Dear Senator Dastyari

Inquiry into Australia’s Innovation System

On behalf of the University of Sydney I welcome the opportunity to provide the attached brief submission to the Committee’s important inquiry into the Australian innovation system. I do so as a career researcher with extensive knowledge and experience of Australia’s and the United States’ research and higher education systems.

We have limited our comments to eight key high level points and recommendations relevant to the terms of reference - trusting that there will be opportunities to engage with the Committee about matters of detail over the coming months.

Our submission is intended to complement those made by Universities Australia and the Group of Eight on behalf of their members.

If it would be of interest to Committee members, the University would be delighted to organise meetings for them on campus with staff and students with relevant expertise and experiences.

Please do not hesitate to contact me should the Committee require anything further from the University of Sydney.

Sincerely

Professor Jill Trewhella
Deputy Vice-Chancellor (Research)
# KEY POINTS AND RECOMMENDATIONS TO STRENGTHEN THE AUSTRALIAN INNOVATION SYSTEM, JULY 2014

## Summary

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Discussion of points

1. A national research investment strategy and plan

As noted by the National Commission of Audit in February 2014, at around $9 billion in 2013-2014, the Australian Government makes a substantial investment in the research and innovation system each year on behalf of the Australian taxpayer. Drawing on work from the Productivity Commission, the Commission of Audit also noted that there is a strong case for public support for science and innovation in areas of market failure, and a need for a strategic, whole-of-government approach to determining where available funding is spent.¹

In this context, the National Research Investment Plan developed by the cross-departmental Australian Research Committee in 2012 remains highly relevant. It provides a useful starting framework to guide future decision making about how to maximise the impact of research investment on productivity growth, living standards and on solving key national and global challenges.²

Before such a strategy can be developed there is a need for a clearly articulated vision of the types of industries (and jobs) that will characterise Australia’s economy in the future. As Deloitte have recently suggested, the key to Australia’s continuing prosperity may lie in building on areas of competitive advantage to make the transition to a diversified high-value-added production and services based economy with strengths in a range of niche areas.³ If we aspire to have a globally competitive, knowledge-based economy with well-paying jobs, then it will be vital to ensure that our education, research and innovation systems remain strong.

**Recommendation 1:**
*That the Committee considers recommending that the Australian Government articulate a clear vision for the future of Australia’s economy (and workforce), and develop a whole-of-government approach to allocating funding for science, research and innovation programs to support the realisation of that vision.*

2. An underlying core of public funding to support research excellence and growth

The nature of research is changing - operating increasingly on global scale, through large, international, multi-disciplinary collaborations that seek to share costs and bring the world’s best minds and technologies together to expand knowledge and solve the most pressing problems facing humanity. There is also an increasing awareness of the growing significance of global university rankings, the linkages between public funding for basic research, strong ranking performance and the ability of institutions to attract the brightest students and staff from around the world.

All of the university ranking systems rely to varying degrees on lagged data. The current rankings reflect the outcomes of institutional decisions taken, infrastructure built, and research performed in the early to mid-2000s and earlier. For some of the key indicators (Nobel Prizes and Fields Medals, citation impact for example) the lag effect is much longer, and can be 30 years or more. In Australia, total public funding for science, research and innovation grew strongly over the last decade or so. The impact of this investment growth was reflected in the trends in the research outputs (quantity and quality) from Australia’s universities, medical research institutes, and other public research organisations, and in the generally improved rankings performance of Australia’s universities that began towards the end of the 2000s.

As UA and Go8 submissions detail, the governments of our key competitors in Asia, North America and Europe are pursuing deliberate strategies to strengthen and grow their higher education, research and innovation systems. They recognise that in order to benefit fully from the global pool of public-good knowledge, they need to be active participants in the global research system. If Australia is to maintain and improve its capacity for innovation, and continue to see the rankings of its universities improve, it too will need to find ways to unlock funding to support research excellence

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³ Deloitte, *Positioning for prosperity? Catching the next wave*, online publication
and growth in the system. Here we note that Australia’s total level of public investment in tertiary education remains below the OECD average as a proportion of GDP, while over the last decade the Australian Government’s total investment in science, research and innovation has declined both as share of GDP and total government expenditure.

