THE UNIVERSITY of ADELAIDE

Inquiry into the performance of the Department of Defence in supporting the capability and capacity of Australia's defence industry

Submission

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make history.

1 Background

The University of Adelaide (University) is a research-intensive university, distinguished by its international reputation and commitment to innovation and excellence in research and teaching. As a member of the Group of Eight, a coalition of Australia's most research-intensive institutions, the University is a destination of choice for highly talented researchers, students, government and industry partners.

The University has a long history of 'collaborative innovation' that benefits our partners, our state, our nation and the global community. It is a value that we hold dearly and one that is central to our goal of making history. The University works extensively with the Department of Defence and defence-related organisations in a variety of ways - as an advisor, research partner and producer of high-quality, career-ready graduates equipped to make our world a better, and more secure, place.

In the spirit of that collaboration, the University has established a number of Research Institutes with the Defence and Security Institute (DSI) being one of these. Headquartered at Lot 14, South Australia's high-tech hub for innovation and entrepreneurship, the DSI ensures the university's capabilities are relevant, readily identifiable and accessible and is the primary point of contact for accessing the defence and security research and education capabilities of the University.

The DSI works closely with its key stakeholders to identify and facilitate long term strategic partnerships and transition research into product and practice. These partnerships help to achieve national security goals and the development of world leading capabilities and industry in South Australia.

The following submission, prepared by Professor Michael Webb, Executive Director DSI, is in response to the Senate Foreign Affairs, Defence and Trade Legislation Committee inquiry into the performance of the Department of Defence in supporting the capability and capacity of Australia's defence industry. The response takes the view that academia is a critical element and contributor to the "defence industry".

2 Terms of Reference

2.1 Support to Australia's defence industry in meeting the current and future needs of the Australian Defence

Sustained engagement and resourcing are critical for universities to meet the current and future needs of the defence sector. Without an enduring and collaborative relationship, capacity and capability risks are introduced that cannot be mitigated, or dealt with, in a timely or effective manner.

Two initiatives from the 2016 Defence Industry Policy Statement, the Next Generation Technology Fund (NGTF) and the Defence Innovation Hub (DIH), have enabled a step change in scale and focus for the university sector in areas of high priority for Defence. In relation to NGTF, some of these emerging areas of strength have enduring priority under the AUKUS Advanced Capabilities[1] identified by AUKUS partners (Table 1). It remains unclear whether or not support for research established under NGTF and DIH initiatives will persist, thus introducing capability and capacity risks.

The Defence Science and Technology Groups (DSTG) "More, together" strategy seeks to activate Australia's broader innovation system to serve Defence science and technology objectives. In practise, the promise of strategic partnering arrangements has encouraged significant co-investment for sustained research and innovation activity. However, the university sector will require that commitment to be matched and sustained by Defence to deliver sustained outcomes.

A positive illustration of this is the strong support provided by the Defence sector for the circa $240 million Defence Trailblazer program, which is being led by the University of Adelaide in partnership with the

[1] https://pmtranscr pts.pmc.gov.au/s tes/defau t/f es/AUKUS-factsheet.pdf

University of New South Wales, Department of Education, Skills and Employment (DESE), and circa 50 industry partners. Defence support to Defence Trailblazer is being provided at two complementary levels: DSTG are providing technical leadership, and Vice Chief of the Defence Force (VCDF) Group[2] is providing support with governance. The high level of industry engagement and commitment, circa $130 million, provides a very strong indicator of the appetite in industry for closer partnering with universities to develop and deliver capability for the Australian Defence Force.

Table 1. Priority Technologies showing where alignment exists.

NGTF Priority Areas	AUKUS Advanced Capabilities	Defence Trailblazer
–	undersea capab t es	–
quantum techno og es	quantum techno og es	quantum mater a s, techno og es & comput ng
trusted autonomous systems	art f c a nte gence & autonomy	robot cs, autonomous systems & AI
cyber	advanced cyber	advanced cyber techno og es
hyperson cs and d rected energy	hyperson c & counter hyperson c capab t es	defens ve hyperson cs & countermeasures
advanced sensors	e ectron c warfare	nformat on warfare
space	–	defence space techno og es
ntegrated nte gence, surve ance & reconna ssance	–	–
med ca countermeasure products	–	–
mu t d sc p nary mater a sc ences	–	–
enhanced human performance	–	–

2.2 Role providing and supporting opportunities for adjacent industries to contribute to the sustainability and viability of Australia's defence industrial capability.

Within universities, both education and research programs that deliver high value outcomes require sustained commitment from stakeholders (industry, government, students and employers) as well as sufficient scale to be viable. With sustained commitment, the university sector can strive to meet the workforce needs of Defence and defence industry and provide cutting-edge scientific impact. Neither education nor research programs can be sustained with intermittent support.

