputs is changing

- Diversity
- Openness



The nature of research outputs is changing

- Diversity
- Openness
- Collaboration

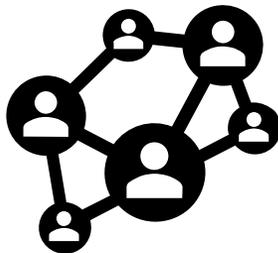
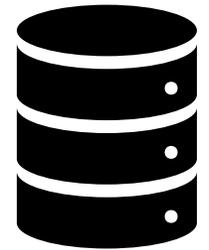
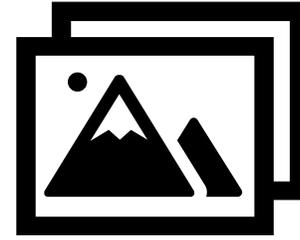
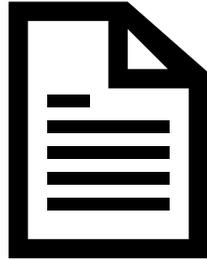


Sources:

- Adams (2013) <https://doi.org/10.1038/497557a>
- Fanielli and Larivière (2016) <https://doi.org/10.1371/journal.pone.0149504>

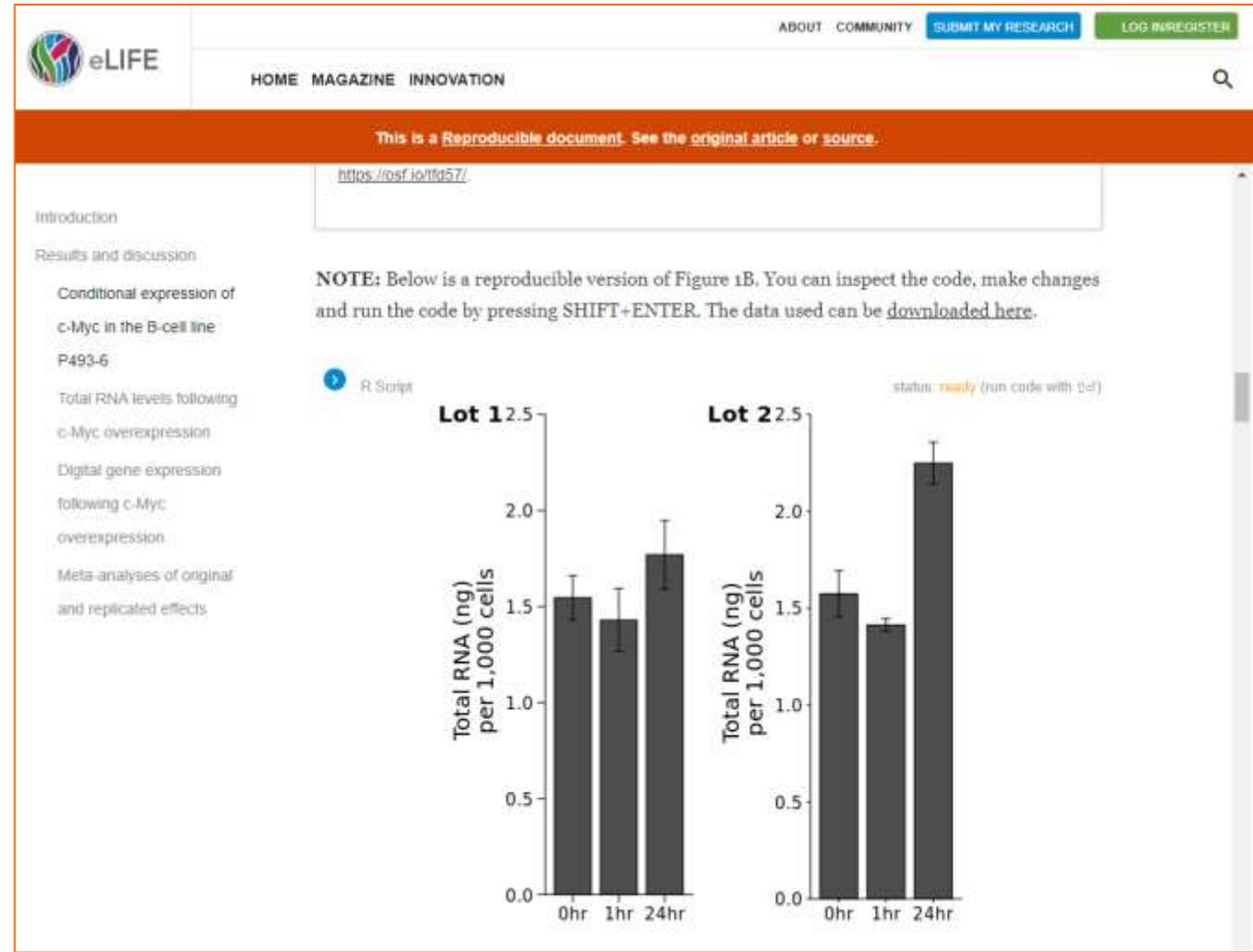
The nature of research outputs is changing