**Recommendation 2:**
That the Committee considers recommending that the Australia Government commit to long term targets to increase total levels of public funding for science, research and innovation as a share of total government outlays and GDP.

### 3. Funding continuity and certainty for research infrastructure

Addressing the need for a long-term, sustainable model for supporting the development and operation of major research facilities continues to be one of the most pressing challenges facing Australia’s research and innovation system.

As a geographically isolated nation, access to high quality research infrastructure is a vital prerequisite if we are to produce excellent research. As a result of investment decisions taken by successive governments Australia has built and sustained a strong base of research infrastructure. Over the last twenty years, a range of initiatives have led to substantial improvements in the quality and scale of Australia’s research infrastructure. The National Collaborative Research Infrastructure Strategy (NCRIS) initiated in 2004 has helped to bring clarity and consistency to the Australian Government’s infrastructure investment prioritisation process. More recently the Strategic Framework for Research Infrastructure Investment builds on the experience of the NCRIS process to propose principles that could guide the Australian Government’s research investment decisions in the future.

Budgeted funding for the original NCRIS ceased in 2011-12 and was not renewed at that time by the previous Government as it sought to find savings across the budget. Since then a range of temporary measures have been taken to help keep the most critical infrastructure operational, pending a decision by the Government about what Australia’s approach to infrastructure funding will be in the short to medium term. The 2014-15 Budget allocation of $150 million for one more year of funding for the NCRIS will provide further short-term relief for the facilities considered most at risk, but this expenditure has been offset by cuts to other research programs. The continuing uncertainty surrounding the future of the NCRIS, the abolition of the Capital Development Pool, and the effective cessation of the EIF and HHF are having a range of negative impacts on the research system. These include the loss of staff with the skills required to build, maintain and operate high-end research facilities.

**Recommendation 3:**
That the Committee considers recommending that the Australian Government develop and commit to a long-term, sustainable model for funding major research infrastructure.

### 4. Balancing support for basic and applied research

Australian universities are often characterised as focused mostly on ‘basic’, ‘blue sky’, ‘curiosity’ or ‘investigator-driven’ research. It is worth noting, however, that over the last 40 years the basic research share of all research undertaken by Australian universities has actually declined from around 77 percent to 45 percent, while the applied research share has increased from around 20

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6 Relevant programs include: the Major National Research Facilities Program (MNRF), the Systemic Infrastructure Initiative (SII), Capital Development Pool (CDP), the National Collaborative Research Infrastructure Strategy (NCRIS), the Education Investment Fund (EIF), the Health and Hospitals Fund (HHF), and the Super Science Initiative.
percent to 46 percent. Notably, over the same period the basic research share of the research undertaken by US academic institutions remained stable at around 75 percent.\(^8\)

The United States is widely recognised as having one of the most successful innovation systems in the world, yet if the figures above are correct, its achievements have occurred with the support of a university system focused largely on the pursuit of high quality basic research. The Productivity Commission has recognised the trend from basic to applied research in Australia's public research programs in successive studies (1995, 2003, 2007). It has recommended that available support should be targeted to support basic research where market failures are substantial, rather than commercial activities that are likely to be pursued by the private sector due to being profitable.\(^9\) The National Commission of Audit made a similar recommendation in its February report.\(^10\)

**Recommendation 4:**
That the Committee investigates the underlying reasons for apparent differences in levels of innovation between US and Australian economies, including testing the extent to which differences in the research profiles of their university sectors may be a contributing factor.

5. Maintaining capacity across the disciplines

Australia has recognised strengths in health and medical research, and it is appropriate that addressing the community’s current and anticipated health challenges will always be a priority for Government. Nevertheless, already in excess of 50 percent of total Australian Government funding for research is directed towards the medical and health sciences fields. New savings and expenditure measures announced in the 2014-15 Budget, combined with the implementation of new strategic research priorities, could result in a further concentration of investment in these disciplines over the coming years.

