SADILP 2018 Concept Paper

"How could South Australia's skilling and education structure be improved to effectively produce the skilled workforce required by defence industry, in particular, to support the Naval Shipbuilding Plan on an ongoing basis?"

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The contents of this report are the opinions and conclusions of the authors and do not necessarily represent the views of the author's organisations, the contributors, the contributors organisations, South Australian Defence Industry Program (SADILP) or the Defence Teaming Centre (DTC).

Our team would like to thank the following individuals, who gave up their precious time to support our research:

Schemko Bialek (ASC South), our Mentor

Professor Pascale Quester (Adelaide University), interview

Julie Pisano (TAFE SA), interview

Matt Opie (University of South Australia), interview

Christian Hamilton (ASC North), interview

Shaun Kennedy (ASC South), interview

Assoc Prof Michael Woodward (University of Tasmania / Australian Maritime College)

William Docalovich (Naval Shipbuilding College), interview

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Executive Summary

As an outcome of the *2016 Defence White Paper*, Australia is embarking upon a $90 billion endeavour to modernise its Naval fleet, and for the first time, establish a sovereign Shipbuilding and Maintenance capability. This unprecedented, ambitious program can only succeed with the support of a highly capable, productive and skilled National workforce.

Defence industry, and particularly shipbuilding, has suffered from the “valley of death” left by the boom and bust cycles between major programs, leading to a loss of skills and a negative perception of the industry. The continuous shipbuilding program detailed in the Naval Shipbuilding Plan (NSP) aims to confront this challenge.

Preparing and sustaining the workforce underpinning the NSP requires forward planning and close coordination between stakeholders across industry and academia. Supporting this, the Government has established The Naval Shipbuilding College (NSC), formed from a joint venture between engineering consultancy Kellogg Brown & Root (KBR) and Huntington Ingalls Industries (America’s largest shipbuilding company). NSC carries the responsibility for workforce planning and coordination between stakeholders, based on a “hub and spoke” model.

Due to the size and long duration of the NSP, workforce planning needs to take a long term view right from developing a pipeline of Science, Technology, Engineering and Mathematics (STEM) skilled students in primary and secondary education, through to developing and accrediting the trades (primarily welding, pipe fitting and electrical), engineering (systems, Naval architects) professionals, project managers & planners.

Key recommendations developed in this paper are:

NSC needs to become more vocal in communicating their strategic goals, and deepen their relationships with key stakeholders in industry and academia. NSC has made considerable progress in establishing a workforce register and accrediting training providers, and has future plans to define course requirements with universities, refine the workforce resource plan, and develop standardised taxonomies for roles. There is currently a lack of understanding of NSC’s role, objectives and deliverables within both industry and academia.

STEM programs in schools, to grow the pipeline for the next generation of workforce candidates, need to be centralised and made far more prominent. Despite the multiple STEM programs currently in place, multiple indicators (TAFE enrolments, University Engineering enrolments, and employment data) indicate a trend of continual decline. Creating greater public exposure to the variety of careers in defence industry will help with this.

Reliance on informal on-the-job training (OJT) needs to be reduced, as this constitutes a key risk factor. Where a step increase in workforce is needed, informal OJT cannot keep up with demand. Formalising the OJT with in house training resources such as accredited trainers & mentors, internal apprentice and graduate training schools that are formally accredited will reduce risk and help provide the step increase in skilled workforce. Industry typically describes university graduates as not “defence industry ready”. Reliance on OJT can be reduced by ensuring universities have more parallel engagement with employers, and a greater focus on work placements.

1 Introduction

1.1 SADILP

The South Australian Defence Industry Leadership Program (SADILP) is a professional development course operated by the Defence Teaming Centre (DTC) to promote leadership development within the Defence Industry.

A key component of the course is a group based concept paper, which enables participants to explore complex Defence Industry related topics, clarify challenges/opportunities and inform both SADILP course members and an Executive Review Panel of their findings.

1.2 Concept Paper Topic

Our originally assigned concept paper topic was:

"How could Australia's skilling and education structure be improved to effectively produce the skilled workforce required by the defence industry on an ongoing basis?"

