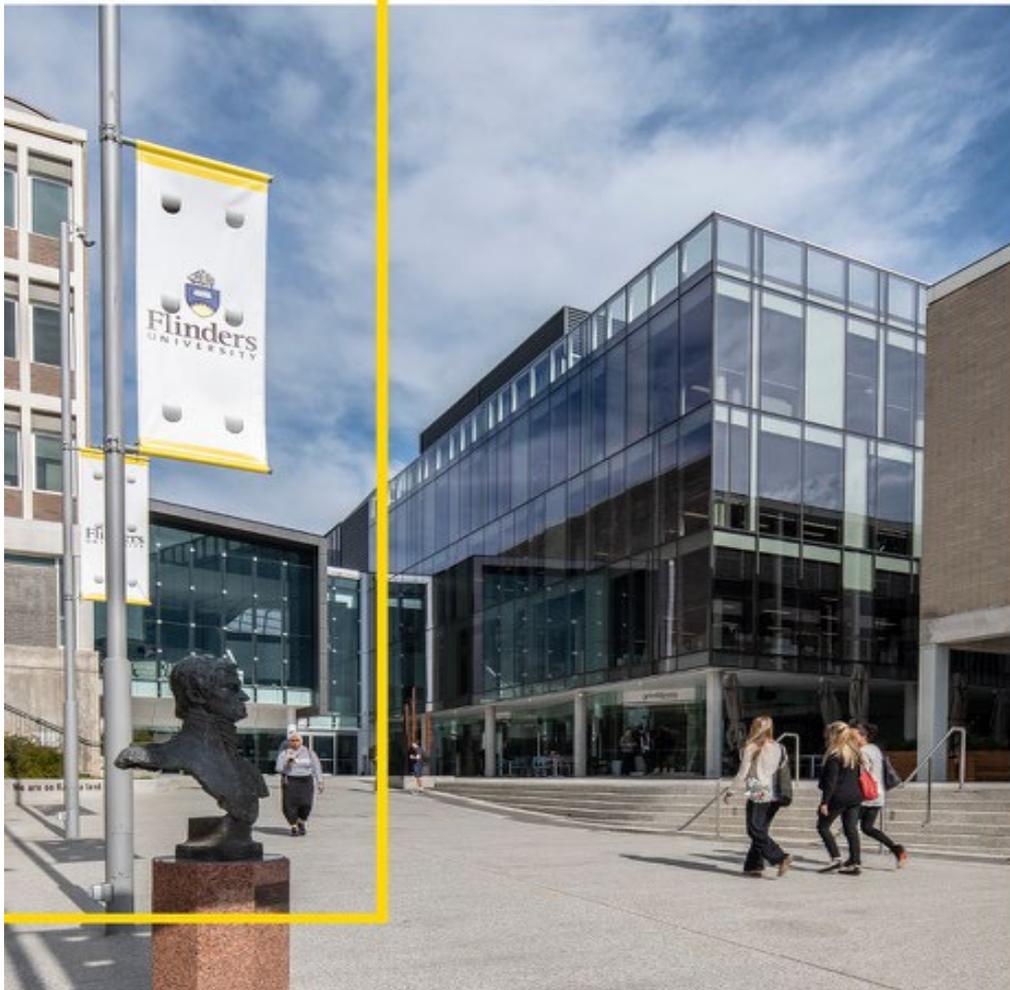


**Flinders University Response to the
South Australia Productivity Commission Research
and Development Inquiry – Issues Paper**

June 2020



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Flinders University – Key recommendations

Flinders University recommends:

1. Increasing South Australian Government funding to support research engagement in growth sectors (e.g. maritime, defence, advanced manufacturing and ageing)
2. Supporting the partnership of the Creative Industries and university to provide experimentation opportunities for screen practitioners to participate in advanced training and engage with a range of academic activity to find new production techniques.
3. The inclusion of research metrics measuring long-term socio-economic, environmental and business outcomes.
4. Effective mechanisms, policy levers and co-investment are put in place to support the interaction of businesses and universities to increase the level of business R&D funding in South Australia.
5. The value of partnering programs (e.g. MDPP) be considered as part of wider efforts to build productive collaborations between industry and universities.
6. South Australian Government Departments have discretionary funds dedicated to R&D research. This could be used for direct research engagement and support for Commonwealth funding opportunities (e.g. ARC Linkages, CRCs, NCRIS, Industrial Transformation Research/Training Centres) that require matched funds in areas of strategic importance for South Australia.
7. The South Australian Government provide incentives for industry linked PhDs including support for full tuition fee waivers. These would work to increase the education of workforce as well as improve and foster linkages between industry and universities for R&D.
8. Government support for industry-based scholarships that seek to ‘answer a problem’. This support would help industry to better understand and integrate research into their business model.
9. To attract world-leaders to South Australia, the salaries of Research Chairs specialising in priority areas be supported by South Australian Government or co-sponsored with industry.
10. The South Australian government should experiment and innovate with the local regulatory environment to try to incentivise the innovation, research commercialisation, and entrepreneurship outcomes it wants to achieve.
11. The establishment of a single SA online portal that lists all available public and private research equipment and infrastructure in the state and provide a facilitation or concierge service to work at the interface of business and universities to make appropriate connections.
12. The South Australian Government commit to a Research Infrastructure Modernisation Fund. This could be accessed for the upkeep and upgrade of equipment. Access to the Fund could be prioritised where activities demonstrate compliance with contractual agreements for industry engagement.
13. The establishment of an Industry Catapult program as part of the Tonsley precinct to develop and embed enduring capabilities for more effective research translation and increased collaboration. Such a program would provide companies and researchers with access to infrastructure and capabilities and reduce impediments to business engaging in innovation and commercialisation processes.
14. Understanding older people as drivers, contributors and consumers of research and supporting opportunities for research and business to engage and apply advanced manufacturing techniques to new assistive technologies.
15. Improvement of the implementation of the open data initiative through more consistent adoption across all State Government agencies and Local Government.
16. The South Australian Government to consider the potential benefit to South Australia of the introduction of a Research and Development Tax Incentive ‘collaboration premium’.

Introduction

Flinders University was founded in 1966 and is based in Adelaide with a significant rural and regional footprint through South Australia and the Northern Territory. Flinders has a history of innovation in research and close engagement with industry and the community. In 2017, Flinders University moved to a six College structure to align associated fields and encourage interdisciplinary research. The updated structure is briefly described in Table 1.