- Diversity
- Openness
- Collaboration
- Granularity

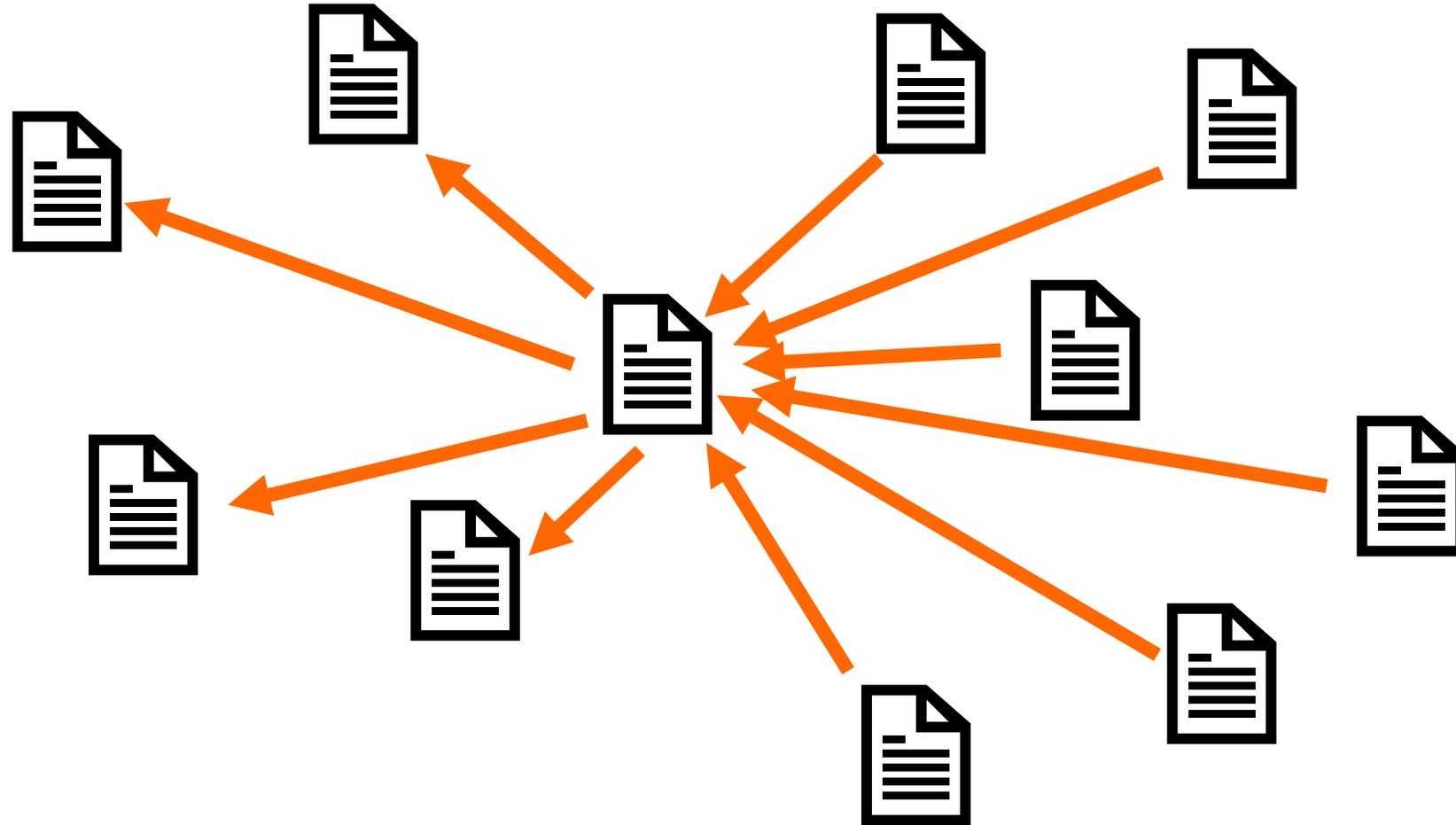


The nature of research outputs is changing

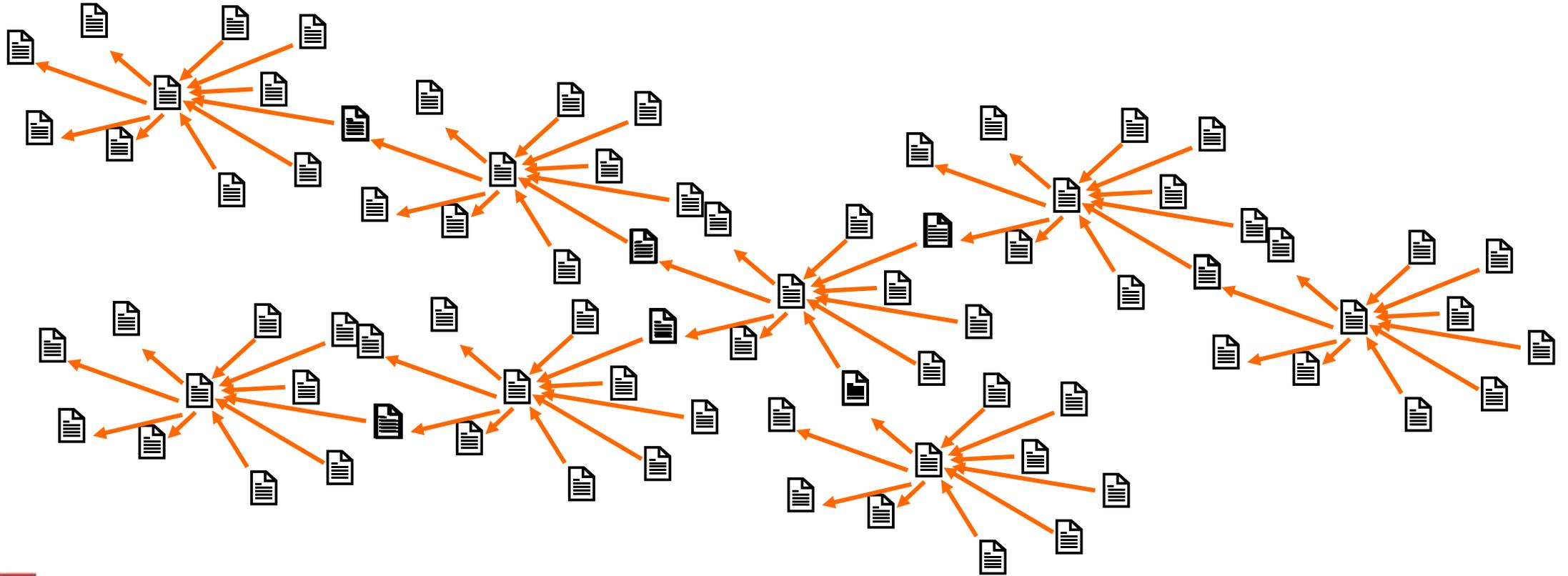
- Diversity
- Openness
- Collaboration
- Granularity
- Interactivity