To adequately investigate and draw recommendations on such a broad topic would require significant review and research of the following;

- National primary, secondary, tertiary and vocational education systems.
- The workforce requirements of all Defence Primes, second & third tier suppliers and SMEs involved in Defence industry.
- Full review of the Commonwealth's Defence White Paper, Integrated Investment Program, Defence Industry Policy Statement, Naval Shipbuilding Plan and associated material.
- Engagement with relevant Government and industry bodies such as CDIC, DTC, TDA, Defence SA and other state based equivalents.

Instead, this paper focusses on the largest and most significant part of the investment – The Naval Shipbuilding Plan. It explores opportunities that exist to connect industry and education providers as well as the importance of STEM promotion, job readiness and broadening the workforce talent pool.

1.3 Context

The Naval Shipbuilding Plan represents a $90b investment to modernise Australia's naval fleet, and to establish a (predominantly South Australian) sovereign design, build and sustainment capability. This represents a historically high level of concentrated and coordinated effort by government, industry and education sectors. The human capital required for the initial and ongoing phases is a key success factor to the Naval Shipbuilding Plan and the lasting economic benefits for South Australia.

The plan requires Defence Primes to deliver the programs concurrently (refer figure 1), with each Prime having to significantly expand the capacity and capability of their Australian footprints. Education stakeholders and Primes require a consolidated view of the resource profiles during the planning and execution phases of the programs.

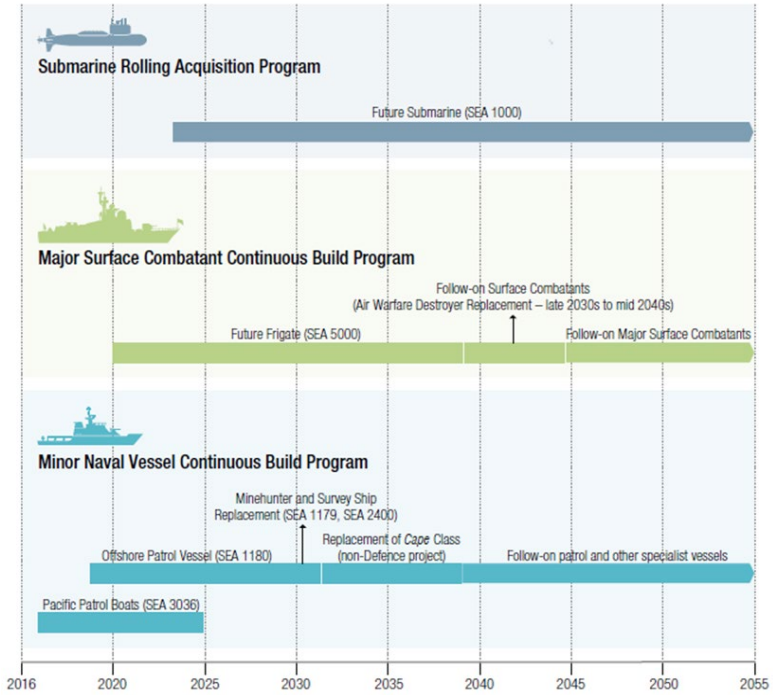


Figure 1 - Naval Shipbuilding Continuous Build Programs (Naval Shipbuilding Plan)

Having this consolidated view is difficult due to several factors:

- The successful tenderer is not necessarily known during early stages
- The resource profile can change with the Primes final sourcing decisions
- The information can be commercially sensitive
- The taxonomy used to describe the detail skill set required within resources is complex and varies between Primes (Refer example, Appendix B).

This results in "best estimates" being used by individual education stakeholders to judge the demand for the education services they intend to offer.

