Back to Earth

Landing real-world impact
in research evaluation

ELSEVIER

Foreword

Landing real-world impact in research evaluation

JUDY VERSES,
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Research not only adds to our collective knowledge, but it can also greatly benefit society; today's researchers are tackling some of the world's greatest challenges, including climate change, clean energy, and infectious diseases. Research is also shaped by society's needs, unfolding global events, discussions with policymakers, industry, and communication with the public.

Research with an impact on society has always been important. But with increasingly stretched budgets, it's now equally important to assess, audit and communicate this impact. Funders know this and researchers know this. Indeed, academics are already being increasingly called on to show the economic and societal impact of their work, and funders have systems in place to evaluate this.

Are these systems fit for purpose? How do researchers and their representatives feel about them? And could research impact evaluation be done in a better – perhaps more holistic – way?

To help inform this important and ongoing debate, Elsevier commissioned a survey of the academic community. The survey, of 400 researchers, academic leaders, and heads of funding bodies in seven countries, was conducted in August and September 2023. Its findings illuminate many problems with the status quo and suggest who may be best placed to change the situation. They reveal a strong desire for improvements – and indicate what would help to achieve and accelerate the necessary changes: greater coordination on methodologies and standards, for instance. They also explain why reform in this area, despite strong support, has progressed more slowly than other advances in the research ecosystem, such as the move to more open data sharing.

This desire for change is already powering organizations such as the Coalition for Advancing Research Assessment (CoARA) and the network for Advancing & Evaluating the Societal Impact of Science (AESIS Network). But the indications are that there's more enthusiasm to be tapped. Supporters of change are spread widely around the ecosystem; a breakdown of respondents shows that they range from early-stage PhD students to university vice chancellors and those in charge of funding budgets. Once their energy is set in motion, it should have the power to transform not only research priorities but the scientific path of humankind.

Elsevier has joined hundreds of organizations and thousands of individuals who are on a journey towards a better approach to research impact assessment. We can offer access to comprehensive and insightful data sets and our technical ability to develop additional metrics and indicators. Most importantly, we are united with the academic community in our aim to reach for a system that values and rewards inclusion, rigor, integrity and impact to advance scholarship and society.

66%

say academia has a moral responsibility to incorporate real-world impact into standard research evaluation

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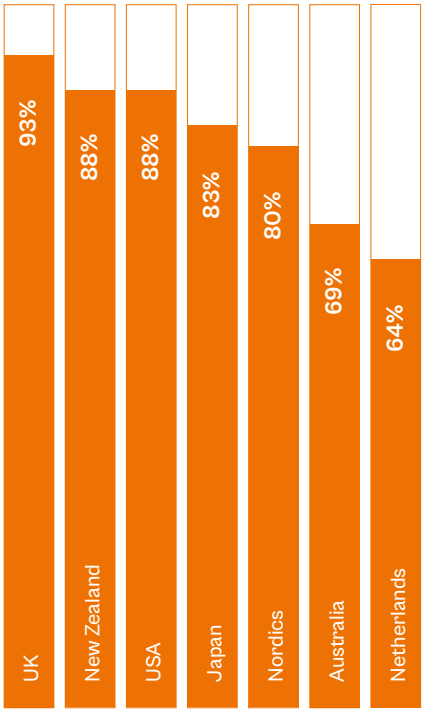
A latent impetus

What's working & what's not

The debate on how to measure the real-world impact of research is more than 300 years old. Recent initiatives have brought solutions closer – but there is still much to be done

IN EVERY COUNTRY SURVEYED, MORE THAN HALF THINK RESEARCH SHOULD AT LEAST AIM FOR REAL-WORLD IMPACT

Question: Should research at least aim to have an impact on the wider world?



Public policy expert Susan Cozzens summed up the state of play back in 2002, after attending an academic workshop on research evaluation.

"The majority of the [measurement effort] has studied the process of innovations and not its outcomes," she wrote. "Traditional innovation studies still focus narrowly on making new things in new ways, rather on whether the new things are necessary or desirable."

As discussed later in this report, proper evaluation of research impact is both hard to define and to carry out. And a significant section of the academic and research community says there's greater progress to be made.

That's the headline result from the Elsevier survey: almost a fifth of the 400 respondents across seven countries argue that current systems of research impact assessment are ineffective at evaluating real world impact. Asked whether the current system incentivizes real-world research – if it is doing a good job, in other words – 28% of people say it's not effective or not at all effective.

Some 18% describe current assessment systems as crude, 15% think they are outdated, 20% opaque and 13% discriminatory. Just 40% would describe them as sophisticated, 42% futureproof and 46% transparent.

If these results hold across the wider system, it could indicate the signs of a real problem, both for those being assessed and for those doing the assessing. At the very least, they show significant numbers of people in the academic and research community believe there is room for improvement.

So, how did we get here and what does that mean?

Impact has always been part of academic research. Back in the 1660s, the Royal Society was set up in the UK to recognize, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity. Publishers have reflected this goal as well. The founders of the *Lancet* two centuries ago, for example, set out to positively impact the lives of people by making science widely available so that medicine can serve and transform society. And investment in research from companies and industry has always been targeted to return impact in the form of greater technology, commercialization and profits, often on short timescales.

A 2021 analysis found many examples of impact being included in national research assessments

Just

1%

are opposed to using real-world impact in research evaluation

64%

say the current system of research evaluation prioritizes academic outcomes above real-world impact

Formal assessment of impact has its roots in greater public support for science and development (a change also discussed later in this report). One prominent example of a call for change was by British prime minister Margaret Thatcher – who as a former chemist knew something about balancing both sides of an equation – when politicians started to ask what they were getting in return for the tax dollars they were handing over.

Starting in 1986, UK officials asked universities for regular summaries of their research activity for grading. Institutions that scored the highest marks received the most central funding in the next round. Called the Research Assessment Exercise (RAE), it did not look at impact[1] as such and was more interested in the perceived quality of the academic results of the work, measured by the journal papers and other publications that subsequently emerged.

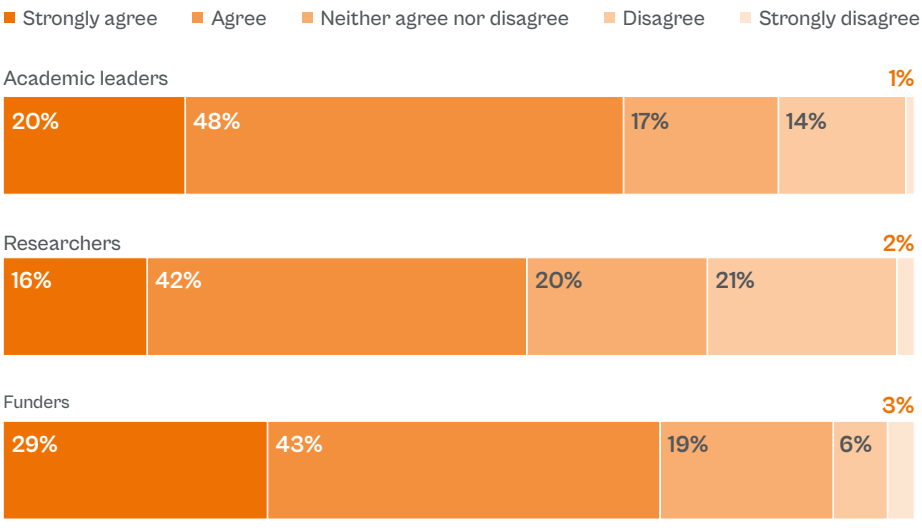
Building on the first RAE rounds and emphasizing the wider need for excellence and the needs of potential end-users of research, a 1993 UK government white paper argued the process was insufficient and that the benefits of scientific research should accrue to society at large. This led to changes across the UK research and innovation system.

By 2010, an analysis by the RAND Corporation reviewed various assessment frameworks that had sprung up around the world to measure academic research output, including impact, from Argentina and Japan to the US Army.[2] Most were limited scale self-assessments that had little influence on allocation of funds. The UK research councils mandated the collection of outcomes and impact data from funded projects in 2014. More high-profile was the UK's move in 2011 to formally account for impact in its Research Excellence Framework (REF, a successor to the RAE). Based on submitted case studies, impact was to account for 20% of the total assessment. (Research outputs, the focus of the RAE, now represented 65%.)

The move was controversial, with some critics initially calling the idea "poisonous."[3] But after the results were published in 2014, the inclusion of impact was backed by many, including a review by Lord Nicholas Stern[4] and the journal *Nature*.[5] Proposals for the next REF exercise, due in 2028, raise the contribution of impact assessment to 25% and introduce new criteria such as evaluation of culture, people and environment.

