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INQUIRY INTO FUTURE DEVELOPMENT OF THE NSW TERTIARY EDUCATION SECTOR

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SUBMISSION: INQUIRY INTO THE FUTURE DEVELOPMENT OF THE NSW TERTIARY EDUCATION SECTOR
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INTRODUCTION

The University of Wollongong (UOW) welcomes the opportunity to provide input into the Inquiry by the NSW Legislative Council into the future development of the NSW tertiary education sector.

SUMMARY

Through the creation of new jobs and industries, and pursuing breakthroughs that improve the productivity of existing industries, the University of Wollongong (UOW) helps to drive both social and economic transformation.

UOW works together with industry, research partners, governments, communities and other universities to address society's critical economic, environmental, social and medical challenges. Our initiatives are helping small and medium-sized enterprises (SMEs) engage with our researchers to develop new technologies, innovative products and services, improve business capabilities, and engage in regional industry collaboration.

A dynamic university recognised for our innovative spirit and agility and ranked in the world's top 200 universities, UOW plays a fundamental role in driving social and economic change in communities across NSW and Australia.

In early 2020, UOW released, ***Leading Locally, Competing Globally: Economic Impact Report 2020***, prepared by researchers from UOW's SMART Infrastructure Facility and leading international professional services firm Ernst and Young. The report highlighted we are leading locally by competing globally in generating over $2.5 billion in gross output annually. In real terms, the direct economic impact of UOW activities in the Illawarra region increased from $573 million in 2015 to $637 million in 2018.

Wollongong is recognised as one of Australia's most important Gateway Cities significantly contributing to national development as a unique place of work, education, culture, recreation and leisure. This analysis is contained in the report ***Australia's Gateway Cities: Gateways to Growth*** commissioned by the Committee for Geelong, in collaboration with the City of Newcastle, the City of Greater Geelong and Wollongong City Council which was launched in November 2019. Such cities are industry pioneers and innovation gateways for future economic growth. Wollongong is a city of lengthy industrial heritage that has transitioned and continues to transition as changes in the global marketplace alter the local jobs market.

Since our foundation, UOW has provided the Illawarra with the economic leadership to grow and develop vibrant, prosperous and globally competitive communities. This support has grown across NSW with our regional campuses at Nowra, Batemans Bay, Bega and Moss Vale and our three metropolitan campuses in Sydney comprising South Western Sydney in Liverpool, Sydney Business School at Circular Quay and Southern Sydney at Loftus.

The object and functions of UOW are set out in the ***University of Wollongong Act 1989*** and these are comprehensively maintained by the Council of UOW.

UOW actively supports the development of regional human capital, economic development and sustainability of regions across NSW through the provision of our regional campuses. We lead positive change by maximising regional assets to bring benefits to our communities.

The University is also providing our communities with access to tools and support to create a thriving economic future. An example of this is the **Bega Valley Innovation Hub (BVIH)** - a unique business accelerator program run by UOW and the iAccelerate Innovation Network to help locals grow ideas into viable businesses. It was established in 2018 by funding from the Federal Government, UOW, Bega Valley Shire Council, Bega Cheese and the Bega Chamber of Commerce. It also hosts outreach programs such as high school start-up camps, education events to help local businesses understand how an innovation support system works and training workshops to help businesses adopt new technologies.

Also in the South, UOW's Shoalhaven Campus is the site of the **UOW Industry 4.0 Hub**, a collaborative environment for students, industry and entrepreneurs, which is set to position the Shoalhaven at the forefront of advanced manufacturing. The hub is aimed at benefitting agribusiness, defence and manufacturing industries, which are key drivers of the Shoalhaven economy. The hub, modelled on the Facility for Intelligent Fabrication in Wollongong, is equipped with cobots and industrial robots.

FOSTERING INNOVATION AND LINKING SMEs

World-class multidisciplinary research, training and education address the needs of industries in UOW's communities. UOW is committed to delivering initiatives and facilities that help drive innovation, investment, new jobs and new industries.

Innovation Campus: UOW's Innovation Campus is a nexus in strengthening business, education and research ties locally and globally and has contributed greatly to increased collaboration between UOW and industry. The award-winning research, innovation and commercial precinct is helping to activate new economic activity and regional jobs as well as increase Australia's innovation performance. The Campus is home to research institutes and a well-established community of innovative multinational and national companies, including NEC Australia. University research entities based here work in the development of "intelligent" innovative materials with the potential to regenerate damaged human nerves, the development

of superconductors that make energy transmission more efficient, and new techniques for sustainable building design. A Health and Wellbeing Precinct being developed at the Innovation Campus will bring significant benefits to the Illawarra community and beyond. The Precinct will integrate research and teaching environments with non-surgical health care and aged-care facilities. Construction in partnership with the private sector is planned to begin in 2022.