Insight from the citation network is increasing in sophistication



Insight from the citation network is increasing in sophistication



Insight from the citation network is increasing in sophistication

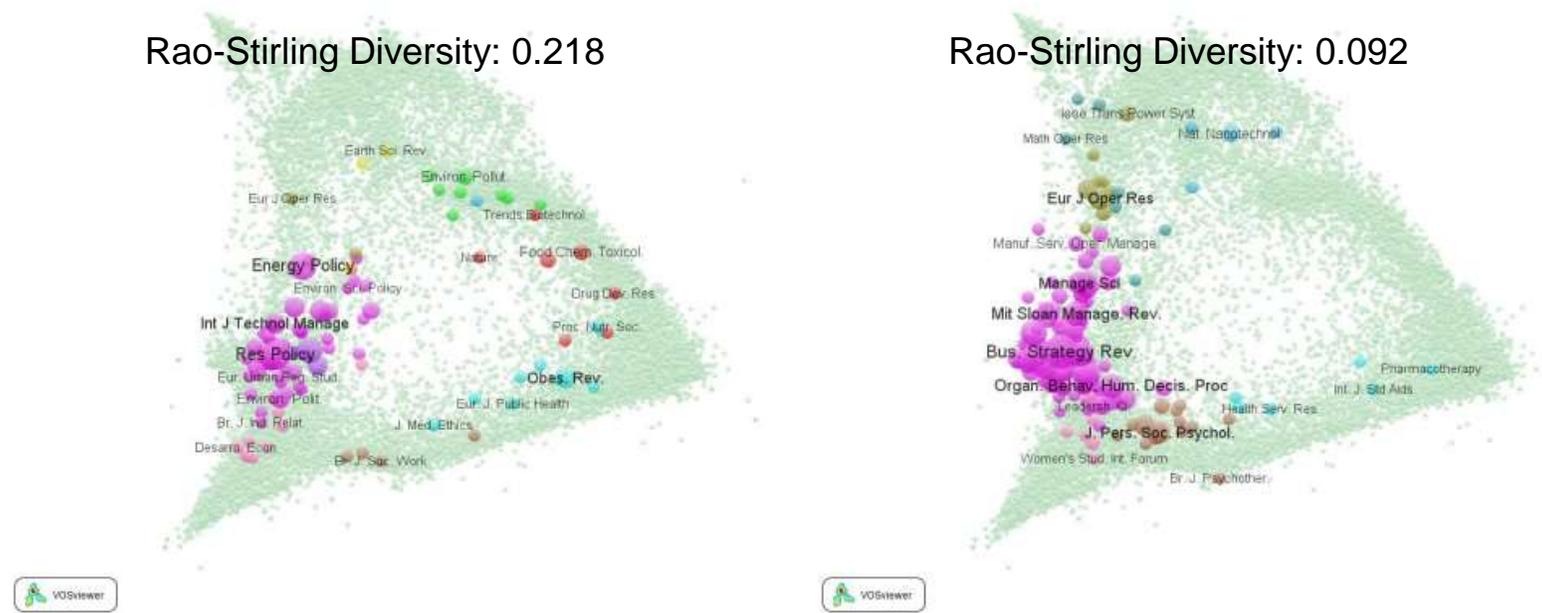
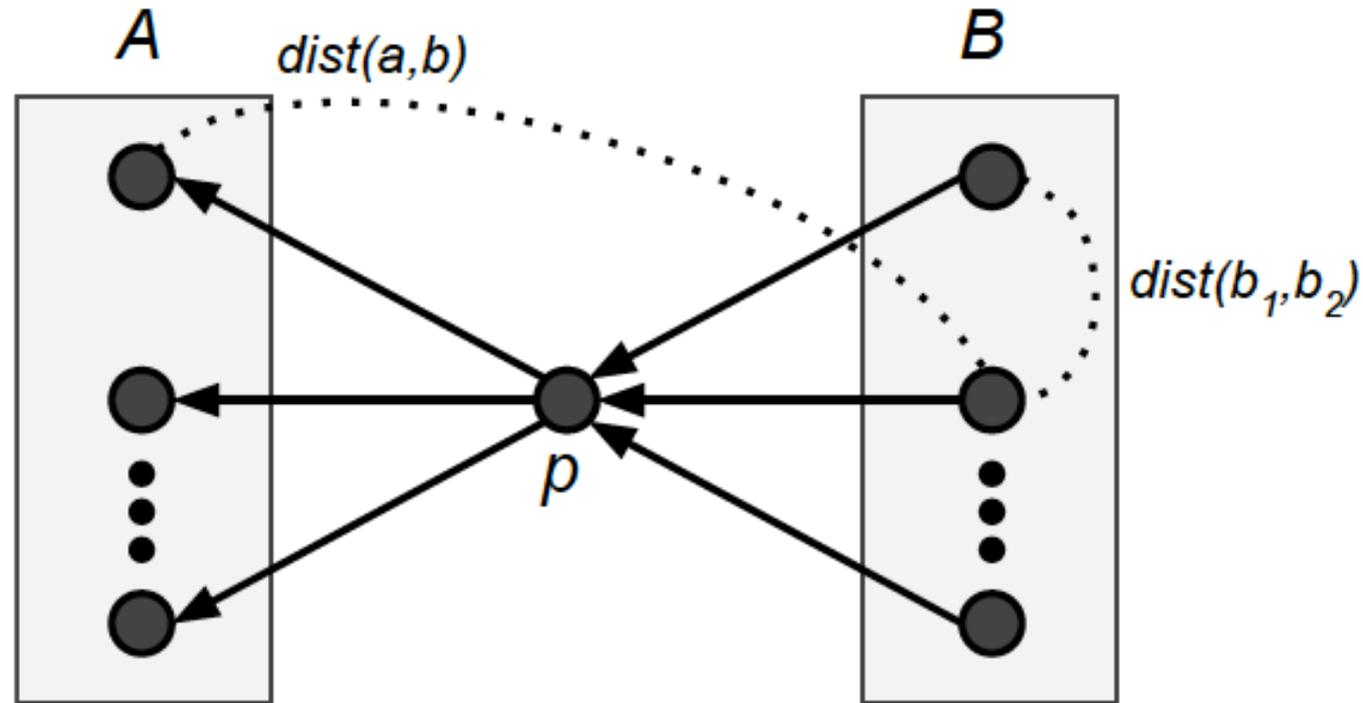
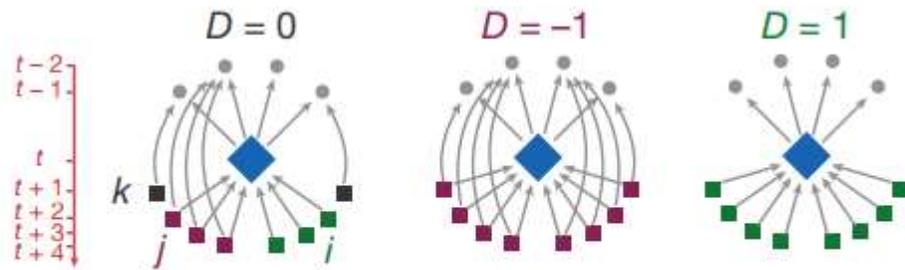


