



MONASH
University

SUBMISSION TO
AUSTRALIAN
UNIVERSITIES
ACCORD
DISCUSSION PAPER

11 APRIL 2023

Monash University is committed to fostering a society that recognises, respects and includes Indigenous peoples, cultures and knowledge.

Monash is committed to supporting and contributing to The Uluru Statement from the Heart process for a First Nations Voice to the Commonwealth Parliament of Australia and Treaty discussions in the state of Victoria and the Yoo-rrook Justice Commission.

1. INTRODUCTION

Monash University is a member of Universities Australia and the Group of Eight. We have contributed to the proposals and recommendations contained in their submissions, and endorse their intent.

We also note the still-relevant findings and recommendations of the 2018 Monash Commission into post-secondary education¹.

Our own contribution is based upon our experience and expertise as a large, diverse, research-intensive university, with a network of global campuses in Australia, Indonesia, Malaysia, China, India and Italy and supported by Monash College as a pathway provider.

We welcome further engagement on any of the issues and proposals outlined below.

2. THE MONASH COMMISSION INTO POST-COMPULSORY EDUCATION

The 2018 Monash Commission identified five challenges facing tertiary education in Australia, which remain today:

1. The system needs a unified and overarching direction.
2. Structural impediments to wider participation need to be removed.
3. The system needs to become more flexible, permeable and agile.
4. The system must have capacity to respond to societal disruption.
5. The system needs a transformed funding model.

After exploring these challenges, including the commissioning of various expert papers², the Commission made three recommendations for system renewal, which we endorse:

1. Establish a statutory agency for post-compulsory education and training.
2. Introduce a universal learning entitlement and a lifetime learning account.
3. Design a coherent, sustainable model of financing public providers.

¹ <https://commission.monash.edu/2019/05/03/1374780/report-of-the-2018-monash-commission>

² <https://commission.monash.edu/@the-discussion/2018/10/19/1362822/designing-for-the-future-working-group-resources>

3. NATIONAL CHALLENGES AND PRINCIPLES FOR RESETTING AUSTRALIA'S HIGHER EDUCATION SYSTEM AND CREATING A TERTIARY EDUCATION SYSTEM

The Monash University Strategy, *Impact 2030*, is framed around responses to three global challenges:

- Climate changes now being generated and experienced threaten the fabric of our planet, the quality of air, water and biodiversity that sustains us. From its adverse consequences unchecked come natural disasters, issues of food and energy security, deteriorating planetary health for our human populations, disruption of habitats, and forced migrations of all living species. The impact of rising carbon emissions affects government policies, national and international, the shape of industry, locally and globally, and the way we work and live.
- Disruption is occurring to established institutional orders across and within nations. In the 21st century we are witnessing mechanisms for international security being undermined; some conflicts and their consequences for national, ethnic and religious groups become seemingly intractable; digital disruption felt within and across borders; and trust in institutions and processes, which once bound people across nations, seemingly being eroded. The impacts of colonisation on Indigenous peoples, of slavery and indentured labour, and its modern forms in the Indo-Pacific and across the world, highlight the continuing inequalities within nations, and the other global forms of insecurity that extend across borders.
- Thriving communities hold the promise of the 'good life' we seek. This is the challenge of how we live well, and how we live well together. There are medical and health issues about the individual, family and population burden of disease, but also systemic social issues of inequality and disadvantage, intolerance, discrimination and violence requiring understanding and solution. Ways of preventing or managing both communicable and non-communicable diseases that are global in their reach and impact require effective national and global action. Equally, the challenge of building cohesive and tolerant societies that support the ability of their populations to access adequate shelter, sustenance and education remain key to the success of nation states, and to addressing global disruptions and inequalities.

These global challenges require analysis, solutions and action through and with governments, industry and community to be addressed successfully. They also require research and innovation, education and development of new capabilities, and engagement of our universities and other tertiary education institutions. In order to navigate global challenges and build the prosperity, security and future of our nation, it is necessary to ensure policy settings that enable the effective contribution of a high quality tertiary education system.

A set of clear goals across commonwealth and state jurisdictions is necessary to gain the benefits of a seamless tertiary education system, not only intersecting sectors of higher and vocational education. This includes agreement on where accountability for particular functions will rest, whether that is financial accounts or reports on workplace or gender equity, so that there is limited duplication. A tertiary education system will assist with providing the pathways that support increased access for underrepresented groups and increased educational attainment of rate capabilities, skills and innovation needed for the future.

In this submission, we focus on the key role of Australian universities in research and innovation and the education and development of new capabilities through undergraduate and postgraduate qualifications.

Two underpinning features of universities need to be supported in order to ensure world class research and continuing innovation in research and education.

1. The role of universities

The core purpose of higher education is the creation and transmission of knowledge through research, education and engagement. To advance knowledge through discovery and innovation, Australian universities must operate successfully in a global context and contribute globally.

