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13 November 2020

**South Australian Productivity Commission Inquiry into Research and Development in South Australia Draft Report - submission from the University of Adelaide**

On behalf of the University of Adelaide, please find attached a submission in response to the SAPC Research and Development Inquiry Draft Report released in October 2020.

The University welcomes the opportunity to provide this feedback, and remains pleased to work with the Commission to explore or further develop new opportunities to improve the State's capability to attract investment and support innovative research.

Yours sincerely

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Deputy Vice-Chancellor and Vice-President (Research)

Attachment: University of Adelaide submission on the SAPC Inquiry into Research and Development in South Australia Draft Report.

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## South Australian Productivity Commission Inquiry into Research and Development in South Australia - Draft Report released 9 October 2020

### Submission from the University of Adelaide, 13 November 2020

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This submission is presented on behalf of the University of Adelaide by Professor Anton Middelberg, Deputy Vice-Chancellor and Vice-President (Research).

#### 1. SUMMARY

The University of Adelaide compliments the Commission on the considerable amount of work it has dedicated to the production of its draft Report. Overall, the document is well calibrated and the University is in fundamental agreement with its key messages and draft recommendation, and gives broad support for the findings of the Commission, which provide a sound view of the importance of R&D. It is good to see the recognition of the importance of both basic and applied research, and the acknowledgement that a long-term approach is often required to see research initiatives yield economic dividends. As a leading research-intensive institution, the University is entirely committed to building a strong, transdisciplinary and highly-competitive R&D ecosystem in South Australia.

In June 2020 the University of Adelaide provided a comprehensive submission to the SAPC Issues paper covering much of the scope of the draft Report. This current paper does not seek to reiterate the points made in that submission. Rather, we focus here on the primary messages of the draft Report, its draft recommendation, the principles and options outlined in section 7.2 ('the path to performance'), and selected information requests where it is felt additional input may be of value. The latter primarily relate to the research workforce, research infrastructure and commercialisation.

#### 2. INTRODUCTION

The University's research produces demonstrable benefits for the State, and it is a major contributor to State GDP. It underpins and contributes to the growth and development of key industries such as health and medicine, agriculture and food, defence and security, as well as informing and enriching policy-making and public debate in areas including social well-being. The existence of world-leading research in several areas also helps to attract major projects and investment into the State.

The key messages contained in the draft Report demonstrate a sound understanding of the challenges facing the State and its universities, in particular:

- The reliance of the higher education sector on its own funds for research spending, now exacerbated by the COVID-19 pandemic and its consequences, although noting that this is national problem.
- The importance of DST and CSIRO within the State and significant opportunities for capturing local benefits, combined with the value of State Government investment, e.g. in the South Australian Research and Development Institute. In fact, the University has had productive partnerships with all three organisations for some time, and there is considerable opportunity for these to be uplifted with assistance by the State in the context of investment at Lot 14 and the Waite Precinct, noting that the University has significant ambitions in both areas.
- The need for a framework to make informed choices among sectoral priorities within a longer timeline, replacing the 'policy churn' within State Government and 'limited evaluation of initiatives'.
- The challenge of attracting and retaining research leaders within the State.
- The importance of deeper business engagement with local research, and the ways in which the presence of high-quality research groups can assist in the translation of research.

### 3. REPORT SECTION 5: FACTORS AFFECTING R&D PERFORMANCE: CAPITAL

The draft Report discusses questions about the best way to deploy limited investment resources, noting that the Commission 'remains concerned about a bias to infrastructure'.<sup>1</sup>

A top priority for the University is the creation of leading-edge research and innovation outputs, requiring, foremost, world-class researchers and high-quality PhD students. This complements our education mission of graduating students well prepared to take on the world. These are our core missions - the conduct of outstanding research and education. All of our other activities are centred on enabling this process, in common with most leading universities.

Inevitably great researchers attracted to the State will require high-quality facilities and infrastructure to produce efficiently innovative and impactful outcomes. We recognise that infrastructure is an enabler of talent recruitment, although is not a guarantee of success. Thus, infrastructure is provided to support people (talent), and not as an end in itself. Of course, there are times where there are complicating factors, such as the need to build the Adelaide Health and Medical Sciences (AHMS) building to follow the relocated Royal Adelaide Hospital, but this will be an exception and not the rule. Fundamentally, infrastructure needs to be prioritised alongside Top Talent and other drivers, not considered in isolation.