Figure 8a and b: Scopus-based overlay maps 2012 comparing journal publication portfolios from 2006 to 2010 between the Science and Technology Policy Research Unit SPRU at the University of Sussex (on the left; $N = 268$; available at http://www.Vosviewer.com/Vosviewer.php?map=http://www.leydesdorff.net/scopus_ovl/spru.txt&label_size=1.35) and the London Business School (on the right; $N = 715$; available at http://www.Vosviewer.com/Vosviewer.php?map=http://www.leydesdorff.net/scopus_ovl/lbs.txt&label_size=1.35).

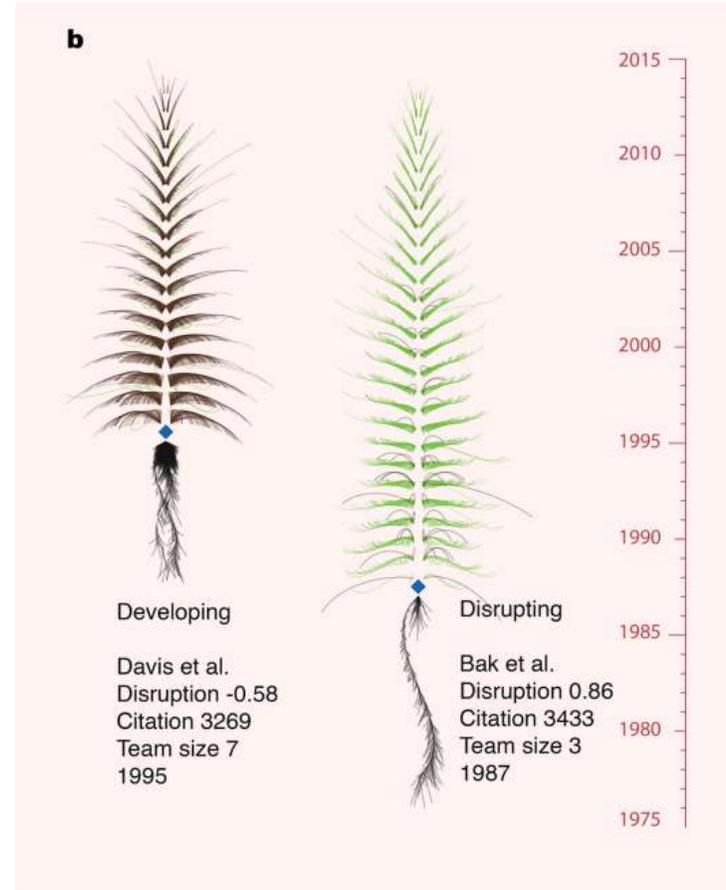
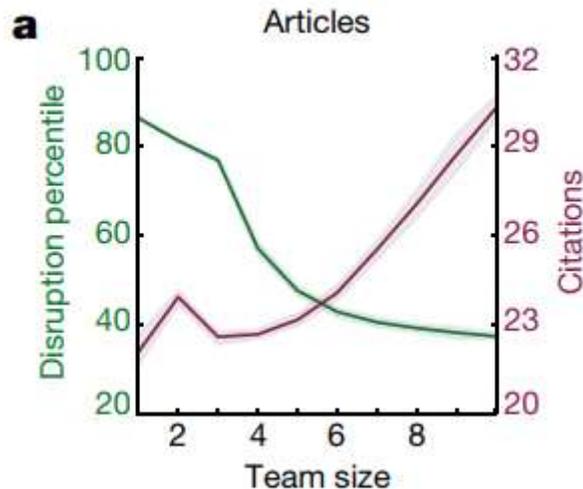
Insight from the citation network is increasing in sophistication



