

# *Industry Skills Forecast and Proposed Schedule of Work*

Naval Shipbuilding

July 2019



# Executive summary

## *Background*

On 20 September 2018, the Australian Industry and Skills Committee (AISC) endorsed the final membership and structure of the new Naval Shipbuilding (NSB) Industry Reference Committee (IRC). The NSB IRC was established to support the national implementation of the Naval Shipbuilding Plan 2017, which seeks to establish a sustainable, long-term naval shipbuilding industry in Australia.

The NSB industry describes the design, build, test and sustainment of vessels for the defence of Australia. The 2016 *Defence White Paper* set out the Australian Government's plan for the largest recapitalisation of the Royal Australian Navy (RAN) since the Second World War. To achieve this commitment, the Australian Government will invest approximately \$90 billion in a continuous build program for submarines, frigates and offshore patrol vessels (OPVs) through to 2050.

At each phase of work, the industry will require a different mix of skills. To assist in determining those skills, five job families (group of similar jobs)<sup>1</sup> have been formed by the Naval Shipbuilding College (NSC) as part of the NSB taxonomy. The NSB taxonomy was developed in collaboration with the prime contractors ('primes'), and broader defence industry. Each job family contains a number of job functions (groups of similar skills)<sup>2</sup> and associated job roles (specific capabilities).<sup>3</sup> Based on industry consultation and our analysis, the overwhelming majority of job roles across the NSB industry can be grouped into one of the following five job families: engineering, operations, project management, supply chain, and support.

The NSB industry is unique in that it is driven by the Australian Government's requirements as articulated by the various government departments, including the Department of Defence and the Australian Border Force. Government tenders define the requirements for products and services. Primes across Australia then work to develop solutions that best meet the specific requirements of these tenders. .

## *Demand for skills*

In the NSB industry, workers operate across a diverse range of business types employed in a variety of job roles. Australia's marine manufacturing industry employed approximately 14,600 workers in 2014-15.<sup>4</sup> The workforce is predominantly young (an average age of 30-35), male (approximately 90 per cent) and concentrated in South Australia and Western Australia (approximately 65 per cent of total employment).<sup>5</sup>

Employment growth is expected to occur across all NSB job roles, as noted in the Defence Industry Skilling and STEM Strategy, and the Naval Shipbuilding Plan.<sup>6</sup> Direct job growth in the NSB industry is predicted to grow by an additional 5,200 workers by 2026.<sup>7</sup> Demand for workers with core manufacturing skills, such as fabrication and welding, will be particularly strong and numbers will need to increase by a factor of four from current levels.<sup>8</sup> The naval shipbuilding and sustainment workforce, including acquisition and supply chain is projected to grow to approximately 15,000.<sup>9</sup>

## *Suitability of existing training*

From consultations we heard that the engineering job family is broadly catered for by the higher education sector. The use of new and innovative materials, manufacturing techniques and the general digitisation of the fleet require new skills to be developed within the workforce. Industry is working with the higher education sector directly to develop content that meets their specific requirements. However, the ability to deliver these large and complex projects poses a unique skills challenge for the workforce, requiring specialist skills in integrated logistics support, which are not currently delivered to the standard required by industry.

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Industry stakeholders believe that most entry level jobs within the operations job family are broadly catered for by the Vocational Education and Training (VET) sector. Employers in the sector that currently have a workforce have developed 'on-the-job training' to equip graduates with a range of skills to meet industry requirements. This on-the-job training provides graduates with adequate levels of NSB contextualisation to be successful in an entry level naval shipbuilding role. Industry noted the future need for a larger grey-collar workforce that have the skills to operate in an increasingly digitised shipyard and undertake more complex tasks. The specific skills associated with technologist role will continue to become clearer once the program build commences.

Industry consultations suggest that at a fundamental level the project management job family is met by the higher education sector. Industry noted the need for specific skills relating to planning, scheduling and estimation in the VET sector. Due to the scale and complexity of the continuous build program, specific training relating to engineering and build processes are required to accurately schedule, plan and estimate. These areas are available as a high level 'taster' for project management graduates from the VET sector but lack the specificity to be appropriate for NSB industry.

The skills available in VET sector are generally appropriate for the supply chain job family but may require some contextualisation according to industry.

From consultation we heard that the support job family is broadly catered for by the VET and higher education sector. There is a need for contextualisation of content due to the specific requirements of the NSB industry (e.g., an understanding of ITAR control, and familiarity with ASDEFCON contracts). However, industry believes it will be able to provide the relevant contextualisation as part of 'on-the-job training' provided it continues to have access to pipeline of strong graduates.

No unique Naval Shipbuilding training currently exists in the VET system. Workers in the industry can obtain associated university degrees and VET qualifications from related training packages. A large number of workers in this industry are qualified under the Manufacturing Engineering (MEM), Manufacturing (MSM), Electrotechnology (UEE), Business Services (BSB), Sustainability (MSS), Information and Communication Technology (ICT), and Transport and Logistics (TLI) Training Packages. Due to the overlap of skills, the NSB IRC will actively contribute to the work of relevant IRCs as their training package content is being considered.



We have heard in consultations that these training packages cover the majority of skills required by the sector, especially for entry level roles within the industry. However, the training packages do not cover all of the skills required by industry and the NSB IRC will need to consider where gaps exist. Some work has been conducted by the NSC to identify the specific gaps that exist across the industry, as outlined in the needs analysis plan vide Appendix C.

The most critical driver of change for the industry is the establishment of a forward plan of work and the industry establishing the capacity and capability to deliver that work. The industry is in a state of fundamental transformation, and not merely adapting to individual drivers as they emerge.

Like most industries, shipyards across the globe are working to implement technology associated with Industry 3.0. These shipyards must begin to consider the implications Industry 4.0 will have on their operations, for example the use of advanced automation and robotics, sensor technology and data analytics, cloud computing, and artificial intelligence and machine learning.<sup>10</sup> Industry 4.0 will have significant implications for the skills required in naval shipbuilding in Australia. It is difficult to identify specific skills as a number of the technological solutions are yet to become commercially available. A large number of the skills gaps in the industry have come about due to increasing levels of automation, being driven by the transition from Industry 3.0 to Industry 4.0.

### Proposed projects

The NSB IRC through this document has identified the skills required by NSB industry, considered current training products that are relevant to the NSB industry. Where the NSB IRC has found skills and training gaps, it has either referred the recommendation to another IRC and SSO, or where appropriate, considered writing training products to address the NSB specific gap. PwC’s SfA have established a matrix using the five job families and Australian Qualification Framework (AQF) levels (below).

**Table 1: Skills and training gaps**

	Engineering	Operations	Project Management	Supply Chain	Support
Advanced	Project Stream A				
Mid-level		Project Stream C	Project Stream B		
Entry-level					

**Key**

	<i>Job functions adequately served by existing training products or course offerings. In these sections some amendments may be considered by relevant IRCs</i>
	<i>Job functions not adequately served by existing training products</i>

Using this matrix, we were able to categorise the skills and qualifications required for each job family from entry level to advanced. Stakeholders were presented with the five job families and the job functions contained within them, and asked to identify job functions that were adequately served by the VET and higher education sectors. From this process, three project streams were identified across the five job families where training product material needs to be considered to address the NSB industry’s specific skills and training requirements.

PwC's Skills for Australia (SfA) and the NSB IRC propose projects to address new and emerging skills needs in the NSB industry. This proposed schedule of work for 2019-20 sets out the following projects:

- **Project stream A – Engineering: Integrated Logistics Support (ILS)**, which proposes to create training products to address the skills needs for five support system constituent capabilities (SSCC) contained within ILS, as well as address the need for greater understanding and knowledge of ILS and how it is related to current operations. This work may be done in conjunction with the Supply Chain cross sector project.
- **Project stream B – Project Management: Procurement, Planners, Schedulers and Estimators**, which proposes to create training products in response to industry demand for enhanced skills in procurement, planning, scheduling and estimating of individual tasks within the broader program of work that will allow for the delivery of these intergenerational projects on-time and on-budget. This project may be done in conjunction with the current review of the Business Services Training Package.
- **Project stream C – Operations: Grey collar workforce**, will be considered in 2020-21.

As discussed above, the following training packages are highly relevant to the NSB industry: Manufacturing Engineering (MEM), Manufacturing (MSM), Electrotechnology (UEE), Business Services (BSB), Sustainability (MSS), Information and Communication Technology (ICT), and Transport and Logistics (TLI) Training Packages. This list is not exhaustive, there may be other training packages where NSB relevant training is delivered. Due to the overlap of skills, the NSB IRC will actively contribute to the work of relevant IRCs as their training package content is being considered.

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## *Skills forecast*

# 1 Sector overview

On 20 September 2018, the Australian Industry and Skills Committee (AISC) endorsed the final membership and structure of the new Naval Shipbuilding (NSB) Industry Reference Committee (IRC).

The NSB IRC is responsible for:<sup>11</sup>

- ensuring that the skilling requirements for the naval shipbuilding and sustainment industries are reflected in relevant training packages
- working with the Naval Shipbuilding College to understand workforce requirements for the naval shipbuilding and sustainment industries
- examining relevant competencies, skillsets and national training package qualifications to address any gaps to support the specific needs of the naval shipbuilding and sustainment industries
- examining new approaches to career structuring, progression and transition in the sector, and the education pathways needed to support these
- scoping opportunities for collaboration across vocational education and training (VET), higher education and industry sectors to take advantage of opportunities presented by naval shipbuilding
- working in partnership with relevant IRCs to lead industry's response to the needs identified, ensuring that qualifications deliver the right skills, to the right standard, for this expanding high-skilled industry.

The IRC has been established to support the national implementation of the *Naval Shipbuilding Plan 2017*, which seeks to establish a sustainable, long-term naval shipbuilding industry in Australia through the design and construction of a number of modern naval vessels.

This requires a range of skills that cut across a number of industry sectors, including design (naval architecture), engineering, complex systems integration, and advanced manufacturing and outfitting techniques using highly specialised materials and composites. While many of these skills currently exist in shipbuilding or adjacent industries, the IRC will seek to ensure that all of the specialist skills required can be delivered through the national education and training system (across both VET and higher education).