The Australian Universities Accord should ensure this role of universities is clear in any federal legislative change, including settings of a tertiary education commission or other relevant oversight agencies, committees or major funding schemes. There should be reference to and cognisance taken of international standards of excellence in research and education in the design of tertiary education, to ensure connection to global knowledge systems, not only to national priorities and requirements.

2. Institutional autonomy and diversity

Tertiary education institutions are complex. Universities, particularly as public institutions within the broader set of tertiary education institutions, are, as described above, committed to a core purpose but may and should have diverse missions, which are tailored to their own strengths, locations and founding legislative principles.

Australian universities have a long history of institutional autonomy with a focus in regulation and accountability on quality and outcomes over process. These principles have been enshrined in the 'TEQSA' legislation and should be understood to have relevance for other legislation and instruments that might emanate from Accord recommendations. These principles include:

- A risk management approach to minimise regulation and maximise guidance for improved effectiveness and efficiency.
- Policy settings that encourage collaboration and cooperation to guide best practice.

To support autonomy and achieve greater institutional diversity, the Accord needs to give attention to sustainable funding:

- Long-term funds to support education and research infrastructure are important to ensure significant investment in and renewal of key infrastructure in our tertiary education system. A federal Accord should consider public education infrastructure in universities and technical and further education to maximise effective renewal and use. Research infrastructure is a significant national matter which we address in section 4.3.1.
- The 2018 Monash Commission recommended "an Innovation Fund to foster institutional innovation, diversity and continuous renewal in post-compulsory education and training. Such a fund would encourage the emergence of new providers and assist existing providers to refocus their missions and course offerings."³

³ https://www.monash.edu/_data/assets/pdf_file/0010/1762507/19P-0131-The-Monash-Commission-24p-final.pdf
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- Education and research funding should not be combined, but should be considered and allocated separately to recognise their differing priorities and needs.
- Education and research funding needs an element of block or maintenance funding to underpin national capability, alongside annual funding allocations that vary with the demands and priorities of the time.

4. KEY ISSUES

4.1 MEETING AUSTRALIA'S KNOWLEDGE AND SKILLS NEEDS, NOW AND IN THE FUTURE

4.1.1 75 per cent tertiary education attainment⁴

In the future our nation will demand more, not less, tertiary education than we currently provide. This demand will include:

- Education to meet the complex knowledge and technical requirements of the organisations, industries and services that will comprise our economy
- Retraining as occupational and professional requirements and industry and sector mix changes
- Support for civic and cultural engagement of our longer-lived and increasingly diverse population,
- Capacity to generate new knowledge and discover more about our world, and
- Translation of the research and findings generated for better practice, services and products and the enlightened development of our society and economy.

The 2019-2023 National School Reform Agreement set a target of 90 per cent Year 12 or equivalent completion by 2020. The 2021 Census reports that 81 per cent of 20-34 year olds had completed Year 12⁵, and 69 per cent of 25-39 year olds had completed a non-school qualification⁶.

To meet the new demands, Australia needs to set ambitious tertiary attainment targets. We recommend 75 per cent as the attainment target of post-Year 12 or equivalent qualifications for the Australian resident population aged 25-39 years by 2040.

There are 195 higher education providers. According to the Higher Education Statistics Collection, 1.6m students are enrolled in higher education annually, 73 per cent domestic and 27 per cent international.

⁴ For a fuller discussion, refer to "Responding to The Australian Universities Accord challenge", Professor Margaret Gardner AC, in Monash Lens, 11/4/2023: <https://lens.monash.edu/@education/2023/04/11/1385663/responding-to-the-australian-universities-accord-challenge-margaret-gardner-ac-monash-university>

⁵ Source: <https://www.abs.gov.au/statistics/people/education/education-and-training-census/2021>

⁶ Note: Non-school and post-Year 12 or equivalent are not the same. Non-school includes Certificates I,II,III,IV whereas post-year 12 or equivalent excludes Certificates I, II

And around 90 per cent of those students are enrolled in the 43 registered universities (37 of which are public)⁷.

In vocational education, there are more than 4,000 providers and the majority are private companies or organisations. The vast majority of students, particularly those in longer and more complex qualifications such as diplomas, are enrolled in public technical and further education institutions (TAFEs).

The major accountabilities for the funding of tertiary education are with the Commonwealth government for universities and for TAFEs with State governments (although 40 per cent of vocational education funding is from the Commonwealth government).

The basis on which public funding is distributed to higher and vocational education is different and, apart from some overlap in relation to income contingent loans, essentially similar levels of educational qualification, such as diplomas, are treated entirely differently for funding purposes depending on the type of institution in which they are offered. Their relative autonomy in relation to the design and delivery of educational qualifications is also markedly different. Both these factors constitute barriers to movement from a vocational qualification to a higher education qualification and therefore to the pathways that are sought as a means of facilitating access across tertiary education.

One challenge to reaching the 75 per cent attainment target, therefore, is ‘harmonisation’ of funding across higher and vocational education, by addressing disincentives to movement between sectors and anchoring longer cycle vocational qualifications in the more stable institutional funding regimes that have characterised higher education.

