

SUBMISSION TO THE SENATE ECONOMICS REFERENCES COMMITTEE AUSTRALIA'S INNOVATION SYSTEM



EXECUTIVE SUMMARY

A comprehensive national approach to innovation is crucial to being able to better position Australia as one of the most innovative economies in the world and signal its strengths and capabilities in the research sphere.

The Australian tertiary system is already committed to world-class educational systems and an internationally recognized research environment. Greater leadership or focus from Government and closer alignment of the expertise in tertiary institutions with Government investments and programs and national, state and regional innovation goals, will assure future economic growth and prosperity in the knowledge based economy. For this to occur requires:

- An environment that allows opportunities for innovation to flourish through regional and local coordination of innovation, greater government and private investment to encourage connections between academic research and market opportunities, investment in state of the art research facilities and infrastructure, and the attraction and retention of world class researchers, innovators and entrepreneurs.
- Universities taking a strong leadership role in facilitating the innovation agenda and building an entrepreneurial culture. The Australian Government can play a pivotal role in enabling the uptake of innovation from the tertiary sector by industry, particularly through incentivising collaboration between institutions and industry.
- Establishing strategic partnership funds to support international science and innovation collaboration.
- Providing a challenging and supportive environment to assist young entrepreneurs to launch and grow their businesses.
- Investment in social innovation.
- The capacity to measure the impact of investment in innovation to ensure maximum benefit from the investment or redirection if needed.

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The University of Newcastle (UoN) welcomes the opportunity to contribute to discourse on Australia's Innovation System and believes that the Senate Economics References Committee's review has come at a critical time. There is an urgent need to bring together all the elements that an agile, innovative society needs, people with the right talent, training and attitudes, programs to provide strategic support and policies that allow innovation to flourish, and ensure that all parts of the system work as smoothly and as quickly as the global market demands. The universities in Australia are already committed to world-class educational systems and an internationally recognized research environment. Drawing upon the expertise already existing in the tertiary sector, commitment from the Australian Government and a comprehensive national approach to innovation has the potential to better position Australia as one of the most innovative economies in the world and signal our strengths and capabilities in the research sphere. The Australian Government can play a pivotal role in enabling the uptake of innovation from the tertiary sector by industry.

Australia offers a strong creative environment, a social sense of solving some of the world's most pressing issues, a culture that embraces diversity and a lifestyle to attract some of the world's best talent. Integrating these elements and aligning them to Government investments and programs and national, state and regional innovation goals, will ensure economic growth and prosperity in the knowledge based economy of the future.

The University of Newcastle (UoN)

The UoN has a strong record in building a culture of innovation across its campuses through a range of initiatives:

- Our two flagship institutes (the Newcastle Institute for Energy and Resources (NIER) and the Hunter Medical Research Institute (HMRI)) have flourished in a culture of transformative research connected to industry, business and government.

NIER engages with major international, government and industry partners and links them with researchers across the social sciences, health, and engineering and science disciplines to deliver multidisciplinary projects which address the energy reform agenda. NIER has attracted over \$48

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million in research contract funding in the past year including \$30 million for an industry-government funded project in the area of ventilation assisted methane abatement. The industry involvement and leadership in this project will ensure that resulting innovation will be adopted by the mining sector.

NIER has also recently launched a new Centre for Resources Health and Safety through a new \$1 million research partnership with global healthcare provider Aspen Medical aimed at saving lives in the high-risk resources sector.

NIER and CSIRO have established a joint energy innovation precinct in Newcastle positioned to address the full suite of energy options for Australia. UoN has achieved matching funding support from the NSW Department of Primary Industries to establish an International Centre for Balanced Land Use at NIER to be led by a UoN 'Global Innovation Chair'.

HMRI serves as a regional research hub, bringing together researchers, clinicians and industry. This collaborative model facilitates a two-way knowledge exchange between clinicians and researchers and is consistent with national and international trends towards health research hubs.

Based at HMRI, Viralytics, a small start-up company that commenced as an initiative of University research leaders and Newcastle Innovation, is a well-established venture on a significant upward trajectory. In 2014 alone, it has attracted a \$27m investment to allow for ongoing operations of the company to conduct further clinical trials in the United States.