As a research-intensive university, we are under-invested in research infrastructure overall, the AHMS building notwithstanding. To be successful in increasing our research productivity, the State needs to invest in the mutually-dependent talent and infrastructure. We need specific research infrastructure to attract and support strategically-chosen Top Talent, or we will be uncompetitive. Of course, infrastructure without the talent will also fail to deliver the required results. There is a central dependency relationship driven by people and supported by infrastructure.

One example is the Large Animal Research and Imaging Facility (LARIF) at Gillies Plains. This facility has some good, productive infrastructure (machines) located in buildings that are outmoded. If the University of Adelaide were to recruit researchers able to utilise this infrastructure for their research projects, as part of the process we would show them outstanding facilities at North Terrace e.g. AHMS/SAHMRI, and then show them the facilities at Gilles Plains and the connected capability at Roseworthy. If the University of Queensland (as an example) were seeking to recruit the same researchers, they would show them the outcomes of investment into infrastructure that is new and attractive across the entire research capability set. In the example of LARIF, Renewal SA has just extended the lease at Gilles Plains, whereas a longer-term, more comprehensive, whole-of-state approach might have been to re-locate LARIF to new buildings at Roseworthy to facilitate creation of a national-scale cluster which would be a much stronger value proposition for talent attraction. Similarly, investment into modernising infrastructure at Waite and to ensuring state-of-the-art capability at Lot 14 is needed to ensure the State is able to attract talent on a competitive basis.

The draft Report also rightly highlights the long lead-in time associated with research impact, noting that 'studies in the agriculture sector for example find lags of decades.'<sup>2</sup> While this is accurate, it is important to remember that ongoing investment into sustaining leading capability (e.g. at the Waite and Roseworthy agricultural precincts), is essential; short-term deprioritising of support can have long-term, adverse consequences.

In this same context, we agree it is important to align areas of research strength with industry structure while also noting the benefit of two-way ideas flow via high-performing teams. This thinking has led the University of Adelaide to prioritise areas of research that are most relevant to the State, including defence, health and biotech and agrifood, with partnerships in each of these areas. This is a recent change that will not yet have had an opportunity to impact on the data presented to the Commission, but it is a significant change that we feel will benefit the State in the longer term.

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<sup>1</sup> SAPC R&D Inquiry draft Report, p.19

<sup>2</sup> SAPC R&D Inquiry draft Report, p.174

### **Recommendation 5.1: Central information register of R&D infrastructure**

*The Commission recommends that the Office for the Chief Scientist, in regular cooperation with universities and industry develop, maintain and promote the extent of research and development infrastructure available for use in South Australia (including national infrastructure networks).<sup>3</sup>*

The University is very supportive of this recommendation, not only for reasons of efficiency but also to promote collaboration and planning for future development of infrastructure. For practical reasons, considering the thousands of pieces of infrastructure across the State, this register might be limited to significant items.

Additionally, as proposed in our submission to the SAPC Issues paper, we reiterate that this would be enhanced by the provision of collaborative State investment in enabling core research infrastructure, including the development of a long-term strategy and investment plan, noting that the Commission acknowledges the value of the research infrastructure roadmap to be developed by the Office of the Chief Scientist. This should include ensuring critical base infrastructure is housed in accessible, well-managed facilities that are set up for cost recovery and provide a wide range of value-add services.

The University welcomes the suggestion that the State Government should improve its engagement and alignment of priorities with the Australian Government, and leverage increased funding for R&D infrastructure assets supporting the needs of business. Understanding the needs of business is a critical first step, and the University supports the initiatives of the Chief Scientist in engaging with business to inform the development of the aforementioned roadmap.

The sharing of information about infrastructure capability between R&D organisations and business can produce some productive synergies. For example, the University of Adelaide has in recent years entered into an agreement with the [Silanna Group](#) whereby the latter has located a semiconductor fabrication facility on the University's campus, and the complementary facilities of both organisations are shared for research purposes. This collaboration has in turn led to further investment in Quantum Materials research infrastructure and the strategic recruitment of two world-leading researchers to grow a research program in this area.