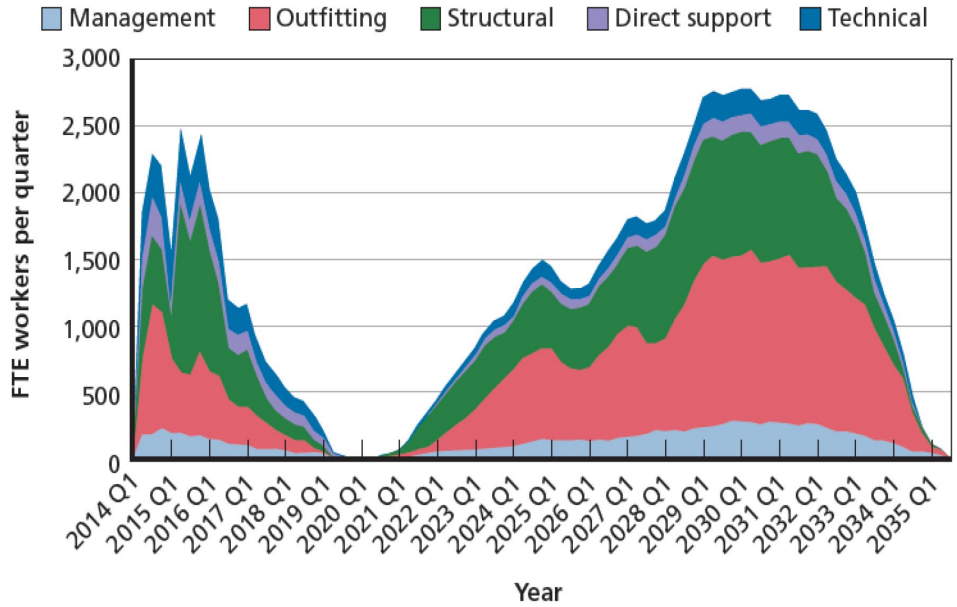


Figure 2 Resource profile, AWD and SEA5000, Naval Construction Program- Mobilisation, Rand Corporation

Primes will also develop skills internally;

- Micro courses to develop and orientate candidates with generic qualifications
- OJT, to develop candidates during their careers

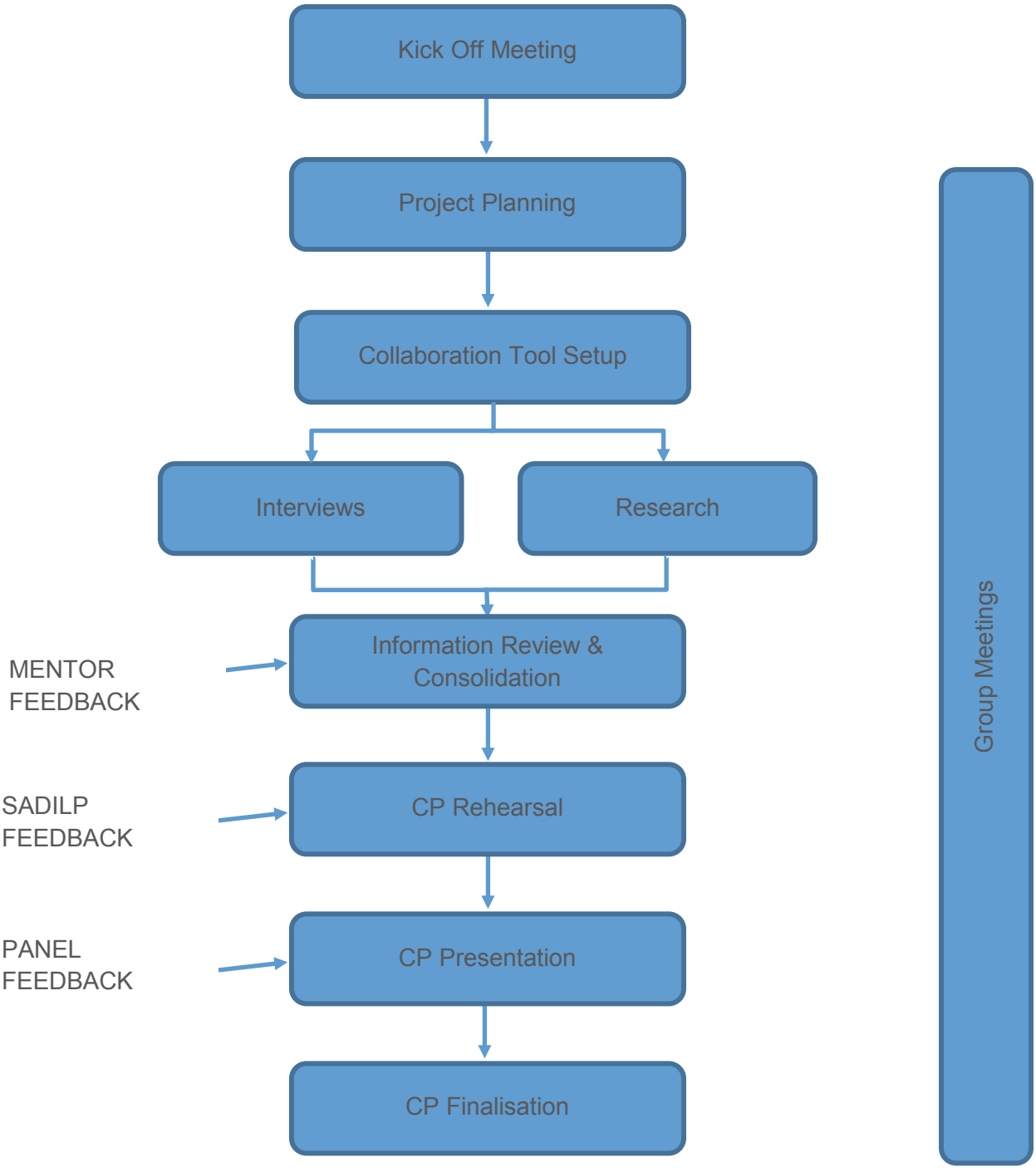
This internal supply of skills adds to the complexity of the consolidated view available to education stakeholders.