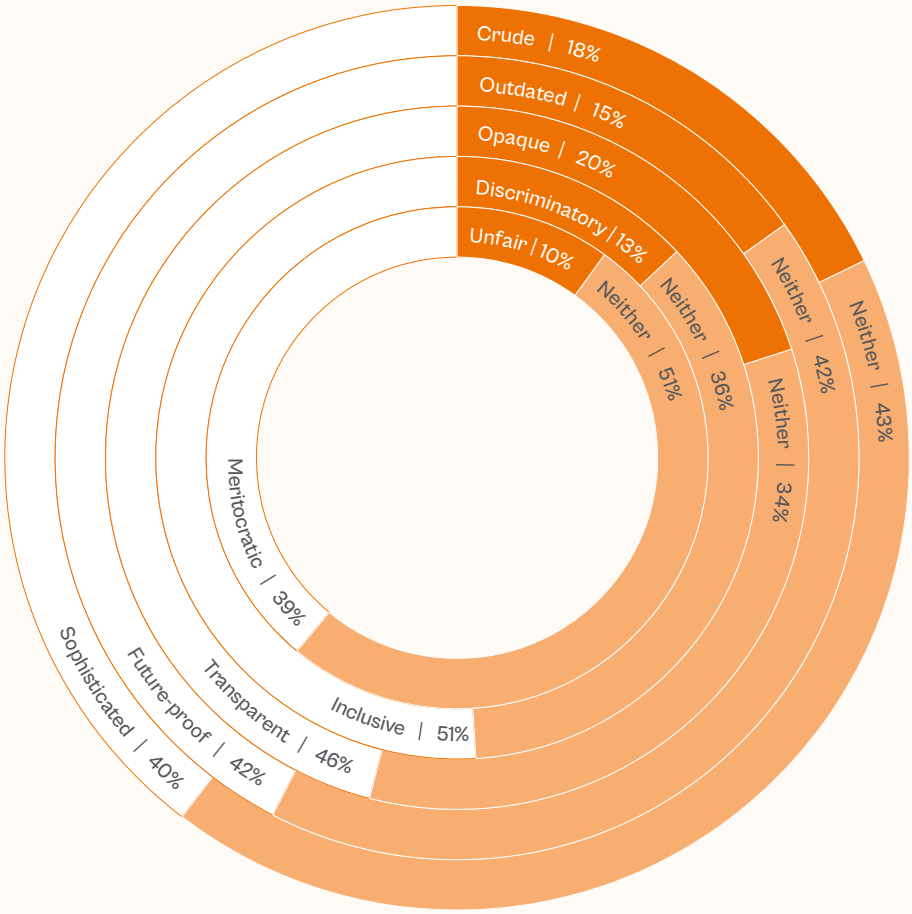
THERE IS A CLEAR IMPERATIVE AMONG RESEARCHERS, FUNDERS AND ACADEMIC LEADERS FOR EVALUATING RESEARCH MORE HOLISTICALLY

Question: Is there now a clear imperative for a shift to a more holistic approach to research evaluation?



MORE THAN HALF OF RESPONDENTS IDENTIFIED AT LEAST ONE SERIOUS PROBLEM WITH CURRENT METHODS OF RESEARCH EVALUATION

Question: How would you describe the current methodologies and systems used for research evaluation?



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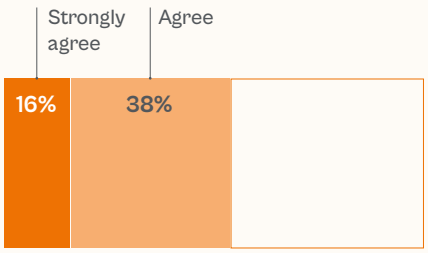
Not one of the 400 respondents give the current methodologies full endorsement

51%

have at least one serious criticism

BARELY HALF THINK INCENTIVES ARE CURRENTLY WORKING

Question: Does the current system of research evaluation successfully incentivize work that can make a meaningful difference to the wider world



A 2021 analysis found many more examples of impact being included in national research assessments.[6] Hong Kong, for example, uses a system directly based on the UK REF, while engagement and impact assessment was reintroduced as part of Australia's Excellence in Research exercise in 2018.

"We focused quite a bit of on what we call approaches to impact," says Shantala Mohan, Director of Research Impact and Integrity at Western Sydney University. That included the support provided by an organization or an institution for the research program or the research team to realize impact, as well as effective engagement.

"It's how they engaged with the stakeholders to realize impact. Did they empower the stakeholders? Did they co-design the project with them? Or just did they bring them in towards the end?" Mohan adds.

New Zealand has asked funders to highlight the need for impact in all research contracts, and to collect impact data according to common standards. Since 2010, a "broader impacts criterion" has been crucial for funding from the US National Science Foundation (NSF), with organizations encouraged to develop their own ways to check what impact is delivered.

Some efforts to add impact to research assessments have faced bumpy landings. In a 2018 pilot scheme, the Spanish government offered salary bonuses to researchers who could show success in what officials called "knowledge transfer," including the generation of economic wealth and social value. Almost 16,800 applications were made by individuals, but an assessment of the results published last year described them as "disappointing."[7] Just over half of the requested bonuses were granted, but the results showed a significant gender bias: two thirds of men but just a third of women got the impact-related payment. The discrepancy probably indicated a preference for economic impact, which was more likely to be claimed by male applicants, analysis suggests.[8]

As this shows, there are multiple systems and approaches, with more in the pipeline. Impact assessment and evaluation is here to stay. It is now up to the research community – funding bodies, academic organizations and researchers - to find a way to further evolve.

[1] academic.oup.com

[2] rand.org

[3] timeshighereducation.com

[4] gov.uk

[5] www.nature.com

[6] sciencedirect.com

[7] frontiersin.org

[8] riunet.upv.es

The movement for change

There is a clear global trend towards holistic research assessment. But there is a groundswell saying the transition should be accelerated

The discontent identified in the survey results taps into a broader movement to constantly improve how research assessment is done. Much of this has developed from researchers' concern over the way some organizations use bibliometric data to grade and reward their researchers based on publications. Meanwhile, academic leaders and funders are driven to evolve assessment by larger factors, such as the public pressure to show return on investment.

Changes to impact evaluation should reflect evolving attitudes in society, says Motoko Kotani, Executive Vice President for Research at Tohoku University, Japan. "The role of universities and research institutions should be changed, and assessment of the organization and individual researcher, and the research projects should be changed accordingly," she says.

One tension in trying to evaluate impact, Kotani adds, is that the concept can mean different things to different stakeholders. "Policymakers tend to see the impact in the short-term, and impact which can be measured by a small number of indices," she says. "While the academic community respects impact in history and impact based on original ideas in science, which is therefore difficult to assess by quantitative methods."

Momentum to address this and other issues has built over the last decade, and that is reflected in the Elsevier survey results. Two thirds of respondents agree or strongly agree that there is now a clear imperative for a shift to a more holistic approach to research evaluation. Less than a fifth disagree or strongly disagree.

How has that momentum been translated into action? At the Annual Meeting of The American Society for Cell Biology in San Francisco in 2012, editors and publishers of scholarly journals developed a set of recommendations called the San Francisco Declaration on Research Assessment (DORA). The recommendations urged funders, universities, and others in the community against using journal metrics as a "surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions." More than 24,000 individuals and organizations, including Elsevier, have now signed the declaration and committed to reform research assessment to align with its goals.

How can this be done? In 2015, experts in the field distilled existing best practice into ten principles and published them as the Leiden Manifesto for research metrics. For example, decisions should not be based entirely on data. There should be an acknowledgement of diverse research goals and efforts to look at work in languages beyond English, while the assessment process should be transparent.

Beyond these specific efforts, there are also associations that bring together the wider community of people who work or are interested in evaluation of impact, research strategy and policymaking, funding and other impact support. The AESIS Network and the CoARA are two examples.

Some major government funders have also made progress towards better assessment of research. The European Commission has run an exercise to define the principles and boundary conditions of assessment systems. Endorsed by EU science ministers, an action plan that set out how the evolution of assessment systems should take place has committed to run a full cycle of assessment reform and review by the end of 2027.

Where next? Which individuals and organizations are best placed and the most motivated to build on this momentum and deliver change? Funders believe they are in the vanguard, but academic

58%

say they are frustrated by a lack of ways to show research's impact on the wider world

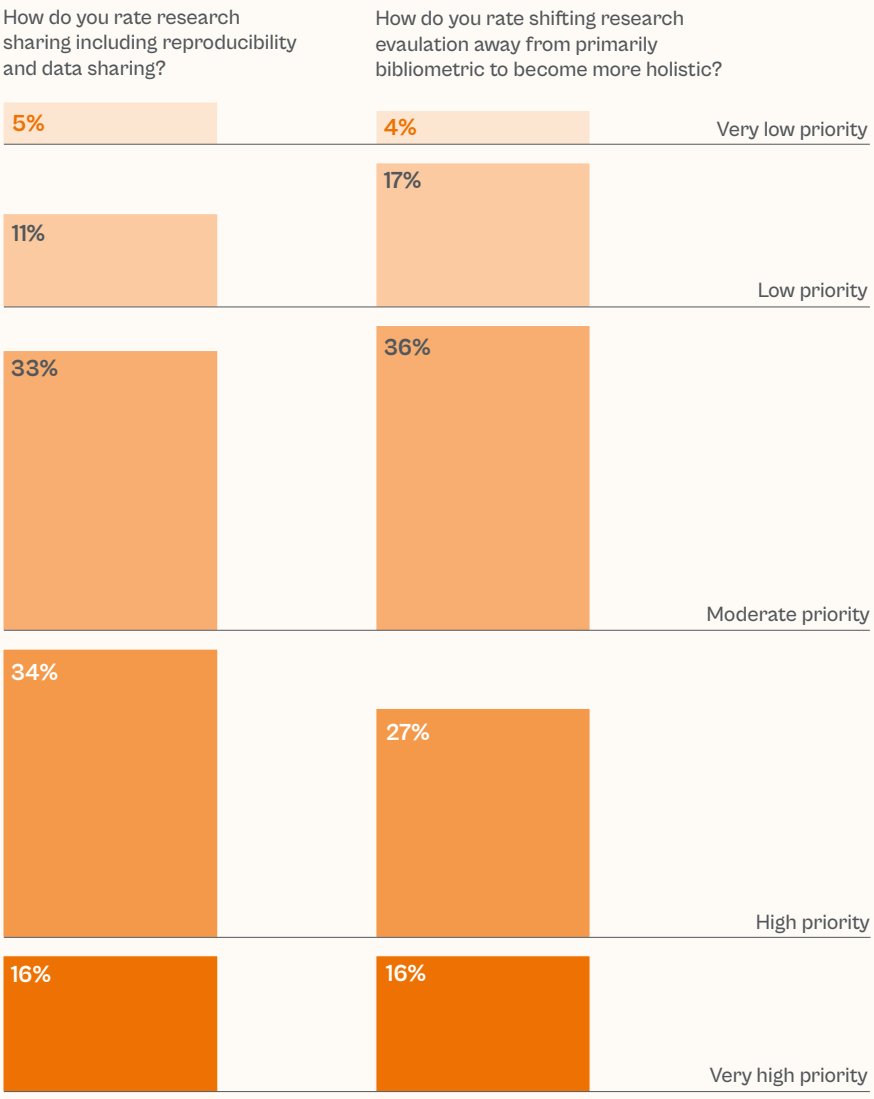
leaders and researchers simply don't agree. The Elsevier survey shows that academic leaders place funders in last place out of seven groups, while researchers place funders just sixth. Academic publishers fare little better: funders, researchers, and academic leaders all rank publishers as sixth or seventh out of the seven options.

