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Department of Education
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UTS SUBMISSION TO THE BOOSTING THE COMMERCIAL RETURNS FROM RESEARCH INITIATIVE

UTS supports the Government's approach to better translation of research into commercial outcomes. The *Boosting the commercial returns from research* (BCRR) initiative is timely for UTS, which is rapidly establishing itself as a world-leading university of technology and is the only Australian university to have improved across all three international ranking schemes in 2013 and 2014. UTS prides itself in being outward facing, engaged with industry, and for producing work-ready graduates.

We have considered the information provided by the Government through the BCRR paper and associated stakeholder forums, and also the recent DVCR meeting at QUT that Minister Macfarlane addressed. Our response below outlines the current research environment in Australia, including some strengths and shortcomings, and addresses the issues outlined in the BCRR paper.

Commercial outcomes

In formulating this strategy it is important that the notion of commercial outcomes be carefully considered and clearly articulated, with an underlying commitment to the benefits of research to public good. The interpretation of commercial outcomes should be sufficiently broad so as to capture the range of benefits that can be realised by research, including:

- Increases in revenue and profit;
- Improvements in productivity and efficiency;
- Cost savings;
- Higher quality products and services;
- New jobs and up-skilling of workforce;
- New start-ups;
- Exports; and
- GDP growth.

It is also critical to recognise that these commercial outcomes can be utilised by:

- Private sector organisations (e.g. start-ups, SMEs and corporates);
- State-owned enterprises (e.g. Sydney Water);
- Public sector organisations (e.g. hospitals, emergency services);
- Government (local, state, federal); and
- NGOs, charities, and volunteer groups.

UTS has engaged in a range of collaborative research projects with organisations that have resulted in commercial outcomes as outlined above. We have detailed four examples in Attachment 1.

Research landscape and model

The research agenda pursued by Australian universities is influenced by a broad range of factors including national research priorities, university strategy, funding sources, collaborators and academic interest. It should be recognised that this research agenda will differ from the overall structure of Australian industry. There are clearly opportunities to better align areas of research with the needs of industry, while at the same time recognising there are also areas of research where the number of Australian companies that can translate research to commercial outcomes is limited. In many cases Australian researchers collaborate with industry internationally, generating significant benefits for Australia.

The Australian research environment can be viewed as a continuum encompassing fundamental, translational and applied research. We recognise that a balanced portfolio across the entire continuum is critical to support Australia's economic performance.

Fundamental research

Fundamental research, supported primarily by Government, produces excellent researchers and excellent research as outlined in the BCCR paper. It is critical for universities to pursue research excellence to discover new knowledge that can lead to breakthroughs and future commercial outcomes, and in order to contribute to Australia's research reputation.

Without additional incentives, it is unlikely that industry will invest in fundamental research therefore Government must continue to maintain its support for high quality research conducted through universities.

Translational research

There is significant opportunity to strengthen translational research through deeper collaboration with industry. Programs such as CRCs and ARC Linkage Projects have been good for incentivising translational research yet haven't met the needs of industry in terms of speed and agility, management of intellectual property, or applicability to SMEs.

The Industry Growth Centres Initiative must address these issues and provide clear incentives for both industry and universities to collaborate and translate research into commercial outcomes. Furthermore, universities need to provide sufficient incentives and recognition for academics to engage in translational and applied research.

Applied Research

There are numerous examples of applied research being conducted by universities in collaboration with industry, as described in the Australian Technology Network *50 Solutions that Count* (2013) publication. However, UTS supports the Government's initiative to significantly improve cooperation between universities and industry through applied research, recognising that it is applied and translational research that most directly contributes to commercial outcomes.

Research Training

Research training is essential at all levels of a research career (HDR students, early, mid and senior career researchers) and should occur across the entire research continuum. Further research training opportunities should be explored with industry, including industry doctorates, PhD and Postdoctoral internships.

Roles of universities, industry and Government in boosting the commercial returns from research

The Government, industry and universities all have an important role to play in strengthening research collaboration.

Universities

Universities need to develop a common language with industry to facilitate collaboration, address common misperceptions, align incentives and manage expectations.

Universities need to be more nimble and agile when working with industry. Contract and Intellectual Property negotiations need to be flexible and fast.

Universities should provide formal recognition for academics engaging with industry as part of a legitimate career strategy, without compromising academic standing. Universities should also enable easier mobility of academics in and out of industry as part of career development.

Universities should develop opportunities to embed researchers in industry; through industry doctorates, PhD and Postdoctoral internships. Programs such as the UK Knowledge Transfer Partnerships should be explored.

Industry

Industry needs to be encouraged to leverage skills and expertise from universities; they need to better articulate problems and challenges and assist in mapping these to research areas; share data and knowledge; and provide opportunities to embed research expertise within their organisations.

Government

Government has an important role to play in incentivising industry and universities to work together.

Stable and sustained funding of research schemes that support industry and university collaboration need to be maintained, alongside funding of fundamental research.

The Industry Growth Centres Initiative needs to be rapidly implemented, and the Growth Centre Project Fund should be significantly expanded.

The R&D Tax incentive scheme needs to be modified to provide specific incentives for industry to collaborate with universities.