The NSB IRC recognises the existing body of work that has been produced by the Commonwealth Government in relation to employment and skills requirements of industry. As the Skills Service Organisation (SSO), PwC's Skills for Australia (SfA) was asked to examine existing literature, and work with the NSC to understand activities undertaken, as well as identify areas where additional consultation was required. This approach was suggested due to the volume of consultation already undertaken across the industry, and to minimise consultation fatigue. PwC's SfA has undertaken a number of stakeholder consultations nationally to test our findings and further refine our analysis in support of the NSB IRC. A list of stakeholders can be found in Appendix B.

## 1.1 The sector at a glance

The naval shipbuilding (NSB) industry, defined as Australia's sovereign naval shipbuilding capability for the purpose of this report, describes the design, build, test and sustainment of vessels for the defence of Australia. Workers in this industry undertake a range of activities

in connection with defence vessels, including complex design, advanced manufacture, systems integration, and outfitting capabilities. The NSB Industry Reference Committee (IRC) acknowledges feedback from stakeholders that naval shipbuilding overlaps with the broader shipbuilding industry in terms of employment, skills and training required. However, this Industry Skills Forecast (ISF) will focus primarily on NSB and only make relevant observations in relation to the broader shipbuilding industry if deemed necessary.

The *2016 Defence White Paper* set out the Australian Government's plan for the largest recapitalisation of the Royal Australian Navy (RAN) since the Second World War, including affirmation of the commitment to build a sustainable naval shipbuilding capability in Australia.<sup>12</sup> To achieve this commitment, the Australian Government will invest approximately \$90 billion in a continuous build program for submarines, frigates and offshore patrol vessels (OPVs) through to 2050.<sup>13</sup> The Government's long-term plan includes investment in infrastructure and workforce development. This investment provides businesses and individuals with the confidence to invest in their own capability and capacity building, to help deliver the domestic build and employment requirements for these programs. As stated in the *Naval Shipbuilding Plan 2017*, Government investment includes funding for Australia's industrial base in a way that gives existing businesses the capability to act as prime contractors to successfully plan and execute the design, construction and sustainment of future fleets of major surface combatants.<sup>14</sup> This endeavour is to develop national capability to design, develop and build a fleet that can be used for the defence of Australia and for potential export in niche markets.<sup>15</sup>

Australia's industrial base has had to respond to individual NSB projects by hiring large numbers of shipbuilders and then laying them off at the completion of projects. With the delivery of the last of the Air Warfare Destroyers (AWD) NSB industry has had to let go of a large number of highly skilled and experienced shipbuilders.<sup>16</sup> With the announcement of the continuous shipbuilding program and the certainty of activity for the next generation, NSB industry is in a transition phase, with capacity being created through investment.

### 1.1.1 Programs of work

The current NSB industry in Australia is focused on four programs of work:

- **Future Submarines.** 12 Attack Class submarines to replace the existing fleet of Collins Class submarines.<sup>17</sup>
- **Offshore Patrol Vessels.** 12 Arafura Class boats to replace the Armidale Class patrol boats.<sup>18</sup>
- **Pacific Patrol Boat Replacements.** 21 Guardian Class patrol boats built for 12 Pacific Island nations and Timor Leste.<sup>19</sup>
- **Future Frigates.** Nine Hunter Class frigates to replace the existing fleet of Anzac Class frigates.<sup>20</sup>

In addition to this, the Australian Government announced plans to build three additional naval ships – a hydrographic vessel, and two mine warfare support vessels as part of a new Maritime Mine Countermeasures Program (to be known as SEA 1905).<sup>21</sup>

Each of these programs can be broken down into four phases of work:

- **Design**, including developing concept drawings, engineering solutions as well as changes to planning and design documents.
- **Build**, including the fabrication and installation of components in compliance with design drawings.
- **Test**, including activation and evaluation.

- **Sustainment**, including all maintenance, repair and overhaul of vessels to ensure seaworthiness.

### 1.1.2 Job roles in the sector

At each phase of work, the industry requires a different mix of skills. To assist in determining those skills, five job families (group of similar jobs)<sup>22</sup> have been formed by the Naval Shipbuilding College (NSC) as part of the NSB taxonomy. The NSB taxonomy was developed in collaboration with the prime contractors ('primes'), and broader defence industry. Each job family contains a number of job functions (groups of similar skills)<sup>23</sup> and associated job roles (specific capabilities).<sup>24</sup> Based on industry consultation and our analysis, the overwhelming majority of job roles across the NSB industry can be grouped into one of the following five job families:

- **Engineering**, which comprises all design, configuration, test and activation functions.
- **Operations**, which includes all planning, fabrication, support, control, safety and certification functions.
- **Project management**, which encompasses all commercial, scheduling, estimating and management functions.
- **Supply chain**, which includes all purchasing, contracts, logistics and warehouse management.
- **Support**, which comprises of a number of skillsets ranging from business development, sales and marketing to legal, IT and security.

The use of job families allows for a relevant and robust discussion about future skill requirements (compared to, for example, use of sub-sectors). For the avoidance of confusion, 'engineering' in the context of this Industry Skills Forecast (ISF) refers to job functions listed in Table 1 below, and does not refer to a specific Training Package (e.g., MEM Manufacturing Engineering).

The job families aim to allow the industry to consider skills requirements as well as the timing of when these are required in the lifecycle of the four programs of work. The job families, functions and roles, while effective at codifying the existing industry skills requirements, will need to be revisited regularly to ensure that future job roles are considered and appropriately addressed.

Tables 1 to 4 provide a list of the job functions contained within the respective job families.

**Table 2: Job functions contained within the Engineering job family**

Engineering	
Combat systems engineer	Production engineering
Configuration management	Project engineering
Design	Propulsion system engineering
Document Control	Reliability engineering
Electrical engineering	Safety engineering
Engineering assurance	Signatures engineering
Engineering management	Software engineering
Integrated logistics support (ILS)	Structural engineering
Maintenance engineer	Systems engineering
Materials engineer	Technologist
Mechanical systems engineering	Test and activation
Naval architecture	Welding engineering

**Table 3: Job functions contained within the Operations job family**

Operations	
Electrical operations	Piping operation
Facilities	Planning
Heavy fabrication	Quality assurance and product safety
Light fabrication	Quality control
Mechanical operations	Safety and certification
Operations support	Welding operations
Operators	

**Table 4: Job functions contained within the Project Management job family and Supply Chain job family**

Program Management	Supply Chain
Commercial	Inventory, warehousing and logistics
Program office	Purchasing and subcontractors
Project management	
Project scheduling and estimating	

**Table 5: Job functions contained within the Support job family**

Support	
Administration	IT
Business development	Legal
Business improvement	Risk and insurance
Communications	Security
Corporate executive	Work, Health Safety and Environment (WHS&E)
Finance	Training Services
Human resources	

### 1.1.3 Businesses in the sector

The NSB industry is unique in that it is driven by the Australian Government's requirements as articulated by the various government departments, including the Department of Defence and the Australian Border Force. Government tenders define the requirements for products and services. Primes across Australia then work to develop solutions that best meet the specific requirements of these tenders.

Australia has a proud history of naval shipbuilding, which most recently has included the final outfitting of the Canberra-class Landing Helicopter Dock (LHD) and the distributed build of the Hobart-class Air Warfare Destroyer (AWD) that was consolidated at the Osborne shipyard.<sup>25</sup> As part of the continuous build program announced in the *Naval Shipbuilding Plan 2017*, there is an expectation on businesses in the industry to upskill Australian industry.<sup>26</sup> This work will span across Australia's advanced manufacturing, services and construction industries.

There are shipbuilding and repair services businesses operating in most states. Businesses based in South Australia and Western Australia are primarily involved in defence-related shipbuilding, while business based in New South Wales, Tasmania, Northern Territory, Queensland and Victoria are primarily involved in providing components and / or subsystems as part of the supply chain, and the repair and maintenance of naval and commercial ships.<sup>27</sup>

#### Primes

Four large companies accounted for approximately 61 per cent of revenue in the 2017-18 financial year. These companies were ASC Pty Limited, Thales Australia Holding Pty Limited, BAE Systems Australia Holdings Limited, and Cimtec Construction & Engineering Pty Ltd.<sup>28</sup> However, the major companies and their market share are expected to change significantly as the announced head contracts are officially signed, and activity for these programs commences.

#### Small to medium enterprises (SMEs)

SMEs within the supply chain play an integral role in supporting the prime contractors by designing, manufacturing and assembling components. Consultation suggests that industry associations such as the Australian Defence Alliance (ADA), Australian Industry and Defence Network (AIDN) and the Defence Teaming Centre (DTC), among others, represent a significant portion of the approximately 3,000 SMEs across Australia.<sup>29</sup> At its peak, the SMEs within the supply chain are expected to employ almost a third of the NSB workforce.<sup>30</sup>

## 2 *Employment and skills outlook overview*

### 2.1 *Employment outlook*

As set out above, workers in the NSB industry can be categorised into a range of job families. This section outlines our analysis and findings in relation to employment and skills requirements.

