

NAVAL SHIPBUILDING STRATEGIC WORKFORCE
DISCUSSION PAPER

15 February 2019

Executive Summary

The Federal Government is investing \$90 billion in continuous naval shipbuilding, a long-term plan to create economic growth and thousands of jobs for generations to come.

In order to meet the future demands of the national naval shipbuilding enterprise, we must ensure we have the right people, at the right time, with the right skills.

The Government is committed to investing in the skills and knowledge base of the Australian naval shipbuilding industry to help build a sustainable naval shipbuilding workforce. The strategic workforce planning being undertaken will position the enterprise for the required increase in the size and skill of Australia's naval shipbuilding and sustainment workforce.

This Discussion Paper provides an overview of the workforce needs of the national naval shipbuilding enterprise and where the workforce is likely to come from.

There will be a number of challenges in quickly growing the continuous naval shipbuilding workforce during its ramp-up phase in the early 2020s. The paper outlines some of these challenges and a number of the actions that have already been taken by industry and the Government to meet these challenges. There are no indications of long term problems fulfilling total workforce numbers, though developing the naval shipbuilding workforce is a long term endeavour and it will require time for the effectiveness of existing initiatives to be evaluated.

Submissions are invited on how these considerations, and any other relevant issues, should be addressed in ongoing strategic workforce planning. Submissions will help guide the Government's actions to support the development of the workforce for the National Naval Shipbuilding Enterprise.

Contents

1. Introduction	5
1.1. Purpose and scope	5
1.2. Overview of the national naval shipbuilding enterprise.....	5
2. The workforce required to deliver continuous naval shipbuilding: 2018—2030.....	7
2.1. New vessel construction	7
2.2. Sustainment	8
2.3. Broader supply chain.....	8
2.4. Education workforce and academia.....	9
2.5. Infrastructure construction	9
2.6. Royal Australian Navy.....	9
2.7. Department of Defence	10
3. Workforce Supply and Challenges.....	11
3.1. Overlap with other industry sectors	11
3.2. Educational throughput	13
3.3. Skill shortages.....	14
3.4. Experience shortages	15
3.5. International competition for skills.....	15
3.6. Competition between shipbuilding firms: 2020—2030.....	15
3.7. Security clearance requirements	16
3.8. Particular needs of supply chain firms and SMEs: 2020—2030	16
3.9. Royal Australian Navy: 2025—2040.....	17
3.10. Long-term workforce outlook: 2030—2040	17
4. Responses to workforce challenges.....	19
4.1. Rebalancing the ASC Shipbuilding workforce	19
4.2. Naval Shipbuilding College	19
4.3. Short term workforce development	20
4.4. International mobility	20
4.5. Naval Shipbuilding Industry Reference Committee	21
4.6. Improving diversity in naval shipbuilding	21

4.7. Managing fluctuations in workforce demand.....	22
4.8. Whole-of-labour market response.....	22
4.9. STEM Skilling initiatives.....	23
4.10. Royal Australian Navy responses	23
4.11. Developing the Department of Defence workforce	24
5. Next steps	25
Appendix 1: Australian qualifications framework (AQF) qualifications relevant to naval shipbuilding	26

1. Introduction

The Naval Shipbuilding Plan outlines the Australian Government’s vision to establish a long-term, continuous national naval shipbuilding enterprise, which represents the most significant national-building project Australia has ever undertaken. Critical to the successful delivery of new naval capability and the ongoing sustainability of continuous naval shipbuilding, is a highly skilled and productive workforce.

If there are workforce shortages in the national naval shipbuilding enterprise, these could delay the construction or sustainment of naval vessels or lead to significant increases in project costs – either of which could undermine Australia’s naval capability, and our collective achievement of the goals set out in the Naval Shipbuilding Plan.

While recruiting and developing the workforce required for naval shipbuilding is the responsibility of naval shipbuilders, there is a case for the Australian Government to support these efforts. The Australian Government acknowledges that it shares the risks that could eventuate from workforce shortages. The Australian Government can help coordinate workforce needs between projects and also controls a number of policy levers that can help ensure there is a sufficient supply of skilled workers for naval shipbuilding.

1.1. Purpose and scope

The paper is presented in three parts:

- Chapter 2 examines the size and nature of the workforce that is required for continuous naval shipbuilding
- Chapter 3 examines where this workforce is likely to come from and some of the challenges that may occur in growing this workforce
- Chapter 4 outlines initiatives that are already in place to grow the workforce and address the challenges outlined in chapter 3.

Each chapter includes some suggested questions. However, feedback does not need to be limited to the questions posed in the paper. This paper is not intended to be exhaustive in coverage of relevant issues, but to support discussions.

Responses to this discussion paper will help inform the Australian Government’s strategic workforce planning for naval shipbuilding.

1.2. Overview of the national naval shipbuilding enterprise

The national naval shipbuilding enterprise is wide in scope – it covers the design, construction, operation and sustainment of Australia’s new warships. It also covers the development of infrastructure to support naval shipbuilding, such as the upgrades to

Osborne precinct in South Australia. A long term continuous sovereign shipbuilding enterprise also requires a strong education and training system that supports the ongoing training of workers and research and development into future technologies.

The Government has taken decisions relating to the design and build of the next major shipbuilding projects.

- The 12 *Arafura* class offshore patrol vessels are being built by Luerksen Australia, based on its existing OPV80 design.
- 21 *Guardian* class pacific patrol boats are being built by Austal.
- The nine *Hunter* class frigates will be built by BAE Systems Australia using Australian modifications to the Type 26 design.
- The 12 *Attack* class submarines will be built by Naval Group Australia. This will be a completely new conventionally-powered submarine design that meets Australia's unique military requirements.
- Defence has also directly contracted Lockheed Martin Australia to provide the combat systems for the future submarines.
- The Defence contract for the Hunter class frigate with BAE Systems Australia includes SAAB Australia development of the tactical interface. Defence is directly procuring a variant of the proven Aegis system through the United States Foreign Military Sales arrangement and contracting CEA Technologies for the phased array radar system.

Decisions that sit under these prime contracts have implications for shipbuilding:

- Luerksen has contracted ASC Shipbuilding to construct the first two *Arafura* class vessels at the Osborne shipyards in South Australia, and Cimtec to build the remaining 10 *Arafura* class vessels at Henderson in Western Australia.
- The Government has announced that ASC Shipbuilding will become a subsidiary of BAE Systems for the duration of the *Hunter* class frigate project, meaning that ASC Shipbuilding will largely supply the workforce needed to build these vessels.
- BAE Systems Australia has partnered with BlueScope and Liberty OneSteel for the supply of more than 48,000 tonnes of Australian steel for *Hunter* class frigates. Naval Group has contracted Bisalloy and BlueScope to produce up to 250 tonnes of specialised steel, which will be tested to determine whether it meets the specifications for the *Attack* class submarines' pressure hull.

The paper focuses on the workforce needs for naval shipbuilding up to 2030. This is the period in which the workforce required for continuous naval shipbuilding will be growing. By around 2030 the workforce should have reached its 'steady state'.

2. The workforce required to deliver continuous naval shipbuilding: 2018—2030

This chapter examines the expected size and nature of the continuous naval shipbuilding workforce. It identifies the main employers and industry sectors that play a role in naval shipbuilding and Defence’s understanding of their workforce needs.

The Naval Shipbuilding Plan anticipates that the continuous national naval shipbuilding enterprise will require a workforce of around 15,000 people across new vessel acquisition, sustainment and the supply chain. The Government has also announced the number of jobs expected to be created in the construction of each new acquisition project.