Table 1: Flinders University updated information

<p>Flinders University</p>	<p>Research is undertaken across all areas in the institution’s six Colleges: Medicine and public health; Nursing and Health Sciences; Science and Engineering; Business, Government and Law; Humanities, Arts and Social Sciences; Education, Psychology and Social Work.</p> <p>Areas of research focus and strength are grouped into a number of research Institutes and Centres.</p> <p>Areas of research strength include:</p> <ul style="list-style-type: none"> • Health and Medical research • Nanotechnology • Industry 4.0 research, focusing on digital transformation • Defence-related research, focusing on Defence Science and Technology Group and defence industry collaborative research programs • Archaeology and history, with particular strength in maritime and Indigenous archaeology • Ecology and evolution with a focus on palaeontology • Marine science research • Water research • Medical engineering research • Security and resilience research • Creative Arts research 	<p>The Tonsley precinct houses:</p> <ul style="list-style-type: none"> • The Australian Industrial Transformation Institute undertaking trans-disciplinary industry and workplace research in support of industrial and workplace transformation. • The Institute for Nanoscale Science and Technology a hub of nanotechnology research and education. <p>The precinct is also home to technology-focused health and medical research capability, including the Medical Devices Research Institute, the Medical Device Partnering Program and the Flinders Digital Health Research Centre.</p>
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The Colleges of Medicine and Public Health, and Nursing and Health Sciences contributed significantly to the Inquiry into Health and Medical Research and are not the focus of this response. The four remaining Colleges are the focus of this response and include:

The College of Business, Government and Law (CBGL)

CBGL fosters collaboration and the development of ideas in the areas of transformational and technological change, management in organisations both of people and finances, economic development, financial literacy, criminology, socio-legal studies, law, public administration, electoral politics and engagement, international affairs and security.

The College of Education, Psychology and Social Work (CEPSW)

Through the CEPSW world-class teaching and research, students are equipped with the skill, commitment and vision to protect vulnerable communities and advance human development. It provides a forward thinking,

future focused place to research, study and work, supported by placement opportunities, innovative teaching and industry connected researchers.

The College of Humanities, Arts and Social Sciences (CHASS)

CHASS encompasses teaching and research activities in history and archaeology, social sciences, language, literature and culture, and the creative arts. The College aims to help understand the world and to shape it for the better. This is achieved by offering thoughtful, diverse and challenging opportunities to understand and reshape human activities analytically, imaginatively and creatively.

The College of Science and Engineering (CSE)

CSE harnesses the power of science and engineering to solve real world problems. Researchers seek to discover new understandings in fields as diverse as groundwater hydrology, forensic science and medical devices, while our teaching offers training in areas of biological sciences, chemical and physical sciences, computer science, information technology, engineering, mathematics and the environment.

Summary of information requests

Information request 5.1

The Commission seeks further information on:

- *What are the sources of value created by R&D?*
- *What definitions and data could be used for measurement of inputs, outputs, productivity and impacts of R&D?*
- *Where and who use these measures?*
- *What are the limitations of these measures?*
- *Does the current R&D funding model allocate funding to areas which have the greatest benefits?*
- *How aligned are South Australia's research strengths with existing and future opportunities for growth in the South Australia economy?*
- *What regulatory barriers impede the translation of South Australia research into new products and services? How material are they compared to best practice?*

Value of research and development

Within the university sector, research metrics include cash contributions, in-kind contributions, and number and FTE of personnel, along with standard academic output metrics such as publication rates, supervision, collaborative arrangements, prizes and awards, and the number of research applications and their success. These are useful but only contribute part of the research story. Research impact is felt beyond the standard metrics. However, measurement of research impact is usually domain specific and can be difficult to capture.

Other considerations:

- In many cases research metrics are focused on past performance. However, there is also need to consider direction and long term objectives as a key element of research investment from government, industry and the research sector.
- The development of strong and trusting relationships are critical in the early stage of industry/university partnerships. These are not well captured within the current metric system.
- People, organisations and government enter into research partnerships in order to meet defined objectives, but outcomes cannot be prescribed. Such partnerships must have an understanding and tolerance for 'failure'. Early identification and acceptance of unexpected outcomes is critical with learning from failure an element of research and development programs of many successful companies (e.g. Google, Amazon)

In some disciplines, research value is also shown as improved human capital. With research providing the skilled and knowledgeable practitioners of tomorrow. Recognising this, Flinders collaborating partners are motivated to participate in research because it enhances the skills, knowledge and currency of their workforce who can act as research supervisors.

South Australia businesses can benefit significantly from investing in research. Government support for this through grants and dollar for dollar co-investment can both build business engagement with universities but also encourage development of research capability within the organisation. For business this can translate into product improvements, productivity benefits, reduced costs, increased reliability, new patents, job satisfaction and public confidence. For South Australia this can mean increased investment, business expansion, an increase in export volumes and stronger domestic value chains and supply chains. Business metrics include profitability, recruitment of high-profile personnel to the state, new business start-up or businesses moving to South Australia.

Economic indicators are sometimes used as the sole outcome measure of the value of a program, activity or event. However, investigation of social and community outcomes are equally important to inform the decisions of government and policy makers and could include impact on physical and mental health

outcomes, environmental and aspects of social cohesion (including social capital and social inclusion). Standardised indicators of social progress could include:

1. Mental health and well-being as assessed by SAHMRI¹
2. OECD social indicators²
3. The Social Progress Imperative³ which assesses access to basic needs (e.g, nutrition, water, shelter), foundations of well-being (access to education, communication means, healthcare environment) and opportunity (personal and political rights, freedoms, and inclusiveness).

Areas for research focus

South Australia has high levels of external migration, high unemployment (heightened as a consequence of the COVID-19 crisis) and the second oldest population (behind Tasmania). These are challenges for the state that can be addressed through strategic employment of research and development dollars. To meet these challenges and to enhance the South Australia economy, State government funding support is required in the following areas:

- South Australia is heavily involved in maritime shipbuilding and the submarine project. These projects are a major driver of demand for research and development over decades to come, particularly in light of the Australian Government's sovereign capability building objectives and the ambition to create a world leading 'digital shipyard' at Osborne in South Australia. The Defence Innovation Partnership initiated by the State Government is helping to build research capability and maximise some of these opportunities. How we maximise the opportunity for South Australia over decades to come needs to be the focus of attention, developing both short and medium term strategies to fully leverage the economic and social benefit that might flow from such large defence projects.
- South Australia has the opportunity to maximise spillovers flowing from the presence of large scale defence projects and to support the growth of advanced manufacturing in locally and across Australia. This requires research on barriers and impediments to the uptake and diffusion of advanced technologies in small and medium enterprises (SMEs) and large firms.
- Research with a focus on encouraging our older citizens to remain engaged, making social and economic contributions and reducing health care costs is imperative requiring investment in addition to that provided through the Office for Ageing Well.
- In order for the Creative Industries to reach its growth potential the 'business and entrepreneurial capabilities of artists and cultural workers'⁴ need to be developed and strengthened. Currently there is little to no formal Government support for Arts or Creative Industry alignments between Industry and universities in South Australia.

Flinders University recommends:

1. Increasing South Australian Government funding to support research engagement in growth sectors (e.g. maritime, defence, advanced manufacturing and ageing)
2. Supporting the partnership of the Creative Industries and university to provide experimentation opportunities for screen practitioners to participate in advanced training and engage with a range of academic activity to find new production techniques.
3. The inclusion of research metrics measuring long-term socio-economic, environmental and business outcomes.