The other challenge is ensuring greater diversity, by having different types of institutions to meet the differing circumstances of individuals and communities, providing diversity of experience and opportunity. We need to create a means to support experimentation with a larger tapestry of institutional types, to provide dispersed benefits to community, as well as concentrated expertise and infrastructure to drive enhanced knowledge, innovation and practice. (as referenced in the section 3 above).

The attainment target should be the same for students whether they are from underrepresented groups or not. The goals for access and opportunity (which are addressed in section 5.2) should be concentrated on funding to support access, including lifelong learning entitlement and removal of barriers to and facilitation of pathways to movement between vocational and higher education.

We recommend:

- A 75% target be set for attainment of post-Year 12 or equivalent qualifications by 2040, to apply to the entire Australian resident population aged 25-39 years, including currently underrepresented groups, to be achieved by 2040. This will require:
 - institutional funding that supports quality and equitable access for the Australian population across vocational and higher education, and
 - diversifying institutional settings to meet different circumstances of individuals and communities, and to provide diversity of experience and opportunity.

⁷ Source: Source: <https://www.education.gov.au/higher-education-statistics/resources/2021-student-summary-tables>

4.1.2 Accredited simulation environments for tertiary students

This proposal focuses on health workforce needs, but there should also be significant benefits for other disciplines, such as education and engineering, as well as more broadly across other professional degrees and qualifications.

Current medical and health workforce shortages are recognised by state and federal governments, yet addressing these shortages is difficult because responsibility for education is shared. The Federal Government controls the higher education workforce supply levers, such as the number of commonwealth supported places, and state governments fund and operate the public hospitals and largely through this means determine the number of clinical training placements. At the same time, professional accreditation bodies set thresholds for internship/placement hours to ensure quality outcomes that can act as a barrier to increasing the number of relevant professionals because of the constraints of hospital placement programs.

Simulation-based learning offers opportunities to practise complex skills and to implement different ways to facilitate effective learning. Below are a set of current examples where simulations have been developed and introduced to provide high quality educational outcomes.

The Monash Faculty of Pharmacy and Pharmaceutical Sciences designed the MyDispense simulation to serve local educational needs. It has now been shared at no cost with 210 schools of pharmacy across 41 countries. To date more than 41,000 students have logged in over 560,000 times to complete over 1,500,000 exercises.

The Adelaide Health Simulation (AHS) helps students to prepare for high risk, low frequency situations. The education, training and assessment centre is located in the BioMed City precinct, alongside the Royal Adelaide Hospital, the South Australian Health and Medical Research Institute and the University of Adelaide's medical and nursing school and is linked to an additional facility in the city's East End with a combined capacity of 36 simulation rooms.

Monash Nursing and Midwifery uses simulation across all programs, including in preparing undergraduate nurses to break bad news to patients / families, in management of delirium (with simulated patients), for development of communication and teamwork skills, recognition of deteriorating patient outcomes in undergraduate and postgraduate studies, and clinical decision making.

At Bond University simulation activities are being used to rigorously review healthcare team and system performance, and then help design and test improvements, in trauma, cardiac care, emergency medicine, operating theatres and most recently in reshaping patient care for COVID-19. This technology has led to the new profession of simulated participant, who is a staff member who portrays a patient, family member or client to meet the objectives of the simulation.

The opening of the Victorian Heart Hospital on Monash's Clayton campus has enabled teaching across clinical disciplines in purpose-built low fidelity simulation suites (a 4-bed ward), supported with a SimMan®, located in the teaching spaces, and can be utilised by students, as well as Monash Health educators, for upskilling and cross training, and has the potential to reduce clinical placement hours.

The traditional labour intensive internship/placement models are unable to deliver the workforce growth necessary to meet increased demand and overcome system-wide skills shortages. Securing quality

industry internships that provide diverse experiences for students is challenging to achieve at scale and becomes more difficult as shortages of health professionals to supervise students are experienced in our industry partners.

There is both need and opportunity to improve the quality of the student experience in contemporary education practice, by providing a broader range of scenarios that cover the full scope of healthcare delivery, including team-based care.

Simulation and simulation-based education (SBE) is not new, but is not yet as prevalent as it should be despite decades of experience and research. A coordinated commitment and investment in infrastructure and educators to accommodate growth in student placements. We propose professional accreditation bodies, state and territory governments and universities partner on the development of high-capacity simulation frameworks and facilities to provide real-world training and embedded experiences at a scale that can service whole of industry needs for the health workforce, but also for areas of engineering and school education.⁸

These simulation facilities could be hosted in one location or campus and shared with others to become part of shared national teaching and learning infrastructure. In-person internships and placements provide opportunities for graduates to form networks in their desired fields and so simulations should support rather than completely replace in-person placements. They can also be a resource for emerging practices or dangerous settings. For example, during Covid Monash initiated a virtual reality simulation to support healthcare workers across Victorian aged care settings to practise safe infection prevention and control measures.

The use of simulation facilities to provide workplace experience introduces the possibility of different forms of assessment rather than ‘time served’ (as in clinical placement hours). This has potential for greater quality assurance and consistency of graduate outcomes in terms of workplace preparedness.