#### **Overview**

In the NSB industry, workers operate across a diverse range of business types employed in a variety of job roles. Australia's marine manufacturing industry employed approximately 14,600 workers in 2014-15.<sup>31</sup> The workforce is predominantly young (an average age of 30-35), male (approximately 90 per cent) and concentrated in South Australia and Western Australia (approximately 65 per cent of total employment).<sup>32</sup>

The shipbuilding and repair sector, of which NSB is a large and important component (approximately 75 per cent of revenue),<sup>33</sup> is expected to grow consistently (average 4.4 per cent per annum) over the next five years, driven by the Australian Government's investment under the Naval Shipbuilding Plan.<sup>34</sup>

It must be noted that the statistics above do not specifically differentiate between commercial and naval shipbuilding. In addition, these numbers do not capture the complex weapon and combat system development and integration roles that form an integral part of naval shipbuilding activity.<sup>35</sup>

Employment growth is expected to occur across all NSB job roles, as noted in the Defence Industry Skilling and STEM Strategy, and the Naval Shipbuilding Plan.<sup>36</sup> Direct job growth in the NSB industry is predicted to grow by an additional 5,200 workers by 2026.<sup>37</sup> Demand for workers with core manufacturing skills, such as fabrication and welding, will be particularly strong, and numbers will need to increase by a factor of four from current levels.<sup>38</sup> The naval shipbuilding and sustainment workforce, including acquisition and supply chain is projected to grow to approximately 15,000.<sup>39</sup>

#### **South Australia (SA)**

The Attack Class submarines to be built by Naval Group, the Hunter Class frigates to be built by ASC Shipbuilding (a subsidiary of BAE Systems Australia) and the first two Arafura Class OPVs being built by Luerksen Australia at Osborne Shipyard in SA. A \$535 million infrastructure upgrade is underway at Osborne South ahead of the Hunter Class build, with planning underway for an additional infrastructure upgrade for the submarine construction yard at Osborne North.<sup>40</sup> This activity builds on current projects being delivered in SA including the construction and sustainment of the Collins Class Submarines, and construction of the nation's Hobart-class AWD. SA is also home to other key naval combat system projects, including the Canberra-class LHD mission system design, and Anzac Class combat system in-service support.<sup>41</sup>

There will be a requirement for grey collar technicians (such as technologists and information and communications technology (ICT) specialists) during the latter half of build phase I and start of build phase II. Grey collar technicians in this context can be defined as a group of workers who are able to undertake higher cognitive value add tasks and do not exclusively fit under the definition of blue or white-collar workforce. These activities are expected to result in high demand for new NSB workers across all five job families in SA.

### Western Australia (WA)

Ten of the Arafura Class OPVs to be built by Luerssen Australia and Cvmec, and Guardian Class pacific patrol boats being built by Austal will be constructed at Henderson Shipyard in WA. These builds will leverage existing infrastructure, new facilities being constructed by Cvmec as well as an additional \$1.5 billion infrastructure investment to upgrade facilities associated with the Henderson shipyard and HMAS Stirling in WA to support naval shipbuilding.<sup>42</sup>

Key sustainment projects such as the mid-life capability upgrade for the ANZAC Class frigates and the mid-cycle dockings for the Collins Class submarine will continue to occur at the Henderson shipyard. Additionally, deep level maintenance for the Arafura Class OPVs will also be undertaken in WA.<sup>43</sup>

In addition to this the Australian Government plans to build three additional naval ships – a hydrographic vessel, and two mine warfare support vessels in WA. First pass approval for this hydrographic military survey vessel is expected in fourth quarter 2019. The replacement of the Huon-class mine hunters is expected to be brought forward from 2030s to the mid-2020s and is also expected to be built in WA.<sup>44</sup>

These activities are eventually expected to result in high demand for new NSB workers in WA. Industry consultation suggests that in the short term demand for workers will remain consistent with current operations. However, this demand for workers with shipbuilding and sustainment experience is expected to ramp up significantly prior to build commencement for the Arafura Class OPVs in WA, scheduled for 2020.<sup>45</sup>

### New South Wales (NSW)

NSW has long been involved with naval shipbuilding and sustainment activity in Australia, and will continue to have a significant role into the future. NSW is home to one of the largest fleet exercise areas in Australia, located just off the east coast around Jervis Bay, Maitland Bay and adjacent sea and air spaces. These areas provided the RAN with the ability to develop task group capability and include a full spectrum of maritime security operations.<sup>46</sup>

Maintenance activity for the existing fleet of surface ships will continue to take place across NSW. Fleet Base East in Sydney is home to the largest graving dock in the southern hemisphere, and will continue to be a critical national asset for fleet maintenance.<sup>47</sup>

NSW is also home to a number of shipbuilders such as Harwood Marine, with expertise in freight ships, fast ferries, barges, work boats and tug boats, luxury and racing yachts, and patrol boats.<sup>48</sup> Birdon is an engineering and services business provide shipbuilding, repairs, maintenance and in-service support to the military and marine industries.<sup>49</sup>

These activities are expected to result in demand for experienced sustainment workers consistent with current levels in the short term, with a slight increase anticipated in the long term.<sup>50</sup>

### Victoria

Ten Anzac Class frigates were built between 1992 and 2006, predominantly constructed in Australia with some sections made in New Zealand, and were consolidated at the Williamstown Dockyard in Victoria.<sup>51</sup>

While Victoria has not been awarded major contracts for defence builds, Victorian industry will continue to contribute to the nation's shipbuilding endeavour. Victoria's supply chain will be a large contributor to shipbuilding programs. Further, Victoria's capabilities in research and in engineering will play a large role in the delivery of these shipbuilding programs.<sup>52</sup>

BAE Systems Australia conducted the fit-out of the LHD ships and constructed modules for the AWD projects in Victoria, and also has a significant presence in Williamstown and Richmond.<sup>53</sup>

It is likely that there will be some increase in the level of activity and the number of workers required within the supply chain to help meet the requirements of the continuous build program through to 2050.

### Queensland

Queensland based businesses have long supplied parts for naval ships built across Australia. The state also has a strong commercial boat building industry, which manufactures yachts and luxury boats for international export.<sup>54</sup>

Four of the Arafura Class OPVs will be based in Cairns and will require on-going maintenance support. The in-service support for the Guardian Class Pacific patrol boats for Pacific nations will also take place in Far-North Queensland, making up some of the demand for workers with sustainment expertise.<sup>55</sup>

Queensland is home to a number of shipbuilding such as NQEA Engineering and Shipbuilders, with expertise in marine engineering services, pressure vessel construction, non-destructive testing, specialty shop, luxury yachts and through life support for defence vessels.<sup>56</sup>

The forecasted level of activity in Queensland is expected to result in gradual increase in demand for workers. Demand for workers with sustainment expertise is expected to remain consistent in the short term, with an increase in demand anticipated once the new fleets are operational.

### Tasmania

Tasmania is home to the Australian Maritime College (University of Tasmania) that provides education and training across a range of relevant qualifications. The Australian Maritime College also hosts significant research infrastructure such as towing tanks, ocean wave basins and cavitation tunnels and offers world class capability in leading edge research, education, simulation, training and vessel manufacture and sustainment.<sup>57</sup> Under the Pacific Maritime Security Program, Australia will continue to provide training for crews of 12 Pacific Island countries out of Tasmania.<sup>58</sup>

Tasmania has strong capabilities to deliver and maintain specialised vessels including small harbour boats, fast response vessels and transport crafts, large catamaran high speed vessels, coastal landing crafts built for extreme conditions, harbour maintenance crafts, and other small ships for use inshore and across the littoral domain.<sup>59</sup> Tasmania also offers capabilities to deliver world leading maritime and marine services.

In terms of shipbuilding, Tasmania is also home to a number of businesses that are involved in shipbuilding. INCAT provides lightweight ship solutions for ferry operators, special service providers and militaries,<sup>60</sup> Taylorbros are involved in fitting out a number of naval vessels, and Liferaft Systems Australia (LSA) are installing Marine Evacuation Systems (MES) and large capacity life rafts for naval ships. These businesses also supply overseas shipbuilding companies and are internationally recognised.<sup>61</sup> Tasmania offers unique capabilities in design, manufacture and support of specialist small water vessels and deliver world leading maritime and marine services.<sup>62</sup>

This activity is expected to result in consistent demand, in line with current levels, for workers with sustainment expertise. Additional activity may result due to engagement of the SME sector as part of the supply chain. There may be some additional workers required in Tasmania once new fleets are operational.

### Australian Capital Territory (ACT)

The ACT hosts businesses like Lockheed Martin and CEA Technologies, that are involved in developing weapons systems, radar and communication technologies for the RAN. While the overall level of activity related to naval shipbuilding is expected to increase in the ACT, demand for workers with the relevant skills and experience is expected to remain consistent.

### **Northern Territory (NT)**

The Department of Defence is undertaking a \$472 million upgrade of facilities at Larrakeyah Defence Precinct, and the construction of a new wharf and fuel farm to support naval operations in the North.<sup>63</sup> It is also planning \$210 million of upgrades at HMAS Coonawarra to support the new Arafura Class OPVs.<sup>64</sup> The NT Government has committed \$100 million to the development of a ship lift facility that is expected to be operational by 2021. The facility will have the capacity to lift vessels more than 90 metres in length, including the Arafura Class OPVs. Six of the OPVs will be home ported in Darwin at HMAS Coonawarra.<sup>65</sup>

Demand for workers with maintenance and sustainment expertise is expected to notably increase once the first OPV is delivered in late 2021.

## **2.2 Skills outlook**

The naval shipbuilding industry requires specialist skills and experience. Industry specific training may be required for new entrants, especially for those joining from other industries. Further training will be required to maintain those skill levels for the duration of these programs.<sup>66</sup>

Long-term skills requirements have been historically difficult to predict due to the uncertainty of workflow. However, the continuous build program is expected to be different as it allows NSB industry to plan and deliver projects over a generation. The established \$90 billion pipeline of work for frigates, submarines and OPVs has created certainty for the industry and given employers time to plan for, and develop the required skills.

The skills required for each phase are different. The five job families can be used to help characterise the skills mix required for each program.

The IRC's initial view of the skills outlook for the industry is set out below. This view is based on findings from the Defence Industry Skilling Survey (DISS) and PwC's SfA's industry consultations. The DISS was conducted in 2018 by the Department of Defence and respondents were asked to identify areas of skills shortage and the impact.<sup>67</sup>

### **Engineering**

The engineering job family is important for the design, construction and maintenance of the ADF's complex equipment.<sup>68</sup>

A number of engineering functions are likely to be required during the design phase of all four programs (e.g., structural engineering, naval architecture). Smaller numbers will be required for the build phase (e.g., materials engineer). There will also be requirements for engineers in the test and sustainment phase (e.g., test and activation, maintenance engineer, reliability engineer). A mix of these skills is required to perform ongoing maintenance and ensure the seaworthiness of the fleet. Many of the systems on these vessels will be digitised, automated, and run their own diagnostics. Modern weapon systems involve a higher level of complexity than the analogue systems they have replaced. These systems require higher levels of electrical and software engineering skills to maintain.<sup>69</sup>

Defence industry identified engineering as the discipline most affected by skills shortage. Almost 73 per cent of respondents stated that there was a perceived shortage.<sup>70</sup> They identified the design engineering, systems engineering, software design and electrical engineering functions as having the most significant skills shortages.