There is a risk that demand spikes may occur in specific skills if the programs do not attempt schedule deconfliction. Such peaks are likely to lead to “talent wars” and boom and bust cycles in demand and wages.

2 Research Process

2.1 Strategy

In order to address our topic, the team adopted a strategy based on a combination of research, face-to-face interviews, regular group meetings, and the use of on-line collaboration tools to share our information and to facilitate configuration management of documentation. The process is summarised below:



2.2 Interviews

Interviews with representatives across Defence Industry and Academia constituted the most important source of input to the concept paper. In each interview, the interviewee was encouraged to provide their own opinions relating to the topic. A minimum of two team members were present during each interview.

An interview template (educational sector sample included in appendix A) was used as the basis for the discussion, though questions were customised to be relevant to the interview participant.

The following provides a brief summary of the key outcomes from each interview.

2.2.1 Schemko Bialek (Our trusted mentor - ASC)

Schemko was nominated as our mentor for the concept paper. Schemko is currently employed by the AWD alliance at ASC. Schemko served mainly as an advisor, and did not directly provide opinions on our subject but rather made recommendations of who we needed to interview, and how we should go about the process.

2.2.2 Professor Pascale Quester (Adelaide University)

Pascale is the Deputy Vice-Chancellor & Vice-President, Office of Academic and Student Engagement at Adelaide University. She presented as extremely enthusiastic about our topic; it transpired that she is involved in a curriculum redevelopment initiative aimed at better matching University outcomes with Industry needs.

Pascale believes that there is a general lack of information around the workforce resource profile required to support the Naval Shipbuilding Plan, and has made unsuccessful attempts to gain this information. She commented that the university to industry transition process needs to be more “parallel” rather than the current model where students have little exposure to industry until the completion of their studies. She also commented that there seems to be a large “chasm” between universities and TAFE.

On the topic of supply and demand, Pascale anticipates there is a major shortage likely to evolve when the upcoming defence programs are in full swing. A possible “quick fix” solution discussed was to train engineers in similar professions to become Naval Engineers by going into French universities.

Pascale believes that the SATAC admission process can drive students into selecting easier subjects (non-STEM) to maximise their ATAR scores, which potentially limits the pool of students going into technical professions. Also raised was the potential “image problem” with defence related careers and the perception of uniforms and guns, which seems less attractive than other industries.

2.2.3 Julie Pisano (TAFE SA)

Julie Pisano is a principle lecturer for TAFE SA, and her role is focussed on Defence Industry.

Julie also raised the point that the SATAC process does not encourage students to take on the harder subjects because of the “points drive” to tertiary admission.