iAccelerate Centre: UOW's iAccelerate Centre is helping to support start-ups, foster growth and innovation in established companies, and provide pathways for researchers to commercialise their ideas. It is the largest university-led incubator and accelerator in Australia – with over 60 resident companies in 2019. A total of 192 companies (179 at iAccelerate and 13 at the Bega Valley Innovation Hub) have been assisted by the program since 2012 in a range of fields including tech, hardware, service, education, health, wellbeing and social impact. In addition to supporting local companies, iAccelerate has delivered a total of 639 full and part-time jobs since 2012. More than $57.6 million in gross revenue was generated by iAccelerate companies in 2019. iAccelerate's education and support programs are also available through the Bega Valley Innovation Hub (BVIH). Through the BVIH, the iAccelerate program is providing the Bega Valley community with access to the tools and support to create a thriving economic future through increased job creation and opportunities.

Advantage SME and Generator Lab: Advantage SME allows SMEs to engage with the University to develop new technologies, innovative products and services, improve business capabilities and engage in regional industry collaboration. It also provides opportunities to develop new collaborations and business opportunities by engaging with regional stakeholders in industry and all levels of government. The program administers leveraged funding support provided by the NSW Department of Industry. A project funded jointly through the Advantage SME program and Bluey Merino, in partnership with UOW's Intelligent Polymer Research Institute (IPRI), has created wearable technology. Mittagong-based clothing company Bluey Merino wanted to put an NFC (Near Field Communication) label into its clothing so the consumer knows exactly where the fibre in the garment comes from. With limited fibre research occurring in Australia, Bluey Merino sought specific technical skills available at UOW. Meantime, UOW's Generator Lab program connects SMEs, industry and government enterprises with UOW researchers and other stakeholders to solve their innovation problems by using disruptive technologies and collaborative people power. Through this program, two global companies – Komatsu and Hitachi have been connected with regional SMEs and researchers.

Facility for Intelligent Fabrication: The Facility for Intelligent Fabrication (FIF) connects with industry partners from SMEs to larger businesses to educate them on the next generation of manufacturing and fabrication technologies. The FIF demonstrates what is possible with Industry 4.0 technology available today to help bring Australian manufacturing businesses up to speed with a modern factory. The FIF is a collaboration between UOW, TAFE NSW and Weld Australia to assist SMEs to identify and implement technology, backed with technical education, training and certification support. The facility assists SMEs to skill up, using

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UOW's expertise in advanced manufacturing which has been developed over more than 20 years of supporting work in both the fabrication and defence sectors. The FIF brings together the three partners and their networks to provide expertise, technology, equipment and education in a "one-stop shop" and the Facility's members work closely with the Advanced Manufacturing Growth Centre. The Facility provides a nationally unique set of capabilities in welding, automation and rapid metal fabrication. In addition to providing training programs – both general and tailored to company needs – the FIF provides demonstrations of technology and proof-of-concept, including prototype development.

Blue Economy: Under UOW's Global Challenges Program, the *Blue Futures* project is positioning the NSW South Coast as a national leader in the development of Blue Economies, drawing on ocean and coastal resources for economic development in an ecologically and economically sustainable way. The project specifically focuses on Blue Economy opportunities on the NSW South Coast. It builds on the previous research project *Launching a Blue Economy* which assessed what blue economy base exists along the South Coast to bring together SMEs with similar interests. One such project mapped is a project that is using seaweed extracts for wound healing. The biotech collaboration between the ARC Centre of Excellence for Electromaterial Science (ACES) at UOW, Dr Pia Winberg of Venus Shell Systems and Nowra manufacturer NowChem has resulted in Skin from the Sea – a project to fast-track the development and commercialisation of seaweed wound healing materials. After the horrific summer of 2019/20, the *Blue Futures* program will also be exploring how coastal and marine industries can contribute to the recovery of South Coast communities devastated by fire.

NUW Alliance: The NUW Alliance brings together the University of Newcastle (UON), the University of New South Wales (UNSW), and UOW to help establish an expanded innovation network to create new jobs and new industries for NSW and Australia more broadly. Together with Western Sydney University, the Alliance has signed a Statement of Intent with the NSW Government to deliver a world-class higher education and research presence in Western Sydney. The proposed "Multiversity" is planned to specialise in STEM (science, technology, engineering and mathematics) and be part of the Western Sydney Aerotropolis precinct at Badgerys Creek. The four universities plan to create one "Multiversity" campus with strong links to local industry, tailored vocational education and training, and STEM-focused schooling.

UOW'S INDUSTRY LINKAGES

UOW engages with industry, community and government to solve cutting-edge problems. Our commercial research focus areas include power, energy and infrastructure; healthy living; biomedical sciences; future manufacturing including defence-related research; and social change and public policy.

