ATSE

RESPONSE TO THE

Engagement and Impact Assessment Consultation Paper

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AUSTRALIAN ACADEMY OF
TECHNOLOGY AND ENGINEERING

ENGAGEMENT AND IMPACT MEASURES
Consultation paper

The Australian Academy of Technology and Engineering (ATSE)[1] welcomes the opportunity to contribute to the development of measures to capture research engagement and impact from Australia's universities. As Australia's national Learned Academy for technology, engineering and applied science, ATSE has had a keen interest in ensuring that publicly funded research is effectively translated to improve Australia's economic, social and environmental prosperity and wellbeing. Achieving this requires that our publicly funded researchers are adequately incentivised to engage with research end-users, including those in the private sector, government and non-profit sector.

ATSE has undertaken a series of projects in recent years to develop metrics for measuring research engagement. This has led to the development of *Research Engagement for Australia* (REA), a set of metrics calculated largely from existing data. The full details of the REA metrics and methodology are outlined in the reports available on the ATSE website[2] and have been previously shared with the Engagement & Impact Steering Committee (noting that several members of the Steering Committee and its working groups were members of the REA steering committee). In short, the REA metrics use data on external research income, already reported by universities as part of the Excellence in Research Australia (ERA) exercise, to measure research engagement. Many of the questions in the Consultation Paper have been examined as part of the REA project, and the findings are summarised below.

What definition of 'engagement' should be used for the purpose of assessment?

What definition of 'impact' should be used for the purpose of assessment?

How should the scope of the assessment be defined?

Attempting to measure the impact of university research presents a number of challenges:

A lagged indicator
Often the impact of research becomes evident only after a period of many years. For example, a new discovery may require validation research and testing before a provisional patent is sought. Even after a patent is granted, commercialisation of the discovery can take years. And when a new product enters the market, it can take more time for its full economic potential to be evident. Using the returns on a research investment made many years earlier to reward a university for its research impact is illogical. An indicator of impact based on past performance is not one that can be influenced by current researchers and given the mobility of many university researchers, many may no longer be employed by the institution when it receives

1 ATSE advocates for a future in which technological sciences, engineering and innovation contribute significantly to Australia's social, economic and environmental wellbeing. The Academy is empowered in its mission by some 800 Fellows drawn from industry, academia, research institutes and government, who represent the brightest and the best in technological sciences and engineering in Australia. The Academy provides robust, independent and trusted evidence-based advice on technological issues of national importance. ATSE fosters national and international collaboration and encourages technology transfer for economic, social and environmental benefit.

2 http://www.atse.org.au/content/publications/reports/industry-innovation/research-engagement-for-australia.aspx

benefits from historical research outcomes. Rewarding a university for its impact in the past is not likely to incentivise current researchers to collaborate with external parties.

Attribution
Research outcomes from universities often require considerable further investment before they reach the market. For example, development of a pharmaceutical product can include toxicity testing, clinical trials, formulation, packaging and marketing. This makes it difficult to calculate how much of the economic returns are attributable to the original research. One argument is that, without the original research, there would be no economic return. However, attributing 100 per cent of the benefits to the original research is not considered credible by government economic agencies internationally.

Diversity of measures
Measures of research impact (e.g. attendances at performances, social media metrics, citations in government reports[3]) are highly discipline-specific and difficult to robustly compare across institutions

Impact as an indicator of research collaboration
While many impacts of university research involve collaboration with external parties at some stage, this can be quite late in the development stage and can be fairly limited. For example, when a university patent is licenced, there can be collaboration between the university researchers and their licensee. But this is not necessarily the case. As the Government has stated its desire to encourage university researchers to work with external parties, impact may not be a useful indicator of collaboration.

In contrast, while it is only readily possible to 'assess' research impact, research engagement can be 'measured'. Activities and inputs of research engagement are quantifiable through direct measures, such as funding from the private and public sectors. By using external income attracted into research activities as a measure for engagement, the participants are clearly identifiable, and there is an implication of a successful review process by the funding company or organisation to allocate the funds. Such measures are already broadly accepted and used elsewhere in the higher education sector (e.g. ERA and the Higher Education Research Data Collection (HERDC)), where the returns are audited and can be directly compared between different institutions. Finally, measures of engagement activities and inputs are time-bound, and occur in a relatively short and recent timeframe.

For these reasons, the REA project chose to focus only on research engagement, not impact. ATSE strongly recommends that the proposed NISA process focus primarily on research engagement.

The definition of research engagement used for REA was adopted from the Publicly Funded Research Agencies Working Group:

> *Engagement describes the interaction between researchers and research organisations and their larger communities/industries for the mutually beneficial exchange of knowledge, understanding and resources in a context of partnership and reciprocity*.[4]

Implicit in these types of activities are two forms of research engagement – 'knowledge transfer' and 'collaboration.' Knowledge transfer is understood to be "deliberately embedding knowledge for use in a context beyond the researcher's own sphere"; collaboration is understood as "researchers and research organisations engaging with other researchers and research organisations for mutual support and contribution to the conduct of research."[5] In the REA project, knowledge transfer and collaboration were only considered where they occur between universities and the public (community)

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3 A full list of other possible impact indicators are listed on pages 34 & 35 of the REA Proposal (March 2015)

4 *Publicly Funded Research Agencies Working Group. 'Research Impact Principles Framework.'* http://arc.gov.au/general/impact.htm. Accessed 20 December 2014.