Program	Direct jobs ¹	Indirect jobs
<i>Guardian</i> class Pacific Patrol Boats	200	200
<i>Arafura</i> class pacific patrol vessels	400	600
<i>Hunter</i> class frigates	1,500	2,500
<i>Attack</i> class submarines	1,100	1,700
Total	3,200	5,000

These numbers are based on modelling conducted for the Department of Defence and do not contain the full predictions of prime contractors as at 27 November 2018. The Naval Shipbuilding College is working with shipbuilding firms to standardise the collection of data about anticipated workforce needs, including experience levels, occupations and skill sets. The first complete data set in this new format is expected in early 2019 and will be regularly updated thereafter.

This data will be used by the Naval Shipbuilding College and education and training institutions as they respond to the industry’s needs. This data will also enable Defence to better assess whether the workforce required for naval shipbuilding is on track and whether any additional actions need to be taken to help secure it.

2.1. New vessel construction

ASC Shipbuilding is recruiting new workers to begin the construction of the first two *Arafura* class vessels. The *Arafura* class vessels are anticipated to involve approximately 400 direct jobs and 600 indirect jobs across the program. In the early stages of *Arafura* class vessel construction there is a need for more fabrication roles such as boilermakers, fitters and

¹ These numbers are based on modelling conducted for the Department of Defence and do not contain the full predictions of prime contractors as at 27 November 2018.

welders, whereas ASC Shipbuilding's current workforce consists mostly of workers in outfitting roles, such as electricians and test and activation roles.

As the construction of the *Arafura* class vessels is less complex than the construction of Air Warfare Destroyers (AWDs), there is no indication that ASC Shipbuilding, nor Civmec in Western Australia, will have difficulty recruiting workers for the *Arafura* class program.

The construction of the *Guardian* class Pacific Patrol Boats is underway in Henderson, Western Australia, and is anticipated to involve approximately 200 direct jobs and 200 indirect jobs. Workforce challenges are not anticipated, and the *Guardian* class construction is anticipated to be completed by the mid-2020s.

The bulk of the growth in the naval shipbuilding workforce will come from the construction of *Hunter* class frigates and *Attack* class submarines. These two programs are anticipated to involve 2600 direct jobs and 4200 indirect jobs.

In the early stages of the work on *Hunter* class frigates and *Attack* class submarines, the key demand is for experienced workers with the skills needed for design and prototyping. Over the next 12 months, naval shipbuilding firms will be recruiting engineers, naval architects, project managers and front-line supervisors with at least 10 years' shipbuilding experience. Currently shipbuilding firms report problems recruiting such employees in Australia.

Though the overall picture of the shipbuilding industry over coming years is one of growth there will be challenges. For example, construction of AWDs is due to be completed at the end of 2019. As noted above, there is a disparity between the skills of the current ASC Shipbuilding workforce on the AWD program and the skills required on other programs as they begin.

2.2. Sustainment

There are about 2000 workers involved in *Collins* class submarine sustainment, split between South Australia and Western Australia. About 1300 of these workers are employed by ASC Pty Ltd.

Similar to the work mentioned above that is being done to better capture the workforce needs of the shipbuilding industry, more work needs to be done to capture and understand the workforce needs of the wider sustainment industry.

2.3. Broader supply chain

There are a number of firms that supply prime contractors and subprimes with particular parts or labour required. Defence is seeking to better understand the workforce needs of this broader supply chain. Defence understands that for many supply chain firms, naval

shipbuilding only makes up part of their business and they may not employ additional people for this work.

2.4. Education workforce and academia

The wider education sector will need skilled and experienced people to train the workforce, and to continue undertaking original research. A sovereign and continuous shipbuilding industry relies on Australian universities and firms doing original, innovative research that will flow into future vessels and upgrades, underpinned by strong industry-collaboration.

2.5. Infrastructure construction

There are about 150 workers on-site at Osborne engaged in the construction of new shipbuilding infrastructure on the South side of the precinct (Osborne South). The number of workers engaged on site is expected to peak at about 400 in 2019, with infrastructure construction concluding in 2020. Further work is planned for Osborne North, with the number of workers will dependent on the final design and implementation.

While there are no workforce pressures for the infrastructure construction as this work begins, increased investment in infrastructure construction, especially in South Australia in 2019—2022, could stretch the capacity of this sector. The labour market for construction trades, building professionals and civil engineers in South Australia has been tightening over recent years². Should these trends continue, it may place pressure on the availability of skilled workers for these infrastructure projects.

2.6. Royal Australian Navy

The Royal Australian Navy's people are essential to maintaining an effective fighting force. The Navy needs to grow its workforce in the medium to long term, especially its senior ranks and command leadership team, to meet the challenges of continuous shipbuilding and a higher operating tempo. This will require new approaches to improving workforce sustainability, supported by further increases to the full-time and part-time strength of the Royal Australian Navy.

The Government has funded considerable, sustained growth to Navy's uniformed workforce over the next decade and beyond. Over the longer run to 2050, Navy's workforce will likely continue to grow to build, deliver, operate and maintain future capability.

² Based on Department of Jobs and Small Business skill shortage research

The growth will be broad-based across the technical and non-technical officer and sailor workgroups, reflecting the range of skills and experience required to effectively employ high technology warships, submarines and aircraft on operations and to maintain them.

2.7. Department of Defence

The Department of Defence also needs to grow its naval construction workforce over the period to 2030. To be a smart buyer, Defence needs skilled Australian Public Service (APS) staff to work with industry to build, test, certify and deliver ships and submarines.

The majority of the Defence APS workforce growth is in engineering, logistics, procurement and contracting and program/project management positions. Critical categories include communications and marine engineers and naval architects. As these are the same occupations that are also in short supply in the broader shipbuilding industry, Defence faces the challenge of competing against industry to source and retain its workforce in these areas.

Defence is undertaking further planning to model its workforce needs, especially in critical occupations, over the medium term.

Chapter 2 Suggested Discussion Questions

- Are there particular workforce needs that have not been identified?
- How should Defence capture the workforce needs of supply chain firms, especially smaller firms?

3. Workforce Supply and Challenges

Based on the workforce needs identified in chapter 2, this chapter examines where the continuous naval shipbuilding workforce will come from. It also examines some of the expected challenges in growing the naval shipbuilding workforce over the next ten years.

To maintain a suitably experienced naval shipbuilding workforce, there will need to be both:

- A steady supply of new individuals, supported by ongoing career development to maintain a pipeline of experience.
- A focus on retention of experienced workers, to prevent loss of workers with sufficient experience to perform critical tasks.