¹ <https://www.wellbeingandresilience.com/measurement>

² https://www.oecd-ilibrary.org/docserver/soc_glance-2016-5-en.pdf?expires=1590479027&id=id&accname=ocid177318a&checksum=0C5FB2CDE06CB1A70B0017044B181598

³ <https://www.socialprogress.org/index/global>

⁴ Joyce Report (2019) *Review of the South Australian Government's International and Interstate Engagement Bodies and Functions*, 37-38

Information request 5.2

The Commission seeks further information on the following issues:

- *How can South Australian businesses', universities', and research institutes' R&D funding be increased and how can this funding be better targeted?*
- *What role has the South Australian Government played in assisting public and private researchers to access Australian Government funding?*
- *What are the key factors which influence South Australia's total R&D funding?*
- *Why does such a small percentage of private non-profit expenditure on R&D occur in South Australia and what barriers, if any, are there to private non-profit R&D in South Australia?*

Supporting business and university engagement

There is a need for a more holistic understanding of the dimensions of interactions between universities and businesses in South Australia. This includes both the quantity and quality of those interactions and how we can build on good practice. Flinders University has recognised the need to be an active partner in projects with companies, co-investing in projects of strategic benefit to each party and seeking to leverage investment through established Federal and State Government programs. Co-investment by the State Government in NCRIS, ARC Linkage and CRC schemes has been welcome and increases the competitiveness of bids. Continued co-investment by the State Government in applications targeting these programs and stronger support for other initiatives, including the Industrial Transformation Research Centres/Training Centres program would also enhance the competitiveness of bids associated with these initiatives.

The South Australia Government's current focus is on improving investment and trade opportunities in the Defence and Space areas. Consequently, this involves supporting higher technology readiness level (TRLs) research while much of the R&D generated at our local universities is low TRL. This mismatch and lack of support for low TRL research is one of the reasons South Australia and Australia are lagging in interactions between business and universities. Other nations are investing heavily across all levels of TRL research and translational institutions to help remedy this problem. There have been various initiatives of this kind implemented in South Australia over the last six years which we can learn from. Flinders University has welcomed the opportunity to collaborate with the State Government on various industry partnering programs designed to test ideas, develop prototypes, increase the uptake and diffusion of technology and accelerate commercialisation.

Both Queensland and the Victorian government have recognised the benefits and leveraging potential of investing in low TRL research in areas with clear pathways to impact. Some examples include supporting basic research in polymer solar cells, artificial membranes and greener chemical processing techniques. The waning of a focus on direct-business interaction support for universities in South Australia, with current efforts being focussed around entrepreneurship and support for emerging start-up companies, has led to diminished opportunities for South Australia researchers to meet and interact with business and, consequently, leverage of commonwealth funds through programs such as CRC-P and ARC Linkage.

The eligibility requirement for Commonwealth grants and research funding (ARC Linkages, CRCs, Industrial Transformation Research/Training Centres) includes upfront matched funding. This investment is particularly challenging for small to medium businesses making decisions about short and long-term goals and outcomes. Consideration could be given to targeted additional support from the South Australia Government for successful industry-university applications.

A previously South Australia Government supported program (\$750,000 over three years) – NanoConnect demonstrates that a small investment used judiciously can increase business and university interactions substantially. Between 2011 and 2016, chemists, physicists, materials scientists and engineers took an interdisciplinary approach to deliver practical real-world solutions to local industry. This program, administered by the Flinders Institute for Nanoscale Science and Technology, demonstrated that interactions with SMEs resulted in tangible outcomes. Some of the outcomes were as follows:

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- the establishment of a company based on a new ceramic material for precision machining
 - an investigation of underground plastic pipe fittings that showed the existence of manufacturing defects and led to re-design of a more reliable injection moulding system
 - the development of a nanocomposite materials for underfloor heating with a proof of concept being the basis for the development of a new heating product.

The program also led to greater awareness in industry of the nanotechnology and materials capabilities located within South Australia. There were interactions with more than 100 South Australia businesses with 35 of these participating in workshops; 25 in nanotechnology reviews; and 12 in feasibility studies to understand the application of nanotechnology in their businesses.

The Medical Devices Partnering Program (MDPP) is successful program administered by Flinders University with the aim to build research and manufacturing capability across Australia. It is an 'ideas incubator' with a multidisciplinary approach bringing government, researchers, industry and end-users together to collaborate on the development of medical technologies. Programs like these should be examined as part of wider efforts to build productive collaborations between industry and universities.

Government priorities

Not all research is industry and business focused, and there is a need to continue to support 'public good' research. Although there is often very high interest and broad support, the fragility of the non-profit sector is a significant barrier to collaborative experimentation. Philanthropic funding is scarce, and what is available is often conservative and risk-averse. Accordingly, most non-profits stick to their traditional operations and programs as they do not want to be divert scarce dollars from delivering what they are funded to do.

In recent years, budget pressures have meant the South Australia Government has favoured physical infrastructure (preferably 'shovel ready') projects and investment in training, entrepreneurship and start-ups over investments in R&D. The Department of Innovation and Skills website states the Premier's Research and Industry Fund (PRIF) aims to support South Australia's research community to compete successfully on a national and global scale. The site goes on to acknowledge that research and development activity is critical to jobs growth and the emergence of new industries and enterprises. However, no rounds of the PRIF have been opened for several years and PRIF appears to have been replaced by the Research, Commercialisation and Start-up Fund. The new funds' objectives are to support researchers, entrepreneurs and businesses to accelerate their progress with funding from the South Australia Government. This new Fund does not have a research focus but prioritises commercialisation and as already mentioned high TRL research. Only the strategic initiatives scheme is available to researchers and funding awarded through specific calls for proposals with the details of this scheme lacking transparency.

Public servants who can assist in attracting additional R&D funds to the state and support business engagement are spread across multiple Departments. Investment and industry expertise are located across both PIRSA and the Department of Trade and Investment. The Office of the Chief Scientist for South Australia is located within the Department of Innovation and Skills and the responsibility for higher education and attracting young people to STEM subjects is in the Department for Education. The role of the South Australian Chief Scientist currently lacks definition and clarity. If this role is to assist the research community to attract R&D funds to the state this aspect should be clearly stipulated as part of the role. While the stated role of providing independent advice to the Premier of South Australia, the Minister for Innovation and Skills, and Cabinet, on matters of science and research, technology and innovation are laudable; other states have used this position to advance their government strategic R&D objectives, provide a strong platform for promoting STEM careers and sharing relevant business opportunities with their universities. An example is provided by the Lead Scientist in Victoria⁵. The Chief Scientist could bring all these areas together and create a whole of state approach to the 'big' issues associated with the natural, social and health sciences. This should be a

⁵ <https://djpr.vic.gov.au/victorias-lead-scientist/victorias-lead-scientist-strategic-plan-2018-2020>

strategic priority for the South Australia Government and provide greater visibility of R&D funding (grants and tax assistance) available.

