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UNIVERSITY
OF WOLLONGONG
AUSTRALIA

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**Submission to the
Australian Government Inquiry
into innovation and creativity:
workforce for the new economy.**

**UNIVERSITY OF WOLLONGONG
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INTRODUCTION

The University of Wollongong (UOW) is a comprehensive, research intensive institution. The University currently employs over one thousand FTE academic staff involved in research-related roles. Over 1600 higher degree research students are currently enrolled at UOW and in 2014, 290 PhD and Masters (Research) students graduated. UOW has consistently delivered research of outstanding quality and impact, as evidenced by our placement in the top 2% of QS and Times Higher Education world university rankings. The dissemination of our research to user communities, including industry, is one of UOW's key goals and we have a justifiably strong reputation for our engagement with industry. We therefore welcome the opportunity to comment on how higher education institutions can play a significant role in the successful future of innovation in Australia.

THE EXTENT TO WHICH STUDENTS ARE GRADUATING WITH THE SKILLS NEEDED FOR THE JOBS OF TODAY AND OF THE FUTURE

UOW conducts research in a range of areas that look at future areas of employment and ways to help local industry innovate and transition to new areas and models of business. Through leveraging our research, UOW ensures that teaching is contemporary and relevant. Based at UOW, the Australian Research Council Research Hub for Australian Steel Manufacturing (the hub) is a research hub bringing together the best and brightest scientists and engineers from Australia's steel manufacturers and research institutions to drive industry innovation in product development and improve global competitiveness. The hub conducts research and development programs that address manufacturing techniques and best-practice pathways for bringing new ideas to market. The hub was established in September 2014, and is supported by industry and university investment of more than \$17 million and ARC funding of \$5 million over five years.

The Sustainable Buildings Research Centre (SBRC) based at UOW's Innovation Campus has been working closely with BlueScope since its inception on the development and evaluation of new steel sustainable building products. A key example of collaboration has been SBRC's major role in the research and development effort on a new roofing product known as the Building Integrated Photovoltaic Thermal (BIPVT) system, a new roofing system that incorporates thin-film solar panels and aesthetically pleasing designs that can produce energy, heating and cooling for new Australian buildings. The first prototypes of the BIPVT system were used to great effect in construction of the Illawarra Flame house, a retrofit project built by a team of UOW and Illawarra TAFE students that went on to win the international Solar Decathlon China 2013. BlueScope was also the major external funding sponsor of the team. BlueScope is now in the process of determining whether to further develop this product and take to market.

As part of its Global Challenges Program, UOW has also recently formed the Southern Manufacturing Innovation Group (SMIG)¹, comprising 13 Illawarra based manufacturers (SMEs). We have had meetings in which the industry partners described their innovation processes and challenges and others in which UOW presented information on research in advanced materials and robotics. The feedback from SMIG members has been very positive and some new industry-to-industry discussions have occurred as result of this UOW initiative.

Additionally, Early Start is a \$44million transformational project that aims to create and enrich life opportunities for young Australians from birth to 12 years. Early Start includes specialist teaching and research spaces, a Children's Discovery Centre and operates as the hub for 38 Early Start Engagement Centres based in rural and remote areas across NSW. Developed in response to a new wave of research confirming the critical impact of education on children's health, development and life outcomes, Early Start will radically transform teaching, research and community engagement in the higher education sector.

¹ UOW Global Challenges Program, Southern Manufacturing Innovation Group, available at: <http://globalchallenges.uow.edu.au/manufacturing-innovation/UOW191273.html>



To further enhance student employability and to fully equip students for the changing world of work, UOW has developed a longer-term institutional strategy for embedding and integrating employability and career development practices within the curriculum, and throughout the learning experience.

Key objectives of the strategy include:

- All students will have access to multiple opportunities for real world learning scaffolded throughout the learning experience;
- Experiential learning (which includes: work integrated learning; service learning; practice based learning; and work related learning) will be informed by career development learning principles and frameworks
- Enterprise learning will be fostered across the learning experience.

A distinctive approach in this Strategy is a design which highly values a career ready culture, as opposed to job ready or work ready – thus preparing graduates for lifelong and life-wide transitions and decisions. The focus shifts to fostering adaptability and a commitment to lifelong learning, along with the development of key academic, technical and workplace knowledge, and skills and dispositions that vary from one career to another and change over time as a person progresses along a developmental continuum.

Career Development activities available throughout the university experience lead to increased employability and thus a stronger return on students' investment and more satisfaction and confidence with their course and career choices. This Career Ready approach also leads to more effective graduate recruitment, whereby the right graduate approaches the right role, organisation and industry - for the right reasons – leading to improved employee retention and productivity within our graduate employer communities.

MATTERS RELATING TO LAWS AND REGULATIONS THAT MAY ACT AS A BARRIER TO EDUCATION PROVIDERS BEING ABLE TO OFFER QUALIFICATIONS THAT MEET THE NEEDS OF THE NEW ECONOMY AND FASTEST GROWING SECTORS

In addition to Australia's Global Innovation Strategy, UOW supports the development of a National Technology Roadmap to promote sector coordination with appropriate funding. Most countries use technology roadmaps to direct government and industry funding for research and development. In the UK, USA, and EU there are well-defined research priorities and technology development roadmaps that inform university research priorities and identify timelines for translation of research results to industry. The roadmaps are created by government in collaboration with local industry and academia. These countries also use directed R&D tax credits to ensure that strategic industry investment is supported. The USA and EU have successfully used this approach for a long time. The UK has shown in the past 15 years the effectiveness of this approach in creating new UK industry around research-intensive universities. A similar approach could be adopted in Australia.