When designing the Medical Research Future Fund the Government must ensure that it provides the right structure and incentives that will lead to improved collaboration between universities, health providers, medical device companies, and others with clear focus to address major challenges Australia faces in healthcare.

Government must also support the development of an appropriate set of measures of industry and university collaboration.

Measurement of commercial outcomes

UTS supports the development of a robust set of metrics that measure collaboration between universities and industry, and the impact of research. These metrics could include:

- Income derived through university/industry engagement;
- Placement of researchers within industry;
- Joint publications with industry; and
- Intellectual property.

Care must be exercised to ensure these metrics do not create unintended consequences, such as frivolous pursuit of patenting.

These metrics should be incorporated into the assessment of relevant national competitive grants.

UTS capabilities

UTS is well positioned to collaborate with industry, and in the last four years has grown its Category 3 funding by 79%. UTS has implemented a range of initiatives specifically focussed on industry collaboration, some of which are outlined here.

Researcher training

UTS has considerable experience in preparing research degree students for employment and careers in industry. This is evident in specific initiatives such as:

- Participation in the AMSI PhD internship program;
- Having the largest cohort of students (20) in the ATN Industry Doctoral Training Centre;
- Development of industry sponsored scholarships; and
- Provision of professional skills modules and activities to all PhD students.

The recently designed UTS Industry Doctorate Strategy demonstrates the university's focus on industry partnerships in doctoral programs. It is our aim to further embed industry research training initiatives across the University.

Development of an industry gateway

UTS is developing an industry gateway into UTS research. The 'UTS:Gateway' will provide a single point of contact for existing and potential industry research partners and will bring into focus UTS' commitment to, and investment in, the development of impactful industry research engagement. As well as providing an easy route to engaging with UTS researchers, it will offer temporary office space and hot-desking for industry working with UTS. Industry partners will be able to access dedicated research, contracting and commercialisation support to industry wanting to collaborate with UTS.

Easy Access IP

As part of its overall flexible intellectual property policy, UTS has joined a number of other universities in subscribing to the Easy Access IP model, providing a significant proportion of its intellectual property for free under one simple license agreement. UTS will continue to transact high commercial value intellectual property, but recognises that engagement, partnerships, adoption and impact are much higher order priorities for both the university and our industry partners.

Intersection

UTS has established *Intersection*, a partnership between Sydney's ecosystem of creative digital tech start-ups and neighbouring cultural, media, commercial, Government, technology and educational organisations. Through *Intersection*, UTS will facilitate communications, connectivity, mentoring, internships, funding, and research to support the development of future start-ups within this precinct. UTS's capital investment in developing our city-based campus encourages students, academics and industry to collaborate with Sydney's digital creative hub.

UTS would welcome further discussions and engagement on this important strategy.

Attachment 1 – Examples of UTS research collaboration

Autonomous Robots perform essential grit-blasting maintenance on Sydney Harbour Bridge

Collaboration between UTS and NSW Roads and Maritime Services

Steel bridges are a major part of any city or region's infrastructure, and in order to remain functional they need regular maintenance. Australia spends over \$200 million each year on bridge maintenance alone, not to mention the human cost of exposure to perilous environments and damaging paint fumes.

Leading robotics group Centre for Autonomous Systems at UTS has developed a world-first robot capable of scanning a complex environment in real time without the intervention of a human. The robot then uses this information to plan and carry out grit-blasting of the structure. There are now two robots working on the Sydney Harbour Bridge. This technology has since been commercialised by spin-out company SABRE Autonomous Solutions.

Reducing maintenance costs on Australian timber road bridges

Collaboration between UTS and local councils

Sixty five per cent of Australia's bridges are made of timber, many of which are more than 100 years old and were built to carry loads of 10 to 14 tonnes, considerably less than the loads they carry today. UTS has developed a reliability-based design methodology for rehabilitating timber bridges, allowing the historical value and beauty of aged timber bridges to be retained while delivering similar reliability to concrete and steel structures. This technology enables bridge safety to be improved at a cost of between 20% and 50% of that required to replace the bridge. Using this technology, UTS has worked with a large number of local councils to reduce maintenance costs and extend the life of their infrastructure.

Preventing leaks in Sydney's water mains

Collaboration between UTS and the Sydney Water

UTS and Sydney Water are leading a \$16 million, five-year international research effort to better assess the condition of underground pipes and identify trouble spots well ahead of failure. A range of electromagnetic and acoustic sensors have been used on a 1.5km section of decommissioned cast iron pipe, laid in 1922. UTS researchers have developed machine learning software tools to analyse sensor data and accurately profile pipe thickness and detect any defects. This research will enable Sydney Water to avoid major incidents and proactively target maintenance, leading to substantial cost savings and reduced water loss.

Building staff capability for competitive advantage

Collaboration between UTS and a major Australian financial institution

Working with an industry partner, UTS designed a professional development program founded in research that is building the capability of their staff to help enhance creativity and innovation, and retain their competitive advantage as a leader in using technology to provide financial services.

UTS experts and key industry partners collaborated to develop this program, based on design thinking and data analytics. Multiple levels of training have been delivered to 700 staff, with 3,500 staff expected to go through the program in total.