Insight from the citation network is increasing in sophistication



$$\text{Disruption: } D = p_i - p_j = \frac{n_i - n_j}{n_i + n_j + n_k}$$



There is an increasing focus on the culture of research

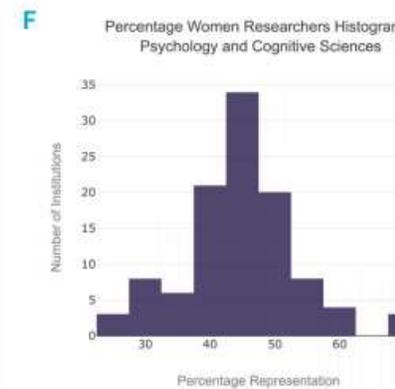
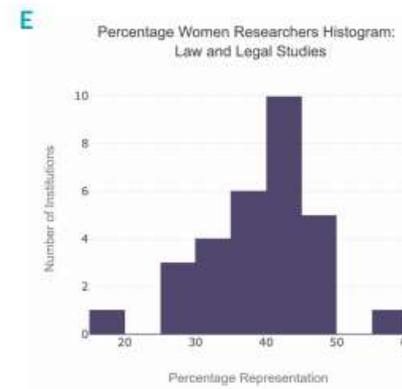
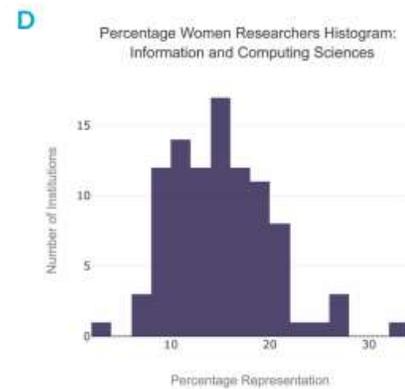
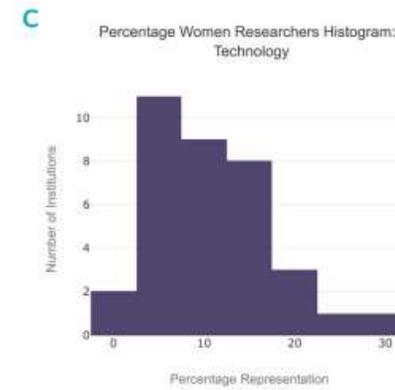
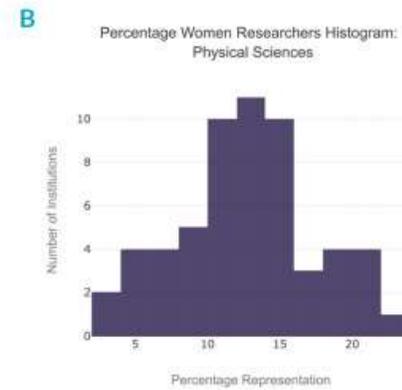
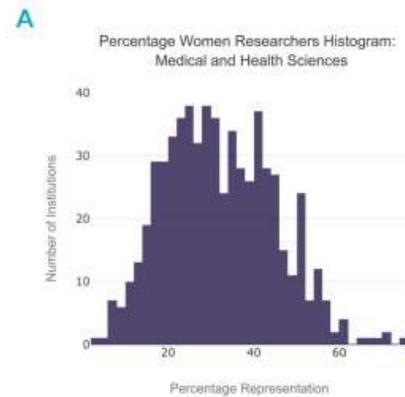


