Dear Professor Chubb,


Thank you for the opportunities ARCom has provided for stakeholders to contribute to the development of the National Research Investment Priorities (NRIP) through consultations focused around the National Research Investment Plan (NRIP) discussion paper (July 2012). The University of Sydney attended and provided input on the NRIP at the NSW State meeting of DVCRs and the public sessions hosted by Ms Kathryn Campbell, Science and Infrastructure, DIISRTE, and welcomes this additional opportunity to contribute to this important process.

We respond to the specific questions below.

Questions 1 and 5-7 address system level priorities that are stated in the paper as the “key policy challenges for Australia over the next decade” and the priority areas for research investments to provide assistance to address these challenges; and the investments required to sustain an effective research system.

Our responses to Questions 2-4 comprise views of Sydney academics with subject matter expertise in particular domains.

The University of Sydney, through its discipline experts and leaders, would be delighted to participate in activities that progress the development of the NRIP and in the further analysis, development and refinement of the specific capabilities within domains that was foreshadowed in the consultation meetings.

Yours sincerely,

[Signature removed for electronic distribution]

Professor Jill Trewhella
Deputy Vice-Chancellor (Research)
Q1. Views are sought on this representation of the national research fabric and the notion of focusing on the development of enabling capabilities (domains) in the NRIP.

This representation of a fabric is helpful in showing the overall interconnection of areas of research and the enabling capabilities that underpin them. It appears to have potential to provide a sound mechanism for identifying gaps in capability and capacity at specific crossover points.

The representation itself (Figure 2), along with the accompanying text in particular, do not, however, adequately capture the importance of fundamental research as the basis for more directed research towards more immediate outcomes in national priority areas. Research is pictured at the bottom of Figure 1, but that sense that the fundamental increase in the stock of knowledge underpins the national research fabric, could usefully come in to Figure 2 and the text. Care must also be taken to acknowledge that some areas can be both enabling and disciplines unto themselves, such as data management.

Q2. Is the scope of each of the domains appropriate and are they sufficient to cover Australia’s needs into the future?

Q3. What other gaps are there in the current and future capability and what mechanism would be best to address them?

Q4. What will be the impact on the national research fabric and Australia’s capacity to increase national wellbeing if the gaps are not addressed?

The overall scope of the domains is broad and considerable work (with representative domain experts) is required therefore to flesh them out more thoroughly, particularly to answer Q3. Some disciplines, such as chemistry, are barely mentioned.

Earth
Given the importance of this domain in the national economy there is a strong argument for increasing investment in geoscience research and addressing the key workforce shortages in geoscience itself, not only in other enabling

Biology
One claim in the paper is that ‘Australia’s biology related research infrastructure [is] approaching sufficient capacity and [is] of internationally leading quality’. This is a doubtful claim with respect to ‘omics’ capacity relative to China, Europe, the US and Korea. Moreover, what infrastructure there is in Australia is not broadly accessible because of high costs. Continued investment in biology related infrastructure therefore remains important.

Human
While the paper places the human domain at the centre of the Australian research fabric informing the other domains, the description of the human domain is too narrow and needs to be extended to embrace broader humanities research and cultural issues, including such things as an understanding of the human condition, of institutions and values that support civil society and democracy, and of Australian society and culture.

One concern we have is that the capacity of a vibrant culture and to enrich society (cultural and intellectual richness and prosperity) is being overshadowed by instrumental concerns (infrastructure and productivity) and that the language in the Human domain
emphasises problems rather than opportunities. This is a particular example of the point about fundamental research we raised in addressing question 1.

It is critical that all domains are adequately funded, and that these cultural aspects of the Human Domain (Humanities) be properly recognized for support in the NRIP. With the impact of the global financial crisis these disciplines are increasingly facing explicit and implicit threats on funding in Australia, but also in North America and Europe.

For example, at the system level, "the links between research excellence and the sustainability of a vibrant international education sector", are prominently displayed in the Humanities and Social Sciences.

In addition we suggest the addition of "educational research" to the Proposed scope of the capability and the existing capability.