The survey shows the mandate for change is spread across disciplines, roles and responsibilities, and that it's not restricted to a specific academic mindset. But there are some common threads. Survey respondents who strongly agree that "I am passionate about being part of research that has a positive impact on the world we live in" are 4.2 times more likely to believe there is a strong imperative for change in research assessment.

The characteristics of this group are hard to pin down. They're not a subset that emerges in conventional demographic data. They are not clearly younger, or older, or based in a specific country or region, or in senior roles. The survey results show that 30% of respondents put themselves in this passionate group. They are most likely to work in biosciences, with 36% of people in this field describing themselves this way, but there are plenty in arts and humanities (29%) and economic and social research (26%). Geographically, percentages are slightly higher in the US and Australia. But there is no standard profile for people with this passion; it is spread across the research ecosystem.

The survey also shows that those who strongly believe in the principle of research sharing are 4.6 times more likely to believe in the need for more holistic research evaluation. Those who are passionate about research impact are 1.6 times more likely to strongly agree their research is well understood by the general public.

MOST PEOPLE SAY THE ISSUE HAS SIMILAR IMPORTANCE TO IMPROVED SHARING OF RESEARCH



MOST BELIEVE SOME PROGRESS IS BEING MADE

Question: How would you describe the progress towards incorporating real-world impact into research evaluation?

The fragile public support for research

In an era when science is part of the culture wars, it becomes even more vital to show a return on publicly-funded research

"If research is to have impact that benefits society, then trust in science is critical," a report from Australia's Chief Scientist Cathy Foley pointed out earlier this year.[9]

Researchers, and scientists in particular, face a paradox. Despite our transition to a science-based society, public support for science appears to be in decline in many places. The pandemic was a triumph for the power of research and showed very visible evidence of impact, with innovative vaccines deployed in record time. Yet the standing of scientists is diminished in many countries, in part because they have been caught up in the culture wars and identity politics.

That seems to be the case in the US.[10] "Between November 2020 and then the end of 2021 is when you see the steep decline in trust," says Brian Kennedy, a senior researcher at the Pew Research Center, where he focuses on science and society research. "That's when the share of Americans who say they have a great deal of trust [in scientists] goes down by 10 points."

63%

of researchers in a 2022 study said public scrutiny of research in general had increased since the pandemic [12]

The Pew Center runs regular surveys that ask US citizens about their confidence in various groups of people, from politicians and the military to journalists.

"The share of Americans who say they have a great deal of trust in scientists was 21% when we first asked this question in 2016. And then it goes up to 39% in November 2020," Kennedy says.

But when the organization asked the question again in late 2021, those who said they had a great deal of confidence in scientists to act in the public's best interests had slumped to 29%.

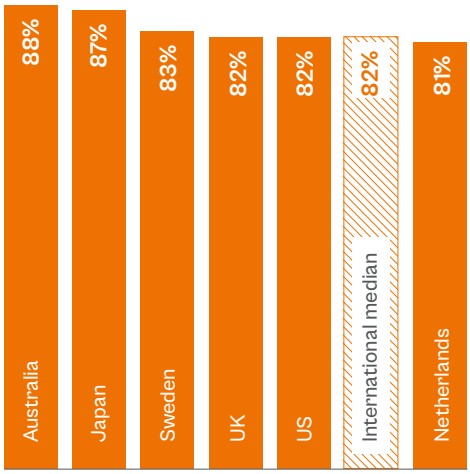
The better news was that large majorities of Americans said they had at least a fair amount of confidence in medical scientists (78%) and scientists (77%) to act in the public's best interests. That placed them at the top of the list of nine groups and institutions included in the survey.

The results reflect the politicization and polarization of science and public trust during COVID-19. "You do notice those numbers are different," Kennedy says. "Democrats have more trust in scientists than Republicans, and that gap widened, but at the same time, trust among both groups declined during the pandemic."

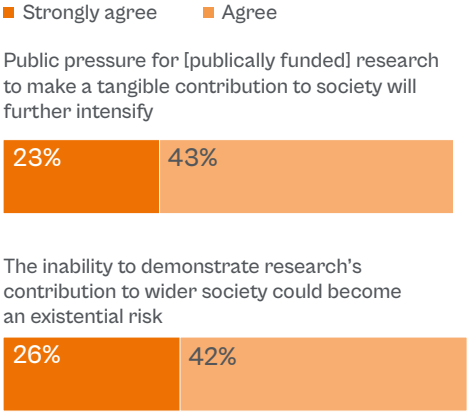
And it's not just in the US. Similar polarization of trust in science along political lines is seen in Canada, Australia, and the UK, he adds.

A 2019 STUDY SHOWED MOST PEOPLE THINK THAT GOVERNMENT SPENDING ON SCIENTIFIC RESEARCH IS A GOOD INVESTMENT[13]

What percentage of the population says government invetsment in science is usually worthwhile for society over time?



RESPONDENTS THINK THE PUBLIC WILL PUSH HARDER FOR GOVERNMENT-FUNDED RESEARCH TO MAKE A MORE TANGIBLE SOCIAL CONTRIBUTION



A role for research

A decline in public trust in science combined with increasing scrutiny on public spending could be bad news for researchers. A public survey carried out earlier this year by the UK Campaign for Science and Engineering (CaSE) presented some worrying results about support for research.[11] For example, a majority of the UK public supported halving the government R&D budget if the money went instead to nurses or lowering energy bills. Almost half of people would only choose to invest more in R&D when the economy is in better shape. And more than a third of people could think of no or very few ways that public investment in R&D improves their lives.

Impact could help, CaSE said. "Advocates for R&D have an opportunity to remedy this issue by making the benefits of R&D more visible. Tangible, local messages about R&D can change people's minds."

In Australia, Foley tried to emphasize that high-profile debates about the quality of individual studies do not undermine the wider integrity of science and research.

"If the debate can be shifted from the isolated issues of integrity to the more pressing issues of quality, I believe the public will better understand the scientific process and trust will be built and strengthened," Chief Scientist Foley wrote in her report. "Trust in science is built on scientific literacy."

Many researchers see the introduction of impact assessment as a means to steer research away from what some call "pure" or "fundamental" pursuits towards specific goals and applications. Whether they view that as a good or bad thing can come down to their interpretation of the responsibility that research has to society.

This question is as old as science itself, or at least as old as the term "scientist," which was popularized only in the late nineteenth century US.

This was a time of furious and often ill-tempered public debate about motivations, corruption and increasing opportunities to exploit and commercialize the results of academic research.

Perhaps most famously, the US physicist Henry Rowland used an address to the 1883 annual meeting of the American Association for the Advancement of Science (AAAS) to issue a "Plea for Pure Science." With inventions such as the telegraph and electric lights, obscure newcomers, he complained, were stealing ideas from the past and being "lauded above the great originator of the idea, who might have worked out hundreds of such applications had his mind possessed the necessary element of vulgarity."

Rowland was not against progress, but to protect the integrity of science he wanted to keep a respectable distance between the research and the application. But as public funding for science ramped up after World War Two (see section 2.4b), policymakers became keener to push science and its application closer together.

Many researchers, of course, still argue that pure science should be research for its own sake. But more institutions, universities and funders now include some kind of societal benefit in the way they define the responsibilities of scientists. The AAAS, for example, issued a statement in 2017 that said researchers had a duty to "conduct and apply science with integrity in the interest of humanity."