The realisation of such opportunities is not simple nor guaranteed, but the mutual understanding of capabilities and priorities is the critical first step. The State Government is well placed to facilitate engagement and to coordinate sharing of information with a view to collaborative development of strategic research partnerships and infrastructure. It is worth noting in this context that the establishment of infrastructure must be supported by effective research partnerships, otherwise history suggests that the infrastructure will be under-utilised, and may quickly fall into obsolescence and disuse.

## **4. REPORT SECTION 6: FACTORS AFFECTING R&D PERFORMANCE: HUMAN CAPITAL**

There is no doubt that one of the main keys to delivering successful and innovative research outcomes is centred on having great research teams, led by inspiring researchers, working in areas of significant value and stimulation. Due to the highly competitive nature of world-class research, South Australia is often at a disadvantage in retaining and attracting new and innovative researchers due to a lack of critical mass, a lack of capacity to invest collaboratively in people and infrastructure (new buildings notwithstanding), and a lack of research areas having demonstrated critical-mass leadership.

The draft Report discusses the higher education workforce, noting the challenges facing the sector associated with succession planning, international competitiveness, collaboration, etc., and we welcome the indication that the Commission will consult further with stakeholders on important issues such as an industrial PhD program, bridging scholarships for early career researchers, State Government support for research skill positions with the public sector, and the benefits of a partnership between key industries, the universities and government to encourage recruitment of new students into research.

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<sup>3</sup> SAPC R&D Inquiry draft Report, p.123

While the performance indicators provided in Table EX1<sup>4</sup> show some positive trends (e.g. in publications and citations), the data concerning the trend in Academic Staff and associated decline in the share of Category 1 (especially) ARC income is a known problem. The draft Report also correctly notes the challenge that the higher education sector faces with the “retention of research leaders and growing the next generation of top leadership...”.<sup>5</sup> The University has identified the need for attracting and retaining talent in SA, and is working on this, while noting that this will become more difficult in the face of COVID-19 budget pressures.

In this context, the 2020 Federal Budget included an additional \$1B in 2020-21 to support university research. This is positive recognition of the heightened stress under which our researchers are currently working, and of the importance of research to our nation. While welcoming this 1-year investment, we know that the current funding system is unsustainable in the longer-term, particularly with the uncertainty surrounding international students. The challenge for universities is to work with government to establish a mechanism to ride through this together. The fact that Australia spends less on research than the average across OECD nations shows market failure. Ultimately it will have to pump more money into research, and this will only happen if the mechanisms linking all the stages of research work together more productively.

Assistance from the State in filling key capability gaps agreed between the University and Government would be welcome. For example, we believe that joint appointments should be fostered and the mutual benefits clearly articulated and managed. In the case of health and medical research, as an example, the University receives considerable benefit and impact from its titleholders and clinical staff and believes that the clinical interface can work both ways. While accepting the need for SA hospitals to deliver high-quality services, we believe clinicians should be provided with the opportunity to engage in research activities where feasible. They are most valuable as members of team-based applications where they can contribute to translation and impact, complementing the more fundamental research of university academics. This requires a strong collaborative ethos and an environment of mutual trust across the clinical and academic cultures. These research positions need to be embedded in core operations in the health system (i.e. through the Local Health Networks), but with connection to the University. A similar model might be applicable to the joint appointment of agricultural researchers between SARDI and the University.

We note the mention of the Veski Fellowship program by the Victorian Government<sup>6</sup>, and believe a strong recommendation from the Commission to create a similar program in South Australia is justified in this area. The Commission could also consider the model of the [Advance Queensland Initiative](#), launched in 2015 with a \$180M investment, which sees the Queensland Government working in partnership with industry, businesses, universities, startups, investors and the Queensland Chief Entrepreneur. On a national scale, one of the major publicly-funded programs to attract and retain the top researchers to and within Australian universities is the ARC [Australian Laureate Fellowship](#) program.

Additionally, a strong, research-intensive university will attract top international talent, which enhances the training available to the State in a range of disciplines. This in turn makes global innovations locally accessible. Thus, strong R&D efforts make an impact even if their direct research is not immediately applicable to products and services.