We recommend:

- A partnership between government, industry and higher education institutions to develop industry-accredited and scalable simulation environments to train future workforces, adaptable to future needs.

4.2 DELIVERING NEW KNOWLEDGE, INNOVATION AND CAPABILITY

Discovery and curiosity-driven research is the cornerstone of knowledge development, enabling translation for the betterment of society and the planet.

Australia’s low level of economic complexity is a risk to future prosperity and our current reliance on resources industries is our greatest vulnerability as we navigate the current data and digital revolution and requirements for sovereign capability. University education and research is the basis for shifting the

⁸ Lead researcher Dr Julie Cohen says latest study findings ([Cohen & Wong, 2021](#)) suggest the use of classroom simulators can support pre-service teachers to provide equitable and effective teaching from day one. The research uses simulations that are administered through a mixed-reality platform which features a virtual classroom with student avatars, paired with live coaching and feedback from the research team. Each avatar is controlled by professional actors that are trained by the researchers in realistic classroom interactions.

balance towards knowledge industries and reaping the benefits of AI, data science and automation, as well as new areas of product and services development.

Monash spends some \$1.1b on research annually, of which approximately \$500m is funded internally by the University. This University investment is derived from surpluses from other areas of activity and is vulnerable to external shocks to other areas of University revenue.

4.2.1 Research Infrastructure

Research infrastructure is an essential underpinning for the research excellence which drives innovation and societal advancement.

Research infrastructure refers to the essential physical or virtual assets, services, and expertise that are made available through organisational structures to facilitate excellent research and promote innovation. These infrastructures may take the form of major scientific equipment, grouped instrumentation, collections, archives, scientific data, digital services, computing systems and communication networks, and research-focussed social infrastructure. Such infrastructures play a crucial role in enhancing the quality of research and enabling the research community to address complex challenges by providing the necessary tools and resources to carry out cutting-edge research. They offer a platform for collaboration and knowledge-sharing and are instrumental in driving scientific advancements and progress.

Increasingly, research infrastructure is viewed as a shared national resource given the scale, the lengthy operating horizons, and the significant costs involved. This shared national resource comprises three critical elements:

1. The infrastructure itself, e.g., equipment, software, databases.
2. The enablers of the infrastructure, e.g., buildings, maintenance, technical experts to operate.
3. The organisational structures that provide visibility of and access to the infrastructure itself, e.g. facility or research platform structures, iLab booking systems, equipment finders like Arin (<https://www.arin.org.au/>).

Collectively, these require a mature national framework that adopts a financial and economic lifecycle approach and which addresses development, operations and end-of-service stages to realise an underlying research infrastructure portfolio at a national level. It must be built on transparency with major stakeholders to inform decision making around development, planning and operations of new and existing capabilities.

Australia is well positioned by having the National Collaborative Infrastructure Investment Strategy (NCRIS) to guide the development and funding of national-scale infrastructure. Outside NCRIS, are two other significant sources of public funds for infrastructure - the Linkage Infrastructure Equipment and Facilities scheme administered by the ARC and the MRFF National Critical Research Infrastructure Program for medical infrastructure. There are also public programs for bespoke infrastructure, for example, via the Australian Antarctic Division.

What is lacking is an overarching strategy to ensure efficient allocation of these funds for provision of national infrastructure aligned to national goals. There is poor connectivity and little visibility around large investments, especially within NCRIS. Information about the nature and scale of investments

across successful projects including co-investments and outcomes is captured at commonwealth level but not published, making it difficult for institutions and jurisdictions to develop their own strategies. This leads to major inefficiencies at both macro and micro levels of decision making and resource allocation. Further, the NCRIS requirement to secure co-contributions from state governments constitutes a barrier to access for some institutions and projects, as it necessitates an alignment of political agendas outside the expertly assessed needs for the underlying research infrastructure proposed.

The result is that individual institutions and/or NCRIS projects are responsible for assembling the funding for critical national infrastructure. The tail is wagging the dog. This segmentation and inadequacy of funding, and the absence of clear and consistent alignment to national priorities introduces significant risk to the research agenda and outcomes for Australia.

Concurrently, the increased emphasis on industry-focussed research and engagement, is creating a need for expansion of national research infrastructure capabilities across Australia. As research infrastructure enables a pipeline for innovation, adversely affecting core capabilities required for fundamental research will have major downstream effects on the quality and quantity of the applied research being conducted. While it is noted that the MRFF Critical Infrastructure scheme is a pilot to support the transition of the medical community towards the translation space, without similar additional investment at national and regional levels into relevant research infrastructure across other areas, Australia's current innovation system will be unbalanced and not necessarily aligned to national priorities.

Monash Research Infrastructure

Since the establishment of Monash Technology Research Platforms strategy in 2011, Monash has developed a progressive network of 25 research platforms which provide open access for researchers within and beyond the University and industry partners to critical capabilities across Advanced Manufacturing, Digital Technologies, Energy, Health, Medical Devices and Biotech.