29%
do not think policymakers understand the purpose and value of research

53%
think research strategy should be researcher-led (rather than policy-led)

[9] chiefscientist.gov.au

[10] pewresearch.org

[11] sciencecampaign.org.uk

[12] Confidence in research: researchers in the spotlight. Economist Impact, 2022

[13] Pew Research Center, 2019

Research policy needs to strike a balance, says *Mark Reed*. It must incentivize impact while creating a culture in which researchers are drawn to impact on their own terms

Opinion
Why research evaluation needs to include real-world impact

PROFESSOR MARK REED
AUTHOR OF
THE RESEARCH IMPACT HANDBOOK

Evaluating impact can feel like yet another burden for over-worked researchers to carry. Most curiosity and creativity-driven researchers would prefer to be left alone to get on with their research, and even those who want to generate impact would rather spend their time making a difference, rather than measuring how much of a difference they made.

That's a problem, because when we can't evidence our impact, it becomes harder to justify public investment in research. But more importantly for most researchers, without evaluating our impact, we won't know if we're actually doing good.

The challenge of responsible impact evaluation

However, this isn't as easy as it sounds. For a start, who decides what impact means? What's good for one group may harm the

THE UK'S 2014 RESEARCH EXCELLENCE FRAMEWORK REVIEW COST[14]

£246m

= €280m /$300m*

**Converted at October 2023 rates*

86%

cost to universities and other research institutions

6%

cost to the four major funding bodies

8%

paid to assessors and specialist advisors

interests of another group, or the same group in a different time or context.

If impact is in the eye of the beholder, then we must evaluate it from the perspective of those it has touched, representing both positive and negative perceptions. Reality is messy, and it takes time and effort to evaluate impact responsibly.

This leads to another problem. Researchers and their institutions regularly complain that they don't have the time, skills or resources to evaluate impact. This means that if funders and governments want evidence of impact, they must invest in evaluation, including professional services staff, training, IT systems and budgets for the kind of nuanced assessments that will provide formative feedback.

However, done properly, there can in many cases be a payback, in the form of research outputs. With sufficient time, skills and resources, impact evaluation can be a win-win for applied researchers who can use the data in new or enhanced papers that more fully demonstrate the application of their research. It may also create collaborative research opportunities for less applied researchers who are curious about working with more applied colleagues to explore future applications of their work.

Charting a course to evaluate impact

The UK pioneered impact evaluation in its 2014 Research Excellence Framework, offering rewards of £325,000 on average for the best impacts. Successive iterations have attempted to tackle various gaming behaviors, with the current proposals for 2028 focusing on improving research culture.

Other countries have resourced but not rewarded their evaluations of impact, typically taking a much lighter touch approach. Although this might not lead to the levels of investment in impact we have seen in the UK, it still has the potential to provide a snapshot of the benefits provided to society from research. If an element of competition is introduced, for example, only allowing the best impacts to be published (as Australia did in its Engagement and Impact Assessment), this can still drive investment in the generation and evaluation of impact.

What next for impact evaluation?

There is a potential radical alternative to the current national research evaluation systems: a universal basic income for researchers. In this system, a proportion of research funding is allocated equally to active researchers for their research and impact activities. This would give all researchers equal opportunities to try out high-risk, potentially game-changing ideas in seed-corn projects, conducting the networking and capacity building they need to create a firm foundation for impact. It would also curtail the "projectification" of research, where it is increasingly difficult to pursue impacts between and beyond projects.

The challenge for research policy is to get the right balance between resourcing and incentivizing impact, while building cultures in which researchers are drawn to impact on their own terms. In my last book, *Impact Culture*, I argued for a radical reassessment of why we engage with impact as researchers and institutions. Researchers are looking for cultures in which their creativity is nurtured and they can feel like they belong. And yet, around the world, researchers increasingly complain that they feel like numbers in an increasingly corporate machine.

Creating bigger and better incentives that inspire ever more complex ways of gaming the system is likely to further disenfranchise already disillusioned researchers. Trusting researchers with more creative freedom – while giving them the tools and resources to explore impact on their own terms – might feel like a risky strategy, leaving impact to serendipity. But by focusing on impact culture first, we can harness intrinsic motivations that are more powerful than incentives, and bring researchers with us on a journey towards responsible impact evaluation.

With sufficient time, skills and resources, impact evaluation can be a win-win for applied researchers

Mark Reed's company Fast Track Impact has trained researchers from over 200 institutions on generating research impact. He is the Co-Director of the Thriving Natural Capital Challenge Centre at SRUC in Edinburgh where he researches ecosystem markets and environmental governance.

[14] REFI review by Lord Stern

02

Defining barriers

What blocks effective impact assessment?

Impact assessment can require extra resources–but the survey shows that the biggest barriers to change are a lack of frameworks and consensus

The survey results are clear. The number one barrier to more holistic research assessment, highlighted by 56% of the sample, was the lack of common frameworks or methodologies to measure the impact of research on the world.

Academic leaders and researchers were especially likely to identify this barrier. Funders, those who would have to implement any new scheme, also ranked this issue highly, but they gave slightly higher ranking to a "lack of consensus on what actually constitutes impact," as well as a "lack of resources to dedicate towards evaluating impact on the world."

Those issues were identified by the general survey as well, featuring in second and third place on the list of barriers. The results also highlight wide awareness that impact assessment is a multi-stakeholder exercise, with institutions, academic leaders, funders, and individual researchers all bringing their own priorities and preferred mechanisms. Achieving sufficient alignment between these different actors was identified as a key barrier by 40% of respondents. And complexity, partly caused by the overlapping and sometimes contrasting agendas of these multiple actors, was named as a barrier by more than a third of the sample (36%). Varying priorities more generally were also suggested by nearly a quarter (24%).

A lack of data to assess the impact of research on the wider world beyond academia was labelled a barrier by 30% of the respondents. This is an issue for those working in medical research in particular, who were 1.4 times more likely to flag it.

Perhaps reflecting the general support for the goals of research impact assessment found in other sections of the survey, only 27% of survey respondents said that "institutions and researchers not wanting it" was a barrier to finding a better, more holistic, system. And less than a fifth (19%) said there was a lack of need.

One interesting, and heartening to many, result was that only 16% of the survey sample said that "difficulty integrating qualitative inputs" presented a barrier to better impact assessment. That's significant because for many academic fields, qualitative assessments of research impacts seem likely to offer an attractive option, even as other methods and systems are developed.

James Wilsdon is a research policy expert at University College London and author of the influential 2015 report on assessments, *The Metric Tide*. He thinks much of the research community now has a more positive view on efforts to judge impact than it did a few years ago.

"We've moved a long way on the kind of general cultural acceptance of impact as a legitimate focus for emphasis and investment and also measurement, where it's possible, over the past 10 to 15 years," he says.

Other surveys show that while researchers and others might complain in generic terms about research assessment, they are still generally supportive of the effects that the introduction of impact has had on the assessment system.

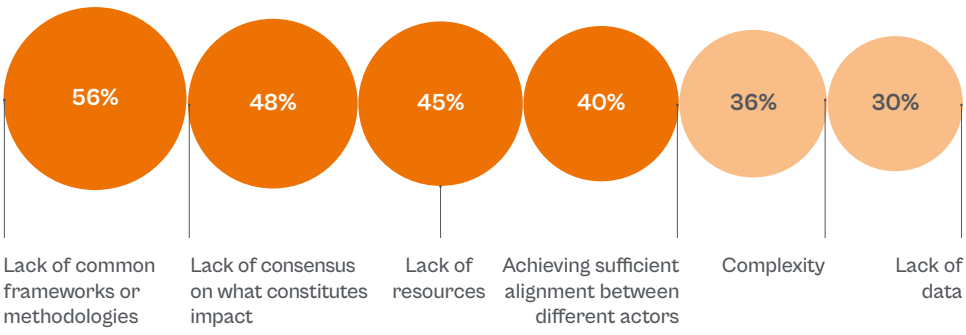
"There's still obviously an argument about whether definitions of impact could be broader and whether we could be capturing things that aren't being captured at the moment," Wilsdon adds. "But I don't hear many people these days calling for it to be axed or rolled back."

Is the lack of resources a barrier to creating a better impact assessment system? Wilsdon says the experience of the UK and the REF shows how momentum can build to generate a positive cycle.

"There's budget and there's people and there's a professionalization of impact assessment as a legitimate part of the system and a focus for activity," he says. "It sets up impact as a strategic priority, and then that percolates down through the system, as a departmental priority and then an individual priority."

COORDINATION AND ORGANIZATIONAL ISSUES ARE SEEN AS KEY BARRIERS. COMPLEXITY AND DATA ARE SEEN AS LESSER PROBLEMS

Question: What are the key barriers to establishing a more holistic method of assessing research's impact on the world?



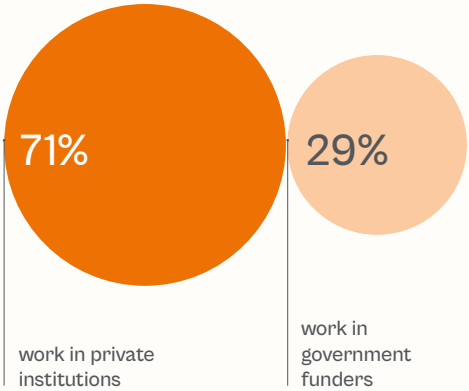
Respondents could pick multiple options

Funding organizations desire change, too

The views of funding organizations are critical to any move to holistic research assesssment; they are the mechanism that potentially gives additional resources to researchers that show real-world impact.

The global survey included 100 research directors and other senior managers in these organizations to understand the barriers they see and the potential problems that would need solving.