From consultations we heard that the engineering job family is broadly catered for by the higher education sector. The use of new and innovative materials, manufacturing techniques and the general digitisation of the fleet require new skills to be developed within the workforce. Industry is working with the higher education sector directly to develop content that meets their specific requirements. However, the ability to deliver these large and complex projects poses a unique skills challenge for the workforce, requiring specialist skills

in integrated logistics support, which are not currently delivered to the standard required by industry.

### **Operations**

Roles in this job family support large-scale production and manufacture of goods. Core skills include fabrication, welding, production design and boiler-making.<sup>71</sup>

Fewer workers are required during the design and planning phase of these programs (e.g., planners, quality control), with larger numbers required for the build phase (e.g., heavy fabrication, light fabrication). Operations workers will be required throughout the test and sustainment phase, but in smaller numbers (e.g., safety and certification). These workers will be important for ensuring the seaworthiness of the fleet.

Defence industry identified manufacturing as a discipline affected by skills shortages. Over 25 per cent of respondents stated that there was a perceived shortage. They identified the planning and production functions as having the most significant skills shortages.<sup>72</sup>

From consultation we heard that most entry level jobs within the operations job family are broadly catered for by the Vocational Education and Training (VET) sector. Employers in the sector that currently have a workforce have developed 'on-the-job training' to equip graduates with a range of skills to meet industry requirements. This on-the-job training provides graduates with adequate levels of NSB contextualisation to be successful in an entry level naval shipbuilding role. Industry noted the future need for a larger grey-collar workforce that have the skills to operate in an increasingly digitised shipyard and undertake more complex tasks. The specific skills associated with technologist role will continue to become clearer once the program build commences.

### **Project management**

Roles in this job family support the delivery of goods and services through effective planning and coordination. Specialists employed in this job family can include contracting officers, project managers, project schedulers and cost estimators.<sup>73</sup>

Workers in the project management family are required in small numbers across all four phases. They will be required for scheduling and estimation during the design phase. Once a program office has been established, they will need to manage the build, test and sustainment phases.

Defence industry identified Program Management as a discipline affected by skills shortages. Almost 40 per cent of respondents stated that there was a perceived shortage. They identified the program management functions as having the most significant skills shortages.<sup>74</sup>

From industry consultation we heard that that at a fundamental level the project management job family is met by the higher education sector. Industry noted the need for specific skills relating to planning, scheduling and estimation in the VET sector. Due to the scale and complexity of the continuous build program, specific training relating to engineering and build processes are required to accurately schedule, plan and estimate. These areas are available as a high level 'taster' for project management graduates from the VET sector but lack the specificity to be appropriate for NSB industry.

### **Supply chain**

Supply chain and logistics refers to the practice of planning and organising complex activities. This could include arranging transport for people, materiel, or the maintenance of military systems.<sup>75</sup> Australia's defence industry provides logistical support through fleet and asset management services. The Government requires primes to maximise Australian industry involvement. Primes will therefore be seeking to add Australian suppliers to their supply chains for each of the programs.<sup>76</sup>

Experienced supply chain workers are required during the design and planning phase of these programs. These workers will establish relationships with suppliers and

subcontractors. They will work to develop and secure a continuous supply of goods and services. The requirement for qualified supply chain workers will decrease once these programs are established.

Defence industry identified supply chain and logistics as a discipline affected by skills shortages. Almost 27 per cent of respondents stated that there was a perceived shortage. They identified the integrated logistics function as having the most significant skills shortages.<sup>77</sup>

From consultations we heard that the skills available in VET sector are generally appropriate for the supply chain job family but may require some contextualisation.

### **Support**

Roles in this job family can include a wide range of services, such as maintenance for complex systems, training, and ICT support.<sup>78</sup> Australia will be one of the leading nations to adopt a modern, digital shipyard. The IT function will consist of hardware and software protocols around data management, security and storage of large data sets. It will also include the development of digital work packages, and human-machine interfaces.<sup>79</sup>

Experienced support workers are required at the start of the program to help establish clear policies and ways of working. Smaller numbers of workers are required to operate and manage the support functions (e.g., IT, legal, finance and HR) during all three phases.

Defence industry identified support services as a discipline affected by skills shortages. Over 27 per cent of respondents stated that there was a perceived shortage. They identified the cyber security function as having the most significant skills shortages.<sup>80</sup>

From consultation we heard that the support job family is broadly catered for by the VET and higher education sector. There is a need for contextualisation of content due to the specific requirements of the NSB industry (e.g., an understanding of ITAR control, and familiarity with ASDEFCON contracts). However, industry believes it will be able to provide the relevant contextualisation as part of 'on-the-job training' provided it continues to have access to pipeline of strong graduates.

### **Generic workforce skills**

As part of understanding the industry's skills outlook, the NSB IRC is required to rank a supplied list of 12 generic workforce skills in order of importance to relevant employers, shown in Table 6. All the skills listed are important. A low ranking does not imply that low usefulness or importance, but rather only indicates that these skills are not critical priorities for the NSB industry. Further, these rankings of importance are presented as an average across the NSB industry; some skills may have higher or lower importance for particular organisations or particular job families.

**Table 6: Ranking of key generic workforce skills**

Rank	Generic workforce skill
1	Design mindset / Thinking critically / System thinking / Solving problems
2	Science, technology, engineering and maths (STEM)
3	Technology use and application
4	Communication / Collaboration including virtual collaboration / Social intelligence
5	Managerial / Leadership
5	Language, literacy and numeracy (LLN)
7	Learning agility / Information literacy / Intellectual autonomy and self-management
8	Entrepreneurial
8	Customer service / Marketing
8	Financial
8	Data analysis
8	Environmental and sustainability

Source: Formal activity undertaken by IRC members on 13 December 2018

Note: These skills are read in line with definitions provided by the Commonwealth Department of Education and Training.

## 2.3 Training serving the sector

No unique Naval Shipbuilding training currently exists in the vocational education and training (VET) system. Workers in the industry can obtain associated university degrees and VET qualifications from related training packages. A large number of workers in this industry are qualified under the Manufacturing Engineering (MEM), Manufacturing (MSM), Electrotechnology (UEE), Business Services (BSB), Sustainability (MSS), Information and Communication Technology (ICT), and Transport and Logistics (TLI) Training Packages.

We have heard in consultations that these training packages generally cover the majority of skills required by the sector, especially for entry level roles within the industry. However, the training packages do not cover all of the skills required by industry and the NSB IRC will need to consider where gaps exist.

It should be noted that a significant amount of work has been undertaken on some of the above training packages in recent months. For example, the MEM training package had a major new release in June. The BSB and ICT training packages are currently in the middle of major reviews that will address some of the skills needs in the NSB industry.

Further to this, the Industry Skills Forecasts for the relevant IRCs responsible for these training packages have outlined projects or other pieces of work that will give the NSB industry an opportunity to contribute to further improving the relevance of those qualifications.

A significant body of work has also been conducted by the NSC to identify the specific gaps that exist across the industry. Where they relate to existing training packages, the NSC will liaise directly with those SSOs and IRCs.

Given the diversity of job roles presented above, stakeholders believe it is likely that the industry will continue to rely on a mix of VET and higher education to train its workforce, including pathways between the two types of education.<sup>81</sup> The pathways between VET and higher education need to be better defined to allow workforce mobility. A greater ability to assess and recognise skills developed in allied industries is required, to allow workers to transition into the NSB industry.

## Employment and skills outlook overview

Lifelong learning is becoming increasingly important in adapting to automation and rapid technological change, including the challenges posed by Industry 4.0. Initial suggestions from consultations have discussed the use of microcredentials, skill sets, and greater support in relation to pathways for workers looking to upskill.

Due to the overlap of skills, the NSB IRC will actively contribute to the work of relevant IRCs as their training package content is being considered.

# 3 Key drivers for change and proposed responses

The NSB IRC through this document aims to identify the skills required by NSB industry, consider current training products and identify the NSB specific skills they deliver. Where the NSB IRC finds skills and training gaps, it will either refer the recommendation to another IRC and SSO, or where appropriate, write training products to address the NSB specific gap.

## 3.1 Key drivers for change overview

This overview of key drivers for change in the NSB industry outlines trends that are likely to present challenges, opportunities or threats in the medium term. These trends will lead to movements in the employment landscape (number and nature of jobs available), as well as the skills needed to succeed in those future roles.

It is important to consider how these trends will impact the job families differently. Additionally, there are different time challenges associated with how these trends will impact the five job families. Both of these aspects are explored further in this section.

### 3.1.1 Forward plan of work

The most critical driver of change for the industry is the establishment of a forward plan of work and the industry establishing the capacity and capability to deliver that work. The industry is in a state of fundamental transformation, and not merely adapting to individual drivers as they emerge.

The announcement of the \$90 billion continuous shipbuilding program, and this once in a generation recapitalisation of the RAN, poses challenges and opportunities for the Australia economy. The secured pipeline of work to 2050 means that there is an unprecedented demand for skilled labour from an industry that has not specifically been catered for in over a decade.

The NSB industry has experienced considerable change in that time, requiring specific skills and experience that may not currently exist in the Australian workforce, or have been lost in the preceding decade. The industry, at its peak is expected to employ over 15,000 people.<sup>82</sup> This workforce will be established based on the projects that have been announced for the next 30 years.

Without this forward plan of work, other drivers for change for change would not exist. Given the forward plan of work, the following drivers effect how the required workforce will be established and skilled.

### 3.1.2 Technological change

Like most industries, shipyards across the globe are working to implement technology associated with Industry 3.0. These shipyards must begin to consider the implications Industry 4.0 will have on their operations, for example the use of advanced automation and robotics, sensor technology and data analytics, cloud computing, and artificial intelligence and machine learning.<sup>83</sup> Industry 4.0 will have significant implications for the skills required in naval shipbuilding in Australia. It is difficult to identify specific skills as a number of the technological solutions are yet to become commercially available. A large number of the skills gaps in the industry have come about due to increasing levels of automation, being driven by the transition from Industry 3.0 to Industry 4.0.