### **Information request 6.1**

*1. Enhancements to the platform to assist universities to advertise their funded postgraduate scholarships locally and internationally in one central location.*

The University sees this as being of marginal benefit. Our experience is that students seeking enrolment in postgraduate research degrees are sophisticated users of digital platforms and have no trouble identifying research institutions and supervisors and, in many cases, scholarships. A central repository of such information would present challenges in terms of maintaining the currency of the information, and could quickly become obsolete, if not duplicative. However, what would be of more

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<sup>4</sup> SAPC R&D Inquiry draft Report, p.14

<sup>5</sup> SAPC R&D Inquiry draft Report, p.16

<sup>6</sup> SAPC R&D Inquiry draft Report, p.157

value is a central location providing information about levels of research activity in the State, employment opportunities, and State strategy and programs to support the growth of research. Institutions could valuably link to such a website to help explain, particularly to international students, the local research ecosystem.

*2. Incentives for industry-linked PhDs to help increase the education levels of the workforce as well as improve and foster linkages between industry and universities for R&D.*

Our experience is that industry-linked PhD projects are highly effective in both developing business-related competencies and employment prospects of PhD candidates, but also in building relationships between industry and university-based researchers. For that reason, the University would support any measures that would increase the number of industry PhD projects that could be offered and their attractiveness not prospective students. Incentives could include top-up scholarships that would make it more attractive to commence a PhD instead of taking up a well-paid job. They might also include incentives to industry to help offset their costs of offering industry-linked PhD opportunities. There would be some value in any new scheme of focusing on organisations which have not previously engaged with universities in the context of PhDs. However, flexibility in the model of engagement of industry with PhD projects is important; one size does not fit all. So incentives should be structured to support various models of engagement.

*3. Growing support programs that extend beyond PhD scholarships, including support for postdoctoral studies and support for existing workers to undertake postgraduate studies.*

The University agrees that supporting traditional models of PhD candidature, while necessary, is not sufficient for rapid improvement of the research productivity of the State. In many respects, early career researchers are at the most research reductive phases of their careers, having trained and qualified as independent researchers and being relatively unencumbered by supervisory and management responsibilities. Investing in the attraction and retention of postdocs produces excellent rewards. Programs that would increase the number of postdocs in the State, especially if they are in roles that engage with industry and help support the training of further PhD graduates, would have multiple benefits. One aspect might be to work on opportunities for scale, such as employers working with universities to set up specific training centres within a business/government department.

On the other hand, it is also important to provide opportunities for existing workers to increase their research skills through postgraduate studies, particularly noting that South Australia falls below national averages in terms of postgraduate qualified employees. We consider that the ability for experienced workers to upgrade their education continuously throughout their careers is a critical enabler of an adaptable workforce in rapidly changing industries.

*4. Enhanced support in the future to take up and engage graduate researchers as well as enable employees with research skills within business to collaborate and interact with the research community.*

The draft Report makes numerous and well-founded references to the difficulty of achieving effective engagement between business and the research community. There are models of successful engagement operating within the State, but they are difficult and time-consuming to achieve, requiring considerable patience and the investment of significant resources. It is beyond the scope of this response to canvas the detailed measures that could be put in place, but we strongly support the notion that government has a role in providing support in the brokering and development of relationships, particularly in areas that are strategic priorities. The draft Report also notes the value of placing PhD graduates into business. This is the critical element seen in a number of the high-performing nations, e.g. Germany.

*5. Facilitating the placement of PhD graduates in projects and activities of strategic value to the state.*

This would be welcome for reasons that have been set out above. However, we would caution that facilitating placement should not be confined to projects that are of obvious strategic value to the State. PhD graduates, irrespective of discipline or project, acquire valuable skills of critical thinking, analysis, communication, problem solving, etc., that are highly transferable to domains of application

not directly related to the PhD topic. A PhD graduate is likely make a valuable contribution to the State and to their employer regardless of their thesis topic.