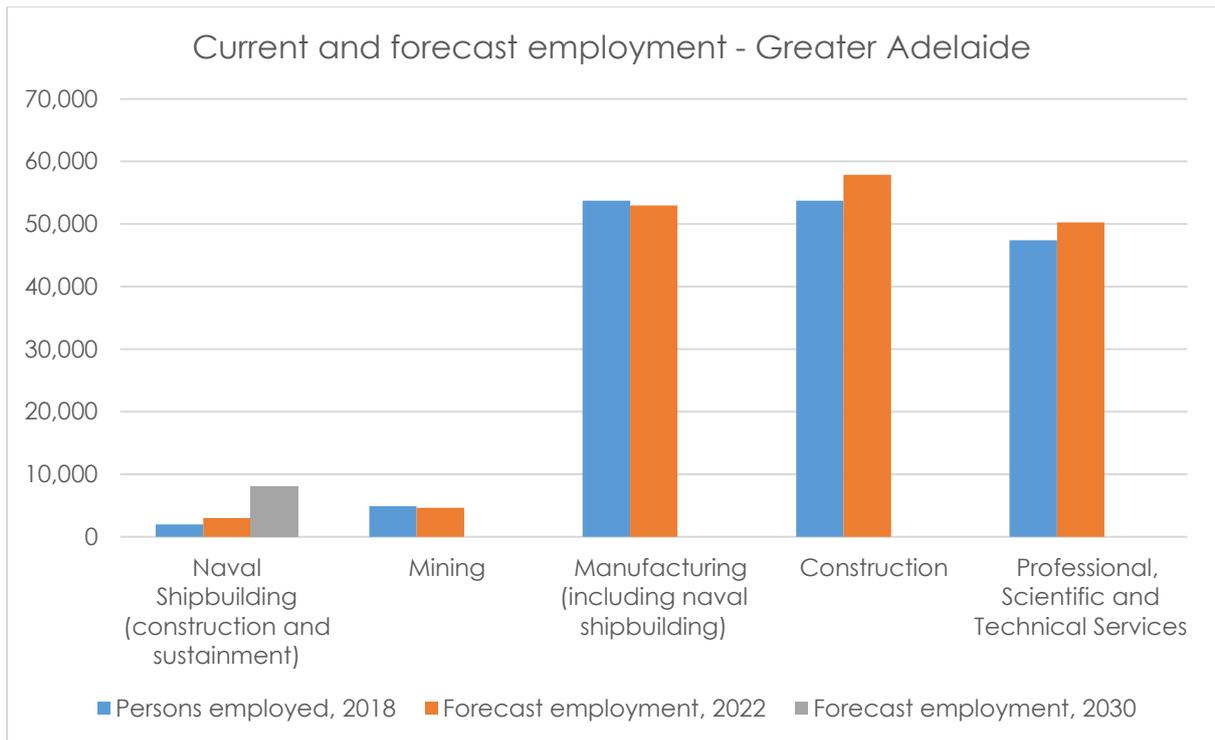
The continuous national naval shipbuilding enterprise is expected to recruit both entry-level workers, for example graduates from tertiary or vocational education and training, as well as already skilled workers from adjacent industries.

3.1. Overlap with other industry sectors

The occupations needed for naval shipbuilding overlap considerably with other major industries, including:

- Manufacturing;
- Mining;
- Construction;
- Professional, scientific and technical services; and,
- the broader defence industry, including space and cyber.

Compared to these industries, naval shipbuilding requires a relatively small number of people.



If any of these adjacent industries experience a downturn, workers may seek to move into naval shipbuilding. For example, the Manufacturing industry in Adelaide is expected to decrease by about 1000 workers over the next five years, even accounting for the increased employment in naval shipbuilding (which is a subset of manufacturing)³. These workers may need training in different techniques or shipbuilding-specific knowledge in order to meet the requirements of naval shipbuilding⁴. The Naval Shipbuilding College (discussed in the next chapter) will play an important role in delivering this training.

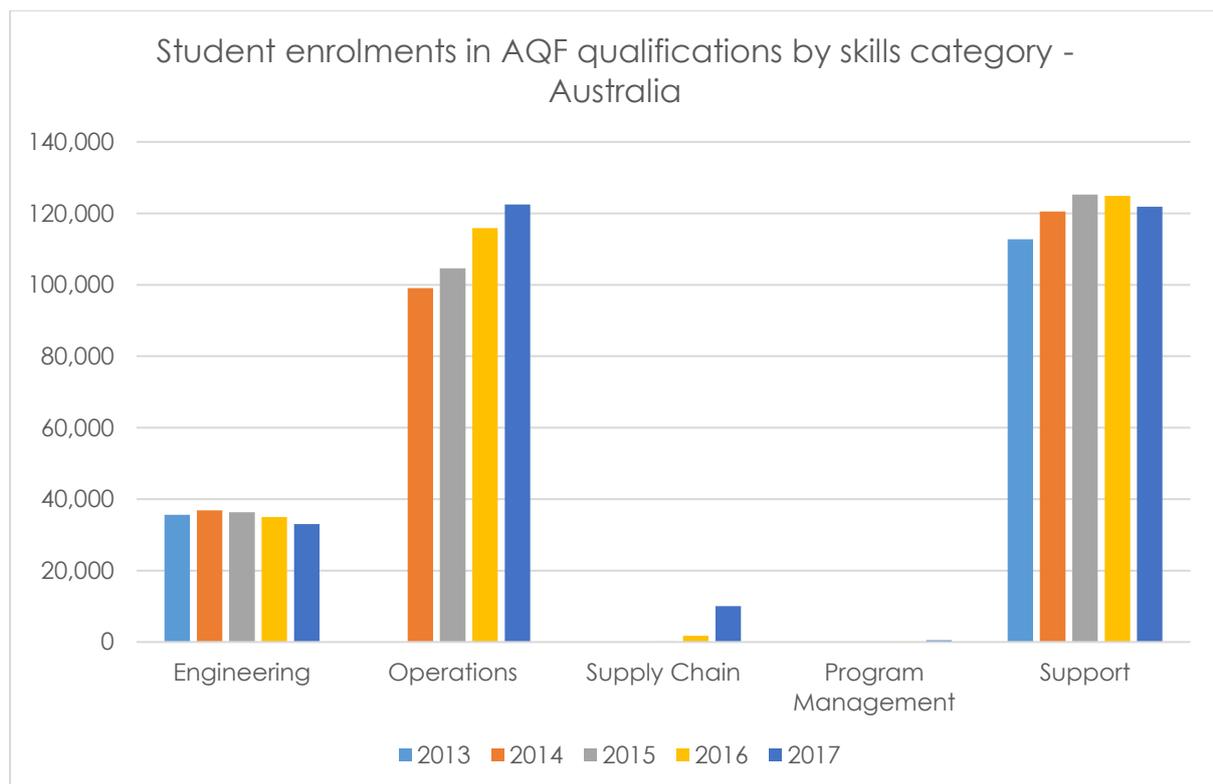
Conversely, significant growth in any of these industries could draw workers away from naval shipbuilding. As a result, the available supply of skilled labour for naval shipbuilding in the medium term will be predominately determined by the broader economic factors influencing these industries. However, it is impossible to accurately predict labour market conditions beyond about three to five years into the future. The Government will continually review labour market conditions to assess how they will impact naval shipbuilding.

³ Department of Jobs and Small Business, 2018 Employment Projections, five years to May 2022, <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

⁴ The Department of Jobs and Small Business' skill shortage research indicates that employers commonly find highly qualified and experienced applicants as being unsuitable if they do not have experience in the industry sector, or within the specialisation of the employer.

3.2. Educational throughput

Over the medium and longer term, Australia’s national education and training system has the capacity to train the workforce required to support the continuous naval shipbuilding program. For example, from 2014-2017 there were an average of 110,500 enrolments and 22,090 completions each year in Australian qualifications relevant to shipbuilding operations roles, such as trades and technicians⁵. In addition, between 2013-2016 there were an average of approximately 36,000 enrolments each year in Engineering qualifications⁶.



Data about the completions of qualifications relevant to naval shipbuilding also shows a steady flow of new graduates into the labour market. A significant degree of skills

⁵ Note: while the number of completions is much lower than the number of enrolments, this does not imply that most students fail to complete a course. Enrolments measures all students enrolled in a course in a given year, whereas completions only measures the students who complete the course in that year. For example, in a four year engineering degree a single student will be counted over four years in enrolments, but in only one year for completions.