Steel Research Hub: UOW headquarters the new ARC Research Hub for Australian Steel Innovation (SRH), designed to drive innovation and improve the global competitiveness of the

national steel industry. With support from the Australian Research Council, and by drawing on the combined capacity of leading universities and partners in the steel industry, the SRH brings together teams of internationally recognised research and industry talent to deliver innovative solutions and breakthrough technologies in steel manufacturing and product development. The Federal Government recently announced funding for the new SRH, to be funded through to 2025. The funding is part of the ARC's Industrial Transformation Research Program. The SRH's eight industry partners are BlueScope Steel, Liberty Primary Steel, Infrabuild, ArcelorMittal, Bisalloy, Australian Steel Institute, Weld Australia, and Australian Industry Group. Over the past five years, the current hub has delivered over 30 successful research projects and many outcomes across its three key programs – Market-Focused Product Innovation, Innovative Coating Technologies, and Sustainable Steel Manufacturing.

Sustainable Buildings Research Centre (SBRC): The SBRC at UOW is a multidisciplinary facility that links with industry to meet the challenge of improving the energy efficiency of new and existing buildings. SBRC projects include developing sustainable building technologies for residential and commercial applications, analysing and improving thermal design for buildings to reduce the need for using energy for heating and cooling, renewable energy and micro-grid technology application, and developing control and sensor technology to improve building performance. A new Building Insights Facility located at SBRC includes capability of measuring the thermodynamic, hygroscopic and environmental performance of large scale building elements. The SBRC is also working with steel producer BlueScope on the development and testing of next-generation steel building products including photovoltaic (PV) thermal roofing, cool roof products and other innovative building envelope systems. It is also working with other key industry partners on innovative control systems for building services, including air-conditioning systems and automated natural ventilation systems. The SBRC seeks additional strategic industry partners to advance its joint research agenda in the fields of energy efficiency and the built environment.

Australian Power Quality and Reliability Centre (APQRC): The APQRC at UOW is a centre of excellence for research, education and consulting in distribution and transmission system power quality, reliability and renewable energy systems. The APQRC has been working in conjunction with industry for more than two decades and expects to make a significant contribution to national and international economies by ensuring that future electricity supply systems will be of high quality while facilitating the integration of renewable energy sources. Established in 1996 through a joint agreement between UOW and Endeavour Energy (then known as Integral Energy), the Centre continues to be proactive in making contributions to future directions in power quality to the electricity supply industry, governing, regulatory and standards bodies, customers, and the community in general.

SMART Infrastructure Facility: UOW's SMART Infrastructure Facility is a world-leading institution dedicated to helping governments and businesses better plan for the future. SMART contributes to infrastructure planning in Australia through truly independent research coupled with deep academic rigour to ensure policy makers and industry partners receive high quality and timely advice on major projects. The wide range of projects SMART has worked on includes mass transit systems in Hong Kong, flood disaster management in Jakarta, regional

transport planning in Australia, and the deployment of low-power wide-area networks (LPWAN). Domestic industry partners include ARRB Group, Australian Bureau of Statistics, Australian Smart Communities Association, Australasian Centre for Rail Innovation (ACRI), BlueScope Steel, Endeavour Energy, IoT Alliance Australia, NSW Ports, Pacific National, Peoplecare, Port Kembla Coal Terminal, Property Council of Australia, and the RFS.

Australian Institute for Innovative Materials (AIIM): Future biofabrication, new materials and new production technologies are developed and commercialised with research and industry partners at the Intelligent Polymer Research Institute (IPRI) and the Institute for Superconducting and Electronic Materials (ISEM). This includes work with nanomaterials in 3D printing, renewable energy and medical science; and innovative technologies to generate, transport and store energy. Within IPRI, the TRICEP initiative – Translational Research Initiative for Cellular Engineering and Printing – offers SMEs, research institutions and industry the opportunity to partner with leading researchers to develop and commercialise 3D printing technologies for use in the medical industry.

Work-integrated Learning Plan: The UOW Work Integrated Learning Plan (WIL) was launched in 2017 with programs co-developed by industry partners. WIL provides students with the benefits of insight, better connections with industries and increased employability, while industries benefit from the opportunity to collaborate and connect to a group of talented students and receive access to UOW facilities. Hundreds of organisations are involved in supporting students through opportunities in WIL, from Wodonga to Bega, Canberra, the Southern Highlands, Nowra and Sydney. In 2019, more than 1,730 students completed a subject that involved an industry-based project, while more than 4,270 students completed a professional experience placement. Two subjects strongly incorporating WIL are Lean Engineering Start Up and Engineering Design and Management. Lean Engineering Start Up is designed to run in a start-up incubator where participants work on their project and develop them into a lean start-up business. Engineering Design and Management provides students (in teams) with the opportunity to undertake a significant product development exercise through to product launch.

