

Correspondence

We need negative metrics too

Research metrics are ambiguous — a paper may be cited for positive or negative reasons. Funding agencies and universities focus on positive impact in evaluating research, which increasingly includes alternative metrics ('altmetrics'; see *Nature* **493**, 159 and *Nature* **495**, 437–440; 2013). We think that researchers can generate a more complete account of their impact by including seemingly negative indicators — such as confrontations with important people or legal action — as well as those that seem positive.

To explore this idea, we at the Center for the Study of Interdisciplinarity discussed ways to evaluate the impact of our research activities. We began with common quantitative indicators of scholarly impact (number and place of publications, citation indexing measures, number and size of grant awards, and so on). Warming to our theme, we came up with several other possible indicators, including negative ones (see table for examples and go.nature.com/miytf3 for a complete list).

In this age of increasing demand for accountability, we believe that academics ought to own the impact of their research, rather than have it determined by someone else.

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Campaign tactics and grants don't mix

Using political-campaign tactics to secure grant awards threatens to oversimplify the science, overwhelm the independent peer-review process, and disregard intellectual-property and confidentiality issues.

Take the European Commission's Future and Emerging Technologies 'flagship' programme, which in January selected two projects to receive about €1 billion (US\$1.3 billion) each over 10 years (see *Nature* **493**, 585–586; 2013). Six projects were shortlisted after a year-long competition on the basis of scientific review — but also on the success of presentations to the European Parliament and political representatives, promotional videos and television interviews.

Substantial media exposure of the US Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative is inducing speculation on research outcomes well ahead of hard experimental evidence.

Securing broad political consensus for large-scale projects is understandable. Yet applicants for some low-budget grants are now also using social media, promoting proposals

by requesting support letters through mass e-mailings and Twitter communications. However tempting, this could outweigh reasoned peer review.

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Australian academy is fair to women

It is not true that the Australian Academy of Science, of which I am president, treats women with disdain (*Nature* **497**, 7; 2013). The absence of women elected as fellows in 2013 is of great concern, but it is an anomaly.

Election of women to our academy has steadily increased, from just one in the 1970s to 27 since 2000. Three of our executive councillors are female, and women chair five out of 22 national committees. This year, half of our early-career awardees and one of four full-career awardees are women (see go.nature.com/avrqiy).

That said, our academy still has too few women. Part of the problem is historical and universal (see, for example, *Nature* **495**, 21; 2013). Past policies either discriminated against women or failed to nurture their careers. The academy has urged Australian

science agencies to prioritize career flexibility and has endorsed guidelines for gender equity (see go.nature.com/zi253a).

We are striving to increase the proportion of female fellows by ensuring that high-achieving women are not overlooked for nomination and that our criteria do not disadvantage them. Further measures to improve the gender balance will be considered at the academy's annual general meeting this month.

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Economic modelling could aid brain map

Debate over US President Barack Obama's brain-mapping proposal (*Nature* **495**, 19; 2013) would benefit from economic modelling. This would refine thinking on goals, funding and timing amid budget cuts and discussions of government-sponsored big science.

An example of this approach comes from modelling the time and money required for genomic research to cut adverse drug-related patient outcomes, using actual data (R. Arnaout *et al.* *Clin. Chem.* **59**, 649–657; 2013). This reveals how understanding drug-response genomics could lead to cheaper, faster progress, delivering specific, fact-based, actionable insights.

The brain-mapping proposal is broader, perhaps calling for technologies not yet invented, but the intention is still to improve health. Economic modelling could aid comparisons between the proposal and competing investments, engage stakeholders and foster accountability. It would serve the ultimate funding source and beneficiary: the taxpayer.

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OTHER POSSIBLE INDICATORS OF IMPACT

Public engagement	Academic community	Media
Protests, demonstrations or arrests	Invitations to present, consult or review	Article downloads
Provoking lawsuits	Interdisciplinary achievements	Website hits
Angry letters from important people	Adviser appointments	Media mentions
Meetings with important people	Reputation of close collaborators	Quotes in media
Participation in public education	Reputation as a team member	Coining of a phrase
Mention by policy-makers	Textbooks authored	Trending in social media
Public research discussions	Citation in testimonials and surveys	Blog mentions
Muckraking	Audience size at talks and meetings	Book sales
Quotes in policy documents	Developing a useful metric	Buzzword invention
Rabble rousing	Curriculum input	Social-network contacts
Engagement with citizens abroad	Faculty recommendations, prizes	Television and radio interviews