For example, to address the gap identified in all other Domains of shortages of trained scientists, mathematicians, etc., educational science in Science, Technology, Engineering, and Mathematics (STEM) can help us understand, and take evidence-based action on, the long-standing problems in STEM education to address the need for numerate and science literate graduates. We need to research Australian problems of STEM education and supply, and Australia has some exceptional strengths in STEM educational research to bring to the task, including the world’s largest graduate centre for PhD research in Science & Maths education (at Curtin University).

To exclude educational research from the list of disciplines in which Australia has world class research strengths would (a) fly in the face of ERA2010 evidence, (b) ignore other sources of evidence about publication impact, such as that used by ARC in its Annual Reports until 2010, (c) potentially alienate many educational researchers from the NRIP enterprise.

**Technology**

Biotechnology is mentioned but omits key relevant sub-disciplines such as biotechnology and stem cell technology.

**Information**

We support the inclusion of research data management as a fundament pillar of the Information Domain, and recognise “there will be a huge opportunity to derive benefit from these data sets through data integration, re-use, mining, analysis and visualisation.” To this end we ask the NRIP to encourage the ARC and NHMRC (and other bodies) to incorporate research data planning into the grant application process, and to fund best-practice research data management for data derived from their research (as NHMRC and ARC encourage open access publication of their research). Further, we would support the continued funding of the Australian National Data Service to assist research providers achieve best-practice in research data management.

Given the recent significant moves towards open access to the scientific literature in Europe, we recommend that Australia prepares for this shift, including the likely costs associated with it. The Finch report in the UK recently completed this analysis, and although the cost reported there is inflated, it will run to millions of dollars per year at a minimum. Given that we no longer publish in bound volumes, and are moving towards a single online literature, Australia needs to be part of this global move, and, ideally, leading it.
Q5. What other structural or policy issues could be addressed to further strengthen the research system?

Q6. What mechanisms would be best to address the structural or policy issues?

Q7. What will be the impact on the national research fabric and Australia’s capacity to increase national wellbeing if the structural or policy issues are not addressed?

We understand that the NRIP is being formulated at a time of significant financial constraint and by a government committed to delivering a balanced budget in 2013/14. However, we would encourage the ARCom to consider a minimum 10 year vision and to strategically plan for 2012-2021, and by looking forward to not only sustain, but significantly improve, Australia’s capacity to contribute to the global research enterprise.\(^1\) And, to keep Australia internationally competitive, we urge the commonwealth to take the earliest opportunity analyse trends in international research funding and to increase real funding for Australian research to levels in line with other comparable (peer) countries. Drawing on the work of the Productivity Commission in 2007, assessing the return on public investment in science and research, no better investment can be made.

More specifically, a number of issues should be addressed:

**The links between teaching and research; and between base funding for teaching and learning and research.**

University research occurs in an educational context, and there are many overlaps and interdependencies between research and educational activities and the funding for them. In our view they are integrally related.

It is critical that government recognises the interconnectedness of research and educational activities and provides base-funding to support universities in their research and research training missions. The ARCom should consider the reform of base-funding, as identified in the Base-funding review, to address the sector’s current reliance on cross-subsidisation from discretionary revenues (driving our dependence on students, in particular those from abroad) to sustain our research effort and address the continuing shortfalls we face in research funding (see 2 below). We note this burden falls most heavily on research-intensive institutions that contribute most in productivity and quality (ERA and HERDC etc).\(^2\)

**The desirability of commonwealth research funders, and other research funders, providing the full costs of research**

All funders of research conducted by universities should be encouraged to pay the full-costs of research including direct and indirect research costs, especially those in the public sector.

While we recognise the role the Research Block Grants play in supporting high-quality research being undertaken in universities and the welcome recent additional funding provided through the Sustainable Research Excellence (SRE) initiatives, a significant gap remains between funding provided and the full cost of research conducted by the universities – including academic salaries, research training, infrastructure, and some

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\(^1\) As the Will’s review of Health and Medical Research did in 1999).

capacity to respond to strategic initiatives – which must be met by institutions from other sources.

The commonwealth must find ways to increase the real funding to the ARC and NHMRC while striving to provide the full cost of sponsored research projects. For example, commonwealth research funders must address the salary shortfall on NHMRC PSPs and ARC salaries on fellowships, DECRAs and DORAs against the rates institutions are legally required to pay, and mechanisms be explored that deliver the “indirect costs” in a consistent and predictable way.

