

Submission to the Senate Inquiry into the efficiency, effectiveness and coherency of Australian Government funding for research

This submission is provided by the Australian Research Council's (ARC) Centre of Excellence for Climate Extremes. We are a multi-institutional centre involving five Australian Universities, with partners including the Bureau of Meteorology, CSIRO in Australia and many significant international groups.

Our submission is specific to the research investment by the Australian Government in the area of weather and climate research, including physical weather and climate science, impacts of climate variability and climate change, and investment in adaptation to climate change research.

- **The diversity, fragmentation and efficiency of research investment across the Australian Government, including the range of programs, guidelines and methods of assessment of grants**

Research investment in the broad area of weather and climate research is deeply fragmented. The ARC funds University research via a highly competitive process. The Bureau of Meteorology and CSIRO are also funded for research, as, in part, is Geoscience Australia (principally for key satellite data), the Australian Antarctic Division, the Australian Institute of Marine Science, the National Climate Change Adaptation Research Facility, the National Environmental Science Program's Earth Systems and Climate Change Hub, and elements of many other of the National Environmental Science Program's research hubs. This leads to funding from at least the Federal Departments of Education, Environment and Energy, Industry and Innovation. There is a need to bring many other sectors into this, including planning (see Senate Inquiry into *Current and future impacts of climate change on housing, buildings and infrastructure*), health, defence, agriculture and so on.

In short, while it is understandable that investment in weather and climate science is fragmented given how these sciences have evolved over the last century, the emerging challenges of weather and climate science, impacts, disaster management, adaptation and mitigation mean that this is untenable moving forward.

We note that most of these funding streams are exclusive – that is ARC funds cannot be used to resource research in the Bureau of Meteorology (for example) and funding to the Bureau cannot be used to fund University research. So, the system has evolved to disincentivise collaboration. Investment into government agencies has reduced over the last decade, leading to a reduced capacity for them to look to collaborative on long term and transformative strategic research in the national interest.

A full and independent review of funding in weather and climate research, including infrastructure (NCRIS for example) is needed to highlight duplication, overlaps, conflicting data/tool investment and so on. This will need to overcome entrenched institutional views and identify national priorities, strategies to achieve those priorities, investment and organisation issues and so on including the impediment that funding to this area is currently spread across the Federal Departments of Education, Environment and Energy, Industry and Innovation and needs to properly expand to include Defence, health and so on. Any outcomes need to balance the short-term operational research needs of the Bureau, with customer-focussed research by CSIRO, with blue-sky research led by the Universities. What is required is a national long-term strategy backed by all partners and funding bodies and implemented in the national interest.

- **The process and administrative role undertaken by research institutions, in particular universities, in developing and managing applications for research funding;**

No response

- **The effectiveness and efficiency of operating a dual funding system for university research, namely competitive grants and performance-based block grants to cover systemic costs of research;**

No response

- **Opportunities to maximise the impact of funding by ensuring optimal simplicity and efficiency for researchers and research institutions while prioritising delivery of national priorities and public benefit.**

Our key funding is via Australian Research Council (ARC). We find the ARC to operate extremely efficiently and if anything sometimes attempts to be too efficient by minimizing administrative overhead to maximize investment in research.

That said, we note that our successful Centre of Excellence proposal was 701 pages, to a funding scheme with less than 10% success rate. We further note a typical ARC Discovery or Linkage grant is of order 100 pages long, with a less than 20% success rate for funding that barely enables the full employment of an early career researcher for the whole term of the grant. Submitting a competitive proposal to the ARC is 1-3 months work and much of this is “compliance”; ensuring the application meets all rules.

It is not trivial to overcome this but we suggest:

- (a) Benefits and efficiencies would be gained if rules, processes and procedures were updated every 3 years, not annually.
- (b) An expression of interest round for Discovery and Linkage would help researchers, but we acknowledge this would impact reviewers and panel members.
- (c) We doubt that outcomes depend greatly on the copious detail provided on each researcher – the “ROPE” - beyond what could be found via ResearcherID or ORCID.
- (d) If the ARC removed 10% or 20% of the information requested, the net impact would be very positive for applicants and reviewers and aid the efficiency of the process. In 2016 and 2017 approximately 3500 ARC Discovery grants were submitted with a 17-18% success rate. A conservative estimate would be that these 3500 ARC grants cost the sector about 700,000 hours to submit of which ~600,000 hours was effectively wasted. A 10% decrease in the total time would save the equivalent of 41 years¹ of human resources per year. In other words, *any* efficiencies, even if fractional, multiplied over the number of applications and hours required to submit the application would be hugely beneficial.

¹ This sounds implausible so here is the calculation. Take 3500 applications (Discovery only, see <http://www.arc.gov.au/selection-report-discovery-projects-2017>). Estimate each takes 200 hours to prepare (that is just under 6 weeks). 3500 multiplied by 200 = 700,000 hours or 20,000 weeks or 416 years. 10% of this is 41 years.

In terms of **impact** we note that it remains extremely hard to win research funding for genuinely interdisciplinary research. There are exceptions that prove the rule of course. However, solving a problem like climate change requires physical science (physics, fluid dynamics, chemistry, physics and so on), engineering, law, economics and behavioral sciences, wrapped in policy-relevance. Such a proposal would cross all ARC panels and would almost certainly fall between those panels. The most impactful proposals are therefore at most risk of not being properly assessed.

In terms of **public benefit**, and realizing the value of research, we suggest there are structural problems. ARC grants are typically funded for 3 years, employing a research fellow or PhD student for 3 years. The ARC grants are scoped to deliver research in that time and that is always very challenging because to win the grant, the application has to be very ambitious. Consequently, it is very common that the research is completed by the researchers after funding has ceased. Consequently, the research is completed but the public benefit is not fully realized. For example:

- Computer codes generated and data generated is not published in accessible ways because this costs time and money and is not resourced
- Effort to communicate research via social media, press releases and so on often needs to be done after funding is completed and resources have ceased to be available
- If a researcher creates something of real value, say a new algorithm, data analysis technique etc that could be very valuable to business or other government agencies, the capability to deliver this properly, documented and supported is very limited.

For short-term Discovery and Linkage projects, their very construct and the selection process makes strategic coordination in the national interest almost impossible. It is only through the Centres of Excellence in Climate System Science and Climate Extremes that the University community has been able to tangibly contribute to the national strategy in a coordinated way. Addressing this issue outside the framework of Centres of Excellence would require a change in the approach of the ARC selection process for three-year projects. Two examples might be to appoint program managers with strategic oversight (akin to the US system) or increase the emphasis in the assessment process on *strategic* national benefit for specific scientific areas.

We note these sorts of issues are precisely why ARC Centres of Excellence have extraordinary impact. We have the capacity, scale, resources and technical support that enable us to overcome these barriers. However, Centres of Excellence are beyond almost all research communities – they are simply too competitive. However, they do highlight the consequences of the ARC's leadership and the outcomes of good Government Funding, both over longer periods when resources are available.

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