

Submission to the inquiry into Australia's Innovation System

University of Melbourne

1. Introduction and overview

The University of Melbourne is delighted to offer a submission to the Senate inquiry into Australia's innovation system.

Australian universities are an integral part of the global innovation ecosystem. They are enablers of innovation, educate the research and knowledge workforce, and undertake research which underpins the generation of new knowledge and new ways of doing things. They are also innovators in their own right, engaging in partnerships with industry, governments and other research and teaching universities to generate new ideas and their application.

The University of Melbourne is a global university. It is the number one ranked university in Australia, number three in Asia, and number 34 in the world according to the Times Higher Education World University Rankings 2013-2014.

The University is committed to supporting and driving innovation. We recognise that for universities, maintaining and improving standing increasingly depends upon performance in this domain. This includes undertaking basic and applied research, which is a foundation for innovation; achieving impact through commercializing research outcomes; and supporting staff and students to explore the application and take up of new ideas. However, in order to do so, we also recognise that universities need to actively partner with other agents in the innovation cycle and in particular with government and with industry.

Government has a crucial and distinctive role in supporting innovation: in creating strong legislative, funding and regulatory frameworks to support research, commercialization and application of new knowledge and new ideas; in facilitating partnerships and collaboration; and in investing in infrastructure and people.

This submission proposes ways in which the Government could work with the university sector to drive innovation. The recommendations borrow from our own strategic thinking at Melbourne and so are framed accordingly. We recommend:

- supporting the development of an innovative workforce
- improving mechanisms to support industry-university engagement
- investing strategically in national innovation infrastructure, and
- creating a governance and regulatory framework that supports innovation.

2. Building the innovation workforce and improving linkages

Recommendations:

- Government should support greater collaboration between industry and academia by, in the first instance, considering a new approach to fostering research and innovation precincts. In particular, models should be explored that centre on *existing* geographic concentrations of expertise, including the co-location of industry and academic partners, and on new programs to provide targeted support to further develop research infrastructure for these precincts. In keeping with this, Government should consider the introduction of incentives to improve the transfer of skills and knowledge between industry and academia, by creating a new program that supports academic-industry secondments and leverages the emergence of such precincts.
- Mechanisms to facilitate greater industry engagement, including exchange of staff between academia and industry, should be considered. This includes student internships and researcher placements in industry, as well as industry placements in academia. As mechanisms come at a cost, funded support for programs from Government would increase their attractiveness to organisations and staff.
- Government could assist with program funding to build the capacity of industry to help universities frame questions for research to address industry issues and problems.

Rationale:

Co-location of research and industry:

Co-location has been shown to increase innovation. Having a critical mass of Australia's top researchers working with global industry players and our most innovative SMEs to lift industry competitiveness is a key to lifting the nation's innovation performance.

Precincts enable the co-location of expertise at critical mass to drive interdisciplinary and cross-sectoral approaches, ensuring projects aim for powerful outcomes and are co-designed by end user.

Silicon Valley is widely regarded as the global hub of innovation, but other cities such as Tel Aviv, London and Berlin have developed innovation ecosystems that bring together research and higher education institutions and industries to accelerate innovation. Other hubs exist around University campuses, and examples include the Applied Sciences Centre in New York or the Science Park at Cambridge University.

There are local examples in Australia. The University of Melbourne is driving a precinct strategy, through the Melbourne Biomedical Precinct, which is one of the largest biomedical precincts in the world, and Carlton Connect – a precinct dedicated

to sustainability and ICT (see Box 1). Cochlear have relocated to Macquarie University close to its ICT and biotech facilities in Macquarie Park.

Box 1

CARLTON CONNECT INITIATIVE

The Carlton Connect Initiative, based at the University of Melbourne, is an ambitious strategy to unite talented people who share a desire to tackle some of our biggest sustainability and social resilience challenges and a passion for designing new ideas and technologies to help secure Australia's prosperity. It brings together significant infrastructure with research, teaching and commercial capabilities and provides a space for collaboration between industry (broadly defined) and the University.

Carlton Connect aims to substantially lift Australia's effectiveness in innovation and entrepreneurship by bringing together global industry players, our most innovative SMEs, and our top university and public researchers to lift our innovation impact. It aims to enable the creation of more start-up companies, helping SMEs to grow larger and delivering growth in emerging industry sectors.

In leveraging existing research focus and capacity at the University of Melbourne, the Carlton Connect Initiative is a good example of 'organically' emerging research critical mass. It, like other emerging precincts around Australia, provides the opportunity for significant returns for targeted research infrastructure investment by Government.