These platforms underpin more than \$950 million in research across Monash alone, encouraging cross-disciplinary research collaborations, supporting technology transfer by attracting industry research partners and helping to attract and retain global talent.

The Research Platforms are openly accessible and operate at best practice underpinned by a mature quality management system (ISO 9001 certification) to enable world-class research and industry engagement.

Annually, Monash Research Platforms provide access to state-of-the-art facilities for more than 2,000 researchers and over the past five years, Research Platforms have supported almost 5,000 researchers from Monash, and international collaborators, external academic organisations and industry partners.

2022 snapshot

Access to research platforms (equipment and services) by 739 chief investigators and 2,477 users in 2022.

- Monash's infrastructure within research platforms comprises 310 items, booked by 1,760 researchers for 190.5k hours for their research activities
- In addition to direct equipment access, research platforms provide 908 distinct research services. A total of 54.4k services were delivered for 1921 researchers.

Total active research awards supported by research platforms in 2022 was \$951m, of which 67% was Category 1 funding and 33% was spread across Categories 2, 3 and 4.

Australia is approaching a crisis point in the stock of infrastructure. As an example, 50% of Monash's core research infrastructure is approaching end of life in the next five years. An average of \$20m annually is required to update/renew the infrastructure to ensure existing capacity is maintained. By way of perspective, the LIEF scheme allocates \$30m annually across Australia - and only for new cutting edge equipment. This issue is pervasive across all major research universities in Australia. Enabling core research equipment to be funded through a newly coordinated, lifecycle-based approach is critical to overcoming this challenge.

Importantly, there are many opportunities to achieve greater returns to Australia from the investments in research infrastructure made. And in an environment where universities have been subsidising an increasing amount of their research from other revenue sources, there is an urgent need for dedicated and predictable resourcing of critical national research infrastructure, which includes both capital and operational expenses.

A highly successful example of a research infrastructure national facility, provided through NCRIS, has been the Melbourne Centre for Nanofabrication (MCN). The MCN was established as part of the Australian NanoFabrication Facility (ANFF) - one of the 24 NCRIS projects - as a joint-venture between six Victorian Universities (Monash University, University of Melbourne, La Trobe University, Swinburne University, RMIT and Deakin University), and CSIRO. Opened in 2011, it has attracted over \$100m of investment from NCRIS, the Victorian Government and its joint venture partners to support its ongoing operations and equipment. It has delivered over \$300M of research projects and provided access to thousands of users across academia and industry every year. This case study highlights the importance of suitable collaborative structures through which to deliver research infrastructure sustainably at a national level. We note that despite its success there are significant end-of-life challenges to the equipment in this facility and without replacement funding the MCN's future is uncertain.

The establishment and further development of the Australian Synchrotron is another model of shared infrastructure.

2001 - Victorian Government committed to funding the synchrotron machine and building to house the facility on land adjacent to Monash University. The University of Melbourne, Monash University, Australian Nuclear Science and Technology Organisation (ANSTO) and CSIRO each provided \$5 million towards nine initial beamlines.

2007 - Synchrotron is officially opened. The Commonwealth and Victorian Government then agreed to each provide \$50 million in operating funds for the period to 2011-12.

2012 – 2016 - federal government contributed a further \$69m and the Victorian government \$26m in operational funding.

2012 - Led by Monash University, the Special Research Initiative (SRI) in Synchrotron Science funded in excess of \$30 million in funding over four years from the Australian Research Council and the National Health and Medical Research Council. Additionally, more than 30 Australian universities committed a combined \$25 million in operational funding.

2016 - the Victorian Government transferred a controlling ownership stake to the Australian Nuclear Science and Technology Organisation (ANSTO) and the Australian Government

allocated \$520 million over 10 years under the National Innovation and Science Agenda, to ensure the ongoing operation of the Synchrotron

The state of national data and digital infrastructure is particularly precarious. These forms of infrastructure have a much shorter lifecycle (only 5 years) because of rapid capability advances, as needs and applications are growing exponentially. The digital revolution is making headway within the research and innovation sector. The continuing advances in instrumentation, such as lightsheet microscopy to give real time 3D optical imaging of biological processes, as well as the increasing complexity of the problems the world is facing, i.e. climate change, is causing an influx in demand for computation, data storage and access to digital services, such secure data environments, AI services and digital imaging processing.

Three NCRIS projects are aligned in this space - PAWSEY and NCI, which offer national supercomputing and priority access to its paying partners, and the Australian Research Data Commons (ARDC) whose focus is on enabling digital research infrastructure that provides Australian research with a competitive advantage through data. The disparate nature of the connection between these projects themselves, but also all other NCRIS projects, which should be enabled by their computational and digital service capabilities, is seen as a challenge that is only escalating given the growth trends. These same challenges face individual universities, who are trying to manage expenditure increases arising from increasing hardware costs since COVID-19 and the concurrently increasing presence of digital research.

There is great need and opportunity to establish a collective and authoritative national-benefit approach to the funding, provision and distribution of the research infrastructure that drives research productivity.