- Our 15 Priority Research Centres bring together our strongest research groups and world leaders in diverse fields ranging across health and medicine, education, science and mathematics and engineering;
- The creation of five thematic based clusters provides a mechanism to drive regional development where researchers partner with industry, business, all three levels of government

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and the community to provide multidisciplinary solutions to complex problems. These cross-disciplinary hubs and clusters use a variety of unique forums for information sharing and for driving new knowledge and pull together expertise from a range of diverse fields to solve issues facing a particular industry sector. UoN has launched four Industry focussed Research and Innovation Clusters: Food; Defence; Global eHealth and Creative Industries. The Defence Cluster network facilitated UON's successful application to join the Australian Military Aligned Rapid Prototype Development and Evaluation Program. Members of the Food Innovation Cluster were instrumental in the University securing membership of the Commonwealth Government's Food Industry Innovation Precinct and subsequently being awarded in excess of \$2 million to establish an Industry Transformation Research Training Centre in 2013. The ongoing development of a strong suite of programs relevant to the Creative Industries by international academic institutions, industry leaders (Oblong Industries, Method Studios and Industrial Light and Magic) with input from an Allen Consulting Group Report has been commissioned by UON. Our fifth cluster is developing in the area of indigenous research.

- The 'Slingshot' accelerator program which supports UON students and graduates develop businesses with a digital technology focus.

Outline of Submission

The UoN has sought feedback from multiple stakeholders including faculties, Newcastle Innovation, our commercialisation and business development arm, NIER and HMRI and external partners in the development of this submission. Should the Senate Economic References Committee require additional information, the UoN is willing to provide further support to the Standing Committee throughout its tenure.

The UoN submission will focus on the following areas:

1. Creating the proper ecosystem
2. The universities' role
3. International networks and linkages
4. Innovation and youth - engaging our young students

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5. Intellectual property
6. Social innovation
7. Measuring innovation

1. Creating Proper Ecosystem

In order to provide opportunities for innovation to flourish in Australia, focus needs to be given to creating the right environment. A number of factors are crucial:

- Although there is a significant role for the Australian Government to play in driving innovation, innovation should be regionally coordinated through the academic and non-academic entrepreneurship community, for example, through Sector and Regional Innovation Centres, Angel Networks and Small Business Enterprise Centres, etc. This will ensure that innovation is contextualised and strategies and programs are aligned and integrated with Australia's existing investments in innovation, commercialization and entrepreneurship.
- Industrial clusters form naturally in response to abundant opportunities. These clusters both inform and benefit from academic research. By attracting firms whose activities are complementary successful clusters increase economic benefits.

Another type of cluster brings together more diverse participants, often with the goal of prompting the creation of new businesses. For example, the MaRS Discovery District in Toronto provides an example of one of North America's largest and most concentrated convergence centres. MaRS puts researchers and research networks, technology expertise, business people and venture capital under one roof to help generate new ideas and move discoveries to the marketplace.

Government investments can create networks of expertise in specific areas without a physical hub facilitating connections between academic research with market opportunities and help early-stage companies to become investor-ready.

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- The innovation agenda should support industry-academia partnership investments in areas where Australia can be identified as a global leader. This will enable industry and universities to work together in creating global recognition of Australia as providing a strong framework to support innovation activities.
 - The development of sector specific programs that offer a suite of research and training programs which enable companies to connect easily with top Australian and international researchers and provide financial incentives for engagement.
 - The creation of programs that bring together a diverse network of organizations, services and programs to help SMEs develop and exploit technologies in the competitive, global knowledge economy.
 - Universities, particularly at the post-graduate level, offer students the chance to engage in serious research, hone their problem solving and research skills and see how knowledge and creativity can spark new ideas. Providing state-of-the-art research facilities and other infrastructure will help to attract, develop and keep talented researchers in Australia.
 - Strategic investment in long-term basic and applied research that is internationally peer reviewed for excellence and demonstrates economic and societal value for Australia. This will help build Australian research standing and build its reputation as a leading area for research investment.
 - The attraction and retention of world-class research talent and the creation of the next generation of excellent researchers and innovators is critical to the success of an innovation driven economy.
 - The attraction of the best and brightest innovators and entrepreneurs from around the world, while at the same time, keeping home grown talent within Australia.