2.3 Work to address the reliance of Australia's defence industry on inputs, be they tangible or intangible, from abroad and key capabilities that could form the basis of targeted exports.

An example from the semiconductor industry illustrates one of the challenges experienced in seeking to reduce reliance on offshore supply chains and in building strong export potential for Australia.

Australia's sole semiconductor manufacturer, Silanna Semiconductors (Silanna), has its research and development laboratory hosted on the University of Adelaide's North Terrace Campus. This enables a dual value proposition – "know-how" from Silanna to the University, and the opportunity for postgraduate students (i.e. workforce) at the University to work alongside Silanna. Arising out of this confluence of shared value are opportunities for Defence capability. One of those is with RF GaN technology, which incidentally, underpins CEA Technologies radar technology[3]. RF GaN technology is currently sourced from the United States of

[2] AVM Robert Denny, Head Force Integrat on, VCDF Group.
[3] https://www.cea.com.au

America. Although the capability to design and manufacture RF GaN devices exists in Australia, identifying the right champion to capitalise on this opportunity has proven elusive.

The difficulty may arise from the nature of the market for high performance, low volume, defence products. To establish a sovereign defence semiconductor capability in high performance semiconductors, significant upfront capital investment is required. Once established, such a manufacturing capability could be self-sustaining, and would have significant export potential. A proposal with support from Silanna Semiconductors, the University of Adelaide, and CEA Technologies, ultimately failed to gain traction with defence or Government more widely. Although there was no shortage of interest in the proposal, there was no mechanism to realise the opportunity.

This example illustrates the need for a framework that supports (at least initially) foundational capabilities for areas of high sovereign risk.

2.4 Defence Partnerships (including AUKUS) that enhance Australia's defence industrial base.

While the AUKUS initiative is still relatively new, there has been substantial and positive engagement with defence in relation to AUKUS Pillar 1, the nuclear-powered submarine enterprise. The Nuclear-Powered Submarine Task Force (NPSTF), now the Australian Submarine Agency (ASA), has been particularly proactive in its outreach to the university sector, allowing it to orient itself to the anticipated workforce needs in terms of both curriculum development and research. It has also enabled the establishment of meaningful international partnerships with US and UK universities.

The Advanced Capabilities identified under AUKUS pillar 2, has to date delivered less engagement. Although there is substantial overlap with NGTF priority areas, there are no clear indications from defence that capabilities in the university sector developed with NGTF support will continue. The University has two clear examples of capabilities in this area, including advanced cyber technologies and quantum technologies. While in both cases the University has leveraged the defence funding with investment from industry and elsewhere, defence support provides the foundation, without which, these capabilities are not sustainable at scale.

2.5 Design and Implementation to improve defence industry's capability and capacity.

The right design and implementation can combine to enhance the ability of an innovation system to thrive. Two challenges for the Australian defence innovation system in terms of design and implementation include.

1. Defence Procurement policy challenges the establishment of sustained capability and capacity in the university sector. These challenges often manifest as a transactional mindset that fails to value the strategic nature of specific investment decisions or the decision making of those benefiting from the investments. For example, in advanced cyber technologies, the University has three separate NGTF agreements in place, which it has used to leverage additional funding from the Australian Research Council, industry, the South Australian State Government and internal university funding. The transactional approach leads to these scaled up developments not being recognised or valued, and they therefore remain vulnerable to unpredictable developments in the system. The new Advanced Strategic Capabilities Accelerator (ASCA) is one such development. While a timely and welcome evolution, with its enhanced clarity of purpose and sense of urgency, it is not clear whether in the transition from an NGTF oriented system to one dominated by ASCA, that extant capabilities underpinned by NGTF will survive.
2. A characteristic of a successful innovation system is one where the "distance" between end users and those innovating in support of the end users, is small. Both industry and the universities highly value direct interaction with defence operators with the insight this provides. The procurement system, and

at times, elements in the innovation system, can work to block such interaction. This kind of dysfunction is particularly unhelpful if the urgency of a need demands an accelerated path to delivery.

2.6 Designing in resilience:

The Australian defence innovation system lacks the complexity and richness of the US system. This is not merely a result of difference in scale, but also of structure and appetite for risk. For example, the USA's University Affiliated Research Centres (UARC) embody a strategic decision to ensure that scale and focus in specific areas of priority are sustained with trusted partners. The US has 14 such UARCs: e.g., the John Hopkins Applied Physics Laboratory (APL)[4], and the Applied Research Laboratory for Intelligence and Security (ARLIS)[5] at the University of Maryland College Park. Given the scale of investment at one or two of Australia's universities in defence science and technology, and the willingness of some universities to adopt a strong security posture, such a UARC model would assist in alleviating the adverse impact of a transactional approach to partnership. The ability to deliver high impact results demands sustained scale and focus which a UARC-type model can ensure.

[4] https://www. huap .edu
[5] https://www.ar s.umd.edu