

Defence Submission to 2023 Universities Accord Discussion Paper

Background:

1. Defence Science and Technology Group (DSTG) is Australia's second largest publicly funded research agency led by the Chief Defence Scientist and is part of the Department of Defence. DSTG is central to Australia's Defence and National Security through its capacity to reduce and mitigate strategic and operational risks and to create and maintain a capability edge. It does this by providing specialist advice on technology and innovative technology solutions, as well as by shaping and harnessing the broader R&D ecosystem.
2. Defence, as a substantial end-user of R&D plays a unique and foundational role in driving impactful outcomes. Defence challenges and opportunities sponsor many research activities across the university environment ranging from the physical sciences to humanities and social sciences. Defence's innovation programs engage with both the university and industry sectors to translate research into new capabilities. *More, together* Defence's science and technology strategy provides focus for research and development activities to align with Defence's priorities, and aims to grow scale in key areas of national priority for defence and national security. This focus can assist universities strategic positioning provided that it is supported by complementary policy settings.
3. Defence also closely engages with the higher education sector from a skills and training perspective, as the organisation requires a highly skilled workforce to successfully perform its core functions across both the Australian Defence Force (ADF) and its civilian groups. Ongoing and future acquisition programs such as the delivery of nuclear powered submarines will increase demand for a STEM qualified workforce, ranging from technical trades through to PhD qualified and experienced researchers. It is vital further work explores how best to align the skills and training offered through the higher education sector to the new and emerging challenges Australia's future workforce will need to face.
4. Defence notes Australia's higher education system is increasingly facing challenges in response to the continuing effects of the COVID-19 pandemic, the rapid pace of technological change, an increasingly uncertain geostrategic environment and a challenging fiscal outlook. Therefore, the development and agreement of an Australian Universities Accord (*Accord*) is crucial to ensure Australia's higher education system is aligned with national needs, and is well placed to address challenges likely to be faced into the future.

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5. It is in this context Defence makes the following submission in response to the *Accord* discussion paper and addresses those questions of greatest relevance to Defence. This submission is broken down into the following three broad sections:
 - a. Overall structure of the higher education system;
 - b. Research in the higher education sector; and
 - c. Higher education skills and training.
6. Finally, Defence makes a number of recommendations for the most important reforms.

Overall structure of the higher education system:

7. Australia is increasingly facing complex and multifaceted problems, requiring input from a range of stakeholders. Support to the higher education sector has not always considered and incentivised the need for coordinated and collective action in the face of challenges of national priority. Enabling the alignment of the sector and specific universities with national missions will assist in ensuring focus of effort. The *Accord* can assist by ensuring appropriate policies and structures are in place to address these critical challenges.
8. In addition to the challenges facing Australia's higher education sector relating to 'skills and training' and 'research', the *Accord* also needs to address fundamental issues relating to overall structure of the higher education system. Some of the most pertinent issues include ensuring the appropriate size and mixture of higher education providers to support an effective and efficient higher education system, as well as how to ensure its overall and continuing financial viability.
9. The increasingly challenging fiscal environment Australia is facing and the unpredictability of global developments means it is vitally important to ensure the alignment with national missions and benefit to maximise the impact of the investment the government makes in universities. The 2015 National Science and Research Priorities acknowledged the country's "...capacity to support research is finite"¹, similarly the capacity to support other aspects of the higher education system is also finite. Therefore, it is important to ensure the *Accord* clearly articulates the role of each part of the higher education system and how it contributes to a successful and prosperous country. Furthermore, the *Accord* could consider how to more effectively cover the full cost of research, particularly where aligned to the national missions.
10. As a geographically large country, with a dispersed population base it is vital to ensure there is the appropriate mix of institutions catering to the needs of local communities and tackling national challenges. Regionally based institutions play a crucial role in increasing the

¹ 2015 National Science and Research Priorities – <https://www.industry.gov.au/publications/australias-science-and-research-priorities-2015> [Accessed 20 March 2023].

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knowledge and skills base of these communities by addressing barriers that may prevent participation such as the need to relocate to larger population centres to continue studying. Additionally, being regional means the knowledge and skills obtained can better reflect the needs of local communities.