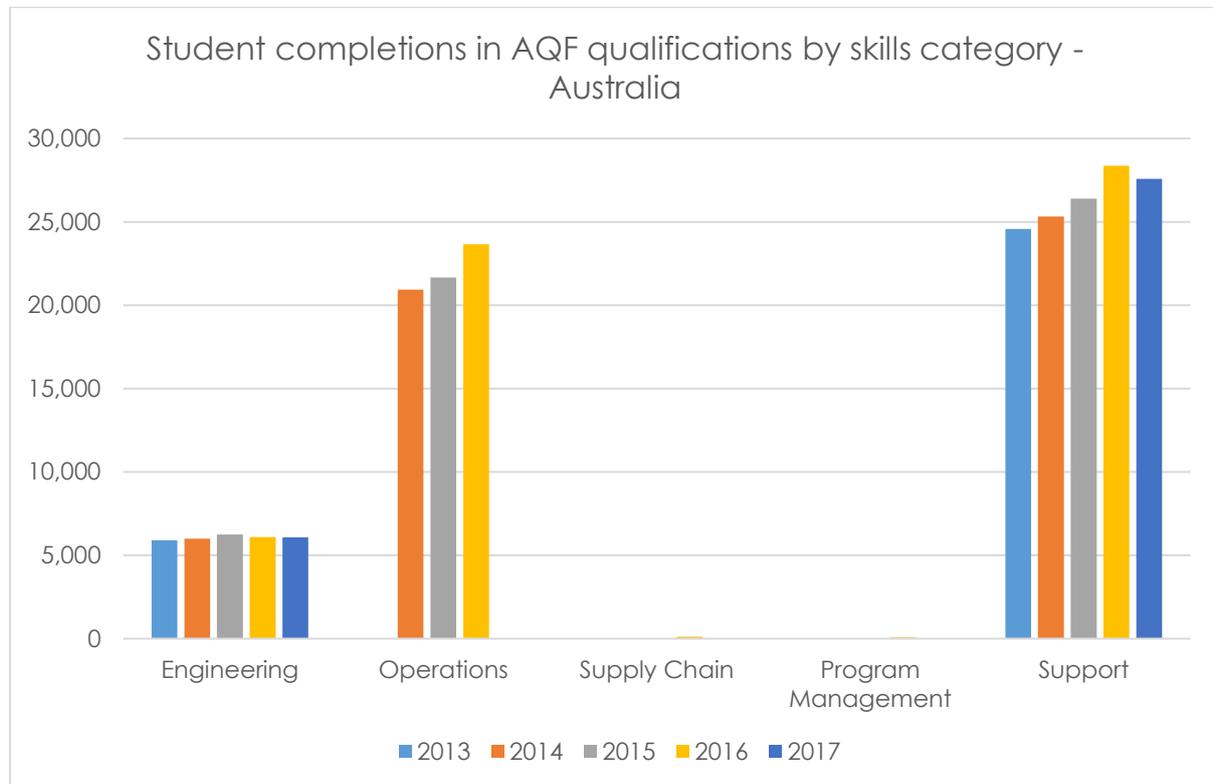
⁶ Source: NCVER, Total VET students and courses 2014-2017 - program enrolments and completions, unpublished data & selected Higher Education statistics, Australian Government Department of Education and Training

Based on identified AQF qualifications, does not include short courses or non-AQF accredited courses.

Caution is required comparing enrolments of 2014 with subsequent years due to increased submissions from training providers and reduced reporting exemptions

Small values (<5) have been withheld

development for shipbuilding takes place within firms, or utilising non-accredited, vendor-specific or just-in-time training, which are not reflected in national training system statistics. For example, formal qualifications under the Australian Qualifications Framework may not necessarily be utilised for supply chain management and program management roles – which is reflected in the very low student numbers for those skills categories.



While the student volume requirements of Naval Shipbuilding can be accommodated within the national system, further work will be required to ensure qualifications reflect the specialised skills requirements of shipbuilding, which in turn will support broader skills development across the economy. In addition, increased mobility of graduates in specialised fields may also need to be encouraged, given delivery is predominantly occurring in the Eastern states. Further data about enrolments and completions in relevant qualifications in South Australia and Western Australia, where new vessel construction will occur, is included in Appendix 1.

3.3. Skill shortages

Several of the trade occupations required for naval shipbuilding, including air-conditioning and refrigeration mechanics and sheet metal trades, are currently in short supply and have been subject to occasional or persistent skill shortages at the national level over the last decade.

Trade apprenticeship completions in South Australia have generally declined over the past few years, mirroring broader trends across Australia. While South Australian trade

apprenticeship commencements have recently begun to rise again, it is not yet clear whether this will be sustained and how quickly it might translate into increased completions.

Addressing these skill shortages across industries, together with any new shortages that may emerge, will be critical to securing an appropriate workforce for the national naval shipbuilding enterprise.

3.4. Experience shortages

A number of shipbuilding firms report difficulty recruiting sufficiently skilled and experienced engineers to work on the design of future vessels. This issue is not about total workforce numbers; these firms report that they are not facing difficulties recruiting sufficient entry-level workers or university graduates. Instead they face difficulty recruiting a small number of employees in particular occupations with around ten years' experience in naval shipbuilding. While employees with transferable skills can be retrained to work on the later phases of naval construction, the early phases require a core of highly skilled workers with prior experience in naval shipbuilding. Navy Technical Regulations also require engineers with ten years' experience to sign off on various aspects of shipbuilding work. An experienced core of employees will also be the ones to train and develop other new recruits, particularly those who are new to naval shipbuilding.

Starting in around 2023, submarine construction will require master welders, due to the highly specialised nature of welding on submarines. During earlier phases of AWD construction there were difficulties recruiting sufficiently skilled and experienced welding supervisors.

3.5. International competition for skills

Naval shipbuilding exists in a global market and there is strong international competition for workers with shipbuilding experience. Canada and the United Kingdom are gearing up for their own frigate construction programs, both utilising BAE's type 26 design, creating strong competition for these employees. This puts pressure on shipbuilding programs that will be difficult to overcome in the short term. While this only relates to a comparatively small number of employees, it will be important to grow and retain a pool of Australian workers with the relevant skills and experience over the medium to longer term.

3.6. Competition between shipbuilding firms: 2020—2030

The period from about 2022 to 2030 carries the greatest level of workforce-related risk for the national naval shipbuilding enterprise. All employers involved in naval shipbuilding, especially BAE Systems (including ASC Shipbuilding), Naval Group Australia, ASC Pty Ltd, the

Royal Australian Navy, and the Department of Defence, will be growing their workforces in this period. There is a risk of labour shortages as the various employers compete with each other and with other industries to attract sufficient workers with the right skills and experience at the right time.

Some level of competition between firms (and between naval shipbuilding and other industry sectors) is inevitable and healthy. It allows workers to gain wider experience and potentially to move into higher paying positions in other areas that will make better use of their skills and experience.

However, if there are workforce shortages, particularly in the early years of the shipbuilding enterprise, then firms are likely to aggressively compete to attract workers from elsewhere within naval shipbuilding. For example, in response to questions at Senate Estimates for the Finance and Public Administration Legislation Committee on 23 October 2018, ASC advised that it is finding it difficult to retain skilled workers with experience on the *Collins* class submarine. Defence notes this claim is based on the loss of 24 engineers over two years, which is four more than normal attrition rates.

3.7. Security clearance requirements

Security considerations are of great importance in the national naval shipbuilding enterprise. Most workers involved in naval shipbuilding will require some level of security clearance, which will escalate depending on the sensitivity of the role.