We recommend:

- An agency be charged with leadership of national lifecycle strategy for investment in national infrastructure, with responsibility for overarching strategy to ensure efficient allocation of these funds for provision of national resources aligned to national goals.
- The legislation of NCRIS as an enduring national program.
- Publication of data about infrastructure investments, use and outcomes to improve national and institutional decision making.
- An increase in the national allocation of funds for infrastructure development, acquisition, operation and maintenance, particularly for core equipment/facilities and also research infrastructure for research focussed on industry needs.
- An integrated national digital research program to support underlying digital research infrastructure access.

4.2.2 Research Enterprise

There is a distinction between the research that universities undertake and the innovation that industries seek. Research is the pursuit and creation of knowledge, whereas innovation is how industry seeks to create new and added value for their business and is generally linked to commercial outcomes.

The research environment has changed considerably over the last 20 years and universities are increasingly self-funding research, undertaking more translational research and spreading their expertise across a greater stretch of the innovation value chain. This shift is generating wealth and prosperity for industry, government and community and should be acknowledged and appropriately accounted for in public policy.

Enterprising research is critical to the productivity capacity of our economy and to deliver the advances for population wellbeing and closing the gap on inequitable life outcomes. The full rewards of university research include broadening the innovation sector in Australia, job creation, infrastructure development, health provision, quality and sustainability of natural systems, and solutions to health and wellbeing challenges to lift the whole population.

As a university, Monash's role is to teach the next generation and expand the boundaries of human knowledge, but over the last two decades this traditional role has expanded as the University has become highly active in the innovation ecosystem. When the expansion of knowledge provides an opportunity to change the way people go about their lives in a positive way, it is important that the University facilitates adoption of discoveries.

The commercial risks are acknowledged and businesses are supported to manage this risk through the taxation system, specifically the Research and Development Tax Incentive (RDTI). Universities and other publicly funded research organisations don't pay income tax, so are not eligible to offset their increasingly-self funded investments in R&D through the RDTI for research they undertake.

The university pipeline from discovery to translation needs a supportive environment. In many cases universities are, in effect, the business partner for their own basic research, contributing both to knowledge formation and value creation. This involves significant levels of financial commitment, capability and expertise, not only in the development but also in the management of IP such as the cost of filing, managing and prosecuting patents, which must be carried for many years before they are revenue generating.

Translation is an extension of fundamental research. Third stream funding is required to support the development of this research through support for translation activities including access to proof of concept and prototyping funding. This part of the chain is extremely risky and at present universities are funding it themselves through their own limited pre-seed funds, or having to shelve projects that have great potential. The establishment of a systematic co-contribution model, consistent over time, would activate the section of the innovation pipeline to accelerate domestic commercialisation of domestic research to achieve the national objective for a modern industrial sector that is recognised globally.

Monash Innovation

Since the establishment of Monash Innovation in 2015, Monash's team of commercialisation, IP and new venture professionals have invested both in-kind services (IP management, spinout construction, shareholder and subscription agreement development etc) and cash (pre-seed funding) to advance the translation and ultimately the adoption of novel technologies, facilitating the transition of projects from internally funded to self generating organisations.

In the last five years this has generated 561 invention disclosures, 213 new patent families and 26 new companies based on Monash IP.

Monash University's present annual investment in new ventures includes \$1.5m in patents, \$500k in proof of concept funding, \$3m in organisational infrastructure and \$2m of direct investment as a cash investor into new spinouts. This financial and organisational commitment is continuing to expand significantly on top of the estimated \$500m spent (from the University's revenue) on research before translation.

In 2022 alone, new and existing spinouts raised \$200m from external investors. Typically new companies spun out of Monash raise \$1-3m in the first three years, and anywhere from \$10-\$30m in the following two years.

As an example, Jupiter Ionics was formed in 2023. It aims to revolutionise the \$70b global ammonia market with patented modular technology which produces green ammonia from renewable energy.

Once the method of producing green ammonia had been formed through research led by Professor Doug MacFarlane, Monash's New Ventures Team joined the project. Over a two year pre-launch phase, Monash invested in-kind contributions of \$1m. This involved access to research infrastructure to advance the technology, the registration of five patent families, the provision of proof of concept funding, the establishment and structuring of a company and hiring a potential CEO to prepare the business case for investment. This enabled Jupiter Ionics to raise \$3m in a Seed investment round, including \$500k cash investment from Monash. With partners Fortescue Futures and Wesfarmers, Jupiter Ionics has also won a CRC-P grant of \$2.65m, with significant contributions from its industry partners and an ARC Linkage Grant, bringing research back to Monash and generating further possibilities for industrial and technological transformation.

The function of universities in translating their own research (in parallel with attracting business partnerships) is not adequately recognised in current policy settings, which seek to bridge the gap between university (research) and industry (commercialisation).

There is growing understanding across government and industry that if universities don't engage in knowledge production there won't be an innovation pathway. Universities committed to transformational research at scale have been successful, adopting global best practice approaches that build in-house capability in commercialisation alongside strong connections to local, national and global ecosystems that lead further growth and success in research translation. Once recognised, research enterprise needs to be resourced and provided incentives appropriately.

