



## EXCELLENCE IN RESEARCH AUSTRALIA (ERA) INITIATIVE

### Proposal to Include Uptake of Research as an Indicator for the Assessment of Applied Research

#### Summary

*The Australian Academy of Technological Sciences and Engineering encourages the Australian Research Council to include in the ERA assessment for applied research fields evaluation of whether the research has had a significant uptake. It proposes a way of doing this based on assessment by experts of brief information provided by the institution for each FOR code. ATSE is willing to assist ARC in identifying suitable assessors for this process.*

#### Background

The Australian Academy of Technological Sciences and Engineering (ATSE) is of the view that a necessary component in the assessment of the quality of applied research in the Government's ERA initiative should be the consideration of whether the research in question, in addition to being of high quality, has had significant uptake by the private or public sectors and could thus be regarded as an exemplar of applied research excellence within Australia.

In its recent submission to the Australian Research Council (ARC) on research performance indicators, ATSE has suggested that the "dashboard" of information supplied to the Research Evaluation Committees include a rating of uptake, where the uptake is deemed to be significant at the national or international level. Whilst acknowledging that numbers of patents and commercialization income can be sometimes regarded as surrogates for uptake, it notes that such vehicles do not capture the very substantial contributions that university research makes to the progress of highly important sectors of the Australian economy, minerals exploration and processing, and agriculture to name several. ATSE is concerned that the currently proposed indicators for Applied Research are not comprehensive in representing the spectrum of applied research. It is likely that a number of academics who are working in applied research, and whose contributions are not well covered by the proposed indicators, will be disadvantaged. More importantly, there is a real danger that their collaboration with

industry, business or government will be diminished or even cease. Those in the private sector who apply university research are often reluctant, for reasons of confidentiality, to cite the research directly in the scientific literature. Recognising high quality applied research that additionally has had significant uptake would seem consistent with the views expressed by the Minister and by industry leaders.

Based on the ATSE submission, ARC invited representatives to meet with the leaders of the ERA team to explore possible ways of implementing the ATSE proposal. This meeting occurred on 28 October, 2009, and ATSE was subsequently asked to provide a written submission that would, amongst other things, suggest how the ATSE suggestion could be operationalised. This is the purpose of the present document.

During the meeting ARC explained how institutional returns would be processed under ERA. Where the number of publications over the three-year survey period from an institution in a particular 4-digit Field of Research (FOR) was 50 or greater, the “dashboard” for the assessment panel would contain aggregated data for assessment at the 4-digit FOR level. Where the number of papers was less than 50, results from the institution would be aggregated at the 2-digit FOR level and assessed accordingly. Institutions would be required to provide contextual statements at whichever FOR level was applicable.

In putting together this submission, ATSE has taken heed of the Ministerial instruction that the ERA process should be based on reproducible parameters and should not involve institutions in excessive effort in developing wordy submissions that perhaps rely more on the word-crafting skills of the submitting institution than on the intrinsic worth of the research.

### **The ATSE Proposal**

ATSE proposes that as a part of the contextual input for the 4-digit or 2-digit FOR (whichever is applicable) institutions be invited to submit a 100-word statement highlighting any significant uptake of the research by private or public sector entities. The indicator material included in this statement would be required to be verifiable and rankable by the process listed below and would form part of the material that the assessment panel uses in deciding on the relative ranking of the aggregate of researchers in the ERA process. The proposal would only apply to those FORs which can be considered to include applied research and it would not be a requirement of institutions to submit a statement. Indeed, institutions should only be permitted to submit a statement if the uptake of the research is of considerable importance to the national or international R&D effort and to national development.

Other criteria relating to the uptake summarized in the statement would be:

- It must have occurred as a direct result of high quality research conducted by the researchers listed in the FOR
- The key research must have occurred relatively recently (e.g. within the past 6-10 years)
- The broad field of research must be continuing at the institution

Institutions should only submit uptake information that relates as “highly significant”, as defined below.

It is envisaged that institutions will not submit more than a few examples of significant uptakes per FOR and will provide sufficient information to allow these uptakes to be assessed by an independent party.

### **Ranking of Uptake Information**

A separate panel will rank uptake information into three baskets:

- A - highly significant on an international basis
- B - highly significant on an national basis
- C - not considered to fit into categories A and B

ATSE is prepared to approach its membership to provide a list of potential assessors to ARC for consideration and will assist ARC to ensure that the assessments of uptake are free from conflict of interest and take place against criteria that are well defined.

Where, in its uptake statement for a particular FOR, an institution submits a number of examples, the assessors should consider all examples and arrive at a balanced assessment based on the significance of the various uptakes and the size of the research group involved. ATSE draws parallels between the assessment process it envisages and the processes currently used by ARC in using external assessors to rank proposals for ARC grant funding. It is suggested that in the first round of ERA the ranking be kept relatively straightforward. Subsequent rounds might include a more comprehensive matrix approach in which both extent of uptake and importance as a transformational technology are assessed using indicators.