Clearance requirements limit, to some degree, the pool of workers available for naval shipbuilding, including students considering a career in the enterprise. The requirement to obtain a security clearance also adds a cost for employers and potentially prolongs recruitment activities.

While security requirements could pose a challenge in the ramp-up phase of naval shipbuilding, Defence has already taken a number of actions to ensure that security clearances can be processed quickly so as to avoid these delays as much as possible.

3.8. Particular needs of supply chain firms and SMEs: 2020—2030

As the naval shipbuilding workforce employed by prime contractors and large firms increases, smaller supply chain firms might face more unique challenges to recruiting and retaining an appropriately skilled workforce.

It may be difficult for small firms to retain skilled workers while larger naval shipbuilding firms are growing their workforces, or due to competition within the supply chain firms. If small firms invest in training new staff, including through apprenticeships, this cost may not be recouped if staff leave to go to large firms.

3.9. Royal Australian Navy: 2025—2040

From 2025 to 2040 the Navy faces challenges in both attracting and retaining sufficient personnel to operate new vessels.

As a technical force, Navy relies especially on the national education system, particularly in the areas of Science, Technology, Engineering, and Mathematics (STEM). Competition throughout Australia for STEM related skills means that there may be challenges in competing for the supply of skilled people to meet Navy's future demand.

As the shipbuilding enterprise progresses there is likely to be increasing industry demand for Navy personnel, due to their knowledge of Defence and Defence processes. There is also strong market competition for workers with technical skills, making Navy personnel with these skills attractive to industry. The major challenge is expected to be retaining sufficient skilled, mid-seniority officers and sailors to build Navy's engineering, technical and logistics knowledge and future leadership once industry begins to mobilise and construction commences.

To retain personnel, Navy also needs to ensure that its people have sufficient time ashore between deployments and can be engaged in meaningful work when not deployed at sea. At present, Navy Force Support Units (FSUs) are one of the main forms of shore work. However, FSUs compete against industry for sustainment contracts. This creates a challenge for Navy to find sufficient meaningful work where FSUs are not successful when tendering.

3.10. Long-term workforce outlook: 2030—2040

Presently there are no indications of long term problems fulfilling total workforce numbers for the national naval shipbuilding enterprise. Barring a significant labour market shock, the naval shipbuilding workforce should remain stable after its initial ramp up period, provided the education and training system maintains an appropriate throughput of new students with appropriate skills, and firms continue to take on and develop entry-level employees.

However, in most industry sectors new technologies are driving an increase in the use of automation to increase productivity and reduce costs. The impact of disruptive technology and the implications of Industry 4.0 will have significant effects on the economy for both large companies and SMEs⁷. Over time, it is likely that these same trends will apply to naval shipbuilding. This has the potential to reduce the number of workers required for particular tasks, shifting the composition of the workforce to a higher overall skill profile. Naval

⁷ AlphaBeta 2017, *The Automation Advantage*, Sydney, <http://www.alphabeta.com/the-automation-advantage>

shipbuilding workers will need lifelong learning and education to continually update their skills to stay abreast of new technologies.

Chapter 3 Suggested Discussion Questions

- Are there other significant workforce challenges that have not been identified here?
- Do supply chain firms, especially smaller firms, have any particular needs or face particular challenges that aren't adequately captured in this document?
- How can Australia shape its employee value proposition to increase global attraction? What is unique about the Australian continuous build?

4. Responses to workforce challenges

This chapter outlines a number of the initiatives that are already in place to grow the naval shipbuilding workforce and overcome the challenges listed in Chapter 3. Some of these actions have been taken by the Australian Government, while others have been taken by shipbuilding firms themselves.

4.1. Rebalancing the ASC Shipbuilding workforce

While ASC Shipbuilding's workforce employed on the AWD project is in decline, retaining a number of skilled and experienced workers will provide a core around which the future workforce can grow. This may also help minimise the start-up costs to construct new vessels. These experienced workers would also be able to help supervise and guide new recruits into the future workforce.

To date, the Government has taken a number of steps to minimise redundancies from ASC Shipbuilding, including:

- bringing forward the prototyping of *Hunter* class frigates to 2020;
- ordering the first two *Arafura* class offshore patrol vessels to be built in Osborne by ASC; and,
- providing ASC with up to \$29.4m to transfer as many as 200 ASC Shipbuilding employees, over three years, to work on future submarine construction and *Collins* class sustainment in ASC Pty Ltd. This includes support for retraining personnel in fields such as Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) and supply chain management for 100 of these employees.

4.2. Naval Shipbuilding College

The Naval Shipbuilding College has been established to ensure a coordinated, national approach to workforce development and skilling across the national naval shipbuilding enterprise. The College utilises a hub and spoke model, by which students enrol in existing education and training providers that have been endorsed by the College as delivering programs to the specialised standards required for naval shipbuilding, and drawing on existing funding arrangements. The College will progressively implement frameworks to increase the capacity and capability of Australia's skilled workforce in line with naval shipbuilders' needs as they evolve.

While the skills needed for naval shipbuilding are similar to those in other industries, it also requires specialised application of those skills. Shipbuilding firms themselves have a critical role in providing the additional training to support existing skilled workers to specialise in

naval shipbuilding. The College will provide a central coordinating point to minimise duplication of effort across shipbuilding firms and education providers.

The College is working with shipbuilding firms, initially Primes, but also representatives from the supply chain, to understand and gather data about their workforce needs and perform detailed workforce modelling across the entire national naval shipbuilding enterprise. The College will use this information to support education and training institutions to incorporate the latest industry-practices for naval shipbuilding into their course offerings. It will also work with education and training institutions to support the development of new courses or micro-credentialing to help skilled workers in adjacent sectors to gain shipbuilding-specific skills and knowledge. The College's initial focus is on pre-production roles and will shift to fabrication and outfitting roles as the build projects progress.

The College is working with schools, tertiary institutes and industry to support greater awareness of the long term career opportunities that the continuous shipbuilding enterprise presents. This will support the attraction of skilled individuals from adjacent industries, and students to the shipbuilding industry, including increasing workforce diversity.

4.3. Short term workforce development

To build a sustainable pipeline of skills and experience to support medium term needs, over the next 12 months industry primes will identify high-potential experienced individuals who can transition to become the next generation of supervisors and middle management.

The Naval Shipbuilding College is developing bridging courses for critical skills to train workers from adjacent industries to adapt to the specific needs of naval shipbuilding. The current focus is on pre-production roles such as designers, project managers, production planners, and engineering roles (Mechanical and Electrical). This work aims to clearly define the commonalities across shipbuilding firms, as compared to the existing capabilities required by the broader labour market. This is anticipated to result in short-courses, which support rapid transition from adjacent industries.

4.4. International mobility

The Naval Shipbuilding Plan anticipated that shipbuilders would bring into the Australian shipyards workers from their home countries who are familiar with their specific production techniques and processes. These workers are likely to fill middle management and supervisory roles and will be essential to the process of knowledge transfer to the Australian naval shipbuilding industry. It is expected that over time the number of skilled workers from international shipyards will decline as the Australian workforce becomes familiar with construction requirements and develops more specialised skills. Outbound mobility – short

term placements of Australians with overseas partner firms and governments – will also play an important role in developing expertise within the workforce.

Naval shipbuilding firms are using temporary skill shortage or short stay specialist visas to recruit workers from overseas, particularly engineers and naval architects that already have extensive experience in naval shipbuilding. There is a general shortage of skilled and experienced engineering professionals in Australia, and this shortage is exacerbated for workers with prior experience in naval shipbuilding. The number of foreign workers required for naval shipbuilding is relatively small, for example, shipbuilding firms anticipate they will need to recruit about 200 foreign workers in 2019.