In relation to how TAFE and others align with industry needs, Julie discussed Defence Industry Education and Skills Consortium (DIESC) which has been established by the three SA Universities, TAFE and the Defence Teaming Centre to represent industry. This relatively new consortium is yet to achieve results however should serve to break down the barriers between TAFE, universities and industry.

TAFE have been working closely with the Naval Shipbuilding College to understand the future workforce needs. (TAFE SA subsequently became the first educational institution to be endorsed by NSC to deliver welding courses).

Julie noted that NSC has an extremely important role to play in establishing the workforce register, performing skills assessments, training endorsement & recommendation. NSC’s current focus seems to be blue-collar trades (particularly welding, pipe fitting and marine electrical) however it is expected to have a role in white-collar role endorsement in the future.

2.2.4 Matt Opie (University of South Australia)

Matt Opie holds the role of Director: Defence with the University of South Australia (UniSA). Matt is well connected, respected and knowledgeable in the defence space.

In discussing UniSA’s strategy to meet the requirements of Defence Industry. Matt estimated approximately 5% of graduates end up working in this space, so it is not their biggest focus, however they have previously introduced specialisations aimed at defence needs (such as Masters in Systems Engineering, Masters in Defence Project Management, and Masters in Cyber Security). He commented that these programs had “died off” however interest is picking up again. He also discussed UniSA’s intent to integrate defence related modules into more general courses such as Business Management, and talked about the possibility of a Minor in Naval Architecture, which would be taught in collaboration with consultancies.

Matt raised the challenge that graduates do not become “defence ready” until they have obtained the appropriate experience in industry. A good example of this is a 2-year rotational model introduced by SAAB which is conducted throughout years 3 and 4 or bachelors’ degrees; this program is in high demand.

In relation to the supply / demand problem, Matt is awaiting information NSC are set to produce regarding the future workforce needs profile. He is concerned that the tertiary funding caps currently in place which effectively limit the number of positions, is likely to clash with Defence Minister, Christopher Pyne’s future vision for Defence. He also mentioned that STEM programs are not yet succeeding, with weak overall demand for Engineering degrees (particularly from Australian students).

2.2.5 Christian Hamilton (ASC North)

Christian Hamilton is the GM of Strategy and Human Resources at ASC. His focus is on the submarine programs (not AWD or future frigate).

Christian says there is no current issue with supply of skills, although this is anticipated to become a challenge. One of the biggest issues is the long periods of experience necessary to reach particular levels of delegation within the ASC qualification framework (for example, it takes an average of 18 years to reach the highest level of engineering delegation). Because of the specialist nature of the work, this is entirely met by on-the-job training, not by the education system, which Christian feels is not aligned to defence industry needs.

Christian noted the importance of the NSC (noting ASC sits on the NSC governance board). His feeling was that NSC's deliverables are yet to be properly defined, and noted that empowerment and a funding model were necessary for success. Key expectations from his perspective were the establishment of a coherent taxonomy across industry for position requirements, and to influence change in the education sector, particularly to reduce the reliance on on-the-job training.

Christian commented that a massive supply problem may be coming for SME's due to the fact that the key programs will take on all the best engineers and drive up salaries due to competitive pressures.

2.2.6 Shaun Kennedy (ASC South)

Shaun Kennedy is the General Manager, HR for ASC South.

A key issue he raised was the failure to address gender equality, within the Naval Shipbuilding Plan. His view is that defence industry is largely a "boys club" with 11% female workforce, and typically a 25% pay gap. He described the NSP as the "largest single government intervention in the SA economy" and therefore must address this issue.

Shaun also had strong opinions in relation to the role of the NSC. His comments were that their role and value to industry is yet to be made clear, he thinks their main role is with induction and on-the-job training. He also mentioned that he is unsure whether having NSC sitting between ASC and TAFE is a good thing.

Shaun raised as a key concern the different cultures / politics of the parent companies (i.e. Naval Group for the subs / AWD alliance / BAE owning the workforce for the frigate program). He feels that ASC have a positive culture with leadership strength and a focus on safety, which will survive the "valley of death".