There is an increasing focus on the culture of research

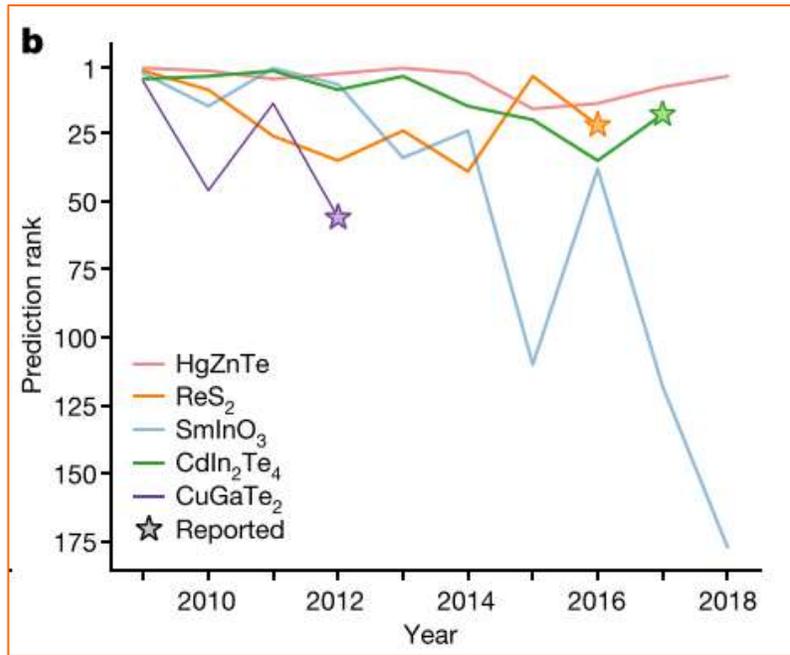


- Academic impact and, increasingly, societal impact feature in national evaluations...
- ...but inclusion of 'process' or 'culture' is rare.
- Examples
 - UK – parts of REF Environment element
 - BE-Flanders – gender (2%)
 - Number of doctoral graduates is a common measure

There is an increasing focus on the culture of research



Artificial Intelligence has the potential to revolutionise research assessment



Sources:

- Tshityan et al. (2019): <https://doi.org/10.1038/s41586-019-1335-8>
- <https://www.nature.com/articles/d41586-020-00018-3>
- <https://www.cam.ac.uk/research/news/ai-scientist-finds-that-toothpaste-ingredient-may-help-fight-drug-resistant-malaria>

Artificial Intelligence has the potential to revolutionise research assessment

The screenshot shows the UNSILO Evaluate interface. On the left, there are several sections with progress indicators: Technical Checks (1/1 items used), Language Quality (87% language quality), Topics (5 topics found), Key Statements (12 key statements found), Related Papers (5 related papers found), Journal Match (100% journal matches found), and Reviewer Finder (100% reviewer matches found). The main content area displays an abstract titled "Non-invasive cardiac imaging techniques as vascular tools for the assessment of cardiovascular disease" by Djaberi, R., Beishuizen, E. D., Pereira, A. M., Rabelink, T. J., Smit, J. W., and Tamsir, M. The abstract text discusses cardiovascular disease as a major cause of mortality in type 2 diabetes and the use of non-invasive techniques for risk stratification.

The screenshot shows the RobotReviewer report interface. It includes an abstract, a risk of bias table, and trial summaries. The risk of bias table is a heatmap with columns for different bias domains and rows for individual studies. The trial summaries table provides detailed information for two studies.