In general, the Australian labour market is capable of producing sufficient workers for most occupations required for naval shipbuilding, in both the short and longer term. There is no identified need to use foreign workers for trades occupations, such as welders, boilermakers or electricians.

4.5. Naval Shipbuilding Industry Reference Committee

Industry Reference Committees (IRCs) are the formal channel for considering industry skills requirements in the development and review of training packages. In 2018 the Government established a new Naval Shipbuilding IRC that has 16 members drawn from across the naval shipbuilding and sustainment industries, including the prime contractors, professional associations and others with relevant expertise. The Naval Shipbuilding IRC will inform the development of formal training packages that are tailored for naval shipbuilding.

4.6. Improving diversity in naval shipbuilding

The government wants to ensure that the benefits of naval shipbuilding flow across the labour market. However, naval shipbuilding currently has a relatively homogenous workforce. For example, in 2017 it was estimated that naval shipbuilding had low participation rates for women (9 per cent of workforce) and Indigenous Australians (<1 per cent). Increasing the diversity of the shipbuilding workforce will be an important way of ensuring adequate labour supply. A diverse workforce increases the talent pool from which the shipbuilding industry can draw, while reaping the benefits achieved from increased performance, efficiency and productivity from a diverse workforce.

Naval shipbuilding employers will need to take actions to improve the diversity of their workforces, in particular recruiting more women. For example, Naval Group, the designer and builder of the *Attack* class submarines has stated its intent to achieve a 50:50 gender ratio in its workforce.

Shipbuilding firms know that they will need to compete for talent and become an employer of choice to retain the skilled workforce they need. This includes ensuring that the working environments they create are free from bias and discrimination and value the diversity of backgrounds and workplace practices that make for an effective and competitive organisational culture.

4.7. Managing fluctuations in workforce demand

Defence anticipates that the workforces required to construct new naval vessels, especially future submarines and frigates, will fluctuate over time. For example, more boilermakers or sheet metal fabricators will be required in the early stages of constructing a particular vessel, but fewer will be required later in the process. In contrast, more electricians and painters will be needed later in the build of each vessel but fewer near the start.

Defence is looking at arrangements to make it easier for employees to move between shipbuilding projects, at least in the Osborne precinct, as the work fluctuates. Appropriate scheduling of vessel construction may also help to prevent peaks in demand for particular skills or occupations occurring at the same time.

4.8. Whole-of-labour market response

Broader labour market factors pose the greatest risk for workforce shortages in naval shipbuilding over the medium to long term. While naval shipbuilding could draw workers from other industries, this could potentially exacerbate skill shortages in other parts of the economy and would not be in Australia's overall interests. Instead, addressing this risk means ensuring that the labour market overall has sufficient workers in key occupations, such as engineers, electricians and welders. This will in turn ensure that there are no skill shortages in naval shipbuilding.

Key to this is ensuring Australia continues to have an agile and adaptable education and training system that responds to unpredictable changes in labour market demand. The Australian Government Department of Education and Training is leading work on a range of activities to ensure that the training system is agile and supports future needs. In addition, a range of government initiatives are already supporting this, including:

- Reform of the governance arrangements for developing training qualifications to improve responsiveness to changing industry needs
- Incentives to attract and retain Australian Apprentices;
- Support for Higher Education and VET students through income contingent loans;
- Increased support for students who need to relocate to study; and,
- Funding of Higher Education and VET places through both Commonwealth and state and territory delivery arrangements.

4.9. STEM Skilling initiatives

Many of the occupations required for naval shipbuilding require strong skills in science, technology, engineering and mathematics (STEM). To attract a sufficient supply of workers into professional occupations such as engineering, Australian governments, at both the federal and state levels, have put in place a large number of STEM skilling initiatives. These are designed to attract students into STEM courses and ensure a sufficient supply of STEM graduates in the future.

Defence also supports a range of defence industry skilling and STEM initiatives, including the School Pathways Program and the Defence Engineering Internship Program. Defence is also currently developing a Defence Industry Skilling and STEM Strategy.

4.10. Royal Australian Navy responses

Navy will meet its future workforce needs through a synchronised strategy of growth, career development and professionalisation, and the retention of people with required skill-sets. Defence has commissioned an independent Naval Work Force review. That report is due to be delivered in late 2019 or 2020.

Navy is working to increase mid-career and mature entry opportunities. To support this, Navy is committed to arrangements that encourage and support workforce flexibility, including enabling people to transfer between permanent and part-time service across their working lives.

The Navy will be increasingly competing with wider defence industry to attract and retain its workforce. For now, recruiting and training targets have been surged to increase the pool of junior personnel to deliver and crew future capability.

Industry is an essential and fundamental input to Navy's capability. To maximise the value of this increasingly co-dependent relationship, Navy will need to develop new ways of collaborating with industry and maintaining continuous engagement. In addition to facilitating easier movement in and out of uniform, Navy may consider options to make better use of serving members' time onshore between sea deployments. This might include regular short term secondments to industry to work on fleet sustainment activities as well as longer term embedded officer secondments.

Increased career flexibility and options for greater involvement with shipbuilding industry may provide incentives for both existing and future Navy personnel to remain connected with Defence, in turn reducing the loss of organisational knowledge and experience.

4.11. Developing the Department of Defence workforce

The Department of Defence is taking a number of actions to grow its workforce in support of the national naval shipbuilding enterprise, especially in engineering and program and project management occupations.

Defence has developed a Naval Construction APS Recruitment Strategy to assist in achieving the growth required for the APS workforce. The Strategy identifies recruitment pathways to maximise attracting talent to critical occupational categories. Examples include offering APS positions to transitioning ADF personnel before they leave the organisation, and a specialised stream in the Defence Graduate Program, which is aimed at filling a medium term need for skilled engineers.

Chapter 4 Suggested Discussion Questions

- Are there any other responses to naval shipbuilding workforce challenges that may complement current initiatives?
- Are there actions that can be taken to create a more adaptable and agile workforce that can move between sectors to respond to varying demands? How can naval shipbuilding be a catalyst for broader skills growth across Australia?
- Are there opportunities for Royal Australian Navy members to work in industry when not deployed at sea? If so, what arrangements or settings would need to be in place for this to work effectively?
- To what extent do funding arrangements in the Higher Education and Vocational Education and Training sectors support the specialised requirements of Naval Shipbuilding, including bridging programs to support transitions from other sectors?
- Are there measures that could be put in place to make the education system more responsive to rapid changes in workforce demand?
- What lessons may be drawn from other sectors to attract workers from more diverse backgrounds, for example, females or indigenous Australians?
- Are there opportunities for greater international collaboration on workforce issues, for example, with the UK and Canada noting the selection of a BAE Systems Type 26 frigate variant by both those countries? Would this allow sharing of expertise and experience, instead of competition for key personnel?
- Are there other actions that could be taken to help the various employers in naval shipbuilding coordinate on workforce issues?

5. Next steps

Defence is seeking any information which addresses the above questions, or any other pertinent data which will contribute to our collective understanding of naval shipbuilding workforce issues.

All input is welcome, and can be sent to shipbuilding.engagement@defence.gov.au, by Friday 29 March 2019. Please include contact details in your submission; in certain situations Defence may contact you to follow up, discuss or clarify information provided in your submission.