In relation to the availability of the skilled workforce, Shaun felt confident in SA's ability to provide the skilled trades needed; he thinks the real problem will come in the technical and managerial roles, complicated by the "spiked" nature of the demand. As a pragmatic approach, he suggests that budget is needed to employ people early, so that they are available "on-the-shelf" when needed.

2.2.7 William Docalovich (Naval Shipbuilding College)

William (Bill) Docalovich is the NSC Program Director, and was kind enough to brief us on their current strategy.

NSC was established by the Federal Government as an outcome of the Naval Shipbuilding Plan, to address the workforce needs of Naval Shipbuilding. NSC is delivered by a joint venture between KBR and Huntington Ingalls Industries (US's largest shipbuilding company and where William has worked).

His view is that NSC is not the "full answer" but will be supporting primes to transition "vanilla engineers" i.e. those without shipbuilding experience into the workforce, as well as working with Universities on behalf of primes. NSC also has an important part to play with the trades, in managing the workforce register which represents a screened "talent pool" of candidates ready to be drawn upon. NSC is actively working with training providers (e.g. TAFEs) to endorse course modules that meet industry needs.

Future key deliverables for NSC include developing standardised inductions for the new workforce, working with Universities to ensure program alignment, and further developing RAND corporation's resource plan for future demand.

NSC has a national remit, although they currently only have a footprint in Adelaide (next to ASC). They are planning to open an office in WA by the end of 2018.

3 Observations and Recommendations

3.1 The Pivotal Role of the Naval Shipbuilding College (NSC)

3.1.1 Observations

NSC are a newly established (2018) initiative, funded by the Federal Government who have a critical role in identifying and closing the gaps between educational and training courses currently offered in Australia and the required skills and expertise needed by the growing Australian shipbuilding industry.

According to NSC Program Director, NSC is an “evolving solution”. They are constantly growing their partnerships and developing opportunities to address workforce gaps and skills development.

There were mixed responses from interviewees in regards to NSC’s role throughout our discussions. The importance of NSC was clearly expressed by all of the interviewees, however, their ambiguity around NSC was also a concern. In particular, they expressed confusion about how stakeholders will work with the NSC, when NSC will be in full effect and key deliverables / measurements of success.

A representative from ASC made mention that whilst NSC clearly had an important role; their deliverables are “yet to be clearly defined.”

Meeting with NSC provided positive insights into the work they have been doing, particularly around workforce planning and management throughout project lifespans, specifically, the creation of the workforce register which will allow re-distribution of talent and capability, resulting in a common workforce.

3.1.2 Recommendations

Initial flexibility should be given to NSC as they develop their business model as a new initiative in the shipbuilding industry.

However, there is a lack of available information that details their key strategic goals and measurements and according to the people we interviewed, key stakeholders of the NSC, especially where their requirements for information go beyond press releases and websites.

We recommend that NSC needs to be proactive in informing stakeholders of their ongoing work. We also suggest that the stakeholder relationships need to be deepened through an inclusive planning and consultation process that seeks to develop pragmatic and actionable steps to moving forward.

A key component to the first phase of the NSC implementation (detailed in the Naval Shipbuilding Plan) includes a nation-wide communications strategy to build public interest in naval shipbuilding as long-term career path. We recommend that the NSC strategy or, if this isn’t viable in the short term, an interim strategy is released with detail to assist stakeholders to understand the current progress NSC is making.

3.2 The Ongoing and Increased Promotion of STEM in Schools

3.2.1 Observations

According to ABS data from 2012 to 2016 (Figure 3), the number of people employed in Scientific and Technical Services within South Australia has decreased by almost 5000 people.