An innovation workforce

Attracting, training and retaining a healthy innovation workforce—that is able to create new industries and transform established ones—requires recognition that the jobs and workforce of the future will be very different from those of today.

Demographic changes will drive increased movement and flexibility in the workforce, reflecting in part the increased pressure of globalization of different industries as well as the values, orientations and capabilities of younger generations.

A healthy innovation workforce will also need to foster risk-taking and celebrate commercial failures as learning opportunities—a characteristic of leading entrepreneurial locations, such as Israel and Silicon Valley. Industry plays an important role in the translation of research into commercial applications that drive innovation, including through providing insights to research that facilitate commercial opportunities. The University recognizes that more needs to be done in this space in Australia, and so is making significant investments to support industry engagement and help develop the entrepreneurs of the future (for example see Box 2).

Government programs that facilitate and build upon the outcomes of such initiatives – such as secondments and exchanges between university and industry – would deliver additional value.

Box 2

THE MELBOURNE ACCELERATOR PROGRAM

The Melbourne Accelerator Program (MAP) was established in 2012 to assist start-ups and provide an environment of creativity, courage and innovation for entrepreneurs. Accelerator activities revolve around the dedicated support provided to Entrepreneurial Fellows. This includes funding, unparalleled networking opportunities and formal mentoring. In the last two years MAP has evolved beyond an accelerator into the most comprehensive entrepreneurship program in Australia with a range of activities to support entrepreneurs of all abilities.

Linking universities and industry

In many instances, there is the opportunity to better utilise end-user insights to inform development of research focus in universities. In comparison to other OECD countries, Australia has one of the lowest proportions of researchers working in industry, and one of the lowest proportions of businesses collaborating with higher education and research institutions. While research will have relevance to industry, at times opportunities are missed. Leveraging the research capacity for business requires a better understanding of culture and capabilities between different industry sectors and universities. Co-location and people exchange is critical to developing better understanding of cultures and capabilities.

3. Investment in basic science and nationally strategic innovation infrastructure

Recommendations:

- Government should establish a major national research infrastructure program similar to the National Collaborative Research Infrastructure Strategy (NCRIS) program.
- Government should grow investment in basic research, as it is central to the nation's economic, social and environmental progress.
- Provide universities with flexibility in the use of Australian Postgraduate Awards to support development of transferable skills during research training (PhD/Masters). These skills might include project management, IP management and commercial skills.

Rationale:

Nationally strategic innovation infrastructure

Research infrastructure is both underfunded and tenuously secured, leaving a significant hole in the national innovation system, and there is no ongoing program aimed at funding substantial pieces of infrastructure that are essential to breakthrough discoveries (for example, see Box 3).

Box 3

VICTORIAN LIFE SCIENCES COMPUTING INITIATIVE

A good example of why it is important to invest in research infrastructure accessible to different research partners is the Victorian Life Sciences Computing Initiative (VLSCI). This supercomputer facility gives researchers access to a powerful tool to help them solve some of the biggest challenges facing the State's health system and impacting on our quality of life. Life scientists and computer scientists are forming exciting collaborations to improve diagnostics, find new drug targets, refine treatments and further our understanding of the major diseases affecting our community: cancer, epilepsy, genetic disorders, infectious diseases and eye disease, among others. The collaboration with IBM further enhances Victoria's reputation as a global centre for excellence in life sciences research capabilities.

Funding landmark and major research infrastructure where the use and benefits can be shared is central to a healthy innovation ecosystem. This ensures Australia participates in a number of lucrative areas of research, fostering powerful international networks while bringing together world leading researchers and innovators to address crucial national challenges.

Investment in basic research

Basic research discoveries underpin all the big inventions. It provides the academic workforce that industry can draw on or poach to spur innovation. Our research workforce is pivotal to tapping international advancements and driving innovation locally. Investment in basic research is a small fraction of the total investment in science and innovation – recent estimates indicate less than \$1 billion of the more than \$8.6 billion total.

Yet international studies show returns to public research are typically in the 20 to 60 per cent range. Australia has a remarkable history of contributing to key inventions: penicillin; wireless LAN; the bionic ear; IVF; CPAP machines; and interventions to reduce the likelihood of diseases including bronchitis and cervical cancer.

4. Supporting commercialisation of university research

Recommendation:

Australia's national research and innovation system, like counterparts overseas, would benefit from a mechanism to support commercialisation of research undertaken in universities, particularly for 'proof of concept' studies. The quantum required would be low compared to the proportion of total research funding, and can be administered transparently and with full accountability.