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- Increased private-sector investment in knowledge-based companies and capital that boosts productivity.
 - Global recognition, including ensuring the proper ecosystem for innovation, which is commerce-friendly and supports the growth of innovative companies and activities. Enabling and encouraging international innovative companies to invest in developing innovation within Australia.

The business climate is also critical to whether innovation will flourish or fail. Australia must be, and be seen to be, a jurisdiction where innovative businesses are welcome. This requires a balanced approach of continuous improvement in the business sphere, while at the same time making strategic investments in human capital, skills, and a creative and secure environment, all of which are key to innovation. Determination of mechanisms to boost competitiveness and free up resources that companies can invest in to drive innovation should be a key priority.

2. The University's Role

Universities play a vital role in innovation bringing together highly qualified academics in the sciences, engineering, technology and health, as well as in commerce, law and economics, which are necessary for an innovative economy. The role of arts and humanities is critical to ensure social innovation. University graduates represent the transfer of knowledge in its broadest sense because they are the people whose actions and decisions will help determine the success of companies in a global marketplace.

Universities must take a strong leadership role in facilitating the innovation agenda. Vice Chancellors need to make industry-university partnerships a strategic priority. They need to make the goals and benefits of partnering clear to the entire institution.

They will also need to implement incentives for university faculty and provide resources to manage a cultural shift that does not undercut basic research but puts a clear priority on engaging with industry for mutual benefit and for the benefit of society.

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Universities should be viewed as sources of innovation and problem solving for the community, both industry and business. Partnerships between industry and universities can accelerate innovation and help deliver solutions to pressing social challenges. But to do so, there is a need to rethink the definition of the research university to one that includes collaboration with industry.

For universities to play this role, they require government support that rewards institutions for their engagement with industry. Currently the Government incentivises universities through their engagement in Category 1 research (national competitive grants schemes); more so than their engagement in Category 2 and 3 industry-related research.

Key areas of focus for Universities will be to:

- Establish research internship programs providing graduate students and postdoctoral fellows with the opportunity to transfer their skills from theory to real-world application, thereby providing companies with a competitive advantage by accessing high-quality research expertise.
- Provide a foundation of cutting-edge research, business, entrepreneurship and scientific management skills to newly awarded PhDs while giving companies access to a highly qualified uniquely trained pool of talent, international networks and linkages. This will ensure that Australia is a world-leading research and innovation destination for top undergraduate students and graduate students from around the world.
- Use on-campus entrepreneurship activities to expose students, across all disciplines, to the principles of entrepreneurship, allowing them to recognize the importance of entrepreneurship/entrepreneurial thinking to our economy, their future and to determine if entrepreneurship is a viable career choice.

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- Develop a vibrant entrepreneurial culture on campus and ensure courses reflect post-study opportunities and provide business and entrepreneurial training for graduate students and post-doctoral fellows.
- Provide training for researchers and faculty embarking on entrepreneurship teaching activities and support for programs to engage alumni.
- Develop programs that support the initiation and expansion of on-campus entrepreneurship capacity, in institutions that have demonstrated and/or are willing to make strong commitments to entrepreneurship, by fostering the adoption of global best practices in student entrepreneurship; reducing barriers for student and recent graduate entrepreneurs to pursue their entrepreneurial aspirations; integrating with regional business support resources; and provide experiential learning opportunities for the next generation of innovators
- Explore new ways to connect with Australian industries through collaborative research projects.
- Provide increased funding for unique training opportunities for graduate students and postdoctoral fellows, the latter through applied, industrial research projects.
- Facilitate a way to recruit top, international undergraduate students.
- Fund proof-of-concept endeavours to provide seed money and expert mentoring for new businesses based on university technologies in addition to entrepreneurship education at universities to educate students and university researchers.

3. International Networks and Linkages

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Universities are uniquely situated to develop international networks and linkages with both higher education institutions and industries, and to bring these connections and global knowledge to Australian industry through research and innovation.

International engagement contributes to new knowledge, to our ability to understand and address major global problems, and to economic productivity and competitiveness through innovation. Universities play a critical role in the development and maintenance of links with the world's best knowledge. Strategic partnership funds should be established to support international science and innovation collaboration as part of selected bilateral relationships.