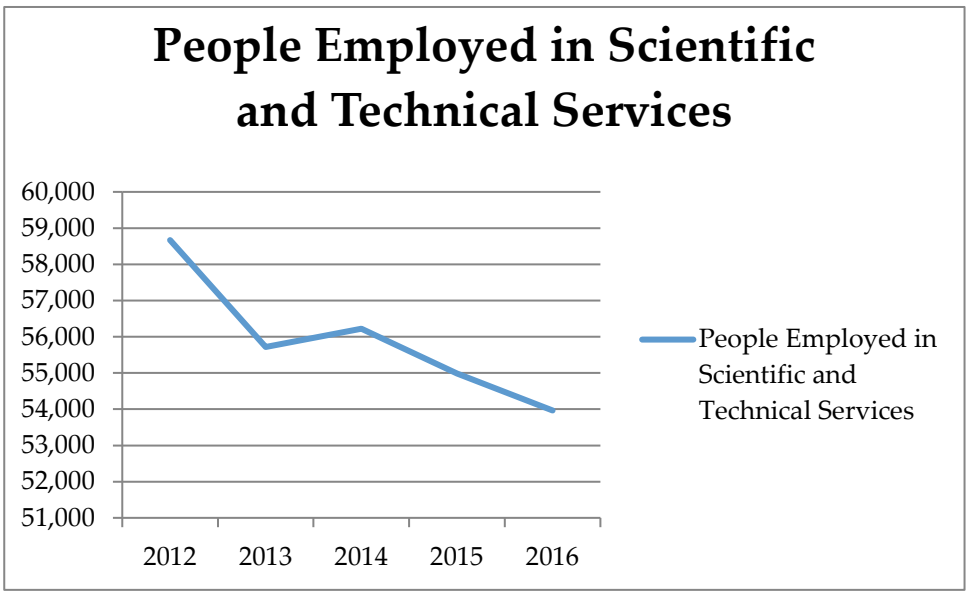


Figure 3 People employed in Scientific and Technical services (Source: abs.gov.au, SA Data by Region)

The overwhelming view impressed on us by the interviewees within the education sector was the importance of the promotion of STEM related subjects. This is paramount to increasing the size of the student pool and resultant employee pool for Defence Industry to realise the full potential of the Naval Shipbuilding Plan.

Margot Forster (CEO, Defence Teaming Centre) stated in the following article (https://brandsanews.com.au/education-today-defence-jobs-tomorrow/) *"The people who will build the last submarine haven't even been born yet"* – which is why the ongoing and increased promotion of STEM in schools is so critically important.

The Department of Education and Child Development in South Australia released their STEM Learning Strategy in 2017, a 3 year plan that has 3 main focus areas;

- Developing expertise in STEM teachers/educators
- Engaging Students in STEM education
- Developing excellence in STEM

This strategy is detailed with key goals and measurements of success that will address the importance of STEM in schools. It will be important that Defence Industry, in a co-ordinated way, leverage off this strategy to expose those students interested in and studying STEM to their workforces and opportunities.

3.2.2 Recommendations

There are STEM initiatives between industry and education which are currently being implemented, for example the Subs in Schools program (Saab Australia, Australia Submarine Corporation, Dept of Defence, REA Foundation). However, where no consolidation of these efforts is apparent, there is a risk of siloing expertise and promotions. More importantly, there are latent and as yet unexplored relationships between industry and education that would help promote STEM.

We recommend the development of a centralised register (maintained by NSC) containing education providers, government departments, businesses and their STEM initiatives, which informs all interested parties of ongoing/upcoming programs and allowing them to identify partnership opportunities as early as possible.

3.3 On-the-Job Training and Job Readiness

3.3.1 Observations

It is well understood that new graduates (secondary, VET and tertiary) moving into the workforce will always require industry, employer and role specific training. Importantly, more can be done within their coursework to ensure they are better prepared for the transition from education to the workforce.

The Royal Australian Navy (RAN), which determine the standards for industry shipbuilders currently require “relevant years experience” (Seaworthiness Competency) to enable an employee to sign off on certain build, design and construction related shipbuilding tasks. The relevant years required can range from 5-18 years, as reported by Christian Hamilton (ASC).

The effect of the focus on time worked and experience required to certify the competency of the employee can significantly decrease the pool of talent to recruit from, particularly in growth project periods. In addition, ASC explained that the “years of experience” model promotes a father-son approach to on the job knowledge, the passing down of information being the most trusted source of knowledge over an accredited training option.

ASC advised us they were exploring accredited competency based training options to address this concern. With a change as significant as this, there are complexities with the influencing the client (RAN), which ASC are currently working through. NSC also discussed their involvement in supporting this change.