WHERE DO THE FUNDERS IN THE SURVEY WORK?



COMPARED TO RESEARCHERS AND ACADEMIC LEADERS, MORE FUNDERS THINK THAT CURRENT METHODS ARE EFFECTIVE

36%

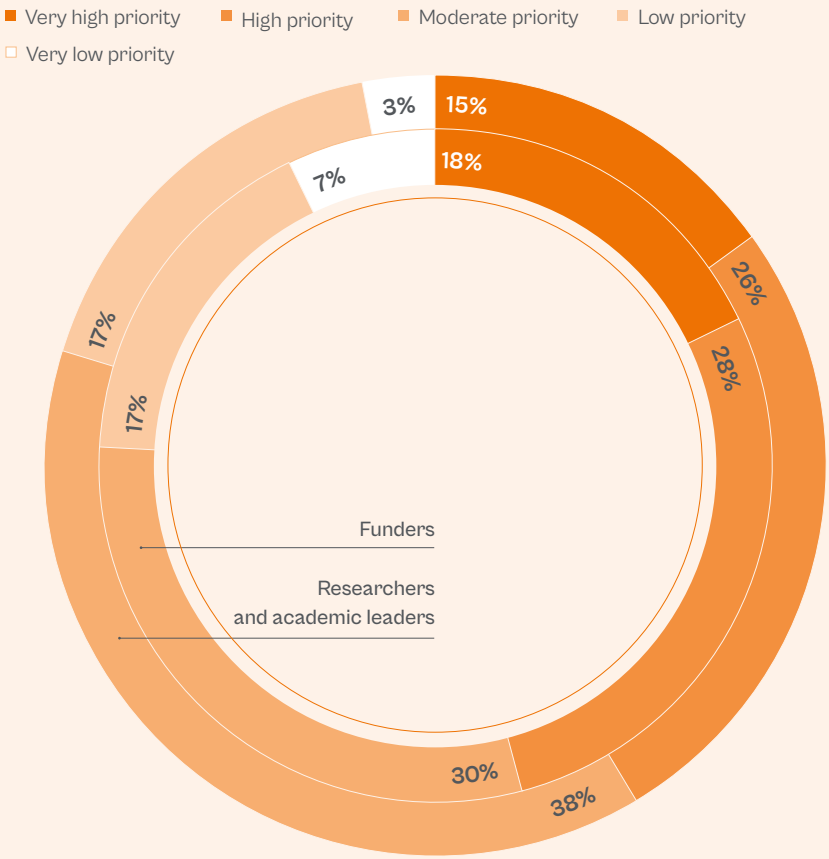
Say current methods are highly effective at evaluating real-world impact against

23%

of researchers and academic leaders

FUNDERS ALIGN WITH RESEARCHERS AND ACADEMIC LEADERS ON THE NEED FOR CHANGE

Question: What priority would you give to shifting research assessment away from primarily bibliometric to become more holistic?

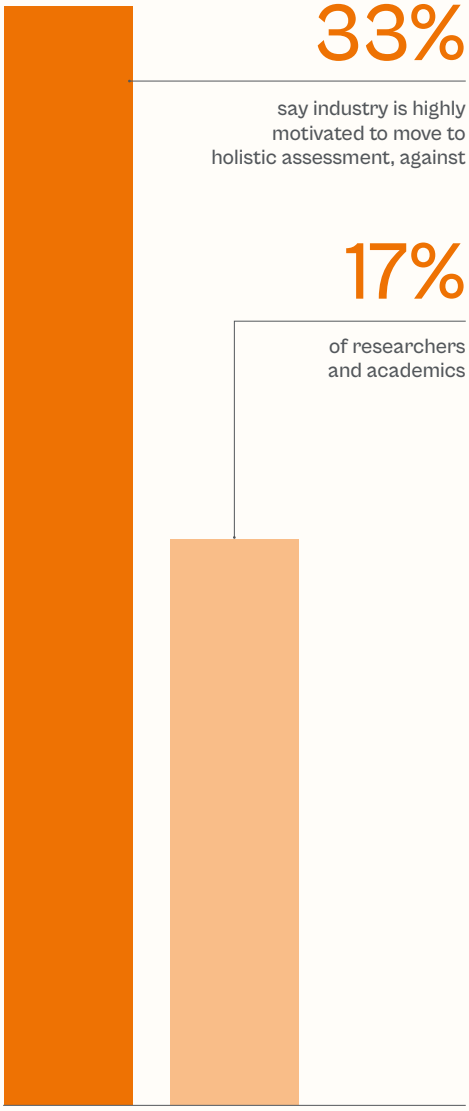


FUNDERS AGREE WITH RESEARCHERS AND ACADEMIC LEADERS THAT THE CURRENT SYSTEM CREATES VESTED INTERESTS

65% agree or strongly agree the current system creates vested interests, against

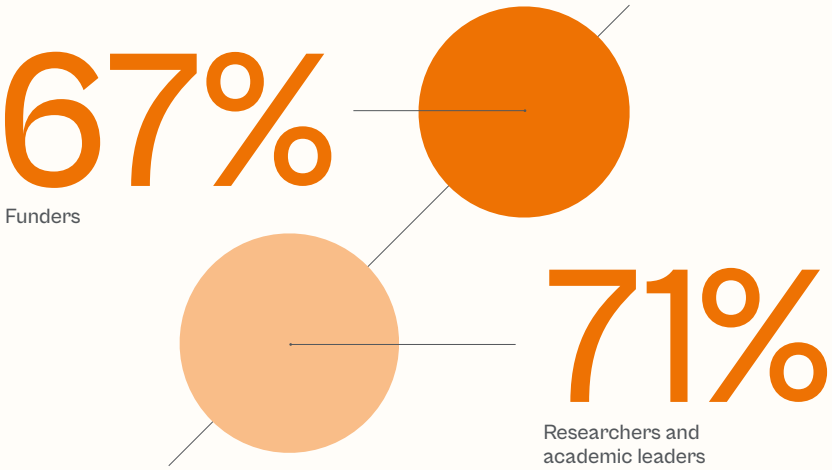
60% of researchers and academics

FUNDERS DISAGREE WITH RESEARCHERS AND ACADEMIC LEADERS ON THE ROLE OF INDUSTRY



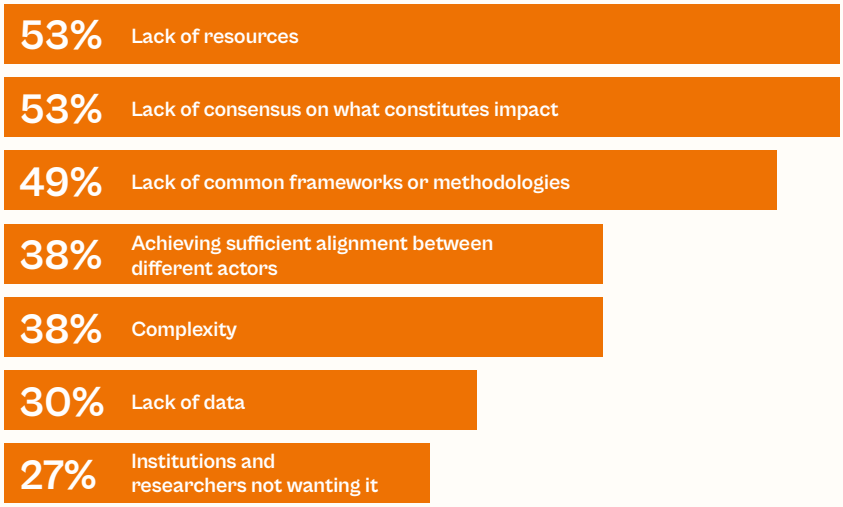
FUNDERS ARE AS PASSIONATE ABOUT REAL-WORLD IMPACT AS RESEARCHERS AND ACADEMIC LEADERS

Question: Are you passionate about being part of research that has a positive impact on the world we live in?



FUNDERS HAVE A GREATER FOCUS ON RESOURCES AS A BARRIER

Question: What are the key barriers to a more holistic method of assessing research's impact on the world?



FUNDERS HAVE MODEST ENTHUSIASM FOR A PUBLIC CAMPAIGN

Question: Would you participate in a community initiative to bring about change?

Impact assessment can quickly get complicated. But there are routes through the complexity

Defining impact

For impact to be assessed it must first be defined. So what is it? While it's tempting to borrow the quip about art – "I don't know much about it, but I know what I like" – that doesn't seem a suitable basis for a reliable and robust system.

How can one compare, say, the output of a clinical trial run by a handful of medics that launches a new drug or vaccine, with the steady accretion of findings and knowledge by hundreds of researchers over a decade, which led to the drug's development? Or assess the relative value of projects that have a high impact on relatively few people and those with a more marginal benefit to millions?

Jonathan Grant is the former Director of the King's Policy Institute at King's College London and now runs Different Angles, a consultancy that focuses on the social impact of universities and research. He has wrestled with the conundrum of defining impact for years.

One early attempt to categorize impact, he says, was the concept of payback. Developed for healthcare research, payback is a framework that categorizes research outputs into five categories: knowledge production; capacity building; informing policy and product developments; health benefits; and broader economic benefits. It's been used, for example, to assess the payback from specific healthcare funding campaigns by charities.[15]

But when Grant and colleagues analyzed the claims for impact made by universities in the 2014 UK REF exercise, they found these five categories were far too broad. Instead, from looking at the 6,679 submissions, they drew up a list of 60, which ranged from specific subject areas (mental health, food and nutrition) to activities (public engagement, technology commercialization).[16] And when they looked at specific examples of what they called "pathways to impact" they identified a staggering 3,709 unique routes.