COVID-19 WORK OF BENEFIT TO NSW GOVERNMENT

UOW is working with our partners and communities to incorporate our research and other activity into the development of products and processes that will help keep Australians safe during the COVID-19 pandemic and assist in rebuilding Australia's economic and social wellbeing. We play an important role in the development of critical health goods that are of benefit to the NSW Government throughout the pandemic.

- UOW is part of the national CovidSOS network of universities and research centres working together to try to remedy the shortages of personal protective equipment (PPE) for doctors, nurses and other front-line staff in our communities. UOW researchers have been producing 3D-printed face shields in collaboration with two local 3D printing companies. Researchers from the ARC Centre of Excellence for Electromaterials

Science (ACES), the Translational Research Initiative for Cellular Engineering and Printing (TRICEP), and UOW Makerspace have combined forces to provide local protective gear solutions during the global COVID-19 pandemic. Face shields have been produced for the Illawarra Shoalhaven Local Health District (ISLHD) and the team is currently making shields for other health authorities. The group has scaled up production in collaboration with local industry to produce hundreds of the shields per week. Using a customised 3D bioprinter made in Wollongong, the team is also testing capabilities on more sophisticated 3D printing designs, including prototyping components for ventilators such as valves and splitters.

- UOW's team of researchers have generated chemical libraries of hundreds of compounds with drug-like properties that are available for testing against SARS CoV2, the causative organism of COVID-19. We are looking for collaborators who have high throughput assays ready to screen compound libraries against SARS CoV2. If an effective drug to treat COVID-19 emerges from these screens, or by other detection methods, UOW is also well-placed to contribute to production of the compound/s through our synthetic/medicinal chemistry capability and capacity.

- UOW's newly established Molecular Horizons: Centre for Molecular and Life Sciences provides cutting-edge equipment that helps researchers learn more about SARS CoV2. Molecular Horizons brings together researchers who investigate the molecular basis of infectious disease, with the potential to develop new drugs and diagnostic equipment. The facility also boasts one of Australia's most powerful biological electron microscopes that can be used to visualise the molecular components of disease-causing organisms.

- Researchers from UOW's Molecular Horizons and the Illawarra Health and Medical Research Institute (IHMRI) are working with the Illawarra Shoalhaven Health District (ISLHD) to ensure stocks of hand sanitiser are maintained across the region. They have created batches of WHO-recommended hand rub formula for Wollongong Hospital during the critical shortage. Molecular Horizons has the ingredients needed and facilities available to produce hand sanitiser to help protect local healthcare workers and the wider community.

- The SMART Infrastructure Facility at UOW is helping governments better understand and anticipate people's mobility changes during the COVID-19 pandemic in a collaborative research project with Meshed IoT. The study is looking at how various locations respond differently to social distancing and partial confinement, while also providing meaningful insights into the way they might respond to gradual relaxing of the current rules according to various policies and interventions put in place by governments. It allows local government authorities to monitor people's movement at transport hubs, public spaces, community facilities, walking trails, parks and beaches.

- UOW College has partnered with Sydney-based company BAMS Hygiene Management to deliver a course that focuses on hygiene and infection control in the workplace. This training at UOW's South Western Sydney Campus in Liverpool includes the correct use of personal protective equipment. The course is able to be rolled out to other businesses and organisations in South Western Sydney and the Illawarra region to help ensure workplaces are able to prevent the spread of infection among employees.

- The Australian Government, working with the health sector and universities, has created a new, paid Medical Assistant role to ensure medical students can gain the work experience necessary to graduate while also supporting the health sector's response to the COVID-19 pandemic. Almost all of the eligible students in the UOW Graduate Medicine course expressed an interest in the Assistant in Medicine role. UOW's medical school Graduate Medicine (GM) was established in 2007 with a core focus on training doctors with the capacity and desire to work in regional, rural and remote communities. Operating from two campuses – Wollongong (regional) and Nowra in the Shoalhaven (rural), all students at GM undertake a portion of their study in a rural setting and almost 50 per cent of the entire medical program is delivered rurally.

- The COVID-19 crisis is demonstrating the potential of digital health technology to manage public health challenges. Other ongoing work at UOW includes (but is not limited to): Assessing resilience of frontline workers, nurses and teachers during the COVID-19 crisis; Assessing impact of COVID-19 isolation practices or perceived stress levels in parents of young children; Advising on methodology on First Nations engagement around COVID vaccination prioritisation; and Assessing the impact of COVID-19 on residential aged care.

FURTHER INFORMATION

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