### **What Constitutes Highly Significant Uptake?**

At the international level, highly significant uptake would mean that the applied research has led to developments that are widely used around the world. This would rate a category A from the assessors. Examples might include a novel component that is included in a high proportion of devices manufactured worldwide; a new approach to software that is incorporated by major software vendors; a universally adopted new chemical process or highly successful catalyst; a major step forward in equipment design; a new exploration technique taken up by the major exploration companies; and a new approach to building construction that is adopted internationally.

At the national level, highly significant uptake would mean that the applied research outcomes have been adopted at the national, or peak sector level and have led to Australia establishing or maintaining an internationally recognised technological position in the particular area. Judgments in this area are harder to make, but might, for example, represent annual benefits to industry of in excess of \$50-100 million per year and maintenance of Australia's technological advantage.

Key to assessing the significance of the uptake for a particular research activity is constraining the assessment to benefits that have already been achieved rather than estimates by researchers of potential future benefits. Here it is noted that applications for ARC grants invite researchers to discuss the future benefits from their work. ATSE sees

it as significant that assessments of uptake are grounded in what has actually been achieved.

### **Possible Statement on Uptake in ERA Instructions**

*As a separate component of the Contextual Statement submitted with each FOR submission which involves applied research (see list of relevant FORs), institutions are invited to provide a 100-word statement indicating the extent to which this research has led to highly significant uptake of the research by the private or public sector in national or international arenas. The information provided will be independently assessed by experts who will provide advice to the ARC Research Evaluation Committee on the significance of the uptake claimed. This advice will be used by the Research Evaluation Committee for the overall assessment of institutional research within the FOR.*

### **Case Studies**

Illustrative examples of past applied research that has been widely adopted are the research that led to:

- The Jameson cell for mineral beneficiation
- The new rheological approach to transportation of mineral slurries
- computer language implementation leading to memory management taken up internationally by major international computing vendors

### **Final Comments**

ATSE is firmly wedded to the concept of assessing the importance of uptake in evaluating the quality of Australia's research in the applied areas. It believes that the schema it has put forward is workable and indicates its willingness to assist ARC in implementing the approach in the upcoming round. It sees merit in the inclusion of those with a background on the implementation of R&D in the assessment panels for applied areas of research and would see a one-third membership of assessment panels being drawn from this background as being desirable.

In the longer term, it foresees other information being included in the assessment process. This will undoubtedly include parameters such as the Proof-of-Concept metric as already explored by the predecessor of DIISR in 2007.

Above all, ATSE wishes to see Australian industry feeling consonant with the ERA process and strongly encourages ARC to move in this direction.

## **FOR Areas to Which Approach Described Above Should Apply**

These are provided below. They approximately correspond to the areas in which ATSE was asked to become involved in the journal ranking process and encompass those research areas having a strong applied focus.

### **DIVISION 04 – Earth Sciences**

0401 Atmospheric Sciences  
0402 Geochemistry  
0403 Geology  
0404 Geophysics  
0405 Oceanography  
0406 Physical Geography and Environmental Geoscience  
0499 Other Earth Sciences

### **DIVISION 05 – Environmental sciences**

0501 Ecological Applications  
0502 Environmental Science and Management  
0503 Soil Sciences  
0599 Other Environmental Sciences

### **DIVISION 07 – Agricultural and Veterinary Sciences**

0701 Agriculture, Land and Farm Management  
0702 Animal Production  
0703 Crop and Pasture Production  
0704 Fisheries Sciences  
0705 Forestry Sciences  
0706 Horticultural Production  
0707 Veterinary Sciences  
0799 Other Agricultural and Veterinary Sciences

### **DIVISION 08 - Information and Computing Sciences**

0801 Artificial Intelligence and Image Processing  
0802 Computation Theory and Mathematics  
0803 Computer Software  
0804 Data Format  
0805 Distributed Computing  
0806 Information Systems  
0807 Library and Information Studies  
0899 Other Information and Computing Sciences

### **DIVISION 09 - Engineering**

0901 Aerospace Engineering  
0902 Automotive Engineering  
0903 Biomedical Engineering  
0904 Chemical Engineering  
0905 Civil Engineering

0906 Electrical and Electronic Engineering  
0907 Environmental Engineering  
0908 Food Sciences  
0909 Geomatic Engineering  
0910 Manufacturing Engineering  
0911 Maritime Engineering  
0912 Materials Engineering  
0913 Mechanical Engineering  
0914 Resources Engineering and Extractive Metallurgy  
0915 Interdisciplinary Engineering  
0999 Other Engineering

**DIVISION 10 – Technology**

1001 Agricultural Biotechnology  
1002 Environmental Biotechnology  
1003 Industrial Biotechnology  
1004 Medical Biotechnology  
1005 Communications Technologies  
1006 Computer Hardware  
1007 Nanotechnology  
1099 Other Technology

**DIVISION 11 – Medical and Health Sciences**

1115 Pharmacology and Pharmaceutical Sciences

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