Flinders University recommends:

4. Effective mechanisms, policy levers and co-investment are put in place to support the interaction of businesses and universities to increase the level of business R&D funding in South Australia.
5. The value of partnering programs (e.g. MDPP) be considered as part of wider efforts to build productive collaborations between industry and universities.
6. South Australian Government Departments have discretionary funds dedicated to R&D research. This could be used for direct research engagement and support for Commonwealth funding opportunities (e.g. ARC Linkages, CRCs, NCRIS, Industrial Transformation Research/Training Centres) that require matched funds in areas of strategic importance for South Australia.

Information request 5.3

The Commission seeks information on:

- *whether the existing mix of labour force skills has a material impact on the state's ability to undertake research in the state;*
- *how employers might assertively attract and retain high quality R&D talent; and*
- *whether the expected supply of students and graduates can support higher output in R&D.*

Postgraduate students are a vital component of the R&D labour force contributing 57% of R&D person years of effort⁶, as such they are critical to increasing the South Australia share of R&D dollars. Although the number of postgraduate students in Australia increased year-on-year from 1990, work effort was seen to decline from 2014-15 to 2016 when part-time status was factored into calculations.

An appropriate pipeline of postgraduate students is essential to continue to grow R&D activities inside universities. This is particularly the case for the defence industry, where there is a requirement for domestic (or Five Eye nation) students. However, anecdotal evidence from Flinders University Institutes and Research Centres indicate that it is getting more difficult to attract high-quality postgraduate students despite the availability of scholarships. This could be for a variety of reasons including:

- the attractions of highly-ranked Eastern state universities
- the high-salary jobs available in many specialist fields like computer-modelling and artificial intelligence
- the perception that PhDs holders find it challenging to find work outside of academia.

The South Australia Government could better assist research in the state by encouraging and supporting more Australian young people to study and work locally. It is noted that the government already supports the attraction of international students (via StudyAdelaide) and overseas migration (via Immigration South Australia). However, there is an opportunity to include an additional platform to assist universities to advertise their funded postgraduate scholarships locally and internationally in one central location. This is particularly critical in the post-COVID environment.

Government incentives for industry linked PhDs would work to increase the education of workforce as well as improve and foster linkages between industry and universities for R&D. This also facilitates the establishment of trust and understanding between industry and universities which can lead to enduring relationships and

⁶ Cited by Grattan Institute (2018) *Mapping Australian Higher Education*

future research opportunities. For the graduate student this can also lead to permanent employment (in South Australia).

Moreover, as demand for graduates from industry grows support programs that extend beyond PhD scholarships are also required. This could include support for post-doctoral studies and support for existing workers to undertake postgraduate studies. The Diploma in Digital Technologies is an example of the latter where skilled shipbuilders are being supported by their employer and government to retain employment and learn new technologies. For South Australia the benefits are extensive, including building local sovereign capability and supporting the primes and local supply chain to upskill.

Flinders University recommends:

7. The South Australian Government provide incentives for industry linked PhDs including support for full tuition fee waivers. These would work to increase the education of workforce as well as improve and foster linkages between industry and universities for R&D.

Information request 5.4

The Commission seeks information on:

- *How important is it to retain young researchers in South Australia and what incentives could be developed to do so?*
- *Are there any barriers to the recruitment of additional world class academic talent?*
- *To what extent does the existing mix of skills and fields match South Australia's industries?*
- *What are the barriers to a better match, and how can they be removed?*
- *Are there any barriers to the recruitment of additional world class academic talent?*
- *What factors are influencing the relatively low level of PhD students enrolled relative to the academic workforce?*

Industry engagement with Higher Degree by Research students

Flinders higher degree students vary in age from their early twenties to their eighties (and by region and discipline). This diversity of Flinders students is valued by academics, policy makers and industry as they contribute their existing real-world skills, knowledge and experience to the university research endeavours.

There is currently a lack of investment in both domestic and international research scholarships. As a result, the current number of research students is low. There is capacity to grow this somewhat across a range of disciplines. Some areas have high demand for research degrees, but low intake as students are not able to financially support themselves without a scholarship. In other areas the dollar value of a scholarship is low when compared to a position in the workforce, thus reducing prospective students desire to undertake research when they could be earning more working in industry.

To attract and retain more researchers South Australia needs more jobs that require their advanced skills and an industry that recognises the economic value to their business bottom-line of having PhD trained staff. Flinders University recognises that half of its postgraduate students will be employed by industry and is therefore seeking to ensure the skills and fields of research of its graduates meet (or are transferable to) the needs of their future employers. While Flinders has worked to align student skills and research with South Australia industry. There are significant gaps in industry awareness and understanding of what universities can provide by way of students and research.

Recent research undertaken at Flinders indicate industry:

- are generally not aware of the value, expertise and skills associated with HDRs (and equate them with undergraduates) but are interested in the high-quality work and new thinking that HDRs can bring to their organisation
- want to know what Higher Degree by Research (HDR) research is being undertaken and would like an easy pathway to connect with students through the university so they can connect early and build relationships (supervisors who do this provide a significant link between HDR students and industry)
- want to engage with researchers who understand their research within an industry context
- needs to be recognised as equal partners, with relevance, credibility and shared ownership of research

PhD programs are often biased towards academia. This approach could be modernised in consultation with relevant industry so that graduates develop industry relevant skills by completion. This could be achieved by reforms supporting HDR studies to include graduate placements, such as occurs in Europe. The Federal government has been using the APR Intern program to overcome some of these difficulties however the requirement to complete a PhD within the 3 year window makes participation for some difficult. Government support for industry-based scholarships that seek to 'answer a problem' would be beneficial. In this way, industry have the opportunity to shape the research project, to align it with their organisational strategy and to focus on their problems and needs.

World class academics

South Australia success rates in attracting funding and investment in research are influenced by the calibre of the researchers, the strength of our collaborations and the facilities to undertake projects. Therefore, it is critical to attract and retain world class researchers within South Australia and to promote successful collaboration within the state, nationally and globally. A senior internationally renowned researcher will attract talented students to graduate programs, attract research funding from sources outside of the state, foster international collaborations and contribute to publications in international peer-reviewed journals.

Case study 1: Value of investment in a Research Chair

Just before 2010 Flinders had an extremely limited forensic DNA program; forensic biology was then and still is one of the most important fields in modern forensic science. Flinders was able to obtain funds from the South Australian Government to provide the salary for a Chair specialising in forensic DNA teaching and research. This attracted a world-leading appointee from the UK who in the past decade has created the best, most productive research and teaching programs in Australia and amongst the best worldwide. Currently there are seven forensic DNA PhD students evidencing that attracting high talent is not a barrier when the right levers are in place. Since 2010, over 110 papers have been published in international peer-reviewed journals. Of the previous nine postgraduate alumni, two have developed collaborations with partners in the USA and three with groups in SE Asia.

