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SADILP 2019 Concept Paper

Defence Industry Modernisation

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The Defence sector is dominated by known defence primes, with many of the same people cycling through the different defence companies and roles. Given this reality, how can defence industry improve its leadership, innovation and culture modernisation? What opportunities are there to leverage from other sectors to supplement defence industry?

Executive Summary

The Australian Government is investing $200 billion in Australia's Defence Capability over the next decade[1]. The biggest projects in Australian Naval Shipbuilding history will be undertaken in South Australia, and it is estimated that 15,000 jobs will be created in shipbuilding alone[2]. The required growth creates a significant employment demand for the Defence industry.

Data on defence Industry employment demographics demonstrate a cyclic and aging workforce. There is a shortfall of new STEM resources and difficulty recruiting for available opportunities and strong competition with growth in adjacent STEM sectors including Space.

The modernisation of Defence industry innovation, leadership, and culture relies on increasing diversity in the Defence industry. A failure to attract the next generation workforce is also a failure to draw on modern practices from a replenished workforce and their potential experience in adjacent sectors.

Existing Defence Industry initiatives aim to boost leadership, innovation and collaboration at both the Federal and State level. There remains a need to further diversify the Defence industry workforce to support growth.

Increased collaboration and Industry 4.0 practices are required to deliver modern capability to the war fighter. Culture and leadership are the biggest barriers to better collaboration, and a low acceptance of risk hampers innovation. Adjacent modernised sectors apply modernised practices and culture including tolerance of failure, and a fail fast mentality that Defence has not successfully leveraged.

SMEs are frequently diversified in adjacent sectors. Primes and the Defence industry have an opportunity to access modernised leadership, innovation, and culture from these adjacent sectors through closer integration with the SME community.

To achieve this integration and a resultant Defence industry modernisation, the key recommendations of this report are:

a) Advocate - Modernise Defence industry branding to achieve better reach & workforce diversity;

[1] Moving towards high-tech future for Defence 2019 -2030
[2] Defence Connect 30 Oct 2019

b) Broaden Intakes - Expand the entry pathways into Defence industry;
c) Collaborate - Team with the growing Space industry to optimise resourcing and investment; and
d) Diversify - Meaningfully integrate with SMEs for a broader career cycle and R&D opportunities.

Research Strategy and Method

In order to understand how the Defence industry may improve leadership, innovation and culture, the research for this paper has resulted from:

a) A review of the current situation in the Australian Defence Industry;
b) Interviews with Defence Industry leadership; and
c) Polling and interviews with colleagues and SADILP alumni.

Research has focussed on the following aspects:

a) Employment challenges and diversity;
b) Measures of attracting younger generations to work within Defence Industry;
c) Encouraging and promoting innovation;
d) Finding examples of successful companies in innovation;
e) Learning from other industries;
f) Attracting people from other industries; and
g) Improving leadership and culture to promote and support innovation.

The Defence Sector

The Australian Defence Force is going through a period of growth and modernisation through the acquisition of new Air, Land and Sea platforms. A number of these major acquisition projects are based in South Australia[3] and a large number of resources and expertise will be required to enable the success of these programs:

a) SEA1000 – delivery of 12 Attack Class submarines to the RAN over a 25-year construction period[4], program commenced 2019.
b) SEA5000 – delivery of 9 Hunter Class frigates to the RAN from 2027, program commencing 2025.
c) JORN Phase 6 – Jindalee Operational Radar Network upgrade, commenced 2018.

These acquisitions align to the Government's strategy to grow the annual Defence budget to 2% of Gross Domestic Product by FY2020/2021[6]. According to the latest Government Budget Statement[7], this growth is on track to occur and expected to continue past 2% into the future[8].

[3] CASG - Projects
[4] Defence White Paper 2016
[5] Defence Connect – 23 November 2018
[6] Defence White Paper 2016
[7] Defence 2019-20 Portfolio Budget Statement
[8] Australian Strategic Policy Institute – The Strategist

Employment Demand

With the above mentioned major projects at various stages of their lifecycle, there is a major demand for skilled employees in South Australia. As shown in Figure 1, South Australia currently has the highest rate of hiring intentions, an indicator of the job market demand, for Defence Industry[9].