6. *The state government, as a major employer, supporting more research skill positions with the public sector.*

We believe that this is critically important. Particular in economically-challenging times such as we presently face, the State Government has a role in seeding and investing in activities that produce long term benefits for the State. Actively enhancing the research skills in the public sector, through the recruitment of new PhD graduates and upskilling of current employees, will produce an enhanced skills base that will ultimately flow out into business and industry. As more PhD educated employees take positions in the private sector, businesses will experience the benefits of employees with research skills and will be encouraged to further invest in PhD qualified employees. State Government, by supporting research qualified employees, can accelerate this process.

### **Section 6.2: Collaboration**

As mentioned in our submission to the SAPC R&D Issues paper, one of the biggest shared challenges for the University and the State is attaining critical mass. We need to aim for appropriate scale and focus in priority areas, collaborating where it makes sense for mutual benefit. In this context, the draft Report rightly acknowledges the importance of cross-sector collaboration as well as the challenges associated with the different cultures in business and the public sector. While not reiterating the details provided previously, we would make the following points in the context of this Section:

- Mechanisms are required that make the boundaries between higher education institutions and business much more permeable. These could include programs that make it simple and valuable to engage in expert exchanges.
- Collectively we need to encourage more research into R&D and university-business collaboration specific to this State, building on existing strengths (e.g. agriculture, defence, machine-learning, etc.).
- To generate scale beyond those organisations already collaborating, we need to ensure that a larger number of SMEs are ready to engage. This requires an understanding of what it means to be 'engagement-ready' and the development and funding of capacity-development/training. There is a clear role for Government in this process.

One small point worth making for clarification purposes relates to the following statement:

*The Commission notes that academic outputs are not the principal motivator in many collaborative models in Europe and the United States. This is a fundamentally different focus from the Australian context and sets these organisations apart in terms of collaboration strategies and outcomes.<sup>7</sup>*

This is not exactly correct as globally academic outputs such as publications are critical for advancement on the academic career ladder. The additional focus on societal impact is true, but that is also something that is not completely missing from the performance evaluation or grant requirements in Australia.

#### **6.2.4. Research institute and business collaboration outcomes**

A State Industry agenda, as described in Section 7.2, would provide a good setting for encouraging collaboration. Without it, collaboration will not reach the scale required to deliver the 3% increase in GSP the Government desires.

If commercialisation is defined as the process of development and delivery of new products and service to the market, then universities themselves do not commercialise the outcomes of research. As such, much of the effort expended by university commercialisation offices is on identifying companies and investors external to the university that have the capability and capacity to drive the commercialisation process. While commercial terms for access to the intellectual property will often

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<sup>7</sup> SAPC R&D Inquiry draft Report, p.170

include the payment of royalties as a percentage of sales back to the university, this financial return is often single percentage points, reflecting the early stage of development of such technologies, and the risk/reward taken by commercial partners and investors to back the opportunity through completion of pre-clinical development and clinical trials before it is approved for commercialisation.

Universities benefit more broadly from additional research income secured for further research on the technology (through grants or contracts with companies and consultancy arrangements with inventors) and, importantly, from brand/profile/reputational benefits from being linked to the successful commercial outcome originating from the university.

Rarely, if ever, is an outcome of research directly commercialisable without further investment into the development of the new product or service. As such, it is the commercial partners and investors that take on the financial risk and technical risk, amongst others, to deliver these new products and services to market. The aggregation of these risks means that success is never guaranteed, and consequently much time and effort can be invested in commercialisation of research outcomes that never make it to market as a new product or service.

Funding for IP protection and a proof-of-concept fund both represent a direct investment by the University to support this activity, where industry and investors are not yet ready and, thus, to support the successful translation of research outcomes. By the very nature of a university's business, this funding is limited and is required to service opportunities across the breadth of research activity at the University. However, in recent years the University has contributed over \$3M to promising early-stage technologies from our Commercial Accelerator proof of concept fund, in addition to IP costs, and we have also leveraged this investment to secure millions more from venture capital, angel investors and commercially-focused support programs provided by Government.