"There was not a magic bullet I can give you to say this is how you get impact across all these varied disciplines and varied impact topics," he says. "We have this deep complexity, and we need to understand and embrace that, in my view."

That does not mean that impact cannot be quantified, he stresses. Take local impact - his team has recently repeated the analysis for the 2021 REF assessment; although the results have not yet been published, he says they have found a way to judge how close the impact happened to the institution where the work was done. In this way, they can judge how successful universities are at creating what he calls "hyper-local impact" within 25km.

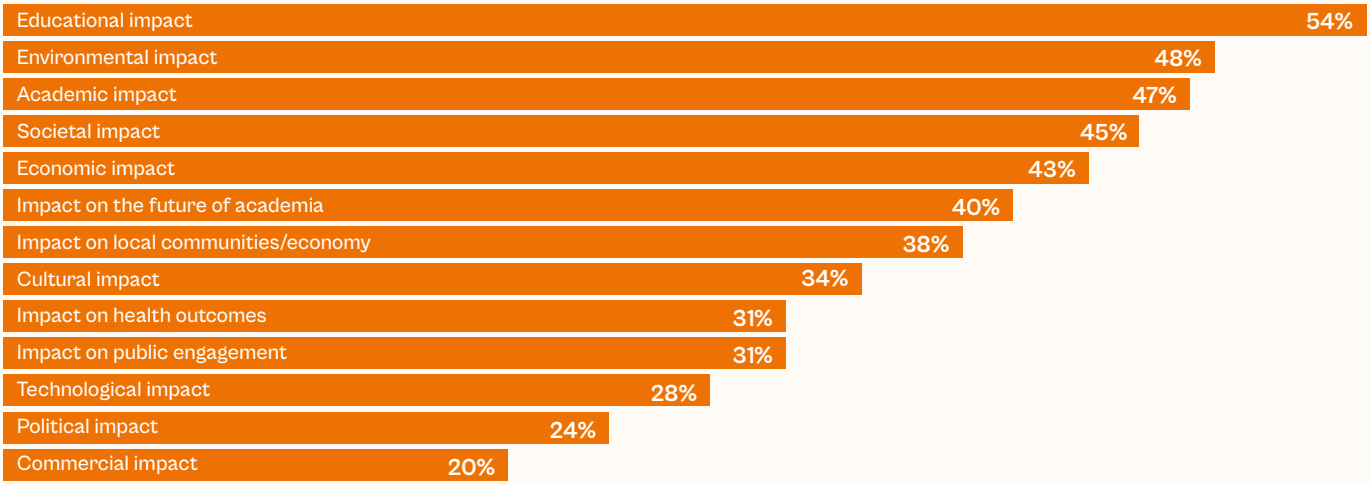
TYPICAL REWARD UNDER THE UK'S 2014 RESEARCH EXCELLENCE FRAMEWORK FOR HIGH IMPACT PROJECTS

£325,000 = €370,000 = $390,000

Converted at October 2023 rates

ASKED TO BUILD A NEW SYSTEM OF RESEARCH EVALUATION, MOST PEOPLE STILL RATE ACADEMIC AND EDUCATIONAL IMPACT HIGHLY

Question: Which factors would you include if building a new system of evaluating research?



Respondents could pick multiple options

53%

of funders said a lack of resources is a key barrier, against

41%

of academic leaders

"I've always been quite cynical about impact metrics. But I do think with new data-mining technologies it's not impossible to start to think about some metrics," he says. "The local impact could be a metric."

Nick Fowler, Chief Academic Officer at Elsevier, points to the United Nations Sustainable Development Goals (SDGs) as the best broader framework currently available to measure the relationship between research and real-world impacts.

"SDGs are an increasingly widely-adopted taxonomy of what impact is," Fowler says. "As such, SDGs provide a unifying language and a unifying set of indicators on what constitutes progress, or impact."

There are some efforts to capture academic impact on such broad indicators. The University of Tasmania, Australia, has a goal to maximize the university's societal impact in the state. That impact is tracked and assessed in broad terms, such as whether life expectancy increases, and by looking at academic work to address high blood pressure, which is a major cause of early death in the state.

"I think the real challenge comes in actually attributing what I do as a researcher, or collectively as a university, to changing those things," Fowler adds. Many individuals, ideas and changes in circumstance contribute to societal change, and there is often a lengthy delay between an action and its eventual impact. "This multi-causality and the lag effects make it very difficult to isolate any individual's contribution," he points out.

One way to try to assess such contributions is to study chains of events and to find suitable proxies for eventual impact. One could be tracking high-profile news mentions of academic work; and another could be pinpointing where research is cited in policy documents.

When combined with impact at the other end of the chain, such as improvements in life expectancy, such proxies can offer a more complete picture of impact, Fowler says.

"I think we need to measure all these things," he explains. "Then even if we can't say that it was this piece of work that led to that outcome, at least we can understand what work is being done and what outcomes are changing."

[15] www.rand.org

[16] kclpure.kcl.ac.uk

Almost half say that more transparency and auditing is an acceptable price for improved impact evaluation

The cost of action

Change requires leadership. But who should lead the move to more holistic research assessment?

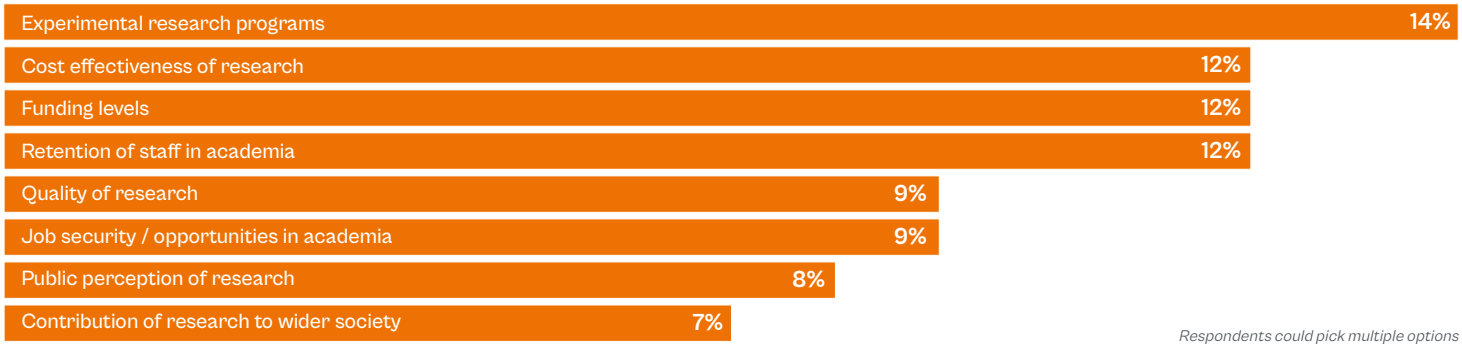
What is an acceptable cost for better research impact evaluation? The survey results offer some insight.

Greater scrutiny of research practices was the most commonly accepted of six possible downsides, with almost half (48%) saying more transparency and auditing was an acceptable price to pay. A significant minority (43%) said they were willing to accept additional administration or documentation in funding applications. A third (33%) of respondents said they would accept reduced individual recognition among their peer group. And a slightly smaller number (30%) were willing to endure longer waits and lead times in the funding approval process.

Still, only a quarter of the survey respondents said they viewed lower funding approval rates as an acceptable cost for incorporating real-world impact into standard research evaluation frameworks. The least popular option of those offered was fewer progression opportunities: just 18% of respondents saw this as a reasonable exchange for a more holistic approach to research evaluation.

THERE ARE CONCERNS ABOUT COSTS AND OTHER ISSUES – BUT AT A LOW LEVEL

Question: Where do you see negative effects on academia with a more holistic form of research evaluation?



Respondents could pick multiple options

To identify the areas most vital to academic evaluation, Elsevier conducted an extensive international listening tour in the middle of 2023. Insights gained were used to draw up this proposed high-level framework for holistic evaluation based on five pillars

A high-level framework for evaluation

The listening tour brought in a wide variety of views from 40 academic leaders and heads of funding bodies drawn from 18 countries. But the debate now needs to be much broader. The community needs a range of concepts, practices and indicators that can be selected based on the research being evaluated, geographical location, and other factors. This outline framework is perhaps a starting point for creating this toolbox.

40

academic leaders and heads of funding bodies, drawn from...