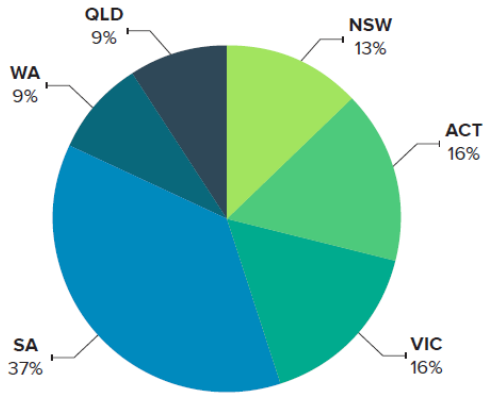

Figure 1: Defence Industry Hiring Intentions 2019-2020

Whilst a majority of these STEM roles available are in the 'traditional' project sectors (Engineering, ILS, Commercial, Design) roles in the emerging technology fields (data analysis, software engineering, cyber security) are on the rise[10].

Recruitment for these technology positions is made more difficult due to competition from adjacent sectors such as Space (which will require an estimated 20,000 jobs in South Australia), mining, automotive, civil aerospace, banking, finance and health[11] and an increase in demand for those positions as a whole in South Australia and Victoria in particular.

Employment Demographics

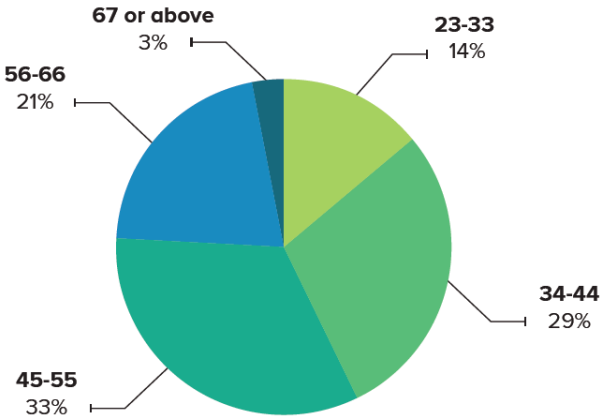

Figure 2 Defence Industry Workforce Age Demographics

As shown in Figure 2, Defence industry statistics from 2018 indicate that the number of younger people entering the Defence-based workforce represents the second smallest employee sector, only

[9] Kinexus Defence Industry Insights 5th Edition
[10] Kinexus Defence Industry Insights 6th Edition
[11] Kinexus Defence Industry Insights 6th Edition

behind those aged 67 or above[12]. This number has declined since the 2017/2018 financial year. This would indicate that, as a career option, Defence industry is not an attractive proposition for new graduates or those newer to the workforce. The reasons for this may be varied including a lack of cutting-edge technology, the overhead to obtain security or ITAR clearances, insufficient employer flexibility, or lack of knowledge of new or upcoming projects.

Whatever the reason, the issue of 'new-blood' within the Defence sector needs to be addressed or an ever-shrinking and aging workforce is an inevitability.

Defence Industry Initiatives

The Australian Defence Industry has a number of initiatives available for boosting leadership, innovation and collaboration at both the Federal and State level. Some of the initiatives currently being undertaken are:

a) Workforce development:
   1. Defence STEM Council;
   2. Defence STEM Vision Strategy; and
   3. Defence Industry Workforce and Skills Strategy.
b) Innovation Initiatives:
   1. Next Generation technology Fund – Funded Collaborative research Programs;
   2. Defence Innovation Portal (CDIC) – connecting industry and research organisations with Defence innovation investment opportunities; and
   3. Defence Innovation Hub – Funded Collaborative Innovation Programs.
c) Leadership Development:
   1. SADILP – South Australia Defence Industry Leadership Program;
   2. DISC – Defence Industry Study Course; and
   3. Professional Certificate in Defence Industry Leadership – University of Adelaide.

Other major initiatives can be found on the Defence SA website[13].

Interviews

Four interviews were conducted with people who are currently working, or have previously worked, in Defence industry in leadership positions. During each interview, the subjects were asked for their individual opinions and recommendations relating to the topic based on their experience. The following people were interviewed and their opinions and recommendations form part of the recommendations in this paper:

a) Steve Ludlam – Chief Advisor, Industry SA – Former CEO ASC
b) Simon Tildesley – Engineering Manager, General Dynamics Land Systems Australia
c) Audra McCarthy – CEO Defence Teaming Centre
d) Matt Neagle – Manager Communications and Engagement, Naval Shipbuilding College of Australia

Innovation in Defence

The fourth Industrial revolution, Industry 4.0 (i4.0) is seeing the advent of Cyber-Physical systems enabled by Artificial Intelligence/Machine Learning (AI/ML), Autonomous Machines, Virtual Reality, Cloud storage and computing, big data, analytics and the Internet of Things (IoT)[14]. Digital Disruption in Defence will interrupt the entire supply chain, impacting everything from

[12] Ibid
[13] South Australia; The Defence State
[14] Industry 4.0: what does it mean to Defence Industry?

manufacturing, logistics and administration through to maintenance, support, and operations, as evidenced by examples such as the Predix 3D printed Autonomous Drone Swarm[15]. For Australia to have a "…more internationally competitive and innovative Defence Industry that can provide the best capability to the Australian Defence Force"[16], investment in i4.0 supply chain elements to enable innovation will be a critical enabler for industry and military capability[14]. In the face of this change and complexity, fast, open, candid and promiscuous collaboration is vital to enable innovation[17].