A great example of what can be achieved through funding, commercialisation and support is exemplified by Amaero International Limited. This is an Australian-based company, initially spun-out from Monash University, which manufactures large-format, complex components in metal with laser-based additive manufacturing processes, commonly known as 3D printing. Amaero has worked with many of the world's leading manufacturers of aerospace and defence products in both an R&D and manufacturing capability. The University of Adelaide worked with the SA Government to secure a grant to establish 3D metal-additive printing capabilities. We then partnered with Monash University and Innovy to integrate these capabilities into Amaero, through the establishment of a strategic partnership to manage the University's 3D metal-additive printing facility at Edinburgh, whilst maintaining access to the facility for research. Amaero was guided and mentored through the SA Innovy Institute's Advance Materials and Manufacturing Program, leading to an oversubscribed \$8M IPO in 2019. The company has a current market valuation in excess of \$100M.

While the University invests in IP and proof of concept funds across the institution, the level of funding available limits the number of projects that can be supported to the 'development' phase. The point at which traditional funding sources can progress research will only get them so far along the technology readiness scale, which is often far too early for equity investors. As such, there is a considerable gap that could be addressed through a revised grant funding initiative that is government-led.

In the past, the SA Government supported Bio Innovation SA (BioSA) as a dedicated granting body to support growth of the biotech industry in SA and Health and Medical research commercialisation from the State's research institutions. In more recent years, this group was re-branded to TechInSA and the remit extended beyond biotech to include engineering, software and agriculture-related project opportunities. The funding that this organisation administered was specifically targeted at this first 'valley of death' with the aim of supporting new technologies from SA to be investor ready. Filing more patents, together with greater access to development funding helped to build a pipeline of significance. This led to new companies being created, and national and international companies attracted to the State for partnerships and access to the IP and research expertise in our universities.

We acknowledge and commend the existing investment by the State in the Research Commercialisation Start-up Fund. However, this funding is limited, is positioned to support all industry sectors and is not readily available to universities to bridge the 'valley of death'. Company structures are required to receive grants. Overall, what is lacking is funding at scale to support more new research breakthroughs, to get further down the development path. Access to such funding



would see more new research breakthroughs developed locally, reach the point of further investment by companies and/or investors to commercialise these outcomes and deliver new products to market.

In previous reviews of the State's ability to translate research outcomes from universities, it has been proposed that a 'single commercialisation office', or the like, would be the solution. This is not the case. The creation and capturing of new IP are not the bottle-neck, and trying to centralise this process would be overly complex in creating unintended legal complexities for the root cause of what we are trying to solve as a challenge in the State.

As rightly highlighted by the Commission in the draft Report, access to capital and commercialisation skills are barriers. The BioSA model provided access to both. While it focused on Health and Biotech, a similar model for non-health and biotech industries would be equally valuable. The aim of such a renewed approach could be to:

- Make available greater proof-of-concept funding to the State;
- Provide a greater opportunity to leverage university-funded proof of concept funds;
- Attract and leverage investment into SA from interstate and overseas;
- Create a pipeline of technologies that could be commercialised through creation of new start-up companies and attract national and international companies to the State;
- Seed a broader local industry and provide an investable pipeline of opportunities for the SAVCF, and other investment venture capital funds;
- Provide experienced staff that can undertake 'independent' due diligence on projects to assess their commercial merit; and
- Provide experienced staff to support 'matchmaking' for companies and investors from around the world to learn about SA developed technologies. This team of staff could:
  - identify opportunities for collaboration and joint commercialisation of IP; and
  - over time, lift the level of experienced managers to run this process who will go on to lead new companies and investment funds in the State.

Further to this is access to investment capital. There is considerable interest from high-net-worth individuals and family offices to invest in technology development. However, there is currently no platform or mechanism for them to do so in a sophisticated or coordinated manner. This opportunity goes beyond the current 'angel investor' activity in the State, where an opportunity exists to create a fund of scale for this purpose with support from Government and larger institutional investors.

## 5. REPORT SECTION 7: CONCLUDING ANALYSIS AND WAYS FORWARD

### 7.1.4 Assessment of SA Government R&D policy and links to productivity

The draft Report includes discussion of research precincts and raises the idea that:

*If virtual precincts and virtual collaboration are now becoming more culturally acceptable, viable and potentially normal amongst modern knowledge workers, then the cost of virtual vs physical precincts must now be part of their assessment.<sup>8</sup>*

While we agree that the virtual nature of some research activity is valid, efficient and growing, it must be pointed out that a considerable amount of research of importance to the State, for example, Agriculture and cutting-edge, multi-disciplinary research in defence and medicine, requires enabling infrastructure. Thus, the Waite, Lot 14 and Adelaide Biomed City precincts remain important to the University's future.