11. Given these circumstances, increased specialisation/differentiation in the higher education sector would be more appropriate. The benefit of a reform which prioritises the courses/degrees best aligned to the needs of national missions and being able to focus this down to local centres of expertise would ensure resources are being directed to where they will achieve the greatest impact. This can increase the availability of resources for investment in priority areas through the reprioritisation of funding. Having more targeted research programs would ensure broader national challenges are being addressed, through focus, and allow for a greater allocation of available resources into areas that will provide the greatest benefit.
12. The impact of the COVID-19 pandemic on international student numbers and the resultant significant downturns in university revenues is a commonly known danger. It is important to understand these risks are broader than purely financial/economic, particularly in the current geopolitical climate. These include potential security risks from some international student cohorts undertaking specific courses/fields of research and the potential risk of foreign interference through access to universities' information and systems. Therefore, it is crucial the *Accord* considers and articulates how the international student market should contribute to the sustainability of Australia's higher education system, whilst remaining cognisant of the potential risks outlined above.
13. The pandemic has also highlighted the importance of providing students a high quality educational experience and employment pathways following course completion. The work developing the *Accord* should investigate whether appropriate policy settings are in place for student and bridging visas, and whether there should be increased opportunities for post-completion employment as a mechanism to obtain the greatest return on the nation's investment.
14. Given the diversity of stakeholders across Australia's higher education sector, it is crucial to gain key stakeholder agreement on its mission and broad design. As the intention of the *Accord* is driving long-lasting alignment between the higher education sector and national needs, it should be structured as a series of agreed principles/actions underpinned by a set of targets against which success can be tracked and measured.

15. These targets should focus on the most critical challenges for the higher education sector including improving access to and attainment of higher education qualifications for under-represented populations and promoting a culture of collaboration and excellence in research endeavours. Whilst these topics will be discussed in greater detail later in the submission, it is important to emphasize the ability for Australia to access the widest possible and most highly skilled workforce is dependent on removing barriers preventing access and participation in the higher education sector. Likewise research excellence is required to address Australia's greatest challenges and noting the finite capacity to support all fields of research, it is vital increased collaboration across industry and university is encouraged and supported to achieve the greatest possible outcomes.
16. It is also important to imbed a formalised reporting and review mechanism within the *Accord* to track the progress meeting agreed targets, ensure the structure of the higher education system remains fit for purpose and allow for the development of policy interventions in response to emerging and critical issues not anticipated by the original *Accord*.

Research in the higher education sector:

17. Australia's strong performance in fundamental research is widely acknowledged, producing 2.7% of the global scientific output despite accounting for the less than 0.5% of the global population, and 85% of Australian research rated at or above world standard². This success is not reflected as strongly in translational and commercialisation outputs. Ambitious and long-term transformation solutions are required for both of the university sector and Australia's industry structure and culture. The opportunity before us is for the *Accord* to set out a pathway to encourage facilitate and reward increased collaboration and deep partnerships between universities, industry and Government to tackle and solve the nation's biggest challenges.
18. As Australia's second largest publicly funded research agency, DSTG is engaged across the entire R&D lifecycle, from conducting fundamental research to its translation and commercialisation to provide leap-ahead capabilities for the ADF. We know from deep experience that we can most effectively break down these barriers when the researchers conducting both fundamental, and more applied, research are working in close collaboration with the partners/end-users who stand to benefit from its translation to tangible outputs.

² University Research Commercialisation Action Plan, <https://www.education.gov.au/university-research-commercialisation-package/resources/university-research-commercialisation-action-plan>[Accessed 20 March 2023]

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19. Defence believes the scale, excellence and impact of R&D activities can be improved through the utilisation of a mission-centric approach. These missions would be designed to encourage large scale research efforts focussed on achieving ambitious shared goals, and bringing together key stakeholders to deliver tangible outcomes in response to critical challenges. For this to be effective, however, these missions need to be delivered in close partnerships between universities, industry and government. This is a more empowering and engaged (and effective) approach than the traditional approach of publishing priorities lists, which do not serve to build the partnerships that create translation pathways or change cultures as is required to achieve tangible outcomes.
20. One of the initiatives Defence is involved in and strongly supports being implemented more widely to support increasing research collaboration, is the concept of **collaborative research precincts** such as the Australian Hypersonics Research Precinct and the Defence High Performance Computing Facility. These precincts increase the depth of the talent pool and skills of researchers available to tackle challenges of national importance, developing research capabilities over and above what is commonly available to any single stakeholder. Critically, these precincts also allow for the development and pooling of specialised research infrastructure. Research infrastructure allows the research community to bind together, spurring further innovation. Research occurring within the context of research precincts that align to national priorities should be incentivised by either financial or eligibility mechanisms. This could take the form of specific funding rounds/opportunities for which the participation of multiple stakeholders to tackle identified areas of national priority, utilising national precincts, are part of the grant guidelines. It is vital an effective coordination mechanism accompanies the wider implementation of precincts to ensure there is a nationally coherent approach, minimising duplication of capabilities and facilities. Such an approach would help foster an improved culture of collaborative research and aid in reducing competition, more effectively using scarce resources to tackle challenges of national importance.
21. The development of these collaborative research precincts can also benefit stakeholders by better understanding where their comparative advantages lie in relation to capabilities and facilities, and drive increased specialisation and differentiation to capitalise on these advantages. In relation to universities, this could assist in better articulating how their unique operating context extends to their research efforts, in addition to a skills and teaching perspective.