### **Digital shipyards**

Over recent years, shipbuilders have been working to bring streamlined, data-rich efficiency to the design and build process.<sup>84</sup> The next generation, digitised and data-driven shipyard promises cheaper and more efficient design and construction, and also reduces the overall cost of ownership.<sup>85</sup> A digital shipyard can be thought of as a single common repository of design data that is always current, and available to anyone who needs it. It allows the operator of any of these vessels to encompass the entire supply chain and all relevant stakeholders across the entire program.

Stakeholders have indicated that there are two distinct requirements for skills within NSB digital shipyards. First, there is a requirement for higher base level digital literacy across the workforce as all roles and activities are expected to be digitally tracked for greater efficiency and quality control.<sup>86</sup> Secondly, specific skills are required for managing an optimised logistics function, where a digital clone of the vessel allows the supply chain to predict what components will be required and when.<sup>87</sup>

### **Digital design and advanced manufacturing**

Digital design processes will be a major driver of Industry 4.0 trends over the coming decade, as they will assist industry to improve design accuracy and efficiency. While this means that the nature of design skills is changing, digital design skills will continue to be essential to Australia's defence capability and the naval shipbuilding industry.<sup>88</sup>

### **High-tech SMEs**

SMEs within the supply chain operate in niche manufacturing areas and are already employing a number of advanced manufacturing technologies.<sup>89</sup> The SMEs require workers to have highly advanced technology skills in order to set-up and operate new systems, processes and technologies. It is expected that these skills will feed into the primes as they ramp up production and experienced employees move from SMEs to the primes.

## **3.1.3 A workforce in transition**

The challenges and opportunities with establishing this workforce are set out below.

### **Recently retrenched workforce**

There is an opportunity for the NSB industry to capture the available workforce that possesses core manufacturing skills that have recently been made redundant from allied industries.<sup>90</sup> There is also a cohort of workers who have experience in the NSB industry, but have been out of the shipbuilding industry for extended periods of time.<sup>91</sup>

The challenge with using this available workforce to its full potential is that defence industry and primes have historically struggled to assess the skill levels such cohorts of workers have developed in other sectors of the economy. From consultations, we heard that the most contemporary example of this challenge was around the mobilisation of a workforce for the AWD project.<sup>92</sup> Defence industry used the VET system to test and assess if workers from other sectors possessed the core technical skills at a Certificate III level. Once these employees commenced work, it quickly became apparent that not all of the assessed workers were able to perform at the expected level of competency. This experience has negatively impacted the confidence of defence industry and primes in the VET sector and is expected to impact the likelihood that the NSB uses the opportunity of this recently retrenched workforce.

### **Demographics**

There is a growing ageing workforce across many Australian industries.<sup>93</sup> For NSB, these demographic challenges are exacerbated, as some of the recently retrenched workers will only be available for early phases of the NSB program, as they approach retirement age and exit the workforce.<sup>94</sup> This presents an opportunity to reskill and redeploy experienced workers, while facilitating knowledge transfer to younger apprentices, engineers and workers at an accelerated pace.

## Key drivers for change and proposed responses

A similar trend has been noted in the workforce that will be available to train NSB workers. From consultations, we heard that the cohort of people with the knowledge and experience to deliver training and education (in both VET and higher education) are exiting the sector due to age.<sup>95</sup> This is a risk for the NSB industry as it looks to ramp up activity to meet increased demand over the next 30 years.

The NSB industry has historically been dominated by predominantly male workers across the various job families.<sup>96</sup> From consultations, we heard that defence industry and primes are working to address some of its key demographic challenges, and that there is an anticipated increase in gender, racial and cultural diversity in the industry which will need to be encouraged through the use of targeted initiatives.<sup>97</sup>

### **International workforce**

The NSB industry requires highly knowledgeable, skilled and experienced workers across the job families, specifically in the engineering, operations, and project management job families. Consultations suggest that the primes are seeking international expertise in the short term to meet some of these requirements, as key skills and expertise are not widely available in Australia.<sup>98</sup>

However, these efforts are often hindered or significantly delayed by rigorous security clearance requirements for international employees. In some instances, industry consultations suggest that this is proving to be a major barrier to employment.<sup>99</sup>

A number of commonalities exist between other nations looking to undertake similar naval upgrades.<sup>100</sup> Therefore, there is a strong need to develop and retain a skilled local workforce, as international competition for talent increases.

Conversely, this also presents a unique opportunity for the Australian NSB industry to develop a fit for purpose system with the potential to export our products and learnings, in this competitive environment.

### **SME workforce**

Defence industry SMEs are especially vulnerable to shortages of skilled labour. Consultation suggests that SMEs across the supply chain are competing for the same workforce, and often losing employees to the prime contractors.<sup>101</sup> Defence primes and larger businesses typically have access to workforce development and management resources that SMEs do not. These can include the capacity to invest in upskilling existing workers, or running development programs for graduate-level employees.<sup>102</sup> SMEs are encouraged to undertake the Supplier Continuous Improvement Program (SCIP), offered by the Centre for Defence Industry Capability (CDIC), as well as obtain accreditation to ISO9001.<sup>103</sup> These requirements impose a time and cost burden on SMEs and need to be considered by any business looking to enter the supply chain.

These trends, coupled with a weak pipeline of apprentices and graduates presents a significant risk to the NSB industry as SMEs become under-resourced and unable to keep pace with growing demand from the primes for products and services. Having access to nationally accredited training that equips graduates with NSB specific skills will be critical to mitigating this risk.

## **3.1.4 Perceptions of the sector**

The ability to attract workers to build capacity in the industry will be critical in this investment phase. However, this does depend on how the potential workforce perceives the opportunities in the NSB industry.

### **Remuneration**

While the NSB industry offers highly competitive salary packages,<sup>104</sup> other industries within the economy that require similar skills, such as resources, oil and gas, and mining, are at

times viewed as more attractive options for young workers.<sup>105</sup> This is due to the perception of stronger remuneration and the flexibility of these roles.<sup>106</sup>

Consultation has shown that the engineering job family has seen strong wage growth in the last calendar year (2018) for roles starting from the graduate level.<sup>107</sup> Stakeholders believe there is likely to be an increase in wages for white and grey collar workforce in the short to medium term.<sup>108</sup> Due to the commercial in confidence nature of this information, further details are not available.

While increased remuneration helps the NSB industry attract high quality talent, it poses challenges around affordability and sustainability. The Commonwealth Government and the primes need to maintain an affordable cost base to realise Australia's export ambition. The sustainability of the industry may be compromised in the long term if costs are not moderated, as shipbuilding in Australia currently costs 30 per cent to 40 per cent more than NSB in the United States of America.<sup>109</sup> With sustained naval shipbuilding activity in Australia, and the establishment of the industry, these premiums are expected to decrease to be more globally competitive.

### **Communication with talent pool**

The NSB industry is perceived to be a high risk industry, given the historic volatility and the 'boom bust' nature of NSB in Australia.<sup>110</sup> From consultation we heard that while there is a strong pipeline of confirmed shipbuilding projects across Australia, the industry struggles to attract school leavers and younger workers due to this perception.<sup>111</sup>

Some of the perceptions around work culture and the value proposition of working for defence industry and primes need to be better communicated to the talent pool defence industries are looking to attract.

## **3.2 NSC need analysis results**

The NSB IRC will focus its activity in line with the proposed responses included in Section 3.3 and Section 6.

As mentioned above, the NSC has undertaken detailed needs analysis in consultation with defence industry and primes. The purpose of this needs analysis work is to identify whether or not educational pathways available to students are instilling the critical competencies required by the NSB industry or identify adjustments, if any, that can be made to modify training and education programs in order to improve the outcomes for the industry.<sup>112</sup> The NSB IRC was asked to engage with this body of work as it had commenced prior to the formation of the IRC, and would minimise the requirements for additional consultation.

The methodology for the needs analysis involved undertaking high-level research – including identification and analysis of job advertisements and role descriptors – to identify the appropriate levels of skills and knowledge required. The analysis included requirements for entry-level work, through to more advanced roles. Initial high-level research was followed up and validated through consultations with industry stakeholder and surveys.

The NSC has undertaken and completed draft needs analysis reports for a number of job functions across three job families. The reports are reviewed by industry, training and education providers to confirm findings and indicate support for recommendations. Findings from the needs analysis process are validated by industry stakeholders and educational providers with recommendations prioritised by industry. Recommendations relating to VET training products are referred to the relevant IRC for consideration in training package review processes.

Details of NSC's needs analysis work and associated recommendations will be made publically available once approved. For further information please engage with the NSC directly.

### 3.3 Proposed responses

In Section 1 and 2 of this document, we identified the skills required by the NSB industry. Consistent with our methodology of identifying skills and training gaps, referring them to the relevant IRC and SSO, and if appropriate, writing training products; PwC’s SfA have established a landscape (matrix) using the five job families and Australian Qualification Framework (AQF) levels in Table 11 below.

PwC’s SfA was able to categorise the skills and qualifications required for each job family from entry to advanced. When looking at the indicators in the AQF, the following are indicative AQF levels for the skills descriptions:

- Advanced – AQF level 6 and level 8
- Mid-level – AQF level 4 to level 5
- Entry – AQF level 2 to level 3

Stakeholders were presented with the five job families and the job functions contained within them, and asked to identify job functions that were adequately served by the VET and higher education sectors. We were able to classify the established landscape into the following categories:

- NSB relevant training products exist and job functions are adequately served by existing training products; and
- NSB relevant training products do not exist, or NSB relevant training products exist but job functions are not adequately served by existing training products.

**Table 7: Skills and training gaps**

	Engineering	Operations	Project Management	Supply Chain	Support
Advanced	Project Stream A				
Mid-level		Project Stream C	Project Stream B		
Entry-level					

**Key**

	<i>Job functions adequately served by existing training products or course offerings. In these sections some amendments may be considered by relevant IRCs</i>
	<i>Job functions not adequately served by existing training products</i>

From this process, three project streams were identified across the five job families, as shown in table 11 above. These project streams were identified because additional training product material needs to be considered to address the NSB industry’s specific skills and training requirements.