Barriers to recruitment of high calibre research academics include:

- Lucrative starting salaries for top graduates in alternate industries. This acts as a disincentive when considering career options both at graduation (with a comparatively low PhD scholarships) and once they have entered the workforce.
- An emphasis on grant success in a context where funding to support research is in short supply and increasingly difficult to access or win. The low success rates of the dominant research grant organisations (e.g. ARC) can be very demotivating.
- The requirement to find resources to support expensive research infrastructure, equipment and cutting edge technology.
- Challenges with security clearances for international recruitment in defence or sectors working with defence (due to Five Eye requirements).
- The lack of career pathways and are limited openings in the academic workforce for high quality PhD graduates.

Flinders University recommends:

8. Government support for industry-based scholarships that seek to 'answer a problem'. This support would help industry to better understand and integrate research into their business model.
9. To attract world-leaders to South Australia, the salaries of Research Chairs specialising in priority areas be supported by South Australian Government or co-sponsored with industry.

Information request 5.5

The Commission seeks information on:

- *Whether and how to encourage small and medium sized businesses to participate more in R&D.*
- *Whether and how to encourage interstate and international firms to invest more in South Australia.*
- *What government regulations or processes are blocking South Australian businesses from pursuing research and development opportunities?*
- *How can the government remove barriers for businesses to access public and private equipment and infrastructure, to enable increased research and development?*
- *Given that governments are key purchasers of goods and services, what reforms could be made to support business research and development growth within the South Australia economy?*
- *Are there other ways to support local businesses to invest efficiently in research and development as part of their growth strategy?*
- *Which industries could contribute more to rapid growth of the South Australia economy? Does the state have the necessary R&D base to contribute to the growth of these industries in South Australia?*

Encouraging business innovation

Small and medium enterprises (SMEs) are typically time and money poor and have limited internal capacity for R&D based activities. All activities are viewed through a return on investment (ROI) lens and all investment needs to demonstrate renewed market value, new competitive advantage and/or provide opportunities to be industry leaders. Typically, SME R&D is driven by individuals within an organisation that are innovative and curious in nature. When this is coupled with a management team that supports innovation and risk taking, then positive outcomes are likely. SMEs often prefer internal (in-house) R&D investment. The benefit of this approach is the business invests in and retains the R&D skill and knowledge. However, this approach can severely limit outcomes - unless the business has a strong culture and drive to be innovative and have appropriately resourced R&D activities.

Some fundamental ingredients for greater business R&D success include improved:

- Risk appetite – from the ecosystem (Government, researchers, and industry) to invest in novel and new innovation
- Collaboration – and a willingness to grow industry
- Intelligent leadership – to lead and ensure the right outcomes and behaviours from stakeholders
- Talent – across the ecosystem that bring everything together
- Diversity – in thinking and investment.

Key barriers and challenges:

1. Skills – many SMEs don't have team members that can successfully write grant applications, nor the time to invest in preparing the application.
2. Awareness – SMEs are unaware of the range and specifications of grant opportunities and how to meet their requirements
3. Perceptions – SMEs believe Universities are bureaucratic and difficult to deal with and aren't aware of which researchers or academics are available and interested in undertaking research.

Tax incentives and small easy to access partnership grants are important to develop relationships between SMEs and universities. As described in Information request 5.2, using a program such as NanoConnect to introduce SMEs to researchers and research outcomes linked to their business is a good way to build up relationships with industry. These programs, however, need to be sustained over time to have any meaningful impact.

Large businesses require different triggers to drive R&D engagement with South Australia universities. Currently business investment in R&D is focused on the eastern seaboard where most are located. Mechanism like Investment Attraction South Australia were showing some success in attracting larger firms to South Australia but this agency has now been disbanded.

If the South Australia government genuinely wishes to encourage more innovation, research commercialisation, and entrepreneurship in the state then it should lead by example. The South Australia government should embody the changes and innovation that it wishes to nurture in the state by itself becoming more innovative, more risk tolerant, and more open to doing things differently compared to other states. One of the keys to regulatory innovation is evaluating the effects over a period of 5 – 10 years to determine whether it is achieving the intended result at the projected costs/benefits, where results are not demonstrated new regulations may be terminated or reverted.

Access to infrastructure

The biggest barrier to the use of specialist university equipment is awareness and funding. There is a currently lack of awareness in the South Australia business community about the world-class infrastructure available on their doorstep. Universities do not always have the contacts or mechanisms to engage with industry about how business can benefit by engaging with new technologies. The other barrier is funding, universities use research dollars to provide technical support and maintain this infrastructure but the fees for use can be too high for SMEs.

Government assistance is required to promote and facilitate inter-university and business use of high-value technological infrastructure locally and nationally. This could be achieved by the establishment of a single South Australian online portal that lists all available public and private research equipment and infrastructure in the state. The portal could include case studies of successful use of those research resources. Partnership with media outlets (newspapers and TV) could regularly promote how a local company derived a benefit from these resources. A concierge or facilitation service could be provided by government to link business with the right people in universities. SMEs and universities could be incentivised to engage together through limited grant programs for cost-sharing, R&D tax breaks, awards, etc. This portal and program would aim to identify the value proposition for business and develop long-term partnerships for mutual benefit of participating organisations and South Australia. A portion of all revenue should be reinvested into the research infrastructure to keep it upgraded, up-to-date, and growing in capability. The overall goal is to spread, promote, and entrench awareness of the research resources.

Case study 2: Infrastructure investment and business access

Flinders Microscopy and Microanalysis was formed to serve the nanoscale science, characterisation and imaging needs of our researchers, government and industry in South Australia and beyond. The instrumentation housed within Flinders Microscopy and Microanalysis is supported by a team of Instrument Leaders (academic staff with an extensive background in their chosen techniques) and Instrument Managers (technical staff who conduct training, support users with routine procedures and perform instrument maintenance), all of which is funded by Flinders University.

The newest instrument, the PEEM is a next generation spectromicroscopic technique that provides structural, morphological, magnetic, electronic and chemical properties of heterogeneous matter with nanometre resolution. It will be the first of its kind in Australia. This unique instrument has been designed for current and future Australian research priorities in advanced manufacturing, space, energy, food, mining and the environment. Funding for this instrument was provided by the Federal and South Australian Governments and included key performance indicators around industry usage. The project would benefit from Government assistance to connect with local, national or international companies that may be able to use and pay for this specialist equipment.

Flinders University recommends:

10. The South Australian government should experiment and innovate with the local regulatory environment to try to incentivise the innovation, research commercialisation, and entrepreneurship outcomes it wants to achieve.
11. The establishment of a single SA online portal that lists all available public and private research equipment and infrastructure in the state and provide a facilitation or concierge service to work at the interface of business and universities to make appropriate connections.