Rationale:

Fostering innovation in Australia will not rely solely on skilling the workforce, as some systemic issues exist that inhibit innovation. In the context of leveraging University research to develop new innovations, the most significant challenge relates to the lack of available funding for 'proof of concept' development.

In Australia we rarely fund research to be 'commercial ready', which is the case in the USA and increasingly in the UK. As a result, companies and investors seeking to leverage university-driven innovations have access to better developed technologies in the USA and UK, compared with the more conceptual offerings of the Australian system. In an increasingly globalized innovation system, where companies and investors scope the globe for innovations, Australian research is at times disadvantaged by its lack of commercial readiness.

Funding for 'proof of concept' to develop research ideas into prototypes suitable for development into commercial outcomes could be better linked into the research funding system, such as through the Australian Research Council or the proposed Medical Research Future Fund. While limited government funding does exist for this crucial 'proof of concept' work, there is the opportunity to better leverage the university sector.

Box 4

HARNESSING VENTURE CAPITAL: FIBROTECH

A good example of why funding for 'proof of concept', and early and mid-stage development can pay large dividends for the Australian economy is the Australian biopharmaceutical company Fibrotech.

Fibrotech is developing a new class of drugs to prevent a massive health burden associated with fibrosis (tissue scarring). The Company develops novel anti-fibrotic drug candidates for the treatment of the fibrosis prevalent in such chronic conditions as chronic kidney disease, chronic heart failure, pulmonary fibrosis and arthritis.

It was initially funded by Uniseed, a venture fund operating at the Universities of Melbourne, Queensland and New South Wales, with investment capital provided by the three universities and AustralianSuper.

In May 2014, Fibrotech announced that it has reached an agreement with Shire Plc, the global specialty biopharmaceutical company, under which Shire has agreed to purchase Fibrotech for an upfront payment of \$75 million. This is a good example of how venture capital can be employed to generate strong businesses harnessing Australian research.

5. Valuing innovation in governance and regulation

Recommendations:

- Strengthen the alignment between science strategy, program funding and research impact by establishing an Expert Council to set research focus and guide funding for key collaboration programs. The role of the Council should include identifying and establishing priority areas for research funded through key programs. Membership of the Council could be shared between experts from industry, universities and the public sector
- The Australian national effort to measure research excellence and impact should incorporate metrics that capture the translation of research through commercial opportunities, in addition to measures of research excellence, such as paper publications and research income. This would support universities in developing organizational capabilities and reward mechanisms for staff achieving such outcomes.
- Government should also consider developing and publishing a consolidated intellectual property framework, similar to that implemented in the UK, to provide guidance for Australian innovation agreements in academia and industry. As a significant client of university research, government agencies can promote the adoption of the framework by using it as the basis of its research agreements.

Rationale:

An expert council supports a system wide approach

As Australia seeks to ensure that it continues to support research excellence whilst securing greater economic and social impact from its research investment, it needs to consider how it draws upon the resources, expertise and experience of all the constituent parts of the system to inform future directions.

There are proven international examples of expert councils. The UK research funding system and in particular the design and composition of the Research Councils in the UK shows how effective Expert Councils can be. While there are many similarities in the scope, functions and reporting lines of the Research Councils in the UK and the work of the ARC and NHMRC, there are also subtle points of difference in the use of Expert Councils consisting of representatives from outside the higher education system.

Measuring excellence and impact in research

The University is supportive of measures that promote excellence in research, including the ERA. However, there is the opportunity to improve current methods of measuring research excellence and impact, which avoid the chance that researchers' role in creating innovation is inhibited. For example, the ERA Framework drives a focus on paper publication in highly rated journals though provides little incentive for the translation of research into innovative products and services.

The government could explore complementary measures to the ERA that encourage researchers to devote effort to activity supporting innovation, such as commercializing their research. This might include recognition that researchers choosing to take breaks in publishing should not impact on career progression. Key measures of research excellence and impact might capture this effort toward innovation. Specifically, additional measurement tools may be required to complement those focusing on paper publication and research income.

In summary, measurement of success in the research sector could usefully focus on research excellence *and* translation in order to encourage behaviours that drive innovation.

Intellectual Property

Negotiations over Intellectual Property (IP) can also be a challenge in academic–industry collaborations. Setting expectations from the outset of negotiations may help overcome issues in negotiations between universities and industry. While individual universities devote significant resources to managing negotiations and IP, there is no nationally uniform approach.

Australia could learn useful lessons from the UK, where the Government has implemented an innovation strategy over a number of years, through the Lambert, Sainsbury, Wilson and Witty reviews. These reviews have driven a focus on research translation, mapped the system and provided a consistent framework that universities and industry can use as a guide for collaborations.