The Accord is an opportunity to acknowledge this development, and to recommend investments that match the timeframes to build a robust knowledge economy and to match government ambitions for growth in industrial capabilities as part of a stronger, modern, diversified and resilient economy.

Not only is it a sound financial investment in future prosperity and wellbeing, the consequences of sustained underinvestment are real and profound - continued reliance on the resources sector for wealth, reduction in international competitiveness, job losses, increased household financial stress, and poorer health outcomes.

The RDTI is the single biggest Commonwealth funded research program, but it is targeted at a stage of R&D that represents only about 5% of the discovery-translation value chain, the development end

rather than the research end. In 2021-22, the RDTI dwarfed all other publicly funded research programs, with its \$2.4b accounting for 25% of the total commonwealth government expenditure on research and development.

There needs to be proportionate mechanisms at earlier links in the innovation chain. Programs such as Trailblazer have the potential to support the R&D system but need to be carefully targeted, staged and implemented. Big initiatives need time to develop rather than being hastily deployed. Many schemes span 3-5 years, which is shorter than the average timeframe from discovery to translation. A good model is the Higher Education Innovation Funding (HEIF) scheme in the UK, established to support knowledge exchange from universities to the wider world of business, community and third sector organisations. HEIF represented a long term commitment that endured beyond changes of government to transform university-generated innovation and commercialisation.

Global ecosystems are key to outcomes. Larger scale collaborative programs will have the biggest impact. That collaboration might be Australia wide, but more likely to reach outside Australia, regionally and internationally.

Research intensive and enterprise enabled Australian universities have the potential to engage more meaningfully with international corporations, which see Australia as the gateway to Asia. Multinational enterprises (MNEs) gravitate to systems characterised by a business-friendly regulatory environment, appropriate talent pools and infrastructure. Governments and universities can partner to attract targeted MNEs to elevate local activity and build new generative industrial ecosystems. The partnership between the Commonwealth Government, mRNA Victoria and Monash University to attract Moderna to Monash's Clayton campus is a successful example of such a strategy.

The resultant activity areas generate more jobs, deepen local supply chains and give rise to greater demand for research/education collaborations.

Monash Technology Precinct

The Monash Technology Precinct and surrounding National Employment and Innovation Cluster is the largest hub for employment and innovation in Victoria outside Melbourne's Central Business District. Prior to the COVID pandemic the cluster contributed nearly \$10 billion to the economy and supported 13,000 businesses and 95,000 jobs. It also represents a significant concentration of Victoria's knowledge-based industries, particularly in the fields of health, advanced manufacturing, future technologies and education. The Cluster is the front-door to Victoria's high-value and advanced manufacturing belt.

As the innovative epicentre of the cluster, the Monash Technology Precinct is home to an integrated network of world leading researchers and research infrastructure including over 35 Monash Technology Research Platforms (all ISO9001 certified to meet industry requirements), the Woodside Innovation Centre, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Victorian Hydrogen Hub, the Swinburne-CSIRO National Industry 4.0 Testlab for Composite Additive Manufacturing, the Melbourne Centre for Nanofabrication, the Australian Synchrotron, Monash Health, the Monash Medical Trials Centre, the Victorian Heart Hospital, the Victorian Health and Innovation Centre, the Medical Medicines Manufacturing Innovation Centre and Monash Biomedical Imaging.

The Precinct also hosts some of Melbourne's most significant and global businesses. This includes ABB, Agilent, Bosch Australia, Johnson and Johnson, Lockheed Martin, Moderna, Moog, Pfizer, PPG, Telstra Global Operations Centre, Textron and automotive manufacturers. Many of them have in-house R&D capabilities or work with universities. In addition, the Precinct is home to a sizeable and expanding startup ecosystem that has produced ASX listed companies, including Amaero International Ltd.

The Precinct builds overall productive capacity by layering education, research training, research and translation. The Precinct's mix of integrated health and engineering infrastructure, research platforms and digital capability enables industry to work alongside researchers to create an unrivalled ecosystem for innovation and investment. This is supported by the access to a pool of graduates across Australia and Asia-Pacific, leveraging Monash University's global campus network, as well as some of the world's leading educators in health, medicine, science, technology and engineering.

Collaboration in the Precinct is underpinned by the Monash Precinct Network, a newly established not-for-profit multi-partner initiative that drives better connections and engagement between industry, education, research, government and supply chains both locally and globally and accelerates initiatives and innovation pathways in the Precinct and wider Southeast Melbourne region.

We recommend:

- Recognition of the fundamental role of university research to lift Australia's innovation capacity by smoothing the discovery to innovation pipeline with regulatory and financial support commensurate with significance and opportunity. This requires long-term (10 year) consistency in policy and programs.
- Establishment of consistent, systematic third stream funding, via a co-investment model to match the risk undertaken by universities in preparing research for investment and partnering. It could be performance based or allocated according to innovation and capability opportunities.
- Governments and universities partner on strategic enterprise development through the creation of an innovation and business environment that attracts MNEs to establish comprehensive operations in Australia thus creating a self-generating ecosystem.