**Project stream A – Engineering: Integrated Logistics Support (ILS)**

ILS is an approach to managing complex logistics, where the goal of the ILS system is to create longer-lasting systems, which reduce costs by requiring less support and ultimately increase returns on investment. From consultations we heard that there is a lack of adequate training for ILS, and that ILS practitioners are required in larger numbers across defence

industries as programs of work ramp up. Each of the five support system constituent capabilities (SSCC) of ILS may require a unit of competency to meet industry requirements. It is suggested that project stream A is considered in FY20.

### ***Project stream B – Project Management: Planners, Schedulers and Estimators***

From consultations, we heard that the planning, scheduling, and estimating job functions need to be reviewed to ensure alignment with industry requirements. It is suggested that project stream B is considered in FY20.

### ***Project stream C – Operations: Technologist / grey collar workforce***

From consultation, we heard that industry believes the complexity of tasks within the Operations job family will increase due to the implementation of advanced manufacturing techniques and industry 4.0. Industry and the primes are not in a position to identify the specific skills that will be required for these functions at this stage. As these roles are expected to be serviced by higher AQF level training, it will be imperative for the VET and higher education sector to work closely and articulate pathways for learners between the two sectors. It is suggested that project stream C is considered in FY21.

Project details for each of these proposed responses are included in Section 6.

## **3.4 Additional considerations**

This section lists additional considerations that have emerged from stakeholder consultations but are beyond the scope of this document. These additional considerations are noted as likely to have a strong impact on the implementation of any changes to training packages, and the likelihood of solutions successfully addressing barriers to inclusion. They may also be considered as falling under the remit of the AISC to consider as additional activities.

- **Workforce planning.** The most consistent concern of industry is the ability to find the required numbers of appropriately trained staff to meet industry's needs over the coming decades. This paper attempts to address the question of appropriate nationally recognised training, but other consideration like delivery of that training, free movement of staff, attraction, retention and upskilling from allied industries were all raised consistently. While it is acknowledged that some of these facets are being addressed, there was a consistent message that current measures lack coordination, or there are still barriers to overcome. It was further expressed during consultation that the membership of the NSB IRC has the right people to assist in addressing some or all of these challenges.
- **Funding.** Across consultations, stakeholders emphasised that the successful implementation of solutions to improve outcomes for NSB industry required a reform of the current funding system for VET and higher education institutions. With increasingly complex tasks being undertaken by workers in this industry, there is a need for sub-bachelor level courses to equip learners with the skills required to be successful. These must be supported by appropriate funding structures to allow new and transitioning workers to access the training they require.
- **Collaboration.** Higher education, VET, industry and government need to work more closely to identify opportunities for collaboration in a variety of ways. Specifically, they need to identify opportunities for learners to experience a shipyard and understand about operating within complex organisations. If there are barriers to this (like Security Clearances, outlined below) there must be measures taken to mitigate their impact.
- **Inconsistent pre-testing.** The VET sector needs to be able to consistently assess the skill level of workers attempting to transition from allied industries into NSB.

This is critical for the success of the continuous build program, and enables workforce mobility across industries. Further, LLN is crucial to undertaking roles in the NSB industry, however, LLN deficiencies have impacted on productivity in the past.

- **Pathways.** VET and higher education institutions need to work to create pathways for learners, as the concept of 'lifelong learning' takes hold. These pathways initially may help NSB industry overcome the challenges associated with employing graduates that are 'not work ready'.
- **Security clearances.** Visa and security clearances have consistently posed a challenge for employers and have prevented NSB industry from using overseas workers to meet their current skills requirements. The transfer of knowledge initially is important for the transfer of skills and knowledge at the various levels of employment across the industry.
- **Non-accredited training.** Non-accredited training has been used by industry to meet specific targeted skills needs. As NSB industry embarks on the continuous build program, there are opportunities to make this training nationally available to improve the general skill level of employees entering the NSB environment.

## 4 *Consultation undertaken*

Consultation on the content of this Industry Skills Forecast and Proposed Schedule of Work has been informed by PwC's SFA's ongoing work engaging with employers, unions, the Department of Defence, SMEs, the Naval Shipbuilding IRC, and written feedback received during two rounds of public consultation and review.

A list of stakeholders engaged to date is presented in Appendix B.

Industry opinions in the project details in Section 6 refer to views raised and validated in consultations outlined in Appendix B. It is acknowledged that additional consultation will be conducted in future project work to confirm that these opinions are largely agreed upon by a broader group of stakeholders and to determine specific requirements for training.

## 5 Proposed schedule of work overview

PwC’s SfA works in an ongoing manner to ensure training products provided across the various training packages are fit for purpose and that workers in the Naval Shipbuilding sector have the skills required to adapt to these key drivers for change.

The proposed schedule of work for the next two years, shown below, has proposed projects for 2019-20 and 2020-21. It is acknowledged that training products need to be adaptable and flexible. Therefore, if any significant but unforeseen technological, regulatory or other changes impact the industry, additional projects may be proposed for 2020-21 or further years to ensure that training products stay relevant.

<p><b>2019-20</b></p>	<p><b>Project stream A – Engineering: Integrated Logistics Support (ILS)</b> To address the industry demand for skills in ILS and the five SSCCs contained within ILS, meet the need for greater understanding and knowledge of ILS and how it relates to current operational practices.</p> <p><b>Project stream B – Project management: Procurement, Planners, Schedulers and Estimators</b> To address industry demand for enhanced skills in procurement, planning, scheduling and estimating of individual tasks within the broader program of work that will allow for the delivery of these intergenerational projects on-time and on-budget.</p>
<p><b>2020-21</b></p>	<p><b>Project stream C – Operations: Grey-collar workforce</b> To address the anticipated industry demand for higher cognitive value add skills across the operations job family as part of the implementation of advanced manufacturing techniques and industry 4.0 requirements.</p>

It is acknowledged that training products need to be adaptable and flexible. Therefore, if any significant but unforeseen technological, regulatory or other changes impact the sector, projects may be proposed for 2020-21 or further years to ensure that training stays relevant. The NSB IRC and PwC’s SfA therefore reserve the right to amend the proposed schedule of work and consider additional projects should the need arise. Due to the overlap of skills, the NSB IRC will actively contribute to the work of relevant IRCs as their training package content is being considered.

# 6 2019-20 project details

This section serves as the Cases for Change for projects scheduled in 2019-20. It outlines the key drivers for change and how they will be reflected in 2019-20 training product development work.

## 6.1 Project stream A – Engineering: Integrated Logistics Support (ILS)

The objective of this project is to develop additional ILS units of competency (UoCs) where existing training fails to meet the requirements of the NSB industry. The project will address industry demand for enhanced technical skills across the five SSCCs of ILS and deliver on the need for greater understanding of how ILS relates to current operational practices. The proposed scope includes creating five UoCs.

### 6.1.1 Rationale

#### Job roles affected

The project will impact job roles in the following ILS job functions:

- **General support officer (ILS):** responsible for identifying aspects that are applicable to the Support System as a whole.
- **Operating support officer (ILS):** Operating facilities, mission system operators, equipment, operator manuals and other technical data, operating support processes and operating support logistic information management systems.
- **Engineering support officer (ILS):** Engineering facilities, engineering personnel, engineering support and test equipment, engineering technical data, engineering processes, engineering logistic information management systems, and software support capabilities.
- **Maintenance support officer (ILS):** Maintenance facilities, maintenance personnel, maintenance support and test equipment, maintenance technical data and manuals, maintenance processes, and maintenance logistic information management systems.
- **Supply support officer (ILS):** Supply facilities, supply personnel, supply support equipment, supply technical data, supply processes, supply logistic information management systems, spares, and packaging, handling storage and transport.

#### Drivers for change

Industry consultation supported the need to develop training in the ILS job function to reflect the following:

1. **Technological change, automation, and the use of increasingly digitised design, manufacture and sustainment practices.** Digital shipyards will bring streamlined, data-rich efficiency to the design and build process. The next generation of digitised and data-driven shipyards will require stronger skills and deeper knowledge of ILS (e.g., life of cost assessment, and reliability, availability maintainability (RAM)) to enable the primes to realise a digital shipyard's full potential. Further, the digitisation of processes and controls within modern shipyards will require ILS practitioners to have broader enterprise skills which will

allow them to work effectively in a multidisciplinary environment. Workers require a stronger understanding of the five SSCCs, how their work interacts with other ILS functions and how ILS impacts on existing work processes.

- 2. Complexity, scale and timing of projects requiring a longer term view of logistics support.** The \$90 billion continuous shipbuilding program required larger projects to be delivered over longer periods of time. To address needs to manage increased project complexity and reduce costs – and process – inefficiencies, industry are calling for greater investment in ILS skills for the workforce. Moreover, managing global supply chains at this scale requires skills over and above those that are currently available in the industrial base.

### Current training products

No current training products exist within the nationally accredited framework that meet the needs of NSB industry. ILS courses are often delivered by private organisations which generally deliver ILS training to employees of the primes and tailor the content to their specific requirements.

Some logistics training exists within the Transport and Logistics Training Package including TLI41510 Certificate IV in Materiel Logistics, TLI50215 Diploma of Materiel Logistics and TLI60115 Advanced Diploma of Materiel Logistics. These courses do not contain sufficient detail relating to the five SSCCs and do not equip learners with the necessary skills to succeed in an ILS role within NSB industry.

Australian Industry Standards (AIS) has been commissioned to lead the Supply Chain Skills Cross Sector Project. The project will identify opportunities for Cross Sector Training Package material to support the development of supply chain skills. Major change is underway across and within supply chains due to the impact of automation, robotics, big data and other new technologies. The Technical Advisory Committee and the Project Reference Group are in the process of reviewing stakeholder feedback on the revised UoCs.

The timeline for this proposed project is to present training products for AISC consideration in October 2020.