5 PFRA.

and/or private (industry) sectors. It should be noted that there are a range of important engagement activities undertaken in universities that are not being captured under this definition which relate to, for example, educational activities and broad community engagement.

Would a selective approach using case studies or exemplars to assess impact provide benefits and incentives to universities?

The case study approach can work if the analysis is rigorous and the case studies show that recent projects have generated benefits that significantly exceeded the costs. An example of this can be seen in a 2014 independent assessment of CSIRO[6]. It is very rare however, for case studies to be undertaken with this level of rigor, without which, case studies are just 'good news stories' and do not provide a solid basis for quantitative evaluation. Although there is value in producing illustrative narratives of research engagement and impact (fulfilling an 'advocacy' objective, as opposed to 'assessment'), this role is likely better undertaken by universities and university bodies, rather than government.

In most situations, case studies are a seriously lagged indicator – they demonstrate benefits from past research. It is unlikely that an impact assessment at the discipline level can be achieved with a relatively small number of case studies (as suggested in the Consultation Paper footnote 5) and that extrapolating from a small number of case studies to a discipline result at institutional level would not be credible. No matter how many case studies are used, they can never be held to be representative of total engagement or impact. However, as recommended in the REA Pilot report, a small number of explanatory 'vignettes' may be useful in providing narrative context for metrics-based measures.

More comprehensive analysis
It is rarely possible to undertake a comprehensive analysis of the impact of past research. One example is the work of Allen Consulting in reviewing the economic, social and environmental impact of the CRC Program[7]. In this case, the analysis was able to examine research outcomes since the Program started in 1991. However, even in this case, the analysis did not attempt to take into account all research outcomes. Those outcomes included in the analysis were sufficient to show that the CRC Program had provided a significant return over and above every dollar that the Government had invested. This analysis was still lagged in that it examined past performance, and some of the CRCs that contributed research outcomes no longer exist. Although it was useful for demonstrating the value of the Program, it is of limited value in demonstrating current or potential levels of engagement or impact.

In the CRC study referred to above, Computed General Equilibrium (CGE) modelling was used to show the level of benefits (direct and indirect) compared with a scenario where the program had not existed. Such modelling requires assumptions which are not always accepted by government economic departments. The Productivity Commission has recently criticised the quality of some economic modelling in Australia, and criticism of the 2015 report commissioned by Chief Scientist (cited as reference 35 in the Consultation Paper) shows that there can be hazards in using this approach for attempting to estimate impact[8].

6 ACIL Allen Consulting 2014, CSIRO's impact and Value: An Independent Evaluation, accessible at http://www.acilallen.com.au/cms_files/ACILAllen_CSIROAssessment_2014.pdf)

7 Allen Consulting Group 2013, The economic, social and environmental impacts of the Cooperative Research Centres Program,

8 Pincus, J (8 April 2015) Case for more science spending doesn't make sense. *The Australian*

What data is available to universities that could contribute to the engagement and impact assessment?

One of the guiding principles of REA was to utilise existing data as much as possible, to ensure that the administrative burden on universities and researchers is minimised. For this reason, the REA metrics are calculated using data already submitted by universities to the ARC and the Department of Education and Training (DET) as part of ERA and HERDC.

ATSE is currently conducting a national trial of REA, based primarily on data from the ERA 2015 round. Additional data is being sought from universities on research extension income (i.e. income derived from the dissemination of outcomes of a research program), based on the finding from the REA pilot that many universities will collect this data in their finance systems but are not currently required to report it to Government.

A key finding of the original REA proposal was that other non-financial indicators of engagement, such as attendances at performances or in-kind contributions by academics, are difficult to measure accurately and robustly. In addition, collecting this information would constitute a substantial additional burden on universities. However, these types of indicators could be collected in subsequent rounds of an engagement measure. The suggestion on page 14 of the Consultation Paper that indicators of institutional media presence might be useful in measuring engagement or impact is unlikely to stand up to closer examination. Using media presence as an indicator would likely encourage some distortionary behaviour. As part of the REA pilot findings, ATSE recommended the inclusion of short, explanatory 'vignettes', which would allow further context and narrative to be placed around the metrics.

Should the destination of Higher Degree Research students be included in the scope of the assessment?

Should other types of students be included or excluded from the scope of assessment (e.g. professional Masters level programmes, undergraduate students)?