Collaboration

Figure 3 Barriers to Collaboration

"[In Australia a] *lack of vertical and horizontal collaboration is an ongoing challenge, with suspicion often more likely than partnership. Elsewhere in the world, your biggest competitor is often, simultaneously, your most important partner*"[18]. As shown in Figure 3, survey respondents from within the Defence industry and the Department of Defence[19] rate Culture and Leadership as the biggest barriers to better collaboration. In addition to organisational barriers, inter-state competition is also hampering more productive and innovative collaboration in support of Defence and the warfighter.[18]

> *"Get the best people, then trust them."*
>
> – William Chappell, Director, Microsystems Technology Office DARPA

Trust is a key component in collaboration between Primes, SMEs and Defence to enable the radical collaboration that is needed to innovate and be at the forefront of technological advances to give our war fighters the tools they need, when they need them. Trust between businesses, government and Defence Industry, and ultimately leaders and their people is paramount to reaching the Governments desired end state for Defence Industry, without trust proposed working relationships tend to be adversarial[20]. Finally, trust eliminates the necessity of writing compliance-oriented contracts[20] and enables focus on outcomes and innovation.

As evidenced by the success in Innovation experienced by the Defense Advanced Research Projects Agency (DARPA), in conjunction with trust, risk taking and tolerance of failure[20] need to be integrated into how the Defence and the Defence Industry collaborate and innovate, to succeed in the mission to provide the Australian war fighter the best possible equipment and technology.

[15] Predix (Drone)
[16] 2018 Defence Industry Capability Plan
[17] Building Defence Capability – The vital role of collaboration
[18] Helping the tall poppies grow – Supporting the growth of Australia's Defence SMEs
[19] Building defence capability – the vital role of collaboration
[20] Innovation at DARPA

Culture and Leadership

For collaboration and innovation, cultures need to shift *"...high-leverage innovators and … companies that report relative high performance have six key characteristics;*

- *They closely align innovation strategy with business strategy,*
- *They create company-wide cultural support for innovation,*
- *Their top leadership is highly involved with the innovation program,*
- *They base innovation on direct insights from end users,*
- *They rigorously control project selection early in the innovation process, and*
- *They excel at each of these first five characteristics and have been able to integrate them to create unique customer experiences that can transform their market."*[21]

Defence Industry clients, the war fighter, cannot be waiting years to get the best technology in the battlefield. Defence must innovate at a much faster rate, evolve and fail at a much faster rate to stay at the forefront and maintain superiority on the battlefield, Digital Technological Advances are the reason but also the solution. Defence needs to be on the cutting edge while Defence Industry needs to be on the bleeding edge, with Procurement Policy needing to be more agile and faster. This will require acceptance of risk, tolerance of failure and tight collaboration between and within Defence and the Defence Industry, and a large cultural shift to innovation being tightly integrated with strategic plans.

"Quite Simply, early engagement with industry is going to be the key to taking advantage of what industry has to offer so that we are all working together to ensure that our war fighter has the best"
– Raydon Gates, Former Chief Executive, Lockheed Martin Australia & New Zealand

Risk

Defence is historically and currently risk averse, for many reasons including finite resources (financial and people), stringent reporting, and parliamentary and community scrutiny of Defence projects and spending. This limits the innovation that can be undertaken as risk must be driven So Far as Reasonably Practicable to low and is inherent in Defence contracting before Gate 0[22].

Rigorous control of project selection early in the innovation process will enable risk to be taken on projects that have the greatest potential for advancement and pay off for our war fighters. The speed of procurement in Defence will also need to change and will involve acceptance of higher levels of risk. Collaboration with SMEs, who have a large portion of their business in other industries requiring them to be innovative and engage with risk to maintain market share, will be key for changing the risk adverse culture. SMEs and their staff can be mentors to the Defence Industry and the project managers, contract writers, leaders and managers within Defence and Defence Industry primes on engaging risk to enable innovation.

Tolerance of Failure

Along with risk, and for many of the same reasons, Defence has a low tolerance of Failure. Failure and partial success are inevitable in ambitious efforts to do radically new things. However, as DARPA I2O Office Director John Launchbury says, "*'Failure' doesn't mean the whole thing collapses. Even if the result isn't what you were hoping for, technologies developed along the way may have great value. They feed into the ecosystem; something new is known*"[23].