5. OTHER ISSUES IN BRIEF

5.1 Meeting Australia's knowledge and skills needs, now and in the future

Job Ready Graduates. The Job Ready Graduates package was insufficiently considered and has failed to produce its desired public policy outcomes, as well as creating a set of perverse incentives that are contrary to meeting workforce needs and supporting equitable outcomes. It should be redeveloped entirely, with a title that reflects the multiple purposes of higher education, while retaining the flexibility of CSP allocation across fields of education and course levels.

Education quantum should relate to notional places and be indexed to a combination of population growth and attainment targets. And student contributions should be reshaped to reduce the major variations in the level of contribution demanded of students by field of study. There should be a goal to move towards equalisation of student contributions.

International education and graduate workforce. The quality of Australia's university system, and its leadership in international education, creates opportunities for increased educational delivery within and outside Australia. This includes teaching by Australian universities at campuses in other nations, as well as articulation arrangements where students undertake part of their studies in their home country and then complete an award at an Australian institution. These innovations enhance the sector's ability to build skills development in our region, and help foster stronger cultural and diplomatic ties. Such innovation could be strongly supported by considering the incentives in the post-study work rights of all graduates of Australian universities regardless of the country in which the student completes their studies.

5.2 Access and opportunity

Lifelong learning entitlement. We support the recommendation made by the Monash Commission in 2018 and by Universities Australia for an equity-based lifelong learning entitlement through a Lifelong Learning 'Trust' as a means to improve participation opportunities by currently underrepresented groups.

Structural impediments and affordability. The 2018 Monash Commission included a survey of high school principals about tertiary education opportunities for their students.

"The responses supported the view that in rural and remote areas, there is overall less support and diminished opportunity to access post-compulsory education. Transport and accommodation costs for those aspiring to study were commonly cited as obstacles.⁹"

Students facing financial disadvantage could be supported through their study with a Social Services student package. Eligible students of all ages could access existing forms of commonwealth and state assistance including rent, concession and health care cards, and living allowances for rent, utilities/energy, pharmaceuticals, telephone, transport.

The age of independence should be reduced to 18 for students moving from regional, rural and remote regions to enable eligibility for these allowances.

Aspiration. The engagement of universities and other tertiary education providers with schools needs to be supported as a partnership in the development of student aspiration and attainment.

This could be driven from the tertiary admissions centres, which are presently focussed on their role as clearing houses for applications and offers. They could be a greater resource for middle years students, providing information about the diversity of post-secondary education, to inspire aspiration and inform better choices.

Consideration should be given to building the structure within which secondary careers advisors operate, aligning with the post-secondary system so they are better equipped to play a larger role in supporting pathways to and through tertiary education.

⁹ Source: https://www.monash.edu/_data/assets/pdf_file/0010/1762507/19P-0131-The-Monash-Commission-24p-final.pdf p13

5.3 Delivering new knowledge, innovation and capability.

National Research Strategy. To unlock greater potential for achievement of national research priorities, a whole of government research strategy should be developed. It should be comprehensive across agencies, and address the full research continuum in all disciplines, with targets relating to the national public and private expenditure on R&D, and with explicit support for basic research conducted in universities.

Coordination of national competitively funded research schemes. It is appropriate that various public agencies have different goals and drivers for the research they fund in pursuit of national research and innovation ambitions. However, each agency also has different approaches for identity management, definitions, interpretation of principles such as career disruptions, equity principles and so on. This creates additional workload for very little return. Processes should be streamlined and standardised across public funding bodies and should include more consistent reporting requirements. This could be overseen by a central body which also has responsibility for the National Research Strategy.

6. CLOSING

In this submission we have identified several significant opportunities to meet skills, knowledge and innovation challenges for the nation, including:

- Setting a 75% tertiary education attainment target for 25-39 year olds, to be achieved by 2040.
- Developing accredited simulation environments at scale.
- Introducing an enduring scheme to provide national research infrastructure as a shared resource.
- Ensuring sustained and consistent funding for research across the value chain, with matched third-stream funding to develop research for commercialisation.

Australia should have a world class education system. The tertiary education system should bring together vocational and higher education that educates at post-Year 12 or equivalent level. This should be overseen by an independent agency that provides advice to government and the organisations it oversees, monitors the outcome of the system for impact and advancement, oversees quality, and supports dissemination of best practice.

The establishment of a statutory agency for tertiary education and training could address several of the challenges currently faced, including improved flow between higher education and vocational training, and ensuring research and innovation, education and development of new capabilities serves national priorities while remaining cognisant of the position of universities in global knowledge systems. Such an agency would provide a forum for consultation over changes to the system, could smooth transitions and facilitate experimentation and innovation and long-term planning and evaluation of outcomes.

We value the openness with which the government review panel have approached this Accord and appreciate the opportunity to help shape the future contribution of the higher education sector for the wellbeing of current and future generations.