The standardisation of commercial collaboration contracts would serve to address issues consistently encountered around IP ownership, licensing, publications, and rights to further research. While completely uniform contracts are not feasible or desirable, if an industry partner is engaged with multiple universities the complexity and time required multiplies almost to the point of impossibility. The recent Australian Defence Science Partnership is an example of collaboration with well-defined terms for all participants. Although not entirely ideal it provides a framework within which all parties can operate. Additionally the Cooperative Research Centre (CRC) participant's agreements provide another example, albeit a poor one since each CRC has a unique agreement. However, projects are much simpler to get underway since most of the contractual issues are defined in the CRC participant's agreement.

The creation of grants to support the early stages of research translation, similar to the European Research Council (ERC) approach would assist in promoting commercialisation as a prestigious activity rather than an alternative income stream. The ERC has established the prestigious Starting and Advanced Fellowships offering €150,000 to take blue sky research to a closer to market (where no industry partner has yet been identified).



This initiative could be introduced here to include an option for researchers to apply for an additional year of competitive grant funding for them to develop and take products from the lab to market. Australian researchers awarded competitive grants could also have access to this type of funding to support research translation activities. UOW experience with Australian industry indicates that the more defined the market for a technology and the further along the research is to a commercial prototype, the more interested they are in a research collaboration activity.

FACTORS THAT DISCOURAGE CLOSER PARTNERSHIPS BETWEEN INDUSTRY; IN PARTICULAR SMALL AND MEDIUM ENTERPRISES, THE RESEARCH SECTOR AND EDUCATION PROVIDERS; INCLUDING BUT NOT LIMITED TO: INTELLECTUAL PROPERTY; TECHNOLOGY TRANSFER; AND RAPID COMMERCIALISATION

Australian industry composition. Areas of research excellence within Australian universities may not have a corresponding number of Australian based companies with the capacity to take up the research. For example, in the areas of materials and advanced manufacturing, Germany, the Netherlands, UK and USA have local SMEs and MNCs to translate the research outputs to commercial products. Australia needs to create an environment that not only produces world class research outcomes, but is attractive for MNCs to develop an R&D presence here and for locally based high technology companies to grow into global R&D leaders.

Insufficient exchange of personnel between University and Industry. Academics focus on research publications and teaching, whereas industry-based researchers focus on commercial deployment of research outcomes. Successful collaboration requires an understanding of both aspects of research. In Australia most PhD students are employed in universities. In other regions such as the UK, USA and EU there is much higher employment in industry and many researchers alternate between academic and industry employment over the course of their career. Additionally Australia needs to create an environment that not only produces world class research outcomes, but is attractive for MNCs to develop a research and development (R&D) presence here and for locally based high technology companies to grow into global R&D leaders. Areas of research excellence within Australian universities may not have a corresponding number of Australian based companies with the capacity to take up the research; for example in the areas of materials and advanced manufacturing, Germany, the Netherlands, UK and USA have local SMEs and MNCs to translate the research outputs to commercial products.

Insufficient infrastructure and support to translate university research results. Research outputs need to be taken to the next stage in development before they can be of interest to industry. For example, while there is a well-established research and development to commercialisation pipeline for drug development, for many materials and engineering technologies there is no clear development pathway. The lack of financial support and specialised infrastructure for translation activity means that Australian research is then often commercialised elsewhere.

Insufficient incentive for University Researchers to engage with Industry. Industry research engagements may provide economic income for the university and be commercially important. However, the work may not be academically significant. Researchers' career advancement is often based on competitive grant income and scholarly publications, rather than industry engagement activities. An associated factor is the typical academic teaching and research workload model, which often do not recognise or allow sufficient time for researchers to focus on industry collaborations.

Insufficient knowledge in industry about University collaboration mechanisms. Universities can engage in consultancies, contract research and collaborative research. The difference between these can be confusing to industry. There is also a complex array of ARC, Commonwealth and State government grants that can be used to leverage industry dollars. Misconceptions in industry about IP ownership, publication rights and further research rights are further barriers.



Difficult and drawn-out processes for licensing IP and creating spinouts. The rules, regulations and processes for licensing and spinouts require significant resource investment by universities and industry partners making potential engagement unattractive.

Collaboration and Contract Setup. Similar to the issue on commercialisation of research outputs, the contract setup for collaboration is usually a protracted and drawn out process. Common issues have to do with IP, publications and rights to further research.

RELATIONSHIPS BETWEEN TERTIARY EDUCATION ENTREPRENEURSHIP PROGRAMS AND PRIVATE INCUBATOR AND ACCELERATORS

Universities can seed and nurture innovative companies through knowledge transfer and collaboration. For example, iAccelerate is a UOW initiative designed to support students, staff and the greater Illawarra Community to build an innovation ecosystem. iAccelerate is a business incubator designed to support entrepreneurs who use technology as an enabler for a scalable service or product that can be globalised. It consists of multi-faceted business acceleration programs to help grow the skills of entrepreneurs, create commercially sustainable businesses within a purpose-designed space to enhance innovation in the Illawarra region. The UOW iAccelerate initiative has recently launched its \$10 million seed fund. The seed fund will enable a raft of Australian early and advanced start-ups to grow and thrive.

UOW is consistently looking to form additional partnerships and attract new mentors to iAccelerate. A strategy in an endeavour to assist Universities in growing and supporting more Australian high tech companies would be competitive funding for developing research outcomes into start-up companies around marketable university inventions. This should include funds for market studies and technical development of marketable prototypes. It would be prudent to more adequately fund existing instruments to capitalise on collaboration schemes that are by now well understood by industry and research sector.

**For further information on this submission please contact Canio Fierravanti
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