The employment destinations and outcomes of HDR students are clearly influenced, at least in part, by their research supervisors and therefore form part of the supervisor's impact. However, the quantification of this contribution is difficult, and employers are not likely to be willing to estimate such a contribution. Further, in order to take research graduates into account it would be necessary to track their subsequent employment. Experience suggests that after two years, most universities have lost track of the majority of their graduates. Work has been undertaken in the United States to use linked employment, tax and census data to track the employment outcomes of research students[9]. Similar work is currently being discussed in Australia (through Swinburne University and the University of Melbourne) and this may prove a more fruitful avenue for assessing student outcomes than data collections from universities. The recent ACOLA Review of Research Training found a clear need to better measure the employment destinations of HDR graduates.

To what level of granularity and classification (e.g. ANZSRC Fields of Research) should measures be aggregated?

Based on analysis conducted for the REA proposal work, the REA steering committee concluded that, for the purposes of rewarding and incentivising researcher behaviour, two-digit ANZSRC Fields of Research (FoR) were optimum. The REA Pilot study carried out in Queensland and South Australia

9 Zolas N, Goldschlag N, Jarmin R, Stephan P, Owen-Smith J, Rosen RF, McFadden Allen B, Weinberg BA, Lane JI (2015) Wrapping it up in a person: Examining employment and earnings outcomes for Ph.D. recipients. *Science* 350 (6266) 1367-1371.

showed that it was possible to get robust comparisons within disciplines across the STEM and HASS sectors when examined at the two-digit FoR level. Engagement income data at the four-digit level were considered too variable to be useful for this purpose. The use of four-digit codes could also encourage the sort of "code shopping" that is alleged to occur in some ERA returns. Inter- and multi-disciplinary research engagement or outcomes could be addressed in the REA by universities apportioning the benefits between the disciplines involved, which the universities would be best placed to do.

Although other classifications, such as the Australian and New Zealand Standard Industrial Classification (ANZSIC) codes or ABS Socio-economic Objective (SEO) classification, would offer useful alternative ways of measuring research engagement, this would require the reclassification of researchers' income and outputs. ANZSRC FoR codes were utilised for REA to minimise the additional administrative burden placed on universities, in addition to offering a balancing measure that would allow the ability to compare universities' performance in given disciplines for both research excellence (via ERA) and research engagement (via REA).

What timeframes should be considered for the engagement activities under assessment?

The REA metrics use external engagement income data for a three year period, consistent with ERA. This timeframe was viewed as recent enough to recognise and reward engagement activities in a way that would influence behaviour. In addition, alignment with ERA would allow for comparisons of research excellence and research engagement in the same two-digit FoR units of evaluation.

How can the assessment balance the need to minimise reporting burden with robust requirements for data collection and verification?

The REA methodology provides a repeatable and verifiable measure, as opposed to case study-based approaches, where the merits of each case study have to be gauged by a panel. Income data is already collected and reported by universities, can be audited by external agencies, and is comparable within disciplines. Page 12 of the Consultation Paper suggests that "…the metric of external research income used in the ATSE trial does not fully address the issue of data reliability for all disciplines and that additional measures may be required." ATSE acknowledges that additional, discipline-specific indicators may be useful (subject to the considerations outlined above), however, external research income was found to be relevant to all disciplines as an indicator of engagement. Although it may not be possible to include in the first iteration of the engagement measure, a method for capturing in-kind contributions by end-users (i.e. inward flowing support to universities) and in-kind work by academics (i.e. outward flowing support from universities, such as clinical research engagement or legal/policy development) would provide a reasonably comprehensive picture of research engagement across most disciplines. If some engagement income is currently being under-reported, then an REA approach would provide a strong incentive to universities to ensure comprehensive reporting of this data.

What approaches or measures can be used to manage the disciplinary differences in research engagement and impact?

One of the advantages of ATSE's REA approach is that it does not attempt to make comparisons between disciplines. Rather it provides a means of positioning university performance within discipline areas. There is no reason to seek to compare engagement by researchers in one discipline to those in another, especially across STEM versus HASS fields. Thus comparison *across disciplines* (page 4 of the Consultation Paper) is neither desirable nor necessary.

Additional comments

In cooperation with the ARC and the Department of Education and Training, ATSE has been commissioned to conduct a national trial of the REA metrics. This trial will apply the REA metrics to all universities using ERA 2015 data, in addition to assessing the ability to collect additional income data on research extension. The results from this trial will be provided to the Steering Committee to inform the engagement and impact measures process.

Summary

Based on the findings from the development of REA, ATSE strongly encourages the Steering Committee to focus the initial exercise on research engagement. This can be effectively and efficiently done by using the REA metrics as the foundation for the measure, with the addition other indicators where practicable and necessary. This could include the use of short, explanatory 'vignettes' to provide further context and narrative to the metrics and the establishment of an expert panel(s) to provide ratings based on the indicators (as outlined in the REA summary report).

The Academy looks forward to continued engagement with the ARC and DET in the development of these measures. For further information, the contact at ATSE is Dr Matt Wenham, Executive Manager, Policy & Projects (matt.wenham@atse.org.au or (03) 9864 0926).