The desirability of a consistent system of research policy, practices and funding frameworks at the commonwealth to create efficiencies, stability and predictability across the sector.

Sydney has consistently argued for the establishment of a consistent system of research policy, practices and funding frameworks at the commonwealth to create efficiencies, stability and predictability across the sector.

The current policy and funding terrain is a mash-up of schemes developed over a decade and more in response to topical issues rather than as part of a systematic overview/framework. As a result Commonwealth policy and funding schemes often have unclear objectives and drive diverse and conflicting behaviours in the sector. For example, due to piecemeal review of the Research Block Schemes (RTS, JRE, RIBG, APAs, IPRS) in recent years, and the introduction of the SRE (ERA), the DIISRTE RBGs are simultaneously rewarding completing objectives: increased output regardless of quality (HERDC) and research excellence and concentration (ERA). The RBG schemes would benefit from comprehensive review within a coherent framework to ensure the system rewards only behaviours that consistently advance its objectives.

So too, the ARC and NHMRC peer review systems are burdensome on researchers and research funders alike, and the integration of peer-review processes applications across departments, and the awarding of longer and larger grants providing full funding would provide efficiencies and economies across the sector.

**Workforce**

The demise of the ARC’s Australian Postdoctoral Fellowship seems to have had a negative impact, resulting in nearly all of our newly-minted PhDs having to go off shore for their first job. This discriminates against young researchers with partners and depletes Australian labs of researchers in what are often their most productive years.

Similarly, we note the lack of long-term, succession planning for human infrastructure/workforce in schemes such as the Future Fellowships. The Minister proudly announced the last cohort of 209 last Wednesday, but next year the first 200 come off their fellowships, followed by 200 the next year, then 200 more … within 5 years 1000 high-flying academics … and, without attractive options in Australia, these productive researchers will be obliged to seek greener pastures overseas.
The need for a coherent, holistic and adequately funded plan for research infrastructure

Sustained and coherent infrastructure programs are absolutely essential, and infrastructure should include the infrastructure and academic and technical workforce fundamental to apply the infrastructure investments to enable researchers in the capability domains.

The research sector needs significant, committed, long-term funding to support major infrastructure now that NCRIS, Superscience, the Education Investment Fund (EIF), are being wound down.

Visionary and ambitious one-off investments in large-scale infrastructure (Synchrotron) need to be underpinned by a long-term support strategy, including plans to renew and update infrastructure and provide operational costs. Funding should not be diverted from other vital programs to stop these gaps. So too, the NRIP must guarantee the acquisition and renewal of the platform of medium-scale infrastructure that underpins much routine, but vitally important, ACGR funded research.

International Collaboration

The Australian Research fabric diagram does not adequately represent the global context, and the significance to Australia’s researchers of strong participation in high-quality international research and global engagement. Research investments must enable Australia to contribute meaningfully to the global research enterprise though facilitating international collaboration and exchange, where appropriate and beneficial, both at home and abroad.

We understand “Collaboration” element is intended to include international collaboration and partnerships, yet it is not clear how the benefits of Australia’s engagement with international research to face global challenges, and local capacity to adopt and adapt international knowledge/experiences to local needs, fit into the fabric.

While 97% of research is conducted overseas, Australian researchers participate fully and “punch above their weight” in quantity and impact of their output. The 2010 ERA exercise has confirmed that the vast majority of excellent research is conducted in the Go8 universities at international standard, and with both breadth and depth.

Australia must remain internationally competitive for three major reasons. Australia must continue to generate our share of discoveries and to solve our own problems. We need our researchers to be attractive, credible and respected partners for the international collaborations that bring us early access to the research conducted outside our borders. We must have the capacity locally to consider, adopt and adapt the best of international research for the benefit of the Australian population.

International Collaboration and Infrastructure

Research is increasingly large-scale, high technology, global and expensive. Australia must remain internationally competitive to “keep a seat” at the global research table. International collaboration based around large-scale platform technologies located in Australia and overseas provides opportunities for exchange and mobility of the best and brightest international researchers and provides high quality training for tomorrow’s researchers (PhD and Postdocs).