

THIS WEEK

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Bridge research and impacts

Tracking societal impacts encourages academics to pursue them. The launch of three new Nature journals should also help.

There is a classic narrative that stresses the importance and value of fundamental science. To make progress, one must take persistence by researchers, mix in patient financial support and then add creative imagination and logic (important for creating hypotheses and testing predictions). Then sprinkle on some unpredictable outcomes and stew for a century, or perhaps even longer.

The 2016 announcement of the detection of gravitational waves is a fine product of this recipe for success. It was borne of theories of relativity that were esoteric but which now, unforeseeable at the time of their origin in 1916, underpin technologies such as global navigation. Readers of *Nature* probably have their own favourite examples of such success stories.

Support for fundamental research remains essential, both as a signal of cultural values and as a driver of future societal progress. But research with a shorter-term or more-local vision of practical outcomes deserves reward and prestige, too — a fact perhaps taken for granted by engineers or clinical scientists, but less so in some other disciplines.

Take, for instance, the way in which regulatory authorities, commercial organizations and physical geographers at the University of Leeds, UK, collaborated to boost water quality and company performance by developing innovative catchment-management strategies in the north of England. Another example is how local health authorities partnered with a digital-media-production company to disseminate content related to a self-help technique developed by psychiatry researchers at King's College London to combat bulimia.

Both these examples are included in a database of case studies collected by the Higher Education Funding Council for England in its pioneering 2014 Research Excellence Framework (REF; see go.nature.com/2zags87). The council assesses the impact of research retrospectively, and rewards high performers with extra funds. This approach has increased financial support for some universities that pursue 'useful' research, but that did not fare well in previous, more-traditional funding frameworks. The next REF, which will be conducted in 2021, will allocate more weight (25% up from 20%) to impact assessments — a move that *Nature* supports. Other funders have signalled that they believe in direct impact, and demand a prospective view of such benefits in funding applications.

The database of REF case studies is interesting partly because it highlights straightforward ways of documenting impacts through explicit description and endorsement by researchers' partners in delivery, and partly because it reveals the variety of pathways to impact.

Association with delivery partners and impact brings recognition and prestige, and so does the funding that such case studies help a university to acquire. Applying impact criteria in retrospective studies is not straightforward, given that real-world change may take years to occur (although where software or digital apps are concerned, progress can be faster). But such analyses can inform researchers and help them to anticipate and establish partnerships at the outset to boost eventual impact.

Impact can also depend on the dissemination of results — and we hope that Nature journals can help. Over the past few years, the Nature group of journals has developed to include multidisciplinary and proactively interdisciplinary journals specifically aimed at societal challenges, as well as at fundamental research across the relevant disciplines. *Nature Climate Change* was the first, and more recent launches include *Nature Energy*, *Nature Human Behaviour* and *Nature Biomedical Engineering*.

How might research journals that seek to make research relevant add value?

Next week, we launch *Nature Sustainability*, *Nature Electronics* and *Nature Catalysis*. (This is not to ignore recent journals in more conventional disciplines including microbiology, astronomy and ecology and evolution.)

Journals that target societal issues typically grapple with an unusual issue for academic publishers: how to assess the significance of research that claims potential utility outside academia.

Sometimes, resolving this issue is relatively straightforward. In some strands of electronics and catalysis, for example, the academic and industrial communities are well connected, share goals and have clear, agreed pathways to the application of knowledge. So the potential impact — and thus the broader significance — of a paper that claims an application can be readily evaluated.

In other areas of research, methods of judging potential impact might not be so established, and this makes it difficult to assess and referee a paper. For example, when considering a paper that cites policy relevance as a key claim to significance, a technical assessment alone will not suffice. To find suitable referees, editors might scan the literature, committee memberships, academic societies and specialist journalism to find individuals who can separate genuine policy value from delusions.

The challenge requires editors to be open-minded and also to enlist referees who can recognize the value in papers whose conceptual novelty might be low but whose impacts can be high — for example, because of a step-change in functionality of an application.

In Nature journals, the ultimate responsibility of selecting which papers to publish lies with the editors — not with referees, not with external editorial boards. Is the decision-making therefore subjective? No more so than decisions in fundamental science can be, where the significance is not immediately obvious. The quality of advice is what counts, alongside the breadth of experience and outlook of the editors.

Beyond the care and innovation needed in the refereeing, and the publication of good papers, how might research journals that seek to make research relevant add value? One way could be to help disseminate the impacts that followed research. Alongside citation and altmetric analyses, journals could publish narratives by researchers of what happened next, validated by testimonials from their partners or by other concrete evidence. Historians could apply this approach to much older papers — including those of past greats. What a richer, livelier and more impactful literature that would be. ■