18

countries

KNOWLEDGE CREATION PROCESS (THROUGHPUT)	KNOWLEDGE CREATED (OUTPUT)	OUTCOMES AND IMPACT
I & D	Quantity	Cultural
Vertification and Reproducibility	Excellence	Economic
Open Science	Collaboration	Environmental
Sustainability	Innovation	Health
Research Practices	Capabilities	Political
Multi-Interdisciplinarity	Commercialization	Societal
Knowledge Exchange		Technological

QUANTITATIVE AND QUALITATIVE

All change

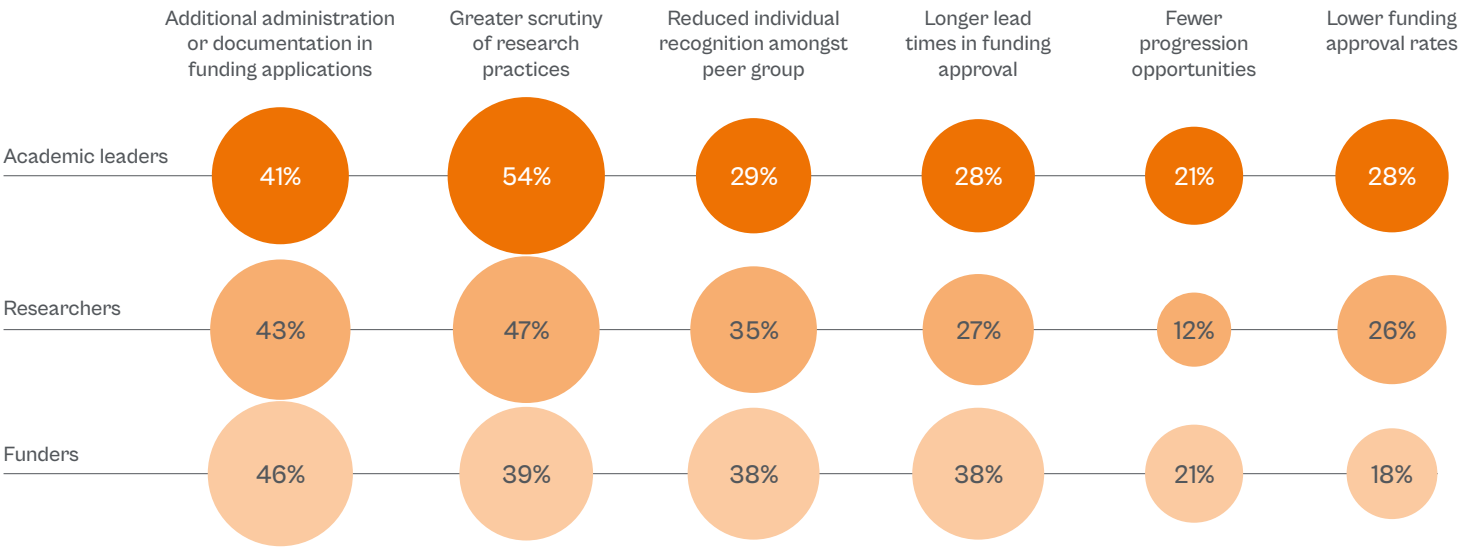
More sophisticated research assessment will increase costs, both financial and non-financial. But the research community says these are acceptable given the advantages to be gained

Which sectors of the research community are willing to take action to develop a more holistic system of research impact assessment – and how? As we saw earlier in the report, there's significant disagreement over who is taking the lead on this issue.

Who should take the lead in catalyzing change? Academic leaders (51%) and researchers (48%) were the most popular choices in the survey results. Policymakers were also a popular choice (40%). But no other suggested group was supported by more than a third of respondents. In a result that might surprise some, the general public (31%) was seen as a more suitable driver of change than either funders (26%) or industry (21%).

RESEARCHERS, ACADEMIC LEADERS AND FUNDERS HAVE SIMILAR VIEWS ON ACCEPTABLE COSTS

Question: What is an acceptable cost for incorporating real-world impact into standard research evaluation frameworks?



Respondents could pick multiple options

What about individuals?
What are they willing to do?

Asked what steps they would personally be willing to take to bring about change and a move to a more holistic system of research impact assessment, almost all (96%) said they would do something. In an encouraging result for the efforts already under way, and for others that could follow, more than half (52%) said they would participate in a community-wide initiative. And 42% were willing to invest time free of charge in research that supports the case. Some 40% would deliver a lecture or a speech, 38% would provide a platform for other individuals and organizations to make the case for change, and 33% would sign a petition.

More than a quarter (26%) said they would proactively research and make the business case for tools and services that enable more holistic research impact evaluation and 21% would be happy to write an open letter or opinion article. A significant minority said they would be willing to take more direct action. All change indeed!

Science, the endless frontier

Adopting more holistic assessments of research impact to interrogate the benefits of science might seem like a big change. And academia, conventional wisdom insists, does not do big change – certainly not quickly.

But is that really true? From the rise of open access to the embrace of citation analysis, many examples suggest that the behavior of the academy can shift significantly when momentum builds and the incentives are right.

Even the way the US government uses public cash to fund research – which most working scientists probably take for granted – is the consequence of one such radical change that would have seemed unlikely to many at the time.

The English philosopher and statesman Francis Bacon is usually credited with the idea that science is a public good and that governments should, therefore, pay for it. However, it took another 350 years for the world's largest economy to take his plea to their Washington, D.C. hearts.

That was in the years immediately following World War Two, when the Manhattan Project to develop the atom bomb, and other military successes based on new technology, helped to convince policymakers that federal funds could make a difference. This was new thinking. While countries such as France and Germany had already introduced public support for science, most research in the US to that point had been paid for – and so was directed by – wealthy individuals and corporations.

A report to President Franklin Roosevelt from Manhattan Project pioneer Vannevar Bush helped to usher in the new era. Called "Science: the endless frontier," the 1945 report made a series of recommendations, including that the government set up and fund a national research foundation that would oversee peacetime research and award basic science grants to universities. The National Science Foundation that followed in 1950 followed that model and set the US on a path that would change science policy and funding forever.

03

Resolution

There is a clear mandate for community-wide change. The next challenge is building consensus within the research community and acknowledging that trade-offs will be necessary

A way forward

52%

said they would participate in a community-wide initiative to bring about change

What would a holistic system of research impact assessment look like? Who is best placed to drive change? There may not be answers yet to some of the questions raised by this report – but it's not too soon to ask them.

The survey results show there is a solid mandate for change, or at the very least for the academic community to come together to discuss what kind of change it wants. Some of the solutions might seem out of reach at the present moment, but others could be a question of sharing ideas, incentives, and best practice.

The survey, drawing together the views of 400 people from across the research community, offers a place to start some of these conversations. They can identify priorities, for example. Asked what should be included in a new system to evaluate the impact of academic research, the strongest support (54%) was for educational impact. Societal impact (45%), cultural impact (34%), economic impact (43%), environmental impact (48%) and academic impact (47%) all featured highly. But just 20% said they would include economic impact and 24% would prioritize political impact.

As several stakeholders have noted, any new system to assess impact is going to have to deal with trade-offs. As definitions of impact types sharpen and become more focused, they lose diversity and might fail to reflect the full picture.

Using data to attempt to compare impact between different research areas could merely focus definitions and impressions of impact onto areas where such data are available. New types of metrics can accelerate and streamline impact assessments but could flatten nuance and oversimplify complex scenarios.

Help could come from new technologies, or fresh applications of existing ones

"I think impact is actually quite a complex issue," says Paul Boyle, Vice Chancellor of Swansea University, UK. "From the point of view of assessing researchers and their contributions, in a sense you have to be open to that kind of very holistic understanding of impact."

Help could come from new technologies, or fresh applications of existing ones. Data and text-mining techniques can reanalyze existing data sets to offer a richer picture of where and when impact occurs and how this links to the historic record of published academic papers. Some are already experimenting with artificial intelligence to try to predict the future impact of scientific papers[17] and grant applications.[18]

"I can strongly see an argument for why we'd want to explain and point out that a lot of that research has direct and obvious impacts on society," Boyle says. "We've got to also come up with ways of understanding people's contributions that do not create such a huge workload that it becomes untenable."

Academic publishers can and should contribute to this wider debate, says M'hamed el Aisati, Vice President, Analytical & Data Services, Elsevier.

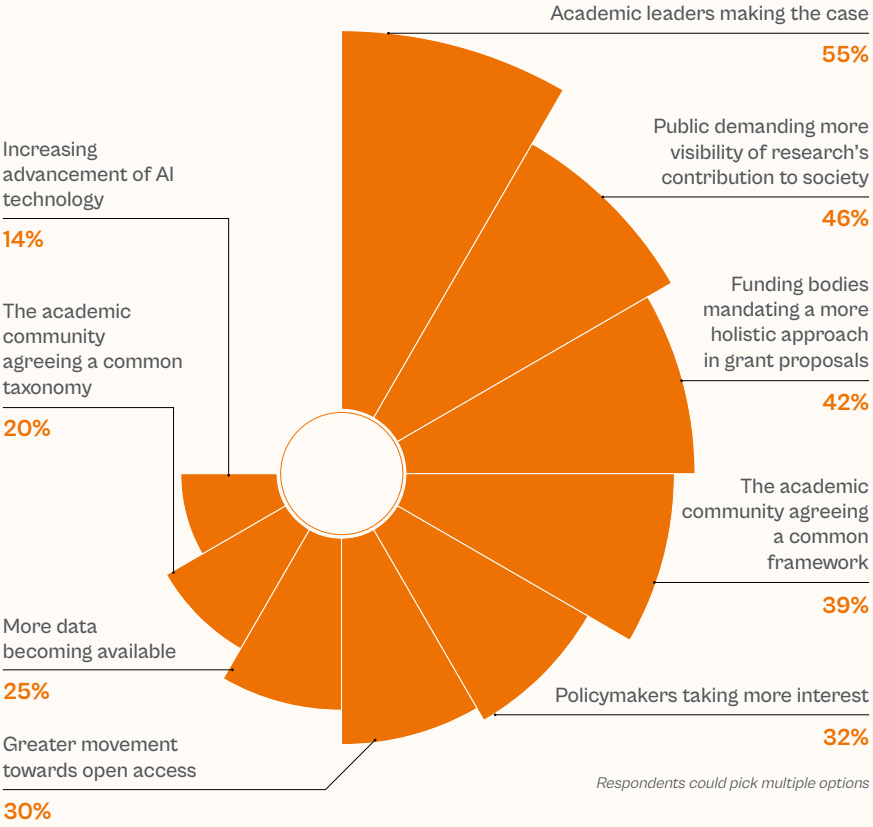
"We are part of this journey, and we have a duty to be involved in the debate," he says. "But it has to be community-driven. Impact solutions are going to be tricky but the whole world needs to come together to figure out better ways to do it."