The strength of Australia’s higher education innovation system, and indeed its future capacity for excellence in health and medical research, depends on the maintenance of educational and research strengths across all disciplines. Increasingly, it is recognised that the solutions to the most complex health and health system challenges may lie through multidisciplinary approaches – bringing knowledge and perspectives from a variety disciplines to attack research problems in different ways and from different angles. This is certainly the approach the University of Sydney is taking in many fields, including in the areas of Obesity, Diabetes and Cardiovascular Disease with our newly created Charles Perkins Centre.\(^11\) Such approaches are only possible, however, if strength is maintained across the disciplines. Another key characteristic of the United States’ research system, and also in the UK, is the relative breadth and depth of research capacity that they possess across all fields. This is not a characteristic that Australia currently possesses, and this may be another factor impacting our relative capacity for innovation.\(^12\)

**Recommendation 5:**
That the Committee considers the importance to the national innovation system of maintaining a strong capacity for education and research across the disciplines.

6. Knowledge transfer and entrepreneurship

Australia’s universities are generally recognised as performing well according to international benchmarks relating to the quality of their research, their ability to generate new ideas and inventions, and the production of high quality graduates. One area where we appear to be less competitive is in our ability to convert these discoveries into concrete economic and social benefits through the creation of new industries and jobs. Another apparent major difference in the way Australian universities contribute to the economy compared with in the United States is

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\(^8\) Group of Eight, Backgrounder 30, *World University Rankings: ambiguous signals*, October 2012, p.46


\(^12\) For a detailed bibliometric analysis of national research system performance see: 1994 Group, *Mapping Research Excellence: research excellence and research funding policy*, September 2011
demonstrated by Forbes Magazine’s ranking of the most entrepreneurial colleges in the North America. That ranking considers the number of alumni from each university who have founded a company with ten or more employees. For MIT for example (which ranked second behind Harvard in 2012), as of 2006, there were some 25,600 active companies founded by its alumni employing over 3 million people.13

The reasons for differences between Australia and the United States in research commercialisation and the creation of new businesses are complex, and are likely to reflect a mix of structural, cultural, geographic, funding and policy factors.

**Recommendation 6:**
That the Committee considers identifying the key steps the Australian Government, universities and business should take to foster the establishment of new businesses by graduates of Australian universities, and the commercialisation of publicly funded research.

7. The global competition for talent

Our universities now operate in an increasingly global market for higher education and research services. Competition for the best students and staff is intense and increasing. Australia currently remains an attractive destination for international students and for researchers in many fields. In some disciplines we can only sustain capacity and competitiveness through skilled migration, while in others there appear to be more suitably qualified domestic graduates than there are positions available.

We cannot assume that Australia’s higher education sector will continue to remain attractive to international students and staff. As noted above, there are links between levels of public investment in research and the performance of Australia’s universities in international ranking schemes that are increasingly important to prospective international students and staff. Ensuring that our migration, health, dependant education, taxation, superannuation, and other relevant policies work together to support the recruitment and retention of international students and staff is also vital.

**Recommendation 7:**
That the Committee considers identifying the actions the Australian Government should take to help ensure Australia continues to remain an attractive destination for international students and high quality researchers from around the world.

8. Fostering international collaboration

The establishment of the New Colombo Plan is a very welcome development. If the scheme grows and is sustained beyond the current political cycle it has great potential to strengthen organisational and people-to-people links in the targeted countries. International research collaboration is now an essential element of the global research system, yet compared to competitor countries Australia’s strategies in this area continue to lack strategic intent, scale and substance. The benefits of and impediments to international education were considered in-depth by the House of Representatives Standing Committee on Industry, Science and Innovation in 2010.14 Many of the findings and recommendations of that inquiry remain relevant to this new inquiry. We commend that report to the Committee, along with our submission to that process.15

**Recommendation 8:**
That the Committee considers revisiting the report - Australia’s International Research Collaboration - released by the House of Representatives Standing Committee on Industry, Science and Innovation in June 2010.

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