Information request 5.6

The Commission asks stakeholders, based on their views and experience:

- *What R&D research infrastructure does the state possess? Is it nationally and/or globally competitive?*
- *Whether infrastructure investments in research and development infrastructure have been effective to date?*
- *What other roles can the state government undertake in infrastructure provision, for example coordination of joint ventures?*
- *What barriers exist to the efficient provision and use of R&D infrastructure in South Australia?*

Tonsley Innovation District

The Tonsley Innovation District has emerged as a key site for Flinders University to engage more comprehensively and effectively with government and industry in accelerating the uptake and diffusion of advanced technologies and skills in the State. Flinders has committed considerable investment to the development of the site including an extensive network of laboratories and teaching spaces. The Flinders at Tonsley campus along with Tonsley TAFE and the Drill Core Reference Library are foundational institutions, helping to attract knowledge intensive firms and start-ups. The South Australia Government has played a key role in enabling leading companies to co-locate at Tonsley, resulting in a critical mass of systems integration and knowledge intensive manufacturing companies agglomerating at the site. Renewal South Australia has played a key role in enabling interaction between those located at the site, facilitating networking between companies and researchers.

As detailed below (see Information request 5.7), evidence from the Catapult program in the UK reveals that considerable benefit can flow from establishing more enduring collaborative research facilities that enable regions to build critical mass over time. However, we do not have funding mechanisms available in Australia to achieve this, noting that CRCs and Industrial Transformation Research Centres and Training Centres are not able to invest in large scale infrastructure and facilities. This is one of the advantages of the UK Catapult program which funds operating and capital costs. While funding rules act as an impediment to establishing large scale, enduring research and development facilities like Catapult centres, so too does the quantum of funding available for investment.

Infrastructure

Flinders has world-class equipment and/or are national leaders through Flinders Microscopy and Microanalysis, Flinders Chemical Analysis services, Tonsley engineering precinct, Flinders Proteomics, Flinders Analytical and Flinders Microbiology and Medical research facilities. Despite their reputations, all of these are very reliant upon ARC grants and cash contributions from the universities. There has been very little cash provided by the South Australia Government or non-ARC Commonwealth agencies. As identified (see Information request 5.5), Flinders is open to developing research and technical collaborations including

sharing equipment and infrastructure, but we note there are significant costs involved to ensure our infrastructure remain globally competitive.

Case study 3: Institute for Nanoscale Science and Technology

The Institute for Nanoscale Science and Technology administers the Flinders Microscopy and Microanalysis Facility using internal funds, an overview of the infrastructure available is shown below. The Institute is also a partner in the Australian National Fabrication Facility-SA node, which is administered through UniSA. The funding for the ANFF was provided through the National Research Infrastructure for Australia (NCRIS) scheme. The Institute utilises the facility of the Australian Synchrotron (located in Melbourne) and our instruments also form part of Microscopy Australia.

▶ **CAPABILITIES**

- Electron microscopy
- Characterisation of surface topography
 - Surface adhesion, conductivity mapping, and measuring dynamic changes in topography
- Electron and Ion Scattering Spectroscopy
 - Elemental & electronic states
 - Concentration depth profiling
- Large Sample Micro Computed Tomography
- Light microscopy
 - Including fluorescence microscopy
 - Biological sample preparation



Past infrastructure investments made by the South Australia Government that support the Institute for Nanoscale Science and Technology have been effective for researchers at Flinders University. This is reflected in our ERA scores of 5 (above world-class) in areas of Condensed Matter Physics, Materials Engineering and Nanotechnology. However, further assistance to engage with industry, and inform them of the capabilities of our instruments would be welcome.

The South Australia Government's led role in the first National Research Infrastructure for Australia scheme was extremely helpful to the research community in South Australia. The significant co-investment provided allowed researchers access to infrastructure that would never have been available otherwise. The pro-active coordination role the government played was crucial and demonstrated to the Federal government that South Australia was serious, committed and understood its science infrastructure needs.

Flinders University recommends:

12. The South Australian Government commit to a Research Infrastructure Modernisation Fund. This could be accessed for the upkeep and upgrade of equipment. Access to the Fund could be prioritised where activities demonstrate compliance with contractual agreements for industry engagement.

Information request 5.7

The success or otherwise of efforts to establish clusters of research and development infrastructure in common locations will be a matter that the Commission will consider. The Commission seeks feedback and advice regarding:

- *whether the clusters are best practice, including in terms of location, development, operation and use of taxpayer funds, and how they could be improved; and*
- *examples of best Australian and international practice.*

The value of clusters

South Australia and Australia have a long history of applying industry clustering, networking and industrial district principles and practices as part of their suite of economic development tools. A 2019 stocktake of Australian Innovation Precincts by the Department of Industry, Innovation and Science provides a snapshot of the recent state of play.⁷

Flinders University are a founding partner of the Tonsley Innovation District⁸ in Adelaide's southern suburbs. This partnership with the South Australian Government and industry has involved considerable investment by all parties in the transformation of the former Mitsubishi automotive assembly plant into an award winning innovation district. The development of the site has been informed by cluster theory and practice rooted in the considerable body of evidence generated by industrial economists and economic geographers, building on the influential work of Michael Porter in his book 'The Competitive Advantage of Nations', published in 1989. South Australia was an early adopter of industry clustering as a form of industrial development strategy, supporting the establishment of clusters in a number of sectors including water and wine in the early 2000s. There have been various clustering initiatives since this time along with industry precinct/district initiatives premised on the benefits of agglomeration economies.

The characteristics of typical geographical clusters are variously evident at Tonsley, Mawson Lakes, Edinburgh Parks, The Waite and North Terrace. It is important to note that there is a great deal of permeability between these in the real world economy of South Australia, where it might be best to conceive of these various agglomerations as constituting an innovation corridor from Adelaide's southern suburbs, through the City of Adelaide to the northern suburbs. Flinders University is actively engaged in a range of research collaborations across this geography. Considerable attention is now being focused on the development of Lot 14, the former RAH site, building on the considerable research strengths that exist on North Terrace and the city more generally.

While no systematic evaluation has been undertaken of the various geographic agglomerations our view is that considerable mutual benefit has arisen from location of significant elements of our teaching and research activities at Tonsley. This includes the opportunity to test new models of industry engagement with a wide range of industry partners. Examples of this include various industry partnering programs focusing on the development of medical devices and applications of key enabling technologies like nano-technology. These initiatives have been led by our Medical Devices Research Institute and Institute for Nanoscale Science and Technology which have worked closely with companies on product development and the uptake and diffusion of technologies.

More broadly Flinders University has partnered with the South Australia Government and the Innovative Manufacturing Co-operative Research Centre to establish the Tonsley Manufacturing Innovation Hub. The hub is a network of companies seeking to explore potential applications of advanced manufacturing technologies in collaboration with researchers. Linked to this we have established a number of start-up support, ideation and product development accelerators including Venturedorm and the Innovative Manufacturing Accelerator Program. These programs operate on a co-investment model requiring investment from the companies involved.