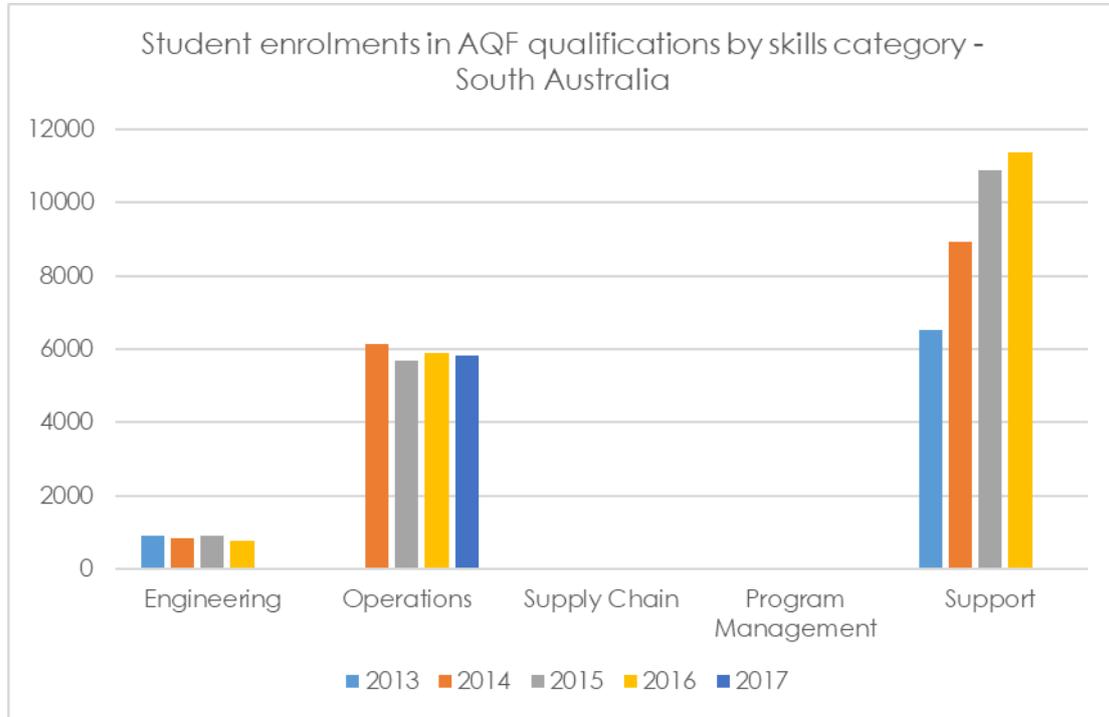
Defence may share submissions with other Australian Government departments or agencies for the purposes of consultation and discussion.

If you would like to discuss the content of this discussion paper or the ongoing strategic workforce planning for the national naval shipbuilding enterprise, please contact the National Naval Shipbuilding Office via shipbuilding.engagement@defence.gov.au.

National Naval Shipbuilding Office

Appendix 1: Australian qualifications framework (AQF) qualifications relevant to naval shipbuilding

South Australia: Enrolments



Source: NCVET, Total VET students and courses 2014-2017 - program enrolments and completions, unpublished data & selected Higher Education statistics, Australian Government Department of Education and Training

Notes: 2017 Higher Education data not yet available

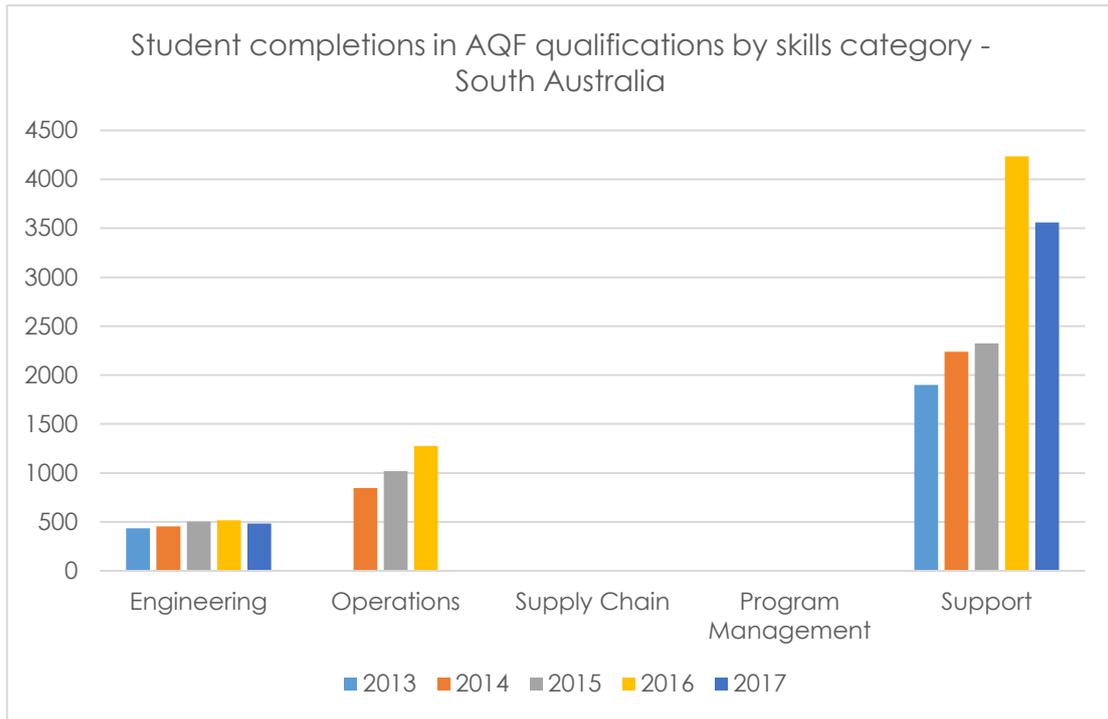
Based on list of identified qualifications delivered in South Australia, does not include short courses or non-AQF accredited courses

Caution is required comparing VET enrolments of 2014 with subsequent years due to increased submissions from training providers and reduced reporting exemptions

Small values (<5) have been withheld

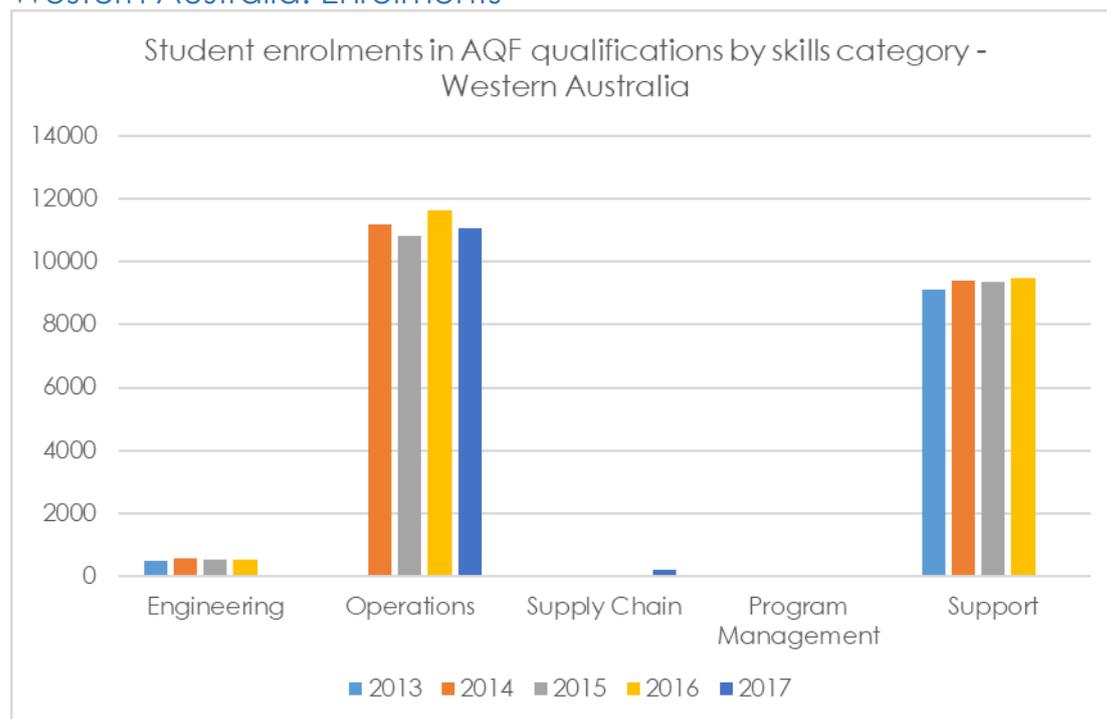
	2013	2014	2015	2016	2017
Engineering	920	841	891	781	
Operations		6147	5690	5887	5828
Supply Chain			0	8	27
Program Management				0	0
Support	6511	8916	10862	11358	