For example, as mentioned in the University's October 2020 response to the SAPC Health and Medical Research (HMR) Inquiry draft report, while there have been strong efforts to promote the (North Terrace-focussed) biomedical precinct, the precinct has yet to deliver as an interconnected and collaborative ecosystem. To be successful, this has to generate a new focus on excellence and a different model of collaboration, not just within the Adelaide area, but also between centres of excellence and regions. We need precincts of innovation and excellence linked to a distributed system which encompasses both patients (e.g. via the University's Adelaide Rural Clinical School with multiple rural training sites across the State) and capabilities (e.g. the Australian Institute for Machine Learning on North Terrace utilising artificial intelligence to support biomedical research). The

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<sup>8</sup> SAPC R&D Inquiry draft Report, p.178

University of Adelaide believes there is considerable merit in a two-precinct HMR approach with all of their various partners, and focusing clinical research primarily around Adelaide's two largest hospitals and its two medical faculties/schools. These latter elements are critical for attracting and retaining the clinical researchers who are at the heart of what we do, and who by extension draw from outside these precincts related and supporting areas including allied health, digital capabilities, engineering medical technology and drug delivery, as well as capitalising on existing capabilities within the precincts such as pharmacy, food nutrition, physiotherapy, etc.

The draft Report, in considering the contribution of SA R&D policies to impacts, notes the interaction of State Government programs with research institutions and states that:

*the Commission finds that despite a number of announcements of good intentions in this respect, there has been little progress or impact.<sup>9</sup>*

While we appreciate that identifiable impact is usually a long-term operation, it should be noted that we have seen excellent progress in our partnerships with numerous SA Government agencies. For example, the University of Adelaide has a very close partnership with SARDI (under a Strategic Research Alliance Agreement). Recent examples of progress in this relationship are the lodging of a joint submission to the ARC Industrial Transformation Research Hub for value-added, healthy oats valued initially at \$7.68M over 5 years, and an application to the ARC Industrial Transformation Training Centre scheme for Accelerated Future Crop Development, valued at ~\$10M over 5 years, which will deliver the next generation of researchers and industry professionals with skillsets to capitalise on the lifting of the GM moratorium. Parallel activity includes the establishment of a new GM and gene editing trial field site, and joint-leadership in the application of machine learning to monitor and improve crop breeding and productivity in partnership with the Grains Research and Development Corporation.

### **7.2 Path to performance**

In this section of the draft Report, the Commission proposes six principles 'for lifting the productivity and allocative efficiency of the state's R&D policies and programs...'. In the context of a rapidly-changing, globally-competitive environment, and the need for scale and focus on research excellence, the University agrees with the principles outlined in this section, namely:

*simplicity, accountability and transparency, as well as contestability and collaboration, plus the adoption of a longer time horizon in the context of relevant risk management systems.<sup>10</sup>*

The University is supportive of the need for a purposeful framework developed in consultation with all the major stakeholders.

In particular, a customised, open and contested regime is widely regarded in research as being best practice, although it is also important to recognise that a baseline of activity is needed and often comes with a fixed cost. Thus, the level of available contestable funds would be expected to be larger when the overall budget is larger. For example, in Agriculture maintenance of even a baseline biosecurity R&D effort will be necessary and will scale more with the size of the state rather than the total R&D spend, meaning there will be less proportion of the budget available to be contested overall. This means that a direct comparison of SA with larger states is a non-trivial exercise.

Another point to consider is that open, transparent and ambitious 'grand challenge' competitions administered by government are a successful model used in countries such as the United States. This model of investment allows researchers to understand the research problem, pitch their best ideas in an open process and demonstrate new capabilities as they arise in the course of meeting these challenges.