[21] The Global Innovation 1000: What the Top Innovators Get Right
[22] Collaborative Contracting Better Guide
[23] Innovation at DARPA

To enable this, Leaders, Managers, Defence Industry and Defence need to tolerate failure, identify the technology and learnings form the project failure, and apply them to new and existing projects, innovating and ultimately leading to our war fighters having a technological superiority. As with risk a move to a culture of innovation through mentoring, changing mindsets and new leadership in the Defence Industry will lead to engagement with risk and Tolerance of Failure through the understanding knowledge and technical advances can still come from project failure.

Fail Fast

Tolerance of Failure and engagement with risk are not enough in the face of the speed of technological advancement. Defence and Defence industry will need to learn to be more agile and fail fast. Stefanie Tompkins of DARPA says, *"If you're on the fence, err on the higher-risk side*." She adds, *"Why study the feasibility of a project for six months if you can get further and learn more by starting the work?"*[23]

Under this approach proposed projects are still scrutinised, however importance is placed on how this might work and what might we learn even if it fails, and not on the level of risk. A fail fast approach also encompass continual reviews of projects, and ending projects where resources would be better used on other more promising work or further work or further development is no longer justified due to changes in the environment or needs of the clients. This enables innovation to keep pace with technological advances and the rapidly changing warfare environments faced by our clients.

Summary of Research Findings

The modernisation of Defence industry innovation, leadership, and culture relies on attracting a diverse "workforce after next"[24], and there is competition. Diversification includes different backgrounds, entry pathways, and experience in other sectors. A diversified workforce will draw in modernised innovation, leadership, and culture from outside of the "defence cycle".

Defence fails to sufficiently reach & attract a potentially wider workforce to existing opportunities, despite existing plans. The Defence Industry Skills Survey found that "*26% of SMEs and 33% of larger businesses responded that efforts to grow their business are being constrained by a shortage of appropriately skilled Candidates*"[25].

SMEs are already diversified in adjacent sectors. Defence Industry Skilling and STEM Strategy notes that "*less than 5% of Australian businesses who self-identified as 'defence industry' were 100% dedicated to defence business*"[26]. Deeper and more meaningful engagement with SMEs therefore offers a pathway for Defence industry to access modernisation from other sectors.

Recommendations

Today's Defence industry is in competition with major adjacent sectors for a limited STEM pool, engages SME's late in the project lifecycle and often superficially via AIC contract requirements, and South Australia continues to lose talent interstate and overseas.

Recommendations to address this based on the research findings above are captured under the categorised action areas: advocate, broaden intakes, collaborate and diversify.

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[24] Defence Industry Skilling and STEM Strategy
[25] Defence Industry South Australia Workforce Strategy
[26] ibid

1. **Advocate: Modernise Defence industry branding to achieve better reach & workforce diversity**
    a. Re-brand to share industry Defence Industry success stories and innovations.
    b. Diversify publicity and recruitment campaigns for appeal to a wider audience.
    c. Switch to platforms and media that align to a next-generation workforce.
    d. Increase awareness of existing opportunities.
2. **Broaden Intakes: Expand the entry pathways into Defence industry**
    a. Recognise transferrable skills in ADF, Reserves, and veteran communities.
    b. Support wider entry pathways with VET and micro-credentialing.
    c. Increase awareness of new opportunity amongst the skilled expatriate community who are seeking to return to South Australia.
    d. Maintain skilled migration.
3. **Collaborate: Team with the growing Space industry to optimise resourcing and investment**
    a. Engage with Space sector entrants to expand the pool of defence SMEs.
    b. Actively engage in Space Agency initiatives.
    c. Identify overlaps between Space and existing Defence capability areas.
    d. Invest R&D funding, directly and through SMEs.
4. **Diversify: Meaningfully integrate with SMEs for a broader career cycle and R&D opportunities**
    a. Engage with SMEs meaningfully, and early in project lifecycles supported by mechanisms that encourage trust (e.g. Memorandums of Understanding).
    b. Create secondment and “above the line” -style opportunities between Defence primes and SMEs.
    c. Lower the barrier to entry for SMEs recognising cashflow, upfront resource investment, and quality requirements can challenge SME viability.
    d. Support new SMEs entering the market by seeking design and manufacture in Australia.
    e. Draw on SME experience in adjacent sectors including innovation & leadership styles.
    f. Invest in R&D through SMEs.

The above recommendations encourage a broader intake into a shared resource pool, drawing innovation in from adjacent sectors via SMEs, to support a sovereign, national capability.

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