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22. Whilst Defence does not believe this collaborative research precinct model focussing on commercial outcomes should be mandated for all supported research activities, it can play an important role in achieving excellence, scale and impact in fields of national importance.
23. Ultimately, one of the most significant factors determining the success of a program of R&D is the availability of highly skilled and qualified personnel. This includes encouraging the pursuit of higher research degrees at universities, through paying a living wage to those undertaking such degrees, and ensuring that future careers, whether in universities government or industry, are available to those who graduate. The *Accord* needs to prioritise aligning the skills and knowledge gained during research training with those required in industry, government and academia. Increasing the number of industry-based research programs is one initiative which will provide a close to real-time assessment of whether the skills and knowledge being obtained during higher degree research programs are appropriate to tackling the research challenges facing industry today. Ultimately, one of the critical enabling factors that will drive the structural and cultural challenges we need in Australian industry is greater absorptive capacity of research-qualified people within industry. Linking the size of the block grant pool to the number of PhD qualified researchers employed in industry would certainly drive energy into this critical space.
24. Increasing mobility between sectors. DSTG has great interest in increasing the mobility of talent across the entire research and development pipeline to ensure government has access to the widest possible talent pool, and to uplift the collaborative capacity across the system. One concrete initiative delivering mobility is the NAVIGATE program. This program is, in essence, a mid-career graduate program - a dedicated science and technology pathway designed to enable high performing STEM specialists to transition into the complex area of Defence science and technology, with participants given the opportunity to work within Defence or with its partners in industry and academia. It is the development of these types of linkages across a range of sectors which allows DSTG to successfully leverage off the capabilities of partners, and is something the *Accord* should seek to encourage right across the higher education sector.
25. Finally, it is imperative the *Accord* acknowledges and addresses the risks to R&D activities, and knowledge and skills developed during the course of research training as a result of the current climate of geopolitical and geostrategic competition and the increased risk of foreign interference. The highly disruptive nature of technologies with defence and national security implications and the potential for dual-use technology development, means any associated R&D activities must be protected and secured through appropriate mechanisms, such as

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developing and implementing robust security frameworks. As an example, Defence requires universities to become members of the Defence Industry Security Program, which provides practical support for universities and industry to understand and meet their security obligations when delivering Defence projects and contracts. Further, through internal Defence sensitivity and risk assessments of potential research collaborations and a set of standard contracting templates with universities, the Defence Science Partnering Deed, we are able to implement relevant security measures for the research being undertaken. Additionally, by prioritising the development of trusted partnerships, Defence can access the best scientific expertise, technical capabilities and infrastructure in an appropriately secured environment, and be assured of the reliability and responsibility of its collaborative partners. Having robust safeguards in place to protect information is also crucial from an international perspective. Defence assures safeguards through the Defence Research Innovation and Collaboration Security policies and procedures. Not only does it assist developing stronger collaborative linkages with our allies from an R&D perspective, but also assists in potentially gaining access to capabilities and technologies Australia does not have the capacity to develop/produce in isolation.

26. It is also important that intellectual property generated from R&D activities is appropriately protected, but not unnecessarily overvalued – it is critical that end-users have more agile, straightforward and financially attractive routes to commercialisation. The use of standard IP agreements, as well as clearly articulated expectations that research plans incorporate pathways to translation (and end-users) from the start would be a significant step forward.

Higher education skills and training:

27. It is vital the higher education sector remains responsive to the current and future needs of Australia's labour market, and ensures graduates are entering the workforce with the appropriate skills and knowledge. Higher Education providers need to demonstrate how their degree offerings meet employer requirements. Universities need to understand the skills and knowledge requirements of industry and government and how these requirements may be impacted through the advent of emerging and disruptive technologies.
28. The expansion of placement and work-integrated learning initiatives provide students with personal insights into the work-based needs of prospective employers, and connects employers with direct levers to influence the skills and knowledge industry requires. These initiatives can also benefit smaller employers, such as SME's, by assisting them to access to the talent pool within the higher education sector on a short-term, temporary basis without the need to commit long-term resources which may not be available.