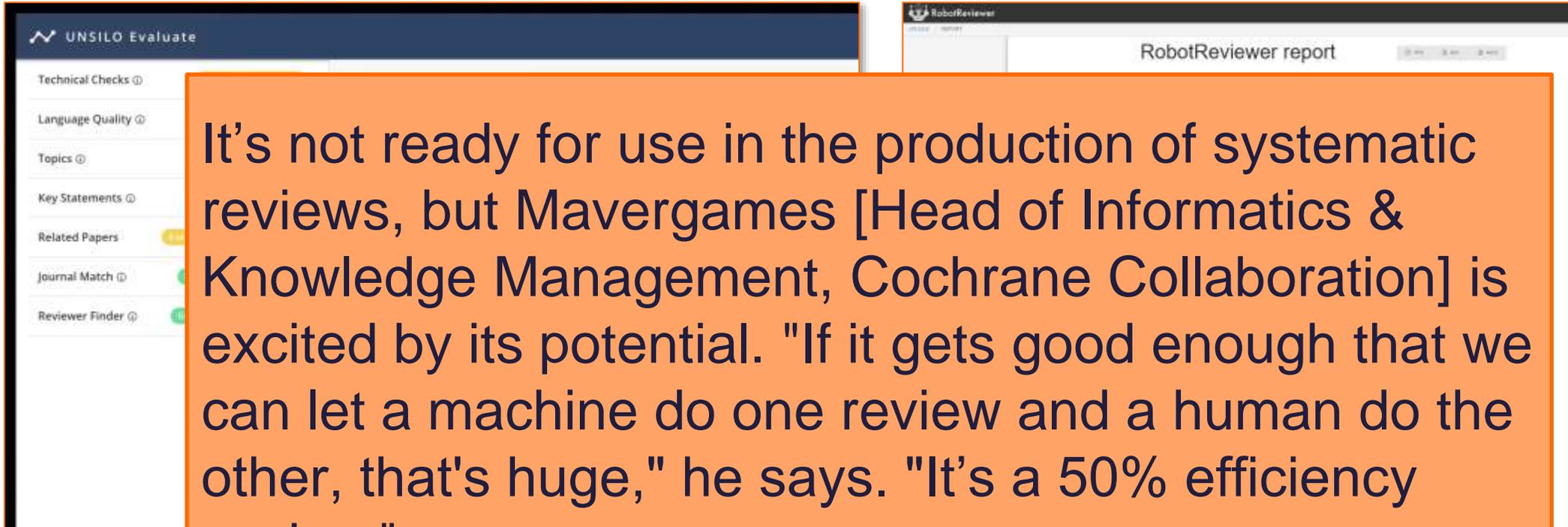
Study	Weight	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment
Dimmen 2016	RCT	+	+	+	+
Quinn 2016	RCT	+	+	+	+
Quinn 2018	RCT	+	+	+	+
Fukui 2014	RCT	+	+	+	+

Participants	Interventions	Outcomes	parttime	finding
167 2005 with a multi-ethnic sample of employees of 16 geographically diverse countries, 60% of participants (n = 102) had the 5 criteria randomized to the intervention.	moderate-to-vigorous physical activity (MVPA)	physical activity with changes in goal setting, satisfaction, self-efficacy, commitment and intention, pedometer steps and daily physical activity	The results show a dose response of increased physical activity with changes in goal setting, satisfaction, self-efficacy, commitment and intention consistent with goal setting theory	1 kg increase
1000 adult women (n = 12 months) randomized, parallel women. Eighty-eight women received text messages via mobile telephone about physical activity	Beary-based physical activity (PA) intervention, internet contact support (SAS), home physical activity intervention	frequency of PA and walking for exercise, PA frequency, PA participation, and walking for exercise, walking for exercise frequency	The median for MVPA and walking for exercise frequency was 1 day per week higher in the intervention group than the control group at baseline (Table 2)	1 kg increase

Sources:

- https://robotreviewer.vortext.systems/#report/_rmQVCDRn-JQWIGnFbZi
- <https://unsilo.ai/unsilo-evaluate/>
- <https://www.natureindex.com/news-blog/living-systematic-reviews-emerging-solution-problem-superseded-research-zika-virus>

Artificial Intelligence has the potential to revolutionise research assessment



The image shows two screenshots of AI-powered research assessment tools. On the left is the 'UNSILO Evaluate' interface, which features a sidebar with various analysis categories: Technical Checks, Language Quality, Topics, Key Statements, Related Papers, Journal Match, and Reviewer Finder. On the right is a 'RobotReviewer report' interface, which appears to be a detailed output of the AI's analysis. A large orange text box is overlaid on these screenshots, containing a quote from Mavergames.

It's not ready for use in the production of systematic reviews, but Mavergames [Head of Informatics & Knowledge Management, Cochrane Collaboration] is excited by its potential. "If it gets good enough that we can let a machine do one review and a human do the other, that's huge," he says. "It's a 50% efficiency saving."

Sources:

- https://robotreviewer.vortext.systems/#report/_rmQVCDRn-JQWIGGnFbZi
- <https://unsilo.ai/unsilo-evaluate/>
- <https://www.natureindex.com/news-blog/living-systematic-reviews-emerging-solution-problem-superseded-research-zika-virus>

Artificial Intelligence has the potential to revolutionise research assessment

Opportunities

- Reducing biases
- Diversity of criteria
- Diversity of output types
- Increasing scale, speed or efficiency of non-metrics driven evaluation

Challenges

- Solidifying biases
- Lack of transparency
- Lack of confidence
- AI 'arms race'
- Commercial lock-in