Inspired by the network of High Value Manufacturing Catapult centres in the UK, Flinders University is currently supporting the development of large scale advanced manufacturing research and development collaborations designed to support of the digital shipyard and sovereign capability building objectives of government. Flinders University and BAE Systems Australia's shipbuilding business, ASC Shipbuilding, have established an Industry 4.0 Collaboration Laboratory and pilot Factory of the Future at Tonsley in support of the \$35 billion Hunter Class Future Frigate Program. This transformative partnership supports the 'digital shipyard' ambition and will assist with accelerating the successful uptake and diffusion of advanced technologies and processes in naval shipbuilding. Additionally, it will help to further the sovereign capability

⁷ <https://www.industry.gov.au/sites/default/files/2019-04/stocktake-of-australian-innovation-precincts.pdf>

⁸ <https://tonsley.com.au>

building objectives of industry and government. Finally, it is the foundation for the export of Australian digital shipbuilding research and industry capabilities to other nations committed to the manufacture of Hunter Class Frigates.

Based at the Tonsley Innovation District, the Industry 4.0 Collaboration Laboratory is supported by a \$1.45m industry transformation research grant from the Innovative Manufacturing Cooperative Research Centre (IMCRC) matched by ASC Shipbuilding. The Industry 4.0 Collaboration involves 16 engineering and design personnel from ASC Shipbuilding, and 12 Flinders University researchers with backgrounds in engineering, science, and social science. The collaboration focuses on the vital role that human factors play in the uptake and diffusion of advanced manufacturing and digital technologies such as collaborative robotics, automated/intelligent guided vehicles, wearables, and industrial edge computing. The research undertaken as part of the partnership is informing innovation and change management processes in ASC Shipbuilding and its extensive supply chain. This is of great local and national significance given the need to improve research translation outcomes in Australia and is worthy of strong state and federal government support.

Cutting edge research on technology acceptance and readiness for Industry 4.0 indicates that solid progress towards the vision of a digital shipyard requires attention to a range of human factors that mediate this process. The Industry 4.0 Lab has been established to develop, test and evaluate a human factors' framework that addresses the multiple barriers to the successful adoption of advanced technologies in maritime shipbuilding. The results of the research are being shared with various industry sectors seeking to accelerate the successful adoption of advanced technologies.

ASC Shipbuilding has invested heavily in the establishment of the Tonsley based Industry 4.0 collaboration to support the vision of digital manufacturing and sustainment processes at the Osborne shipyard. This investment has enabled the founding of the 'Line Zero – pilot factory of the future', Australia's first industrial scale Industry 4.0 test site. The pilot factory of the future makes possible lab-based testing to transition into a pilot scale facility appropriate for industrial trials. Complementing the research program is a workforce capability building and training program. Over 50 ASC Shipbuilding staff are undertaking a Flinders University Diploma of Digital Technologies linked to the research and trials being undertaken in the Industry 4.0 Lab and Line Zero.

The Industry Catapult program in the United Kingdom is generating an evidence base on the merits of establishing large-scale innovation accelerator facilities like the Advanced Manufacturing Research Centre in Sheffield⁹ and the Advanced Forming Research Centre in Glasgow. Australia and South Australia's relatively poor performance in research translation and collaboration with industry would be improved by adopting a variant of the Industry Catapult program in the UK. Inspired by Germany's extensive network of Fraunhofer Institutes the Catapult program has been in operation for nearly a decade, establishing enduring capabilities in support of more effective research translation and collaboration. Importantly they provide companies and researchers with access to infrastructure and capabilities that helps to significantly reduce risks that act as impediments to companies engaging in innovation and commercialisation processes.

Flinders University recommends:

13. The establishment of an Industry Catapult program as part of the Tonsley precinct to develop and embed enduring capabilities for more effective research translation and increased collaboration. Such a program would provide companies and researchers with access to infrastructure and capabilities and reduce impediments to business engaging in innovation and commercialisation processes.

⁹ <https://hvm.catapult.org.uk>; <https://hvm.catapult.org.uk/news/innovation-impact-in-action-the-hvm-catapult-annual-review/>

Information request 5.8

The Commission seeks information on the areas of opportunity that may be created by South Australia's age profile including examples. What R&D activity would support exploiting those opportunities?

Older people are substantial contributors to the economy. The high number of South Australia residents in the 65 year and over age group, along with the ageing of the population, provides many opportunities for South Australia research as the requirements of the population shape demand for goods and services. More so than other generations, the older generation may also have time and a willingness to contribute to research developed using co-design principles to meet their needs.

Healthy ageing research incorporates the promotion of independence, support to navigate chronic conditions along with appropriate and timely care. There is a potential demand for research into new assistive technologies and ICT products to facilitate healthy aging. This is accompanied by business opportunities to use advanced manufacturing techniques to develop new technologies specifically for this market.

Flinders University recommends:

14. Understanding older people as drivers, contributors and consumers of research and supporting opportunities for research and business to engage and apply advanced manufacturing techniques to new assistive technologies.

Information request 5.9

The Commission seeks further information on the following issues:

- *Is the current regulatory environment at the national level conducive to data generation and sharing?*
- *Is the current regulatory environment at the state level, including the operation of the Public Sector (Data Sharing) Act 2016, conducive to data generation and sharing?*
- *Is there overlap between national and state legislation?*
- *What are the barriers to accessing and using public sector data for R&D in South Australia and how material are these barriers?*
- *How could these barriers be addressed? Are there any barriers related to sharing of data among non-government research providers created by government policy? And where is it done better?*

Data access

There have been significant positive changes over the last decade in making South Australia government public data (particularly spatial data) more open and freely available. At the national level, the Australian Government released the Public Data Policy Statement (2015) which requires Australian Government entities to make non-sensitive data open by default and available in free, easy to use, high quality and reliable formats, and in 2017, the Australian Government adopted the International Open Data Charter¹⁰.

The South Australia Government Open Data Framework¹¹ assists agencies to adopt open data principles with Chief Executives, or Open Data Advocates, responsible for the framework's implementation. A significant number of key public datasets are now freely available via Data South Australia (the South Australia Government Data Directory) for R&D use. There are, however, inconsistencies between agencies in terms of

¹⁰ <https://opendatacharter.net/>

¹¹ <https://www.dpc.sa.gov.au/responsibilities/ict-digital-cyber-security/policies-and-guidelines/data/open-data-principles>

providing discoverable, open public data. Data upload to Data South Australia is at the discretion of each agency and this has led to inconsistencies in data currency and in the number of datasets provided.

A Reference Group of key State Government agencies with spatial data custodianship meets regularly to coordinate data management and access within and outside of the public sector. This is a positive initiative that has led to greater open data access and more coordinated data management. There are, however, some legacy issues at play - some of the more traditional data management agencies continue to hold data more tightly. Other agencies are proactively working towards providing more open access to data, particularly Location SA (DPTI). Location SA have been working closely with the Australian Urban Research Infrastructure Network (AURIN) to provide universities with free, open access to live state government datasets. AURIN is a federally funded program, through the National Collaborative Research Infrastructure Network (NCRIS) initiative, whose charter is to provide the infrastructure necessary to enable researchers to access spatial data for research purposes from data custodians across Australia. Location SA have built a web-based data viewing platform, Location SA Map Viewer, enabling the general public to discover, view and download a large number of live State Government datasets. This tool represents a significant advancement in the open data movement in South Australia and has made data discovery and access fast and simple.