### Demand for training product change

Industry consultations have suggested that developing training for the five SSCC of ILS will offer clear streams and pathways that align to job roles in the NSB industry. Moreover, industry expects the number of ILS practitioners to grow as the various programs of work ramp up. Feedback across consultations suggests there is a strong need to create content in the form of either UoCs or qualifications. Industry evidence shows demand for training products for these job roles, confirming that specialisations should be maintained at the Diploma, Advanced Diploma and Graduate Diploma levels.

If these identified industry needs are addressed through the creation of training products, it is expected that there will be an increase in the use of these training products.

### 6.1.2 Ministers' Priorities

The Ministers' priorities addressed by this project are as follows:

- **Improved efficiency of the training system through units that can be owned and used by multiple sectors.** As advanced manufacturing ramps up in Australia and we adopt increasingly sophisticated technologies across the economy, these units will enable consumers and employers to increase workforce productivity and process efficiency.
- **More information about industry's expectations of training delivery is available to training providers to improve their delivery and to**

**consumers to enable more informed choices.** Greater clarity around industry requirements will enable for the delivery of training products that will improve outcomes for consumers and employers.

### **6.1.3 Consultation plan**

Contingent upon AISC approval of this project, consultation will be conducted with a variety of stakeholders. PwC's SfA will engage its broad base of industry contacts nationally across the various stakeholder groups when developing training products for this project. Consultation will take the form of focus groups and one on one consultation with key stakeholders. In addition, an industry survey will be developed and shared with PwC's SfA's defence and naval shipbuilding mailing lists to maximise the number of industry stakeholders who can contribute to the consultation process.

The AISC may wish to consider how this project aligns to the Supply Chain Cross Sector project.

### **6.1.4 Scope of project**

This project proposes to create five new UoC relating to the five SSCCs. These include:

- Reliability, Availability, Maintainability and Safety (RAMS)
- Maintenance engineering
- Supply support
- Technical publications
- Configuration management

This includes undertaking consultation to determine the appropriate training package in which to house them.

## **6.2 Project stream B – Project management: Planners, Schedulers and Estimators**

The objective of this project is to develop procurement, planning, scheduling and estimating UoCs, as limited training currently exists to meet the requirements of the NSB industry. The project will address industry demand for enhanced technical skills across the four key job functions, deliver on the need for greater depth of knowledge and stronger skills. The proposed scope includes creating eight new UoCs.

### **6.2.1 Rationale**

#### **Job roles affected**

The project will impact job roles in the following planning, scheduling and estimating functions:

- **Procurement:** Manage the procurement of materiel as part of complex programs of work, understand procurement contracting and ensure alignment with overall program objectives, and effectively manage risk to ensure the successful delivery of programs.
- **Planner:** Create project execution plans, project monitoring and reporting, perform project coordination, manage stakeholders and team communication, drive process

improvement, and have an understanding of engineering tasks and processes in the shipbuilding environment.

- **Scheduler:** Integrate master schedules, contract master schedules, develop detailed schedules, develop work breakdown structures, report on project controls, have an understanding of zone, block, test and non-recurring effort schedules, develop work packs, manage risk and have an understanding of engineering tasks and processes in the shipbuilding environment.
- **Estimator:** Estimated labour, material and the time requirements for tasks, computes costs associated with tasks, maintains costs database, perform risk analysis, and have an understanding of engineering tasks and processes in the shipbuilding environment.

### Drivers for change

1. **Complexity, scale and timing of projects requiring a longer term view of logistics support.** The \$90 billion continuous shipbuilding program requires larger projects to be delivered over longer periods of time. To address needs to manage increased project complexity and reduce cost – and process – inefficiencies, industry are calling for greater investment in project management skills for the workforce. Moreover, managing global supply chains at this scale requires skills over and above those that are currently available in the industrial base.

### Current training products

Current training products span from Certificate IV to post graduate qualifications in Project Management. BSB is a general training package which provides training to a variety of sectors. The training contained within BSB lacks the specific knowledge and skills required by NSB industry for Planners, Schedulers and Estimators.

At the sub-bachelor level, qualifications cover skills required for managing a small workshop and operating in an SME workshop. This training is not appropriate for complex project procurement, planning, scheduling or estimating due to the increased complexity, volume of tasks and level of detail required.

These training products were last updated in 2018. The timeline for this proposed project is to present training products for AISC consideration in October 2020.

### Demand for training product change

Feedback received from stakeholders indicates alignment and relevance of training to job roles will increase utilisation of these qualifications for NSB industry and result in improved outcomes for learners and industry. An understanding of engineering tasks and processes is important for procurement, planners, schedulers and estimators. This high level understanding is not provided in the existing training for procurement, planners, schedulers and estimators.

The procurement job function would benefit from the development of UoCs to address the specific requirements of procurement personnel operating within the shipbuilding and other complex advanced manufacturing industries. When the product being delivered is innovative and bespoke, procurement becomes higher risk to the organisation given the degree of competition which is often restricted to a limited market. There are opportunities for industry to create pathways for procurement personnel across AQF levels to provide the industry with access to a larger pipeline of talent.

Consultation feedback suggests the scheduler job function would benefit from the development of UoCs to address the specific requirements of schedulers operating within the shipbuilding and other complex advanced manufacturing industries. Consultation feedback

also suggested developing a scheduler apprenticeship pathway to enable greater worker mobility and provide the industry with access to a larger pipeline of talent.

The planner job function would benefit from the development of UoCs to up-skill existing trades workers into the planner job function. This, like the apprenticeship pathway for schedulers, would enable greater worker mobility and provide the industry with access to a larger pipeline of talent.

The estimator job function would benefit from the development of UoCs to up-skill existing trades workers into the estimator job function. This, like the apprenticeship pathway for planners and schedulers, would enable greater worker mobility and provide the industry with access to a larger pipeline of talent.

The project management job function would benefit from the development of new UoCs focused on shipbuilding to upskill project managers from allied industries who already hold VET or higher education qualifications. Modifying training package content to include an increased focus on digitally enabled production processes will provide workers the skills to work effectively in a modern Australian shipyard. New UoCs will also need to focus on software applications and specialist shipbuilding project management knowledge and skills.

### **6.2.2 Ministers' Priorities**

The Ministers' priorities addressed by this project are as follows:

- **Improved efficiency of the training system through units that can be owned and used by multiple sectors.** As advanced manufacturing ramps up in Australia and we adopt increasingly sophisticated technologies across the economy, these units will enable consumers and employers to increase workforce productivity and process efficiency.
- **More information about industry's expectations of training delivery is available to training providers to improve their delivery and to consumers to enable more informed choices.** Greater clarity around industry requirements will enable for the delivery of training products that will improve outcomes for consumers and employers.

### **6.2.3 Consultation plan**

Contingent upon AISC approval of this project, consultation will be conducted with a variety of stakeholders. PwC's SfA will engage its broad base of industry contacts nationally across the various stakeholder groups when developing training products for this project. Consultation will take the form of focus groups and one on one consultation with key stakeholders. In addition, an industry survey will be developed and shared with PwC's SfA's defence and naval shipbuilding mailing lists to maximise the number of industry stakeholders who can contribute to the consultation process.

The AISC may wish to consider how this project aligns to the current review of the Business Services Training Package.

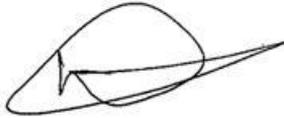
### **6.2.4 Scope of project**

This project proposes to:

- **Create four new UoCs**, relating to procurement, planning, scheduling and estimating
- **Create four new UoCs**, relating to project management in NSB industry.

## 7 *IRC Sign off*

The Industry Skills Forecast and Proposed Schedule of Work was agreed to by:

A handwritten signature in black ink, appearing to be 'Diane Edgerton', written in a cursive style.

Diane Edgerton

Chair

Naval Shipbuilding IRC

11 July 2019





# *Appendices*

# Appendix A

## Administrative Information

### About PwC's Skills for Australia

PwC's Skills for Australia supports the Naval Shipbuilding Industry Reference Committee (IRC). As a Skills Service Organisation (SSO), PwC's Skills for Australia is responsible for working with industry and our IRC to:

- Research what skills are needed in our industries and businesses, both now and in the future, to provide the right skills to match our job needs; helping us to stay at the forefront of global competitiveness and support continued economic prosperity.
- Identify and understand current and emerging trends in the global and domestic economy and how they impact on Australia's skills needs.
- Revise our vocational qualifications and training content to better match what people will learn with the skills needs of our industries and businesses, giving our population the best possible chance of developing work ready skills.

### About the Industry Reference Committee

The Naval Shipbuilding IRC includes 16 members (one position to be held pending future filling) and was constituted in September 2018 by the AISC. With the announcement of \$90bn of shipbuilding projects stretching out to 2050, the AISC established this IRC to understand the existing capability that existed across the economy, and identify skills gaps that would prevent the industry from delivering on these projects. One of the key findings of the RAND Corporation report and the Defence Industrial Capability Plan was the expected shortage of highly skilled workers required to deliver this recapitalisation of the Royal Australian Navy (RAN).