### **Options for a better R&D architecture**

The draft Report rightly discusses the need for strategic leadership and sets out three options as a way of facilitating "a more robust, strategically framed and accountable whole-of-government

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<sup>9</sup> SAPC R&D Inquiry draft Report, p.179

<sup>10</sup> SAPC R&D Inquiry draft Report, p.181

approach to the state's R&D activities to lift their productivity." It then provides three options for discussion (noting that they are not incompatible):

- Option 1: Minister responsible for R&D strategy and performance
- Option 2: An independent advisory body
- Option 3: A strategic R&D committee of senior officials.

The University believes that each of the three options has merit, and we agree that they are not mutually incompatible and a proper model of accountability across government and at the ministerial level could be usefully developed. The idea, as stated in the draft report, that 'elevating and consolidating strategic decision-making within the architecture of government would go a long way to sharpening the efficacy of SA R&D policy' should be a key recommendation.

A single Minister for overseeing the coordination of R&D effort and investment would raise the profile of R&D activities within the State Government, while also providing a single point of contact for people in the sector. Whether this Minister should be created in addition to, or morphed into, the existing Minister for Innovation and Skills, is a point for further consideration by the Commission, given the strong overlap of portfolios.

We agree that having this governance will create better connectivity and scale in initiatives, but we need an equally clear governance arrangement for signalling the growth missions for each sector. The draft Report acknowledges that for research to grow, GSP it needs to be paired with the State's Sector Growth Plans. However, for the research governance arrangement to deliver the intended benefits, it needs a harmonised industry governance arrangement that builds on the longer-term goals/missions to guide research focus, particularly in the sectors of agriculture/food, health and energy.

This arrangement could be combined with an independent advisory board which could assist and support the Minister in driving policy. It should comprise skills-based members from outside of the primary stakeholders. This board would be tasked with identifying common 'goal posts' enabling solutions that cut across sectors (e.g. supply chain/provenance, digital enablement, manufacturing etc.). In addition to the priorities for each vertical stream, this would enable targeted calls for research proposals and teams that can work toward these goals/missions with the understanding of how competitiveness will be enhanced for these sectors over time. Taking a mission/goal-based approach will necessarily drive interdisciplinary research and create the conditions for the development of yet unknown innovation, focused on real challenges linked to growth rather than incrementally improving on what we have; and in turn increasing the likelihood that we will grow our share of genuine breakthrough innovation to drive the global competitiveness and export opportunities for our key sectors.

Similarly, a senior group of government officials (e.g. the Chief Scientist, the Chief Public Health Officer) would provide an additional input, assisting to facilitate one of the critical points, namely that there is a joint approach across government departments.

The draft Report proposes three key elements be incorporated in the management of all these options:

- Independent review of performance
- Regular consideration of opportunity costs
- A focus on people.

The idea of an independent review of performance is broadly sensible, although it relies on the efficacy of the associated measurement targets. As mentioned elsewhere, these should be aligned with traditional, global metrics for research quality. However, they should not set unrealistic or unachievable goals as this can work against desired performance outcomes, and need to be part of a broader goal of building an innovation ecosystem of a scale consistent with the parameters of South Australia.

On the second element, the draft Report states that:

*“the overall process would be driven by an innovative philosophy to R&D policy to seek savings and efficiencies (e.g. pursuing cheap and flexible virtual precincts rather than costly physical precincts) as well as having expectations of research excellence.”*

While it is always appropriate to seek efficiencies and a focus on research excellence is essential, the general principle of less investment but higher expectations will not necessarily lead to growth in R&D. Research institutions (especially in a small state such as SA) need to be able to work together in a way that optimises synergies, but allows focus on specialised or niche areas of excellence.

The third element, ‘a focus on people’ (i.e. high-performing researchers), is definitely an important component in the strategic R&D framework. As described more fully under point 3 above, a top priority for the University is the prolific generation of leading-edge research and innovation outputs, requiring, foremost, world-class researchers and high-quality PhD students. To be successful in increasing our research productivity, the State needs to invest in the mutually-dependent talent and infrastructure. We need to encourage a ‘people-focussed’ view that includes how to support those people with infrastructure, technical staff, good laboratory spaces, etc., and these discussions are very helpful to have at the State-level, since they can establish resources that are used and supported by many stakeholders in an efficient manner.

- Ends -