3.3.2 Recommendations

Reliance upon on-the-job training (OJT) needs to be reduced, as this constitutes a key risk factor. Where a step increase in workforce is needed, OJT cannot keep up with demand. Industry typically describes university graduates as not “defence industry ready”. Reliance on OJT can be reduced by ensuring universities have more parallel engagement with employers, and a greater focus on work placements.

While reliance on informal OJT needs to be reduced, we do recognise it will always play an important role in the knowledge transfer within any businesses, it is limited by the number of people (trades and professionals) who are good trainers within the business. Each of these individuals will deliver a slightly different message distorting the training over time. By formalising the OJT within the business the precise skills and company specific knowledge can be captured and delivered to a wide pool new trades and professional people in a relatively short time frame.

Formalising OJT will require a mix of;

- Developing the training skills of the experienced individuals – ‘train the trainers’
- Establish and maintain robust mentoring programmes for apprentices and graduates
- Establish formal skills schools within the Primes – similar to the apprentice schools that existed in the large manufacturing businesses in the past but to also address more advanced design and project management skills
- Use formal accreditation programmes such as ISO10015:1999 - Guidelines for Training

The NSC with its vast experience and resources from Huntington Ingalls Industries will be able help the Primes establish and deliver these programmes.

4 Summary

Under the Naval Shipbuilding Plan, the Royal Australian Navy's fleet will be modernised, and a sovereign shipbuilding and maintenance capability will be established in Australia. The South Australian economy stands to gain enormous financial benefit, through employment and industry contribution.

To succeed, capability and scale must be developed within the workforce. The NSC is leading this mission, and has made progress to date in establishing a workforce register and accrediting training providers. NSC's role and future plans need to be better understood across industry and academia. A future pipeline of STEM qualified students is needed to feed this future demand. A centralised approach and greater visibility and promotion of STEM and resulting career openings, including defence industry is needed to attract the next generation. Finally, a reduction in reliance upon on-the-job training is necessary to build a more agile adaptable workforce that can grow quickly.

Appendices

Appendix A: Interview Template (educational)

1. Introduce our concept paper topic:

"How could Australia's skilling and education structure be improved to effectively produce the skilled workforce required by the defence industry on an ongoing basis."

2. Ask him / her to describe <institution>'s current strategy in aligning its programs with the requirements of the defence industry

3. Ask him / her what future plans are in place given the increased national focus and spending in Defence programs

4. Ask him / her what partnerships <institution> has in the educational sector, government and industry

5. Ask about whether <institution> has their own or access to data sources / gap analysis relating to current and projected requirements for graduates with skills needed for Defence Industry

6. Ask how <institution> engages with STEM programs at primary and secondary school

7. Does <institution> have any information on what portion of its students go on to careers in Defence Industry?

8. Does <institution> have any programs in place to make students aware of career opportunities in Defence industry?

9. Is there any other information he / she is able to share relevant to our research topic?

10. Request a contact for follow up questions

Appendix B: Sample Taxonomy

Table 1 Taxonomy of Ship building and Ship Repair Skill Categories, Naval Ship Building Plan

CATEGORY	SUB-CATEGORY	SPECIFIC SKILL
General Management and Technical	General Management	Management
		Administration
		Marketing
		Purchasing
	Technical	Design
		Drafting/computer-aided design (CAD)
		Engineering
		Estimating
		Planning
		Program control/project management
Manufacturing	Structure	Steelworker, plater, boilermaker
		Structure welder
		Shipwright/fitter
		Team leader, foreman, supervisor, progress control (fabrication)
	Outfitting	Electrician, electrical technician, calibrator, instrument technician
		Heating, ventilation and air-conditioning (HVAC) installer
		Hull insulator
		Joiner, carpenter
		Fibreglass laminator
		Machinist, mechanical fitter/technician, fitter, turner
		Painter, caulker
		Pipe Welder
		Piping, machinery insulator
		Sheet metal
		Team leader, foreman, supervisor, progress control (outfitting)
		Weapons systems
	Direct support	Rigger, stager, slinger, crane, and lorry operators
		Service, support, cleaners, trade assistant, ancillary
		Stores, materiel control
		Quality assurance/control