4. *Innovation and Youth - Engaging our young students*

To ensure Australia's place as an innovation leader, it is imperative that Australia provides a challenging and supportive environment to assist young entrepreneurs in their efforts to launch and grow their businesses. This could be achieved by:

- Supporting entrepreneurship awareness, education, training and experiential learning opportunities for students outside of universities.
- Building on experience gained in Scandinavia, Canada and the USA, working across various government ministries to refine and coordinate programs that make young people more aware of science, technology, entrepreneurship and innovation and inspire them to choose careers in a knowledge based new economy.
- Engaging universities as they train the next generation of primary and secondary school teachers with knowledge across the learning spectrum kindergarten through to high school so they are well positioned to teach the full range of skills that support innovation, strengthening the linkages between innovators and schools

5. *Intellectual Property*

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Straightforward access to intellectual property is critical to driving an innovative economy and stimulating investment where required. It is imperative that institutions show clearly:

- How they plan to make intellectual property more readily available to businesses;
- Provide incentives to inventors to identify, protect and commercialize intellectual property;
- Lower or eliminate existing barriers to rapid use of intellectual property; and
- Provide access for companies that develop intellectual property in consultation with our universities.

There is a worldwide trend in pooling intellectual property between institutions which can offer a more streamlined system of exploiting intellectual property and finding critical investment income. Other models of exploitation of the results of research must be explored.

To facilitate this, it is critical that emphasis is placed on increasing the transparency of research resulting from federally funding through an Innovation Exchange database.

6. Social innovation

Innovation need not only focus on commercial applications. Australia should embrace the idea of innovation holistically and direct energy and attention to social innovation. By supporting social entrepreneurs, Australia will be better placed to advance social goals. The benefit of supporting people with entrepreneurial skills and training is that they are able to use skills along the continuum from the marketplace to creative solutions to social needs, along the way building innovative and sustainable ventures.

Social innovation is important on its own as a way of finding better solutions to social problems ranging from homelessness to climate change.

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7. Measuring Innovation

Measuring innovation is important in terms of identifying the impact of investment in innovation or whether could be better directed to achieve greater benefit. Other jurisdictions across the world are exploring how to effectively measure innovation and there is a considerable body of knowledge. For example, in Ontario Canada, the Ministry of Research and Innovation is developing an "Ontario Innovation Scorecard." This report will include important conventional innovation metrics, such as dollars invested, publications, patents, licences, start-up companies, highly qualified people trained and venture capital investment. It will also focus on measuring investment impacts including, for example, wealth created per person and distribution of prosperity, the global share of knowledge-based firms, firm births and deaths, investment, and public support for innovation, education, immigration and the trade balance for knowledge-based firms.

Possible measures for assessing the impact of innovation include:

- Experience and results in training and graduating student entrepreneurs and student-led start-up companies: number of start-up companies; number of jobs created; VC/angel invested into clients etc.
- Evaluating the culture of entrepreneurial activity at universities: number of students exposed; number of students trained; number of recent graduates starting businesses; number of workshops; webinars; networking events etc.
- Understanding the economic impacts: number of student and recent graduate entrepreneurs engaged; number of student and recent graduate-led start-ups engaged and created; incremental sales revenues; jobs created; follow-on investments etc.

It is also important to measure not just the impact of innovation, but the speed at which it occurs so that program changes can be made to adapt to a changing innovation environment.

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Consideration should be given to how stakeholders and partners can work together to define appropriate measures, to measure “real” impact.

Most importantly, universities need to be able to demonstrate an active role in facilitating economic growth not just commercialising intellectual property. Universities should be at the centre of regional innovation hubs. The focus therefore should be on measuring outcomes that reflect factors critical to industry competitiveness.

Summation

Experience in other global jurisdictions shows that to be successful, commitment to the innovation agenda must be sustainable and consistent. The mechanism for delivering on the innovation agenda must be aligned with long-term goals, ensure openness and transparency, support effective use of public funds and provides fast, uncomplicated access to programs that support the interaction of Australia’s advanced university research capacity with business, industry and government.