South Australia: Completions



	2013	2014	2015	2016	2017
Engineering	435	456	503	517	483
Operations		846	1019	1276	
Supply Chain				6	
Program Management					
Support	1900	2238	2323	4236	3559

Western Australia: Enrolments



Source: NCVET, Total VET students and courses 2014-2017 - program enrolments and completions, unpublished data & selected Higher Education statistics, Australian Government Department of Education and Training

Notes: 2017 Higher Education data not yet available

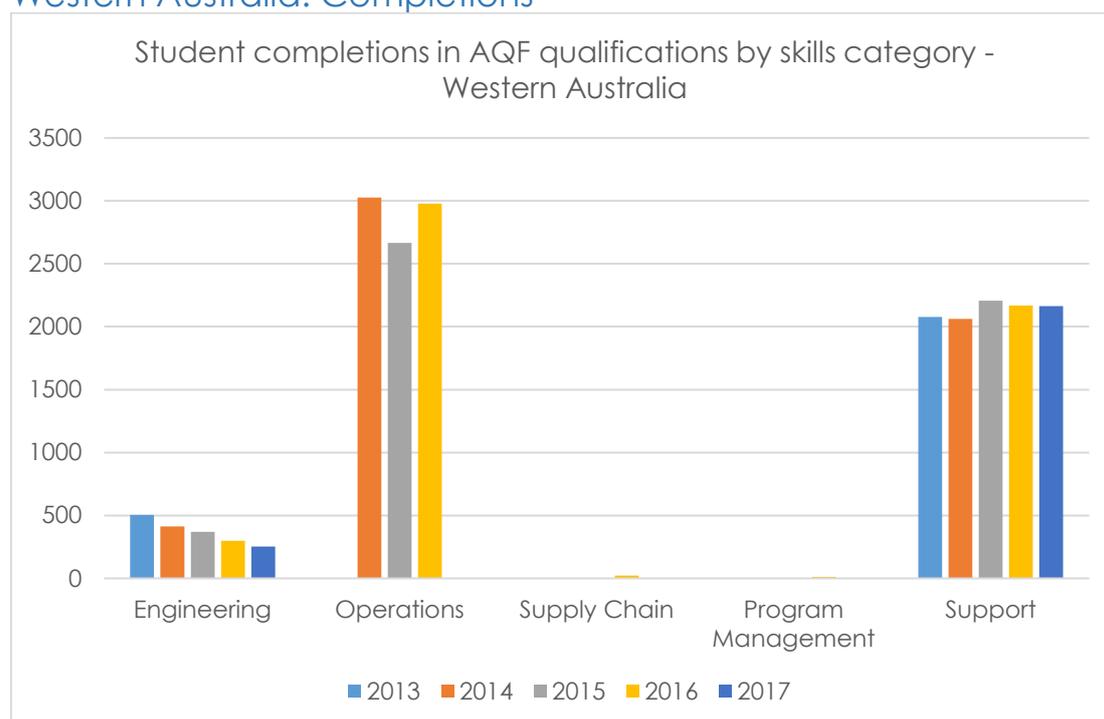
Based on list of identified qualifications delivered in South Australia, does not include short courses or non-AQF accredited courses

Caution is required comparing VET enrolments of 2014 with subsequent years due to increased submissions from training providers and reduced reporting exemptions

Small values (<5) have been withheld

	2013	2014	2015	2016	2017
Engineering	476	551	531	514	
Operations		11173	10813	11641	11068
Supply Chain				53	192
Program Management			0	7	14
Support	9103	9395	9376	9475	

Western Australia: Completions



	2013	2014	2015	2016	2017
Engineering	503	412	370	298	254
Operations		3027	2667	2978	
Supply Chain				22	
Program Management				11	
Support	2078	2063	2207	2168	2164

Note for all charts: while the number of completions is much lower than the number of enrolments, this does not imply that most students fail to complete a course. Enrolments measures all students enrolled in a course in a given year, whereas completions only measures the students who complete the course in that year. For example, in a four year engineering degree a single student will be counted over four years in enrolments, but in only one year for completions. Enrolments is a measure of activity in education, whereas completions is a measure of input or supply to the labour market.

Relevant courses for each skill category

Category	Title
Engineering	Bachelor Process and Resources Engineering Bachelor Electrical and Electronic Engineering and Technology Bachelor Mechanical and Industrial Engineering and Technology Bachelor Manufacturing Engineering and Technology Bachelor Maritime Engineering and Technology Bachelor Other Engineering and Related Technologies Post Grad Process and Resources Engineering Post Grad Electrical and Electronic Engineering and Technology Post Grad Mechanical and Industrial Engineering and Technology Post Grad Manufacturing Engineering and Technology Post Grad Maritime Engineering and Technology Post Grad Other Engineering and Related Technologies
Operations	Certificate III in Marine Craft Construction Certificate III in Engineering - Mechanical Trade Certificate III in Engineering - Fabrication Trade Certificate IV in Engineering Diploma of Engineering - Advanced Trade Certificate III in Electrotechnology Electrician Certificate III in Instrumentation and Control Certificate III in Electrical Machine Repair Certificate III in Electronics and Communications Certificate IV in Electrical - Instrumentation Certificate IV in Electrotechnology - Systems Electrician Certificate IV in Electronics and Communications Certificate III in Air-conditioning and Refrigeration Certificate IV in Air-conditioning Systems Energy Management and Control Certificate IV in Refrigeration and Air-conditioning systems Advanced Diploma of Air-conditioning and Refrigeration Engineering Advanced Diploma of Electrical - Engineering Advanced Diploma of Electrical Systems Engineering Advanced Diploma of Engineering Technology - Electronics Advanced Diploma of Industrial Electronics and Control Engineering Advanced Diploma of Instrumentation and Control Engineering Certificate III in Painting and Decorating Certificate III in Carpentry Certificate III in Joinery Certificate III in Carpentry and Joinery Certificate IV in Project Management Practice Diploma of Project Management

Supply Chain	Certificate III in Logistics Certificate IV in Logistics Certificate IV in Materiel Logistics Certificate IV in Purchasing Diploma of Logistics Diploma of Materiel Logistics Advanced Diploma of Materiel Logistics
Program Management	Advanced Diploma of Program Management
Support	Bachelor Business and Management Bachelor Sales and Marketing Post-Grad Business and Management Post-Grad Sales and Marketing