Elsevier can contribute ideas, he adds. "We do have some solutions. We do not have an absolute model or solution to measure real societal impact, but we do have proxy measures, indicators that give you an idea or signal about a possible impact."

One of these proxies can link patents to research outputs, such as academic papers. Another can make similar links between research papers and policy documents.

ACADEMIC LEADERS ARE KEY TO CHANGE...

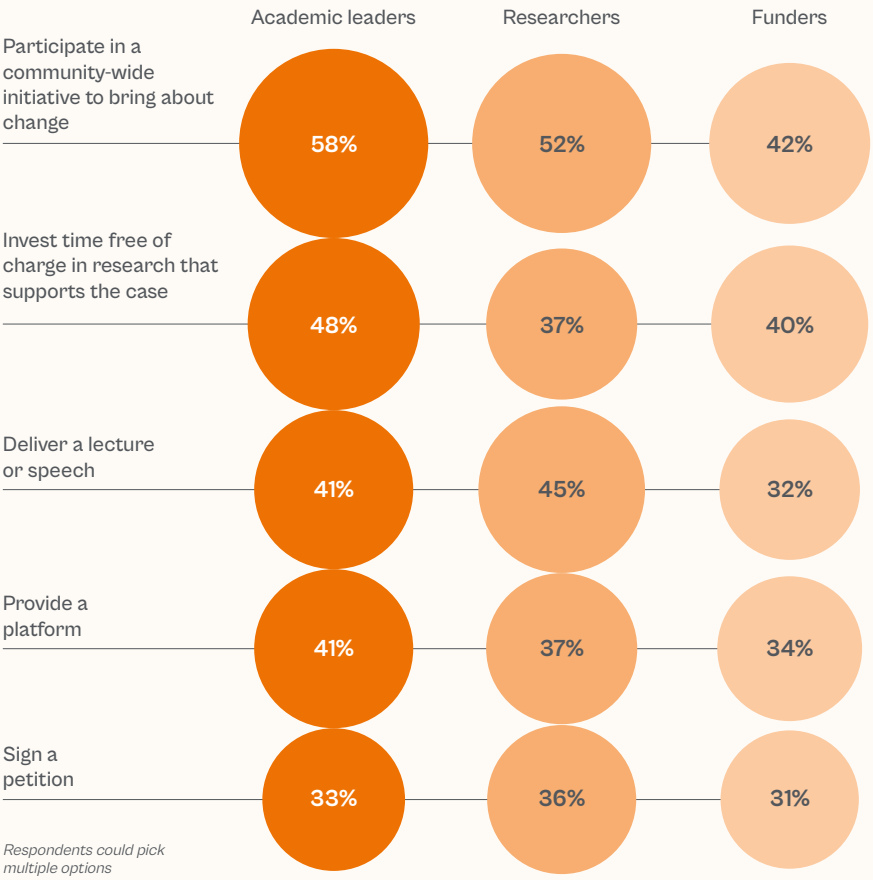
Question: Which do you feel would have the greatest scope to advance the quality of impact evaluation?



Respondents could pick multiple options

... AND THEY SAY THEY ARE WILLING TO TAKE ACTION

Question: What steps would you personally be willing to take in order to bring about change?



Respondents could pick multiple options

"We want people to be aware of these proxies and to adopt them alongside qualitative measures," el Aisati says. "Given the complexity of the matter, we want them to see these proxies as good alternatives, just like the qualitative impact case studies used in some existing evaluations."

But a real solution needs a collaborative, system-wide approach, drawing expertise from across the academic community. Despite flaws, current research funding systems have repeatedly delivered impactful outcomes; changes must offer clear improvement, minimize controversy, and demonstrate clear advantage to the researchers themselves. As this report has shown, there is support across the community for holistic research assessment. Translated into action, that broad support would be a powerful impetus for change.

[17] www.nature.com

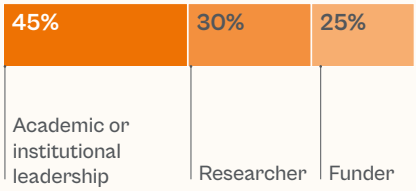
[18] link.springer.com

Survey methodology & demographics

AREA OF RESEARCH MAINLY WORKED IN

Respondents could select multiple areas of research

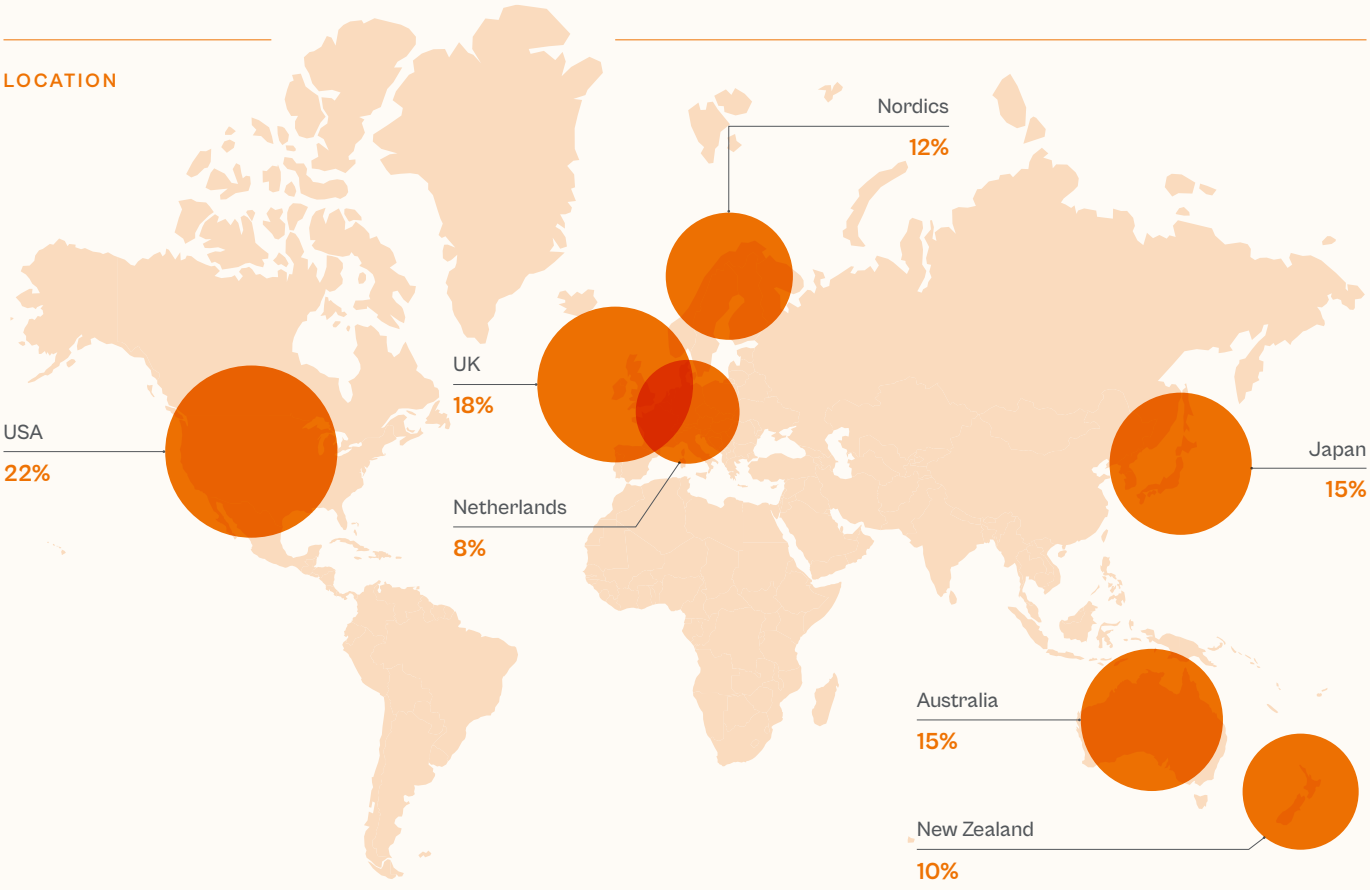
NATURE OF ROLE



13.8

years in academia or research, on average

LOCATION



Survey note:

Elsevier commissioned alan. to survey 180 academic and institutional leaders, 120 researchers and 100 executives at funding bodies (400 in total).

Respondents were based in Australia, Japan, the Netherlands, New Zealand, the UK, the US (largest quota, 22%) and Nordic countries. Fieldwork was conducted online in August and September 2023. Respondents' experience in research/ academia ranged from two to 25-plus years.

For more information, visit:

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