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29. For this reason, regular review mechanisms should be established involving key stakeholders to ensure the content being taught aligns with job requirements, and the number of students studying courses reflects the availability/demand for each profession.
30. There also needs to be an exploration of the best way to update the knowledge and skills of people currently in employment. Increased focus is needed on how specific knowledge/skills gaps can best be addressed. Micro-credential style courses are one option for upskilling employees while in the workforce, and ways of rebalancing the higher education system to remove disincentives for continued education should be considered.
31. As has been noted previously, barriers underrepresented populations have in accessing the higher education sector is one of the greatest challenges Australia faces. Therefore, the *Accord* should consider interventions that increase the accessibility of the higher education sector, commencing with coherently linked primary and secondary education pathways that encourage participation in the higher education sector through to the availability and ease of access to tertiary courses.
32. The role of the ATAR score in determining the access to university courses impedes access to higher education and perpetuates inequality because it fails to acknowledge the vast array of barriers faced by diverse and under-represented groups. Students from low socioeconomic status (SES), rural and remote, and Indigenous students are most prominently disadvantaged. Universities and governments need to work proactively to challenge stereotypes of 'capable students' particularly those from diverse and underrepresent backgrounds.

Recommendations for the Most Important Reforms

33. Defence recommends the following six reforms as foundational to enable a stronger university sector that is prepared to deliver future outcomes in the national interest.
 - a. **Drive differentiation of R&D and teaching offerings to alignment with national missions. Use the Government Scientists Group to assist in the defining the national missions and connecting research with the end use opportunities.**
 - Connecting universities to specific outcomes-directed national missions, will help further the development of specialised and differentiated research capabilities, and deliver tangible outcomes and economic benefits for the nation. Noting the breadth of experience within the Government Scientists Group, this forum is well placed to advise on the nature of the national missions to be addressed and how best to align research efforts to tackle these missions.
 - b. **Incentivise re-alignment of national research capability to industry capability and capacity. Encouraging alignment of the industries that can take innovations to market.**

- The lack of transition from fundamental research through the R&D lifecycle to achieve tangible outcomes means the nation is missing out on the economic benefits of new innovations. Incentivising better alignment between research efforts and our industrial base will aid in the creation of the next generation of jobs and sovereign industries, and provide new export opportunities and markets. Driving better alignment would encourage established industries to further invest in capabilities that deliver economic benefits and provide universities with greater capacity to partner with SMEs who often possess limited R&D capabilities.
- c. Increase the percentage of GDP on research to 3%, and consider fully funding research to remove the reliance on cross subsidisation from international student fees.**
- Australia’s public expenditure on the tertiary education sector (both as a whole and exclusive of R&D activities) as a percentage of total government expenditure at 2.6% and 1.3% respectively is lower than the OECD average³. Countries such as New Zealand (3.6% and 3.1%), the United Kingdom (3.4% and 2.8%) and the United States (3.4% and 3.0%) are all reported to provide a greater level of support to the tertiary education sector as a whole and exclusive of R&D activities⁴. The lack of full funding for university research activities has necessitated cross subsidisation from other funding streams. This approach is unsustainable in the long-term noting increasing budgetary pressures economy wide, and may serve to limit the effectiveness and outcomes of R&D activities funded through such mechanisms.
- d. Ensure PhD scholarships are sufficient to enable a living wage to remove disincentives to research training pathways.**
- The lack of financial security is a disincentive for prospective students to undertake further study, with many seeking to enter the workforce and earn a salary rather than face the prospect of juggling both further studies and part-time work for uncertain job prospects after completion. Paying a living wage may increase the talent pool of students undertaking postgraduate studies and could lead to studies being completed faster and to a higher standard.
- e. Fix research career pathways and incentivise universities to offer ongoing roles.**
- Australia’s ability to maximise the return on investment for its support of the higher education sector is inextricably linked to retaining a highly skilled workforce and benefiting from the development of new jobs and industries. Improving research

³ OECD (2022), “What is the total public spending on education?”, in *Education at a Glance 2022: OECD Indicators*, OECD Publishing, Paris.

⁴ *Ibid.*

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career pathways and incentivising universities to offer ongoing roles to new graduates, would reduce the need for researchers to relocate overseas encourage them to remain in the university sector or move to Australian industries.

f. Incentivise systemic mobility between universities, industry and Government.

- The mobility of talent between universities, industry and Government is crucial to ensure the appropriate skills and knowledge are available at the right place and time to tackle the nation's critical challenges. However, the disparity in conditions, inability to maintain appropriate skillsets and to have prior service recognised across employers can provide a disincentive for highly skilled employees seeking to transfer between prospective employers. Removing these barriers would help ensure an agile and highly skilled workforce is available to pivot to areas of demand.