While the tools, frameworks and policies are in place in South Australia, the implementation of these could be improved. For example, it would be beneficial to conduct a widespread review of data licence conditions on existing datasets with the Open Data Principles at the forefront (Principle 1 – data will be open by default). Many datasets have restricted licences as a result of legacy data management guidelines; however the restrictions are often ‘unlocked’ on request. These restrictions could be permanently in place if a widespread review were to occur.

At the council level, Local Government data is not commonly made available on Data SA. From a research perspective, data at this level provides the greatest benefits in terms of more targeted social, economic and environmental analyses. An additional barrier at the local government level is inconsistencies in data collection methodologies across councils, making it difficult to perform comparative analyses. Efforts have been made to homogenise datasets across council boundaries, however a coordinated approach would be more cost effective and time efficient; and be beneficial to researchers and policy makers who require this small-scale data. The frameworks, policies and infrastructure are in place to enable free, open access to state and local government data for R&D in South Australia, and many agencies have fully adopted this approach.

Flinders University recommends:

15. Improvement of the implementation of the open data initiative through more consistent adoption across all State Government agencies and Local Government.

Information request 5.10

The Commission seeks stakeholder views and evidence on:

- *How do businesses determine the balance between adopting or innovating technology and processes as a driver of innovative products and processes?*
- *Are there ways that the South Australian Government can efficiently support business endeavours in R&D?*

See response to Information requests 5.5, 5.6 and 5.7.

Information request 5.11

The Commission seeks stakeholder views and evidence on:

- *best practice examples of collaboration between higher education institutions and businesses;*
- *the advantages and costs of collaboration among research institutions at local, national and international levels;*
- *examples of best practice collaborations between higher education institutions;*
- *incentives that encourage collaboration; and*
- *regulatory barriers to collaboration that the South Australian Government can address.*

Collaboration between universities, business and government

Flinders University is active in developing relationships and collaborating with business, government and other universities. To help drive this, the University has established a Strategic Partnerships team with a special focus on defence and health growth areas. These inter-sector collaborations take time to develop and require trust and investment. Collaborations of this sort are most enduring when they do not rely exclusively on the working relationships of individuals. However, the benefits once established are huge with the opportunity for multidisciplinary and multisectoral learning and meaning applied to research, practice and teaching.

Best practice examples include:

- As previously identified (see Information request 5.7), Flinders University has a multi-factorial R&D collaboration with BAE Systems Australia/ASC Shipbuilding. Currently in place is a project supported by the Innovative Manufacturing CRC exploring human factors in the uptake and diffusion of innovative manufacturing technologies in the Australian shipyard and supply chain. This cutting edge project provides an explicit opportunity for the University's social and technical scientists to work alongside technicians from BAE on projects to support the implementation of Industry 4.0 technologies in the shipyard and supply chain. Flinders University has also collaborated with BAE and TAFE South Australia in a newly created Diploma of Digital Technology. In its first year, this Diploma is providing 53 shipbuilding workers with the skills required to keep pace with current trends and work in shipyards of the future. These seminal projects provide a strong basis for ongoing local, national and international collaboration to the benefit of the business, the broader industry and the university.
- The Medical Device Partnering Program is another best practice example of collaboration between higher education institutions and businesses. The program is highly regarded by industry as a low-cost, low-barrier (due to IP guarantees) for early stage R&D. The program has facilitated multiple early stage R&D projects, which in addition have established strong ongoing relationships between South Australia universities and industry. The success is seeing the program now being expanded to other states and other sectors aiming to emulate its success.
- The topic of child protection practice has been a priority for the South Australia Government. This provided the opportunity to build on an existing good relationship between Flinders University and the Early Intervention Research Directorate (Dept Human Services) leading to a government investment in a post doc program to explore research practice and what works in child protection. The project also incorporated leveraged funding from Flinders, and significant in kind from Aboriginal and domestic violence services while the Department of Child Protection contributed funding to employ practitioners to support the project on the ground. This project has benefited from the development of honours projects on related themes and aims to develop a PhD circle for Aboriginal candidates. Importantly, the project has facilitated significant buy-in from the sector and change to practice in real time. It is a positive story of leading change together with the project team exploring options to continue the working relationship through an ARC Linkage.
- The long-term collaboration between Flinders University palaeontology group with the ANU Microscopy centre, Curtin University and The University of Tasmania has resulted in the generation of new significant fossil specimens (field work) and sharing of new research CT and geochemical trace element data. Long-term collaborations also exist between Flinders University palaeontology group and international

researchers in the UK, Sweden, Canada and the United States resulting in significant funding (private plane, helicopter flights, gear, base costs etc.) for two joint expeditions to search remote mountain ranges for significant new fossils in Antarctica. These national and international collaborations have resulted in tangible local benefits including valuable specimens being studied and exhibited (with samples donated to South Australia Museum); high impact papers published in *Nature* and *Science*; enhanced coverage of Flinders University in the world wide media; attraction of high calibre PhD students; ARC grants providing local employment and international travel; and national prizes.

- In 2014 a newly appointed Strategic Professor of Forensic Science at Flinders was awarded a Premier's Research and Industry Fund grant to stimulate research relating to gunshot residue examination. Researchers were funded at Flinders, UniSA and UTS Sydney in order to utilize the best equipment and expertise available in Australia. Official industry collaborators, who provided substantial in-kind support and some cash, included Forensic Science South Australia, South Australia Police, NSW Police and ChemCentre WA. The project to date has involved five PhD students and one Honours student. Three of those PhD students are now employed in government forensic agencies. To date, research has resulted in twelve published papers, two of which received awards from the National Institute of Forensic Science. According to a recent scientometric analysis of international gunshot residue research, the output from this project has propelled the research group at Flinders to one of seven leaders internationally. Gunshot residue experts at Flinders have been engaged locally and interstate by legal counsel, including a major ACT Judicial Inquiry into the shooting of ACT Police Commissioner Colin Winchester. New collaborations with Italy (University of Rome, also a world-leader), the UK (University of Surrey), and Switzerland (University of Lausanne) are now developing.

Information request 5.12

The Commission seeks further information on the following issues:

- *What other policy instruments should the state consider?*
- *What are the most important policy barriers for the South Australian Government to address?*
- *Are there any examples of policy levers and outcomes of policy in a national or global context that could be translated to South Australia?*

One of the challenges for South Australia and the nation as a whole is to increase the level of collaboration between our research institutions and industry to support higher levels of research translation and commercialisation. Developing critical mass through clusters, networks and fit for purpose facilities like Catapult centres are among some of the key mechanisms that can help achieve this. While government can play an active role in fostering research collaboration through research funding programs of the ARC and NHMRC, consideration could be given to using other mechanisms to encourage this, including the Research and Development Tax Incentive. An attractive collaboration incentive built into the scheme could significantly increase the level of engagement between universities and industry.

Flinders University recommends:

16. The South Australian Government to consider the potential benefit to South Australia of the introduction of a Research and Development Tax Incentive 'collaboration premium'.