**Table 8: Naval Shipbuilding IRC membership**

Name	Organisation	Title	IRC role
<b>Dianne Edgerton</b>	Directedge Manufacturing (Defence industries small to medium enterprise (SME) representative)	Chief Executive Officer	IRC Chair (Peaks, associations, employers, individuals)
<b>Ian Curry</b>	Australian Manufacturing Workers' Union (AMWU)	National Coordinator, Skills, Training and Apprenticeships Policy	IRC Deputy Chair (Employee representatives)
<b>William Docalovich</b>	Naval Shipbuilding College (NSC)	Program Director	IRC Member (Skills and competencies organisation)
<b>Ron Watts</b>	Engineers Australia	Executive General Manager, Professional Standards and Practices	IRC Member (Skills and competencies organisation)
<b>Christian Hamilton</b>	Australian Submarine Corporation (ASC)	General Manager, Strategy and Human Resources	IRC Member (Employer representatives)
<b>Jennifer Bruce</b>	Lürssen	Human Resources Manager	IRC Member (Employer representatives)
<b>Rachel Botting</b>	Naval Group	General Manager, Human Resources	IRC Member (Employer representatives)
<b>Matthew Double</b>	BAE Systems	Human Resource Director, Hunter Class Frigate Program	IRC Member (Employer representatives)

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Administrative Information

<b>Peter Canavan</b>	AI Group	Senior Policy Officer	IRC Member (Employer representatives)
<b>Peter Iuliano</b>	Teekay Shipping (Sustainment expertise)	Fleet Manager, Government Services Fleet	IRC Member (Peaks, associations, employers, individuals)
<b>Rob Milligan</b>	Lockheed Martin (Systems integration expertise)	Surface Maritime Program Manager	IRC Member (Peaks, associations, employers, individuals)
<b>Matt Murphy</b>	Electrical Trades Union (ETU)	National Industry Coordinator	IRC Member (Employee representatives)
<b>Dan Fankhauser</b>	Department of Defence	Assistant Secretary, Naval Shipbuilding	IRC Member (Government)
<b>Margot Forster</b> <i>(till June 2019)</i> <b>Audra McCarthy</b>	Defence Industry Education and Skills Consortium (DIESC) and Defence Teaming Centre (DTC)	Chief Executive Officer	IRC Member (Linkages with education and training providers)
<b>Stephen van Duin</b>	University of Wollongong (Higher education sector with relevant specialisation and / or partnerships with the naval shipbuilding sector)	Maritime Program Leader – Defence Materials Technology Centre	IRC Member (Linkages with education and training providers)

# Appendix B

## Stakeholder consultations

As summarised in Section 4, the consultation approach to developing this proposed schedule of work included individual consultations, group consultations, a public survey and written submissions. The stakeholders who were consulted during the development of the projects are detailed in Table 12 below. Additionally, a draft version of this report was provided to all state and territory training authorities (STAs) and feedback was received and incorporated.

During our consultation process, attempts were made to cover all jurisdictions and stakeholder types. However, stakeholders were more readily available in regions where NSB activity is more pronounced and where there is high or significant employment in the relevant sector.

It is acknowledged that additional consultation covering all jurisdictions will be conducted in future project work to continue to refine stakeholder opinions and to determine specific changes required to training products.

**Table 9: List of stakeholders**

<i>Name</i>	<i>Organisation</i>
<b>Dianne Edgerton</b>	Directedge Manufacturing
<b>Margot Forster</b>	Defence Industry Education and Skills Consortium (DIESC)
<b>Bill Docalovich</b>	Naval Shipbuilding College (NSC)
<b>Mark Scott</b>	NSC
<b>Brad Anderson</b>	NSC
<b>Nick Howie</b>	NSC
<b>Paul Whetstone</b>	NSC
<b>Ian Curry</b>	Australian Manufacturing Workers' Union (AMWU)
<b>Christian Hamilton</b>	Australian Submarine Corporation (ASC)
<b>Alun Gallie</b>	ASC
<b>Nick Dudley</b>	ASC
<b>Rob Milligan</b>	Lockheed Martin Australia
<b>Grant Nelson</b>	Lockheed Martin Australia
<b>Scott Neil</b>	Department of Defence
<b>Dan Fankhauser</b>	Department of Defence
<b>Ron Watts</b>	Engineers Australia
<b>Glenn Crawley</b>	Engineers Australia
<b>J Russel</b>	Engineers Australia
<b>Sheryl Harrington</b>	Engineers Australia
<b>Rachel Botting</b>	Naval Group
<b>Lorraine Cody</b>	Naval Group
<b>Mark Dowd</b>	Naval Group
<b>Rory Johnstone</b>	Naval Group
<b>Warwick Adams</b>	Naval Group
<b>Stephen van Duin</b>	University of Wollongong
<b>John Norrish</b>	University of Wollongong
<b>Andrew Dowse</b>	Edith Cowan University
<b>Cees Bil</b>	RMIT
<b>Rob O'Connor</b>	Queensland University of Technology

<b>Name</b>	<b>Organisation</b>
<b>Penny Johnston</b>	TAFE SA
<b>Michael Webb</b>	University of Adelaide
<b>Matt Opie</b>	UniSA
<b>Nicole Portwine</b>	SM TAFE WA
<b>Deborah West</b>	Flinders University
<b>Graham Tribe</b>	DefenceNT
<b>Prashant Bhaskar</b>	Australian Maritime College (AMC)
<b>Aaron Ingram</b>	AMC
<b>Mark Potter</b>	Babcock International Group
<b>Jacqui Spencer</b>	Department of Education and Training (Victoria) (VIC STA)
<b>Ross Mitchell</b>	Hunter Assessment and Training
<b>Sam Nicolosi</b>	QMI Solutions (QLD STA)
<b>Rob Gehling</b>	The Royal Institution of Naval Architects
<b>Nelson Brown</b>	Department of Trade, Business and Innovation (NT) (NT STA)
<b>Naomi Mathers</b>	International Centre for Complex Project Management
<b>Lyzette Piazza</b>	Department of Employment, Skills, Small and Family Business
<b>Frances Parnell</b>	Department of Training and Workforce Development (WA) (STA)
<b>Geoff Crittenden</b>	Weld Australia
<b>Michael McGee</b>	Department of State Growth (Tasmania) (TAS STA)
<b>Shona Prior</b>	Department of State Growth (Tasmania) (TAS STA)
<b>Steve Gilmore</b>	Department of State Growth (Tasmania)
<b>Dennis Hendriks</b>	Department of State Growth (Tasmania)
<b>Michelle Riley</b>	Department of State Growth (Tasmania)
<b>Son Ly</b>	Department of Education (NSW) (STA)
<b>Eleanor Paynter</b>	Department of Education (Federal)

# Appendix C

## NSC needs analysis plan

A number of different training packages and IRCs are responsible for developing training for the NSB industry. There are opportunities for the respective IRCs to collaborate with the NSB IRC and develop solutions fit for NSB industry.

The skills and training needs of the industry continue to evolve and are being defined by the primes. PwC's SfA and the NSB IRC will continue to look for, and participate in, opportunities for collaboration around the identification of skills and requirements of training with other IRCs, the NSC, and any other relevant organisations. From consultation, we heard that cross-sector skill areas that develop flexible and transferable skills have the potential to benefit learners, other industries and the broader VET sector.

While collaboration with other IRCs and cross-sector projects may meet some of the training needs of the industry, additional NSB specific training may be required to develop the skilled workforce required by industry.

### NSC Needs Analysis Plan

The NSC has developed a Needs Analysis Plan in consultation with defence industry and primes. The plan aims to identify skills and training gaps as perceived by industry, and then prioritise the order in which job functions are addressed. The NSC's planned needs analysis work to 2020 is provided in Table 10 below.

**Table 10: NSC Needs Analysis Plan to 2020**

	Completed	Active	Scheduled	Remaining	Not Required
Engineering	Designer	Software Engineering	Test & Activation	Engineering Assurance	Maintenance Engineering
		ILS – Analysis		Materials Engineering	Naval Architecture
		ILS – Publication		Reliability Engineering	Project Engineering
		ILS – Training		Structural Engineering	Signature Engineering
		Engineering Management		Welding Engineering	Propulsion Systems Engineering
		Combat Systems Engineer		Safety Engineering	Technologist
		Electrical Engineering		Project Management Engineer	Document Control
		Electronic Engineering		Configuration Management	
		Mechanical Systems Engineering			
		Production Engineering			
		Systems Engineering			
		Operations Engineering			

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NSC needs analysis plan

	Completed	Active	Scheduled	Remaining	Not Required
<b>Operations</b>	Production Planner	Quality Control – Inspector	QA & Product Safety – Assurance Officer	Production Controller	Facilities Safety and Certification
	Electrical operations	Quality Control – Surveyor	QA & Product Safety – Engineer	Operations Planner	Dockmaster
	Welding operations	Quality Control – Technicians	QA & Product Safety – Safety Officer	Operators Technical	
	Piping Operations – Pipe Fitter	Quality Control – Analyst	Mechanical Operations		
		Quality Control – NDT Technician			
		Quality Control – Dimension Control Manager			
		Light Fabrication			
		Heavy Fabrication			
		Piping Operations – Pipe Welder			
<b>Project Management</b>	Project Manager		Program Manager	Commercial – Contracts	
	Scheduler		Project Scheduling & Estimating – Estimator		
			Project Scheduling & Estimating – Cost Analysis		
<b>Supply Chain</b>		Purchasing & Subcontracts – Purchasing Officer		IWL – Inventory Controller	
		Purchasing & Subcontracts – Subcontracts Administrator		IWL – Operator	
				IWL – Control Tech	

Source: NSC Needs Analysis Plan

The NSC's current Needs Analysis Plan excludes the Support job family. This may be revisited, based on consultations and feedback from industry and primes, at a later date. The NSC expects all scheduled needs analysis activity to be completed before the end of 2019, with the remaining activity to be completed in 2020.

- <sup>1</sup> Highest tier in a hierarchy of job segmentation within a workforce. The purpose of a job family is to split the workforce into logical and practical segments to allow deeper workforce analysis to occur. A job family is a grouping of similar jobs at the highest level that usually consists of several job functions.
- <sup>2</sup> Second highest tier in a hierarchy of job segmentation within a workforce. A job function is a subgroup of jobs within a job family that require similar skills, capabilities, knowledge and training (i.e. quality control and safety management).
- <sup>3</sup> Subgroup of jobs within a job function that allows for further refining and grouping of required skills, capabilities, knowledge and training (i.e. Work Health and Safety Representative).
- <sup>4</sup> KPMG (July 2017) *Australia's Marine Industry Capability – Research into the Marine Manufacturing sector in Australia*
- <sup>5</sup> Australian Bureau of Statistics (2016) *Employment and income census – ANZSIC code 2391 Shipbuilding and repair services*
- <sup>6</sup> Department of Defence (2017) *Naval Shipbuilding Plan*
- <sup>7</sup> Department of Defence (2017) *Naval Shipbuilding Plan*
- <sup>8</sup> Department of Defence (2017) *Naval Shipbuilding Plan*
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- <sup>10</sup> Department of Industry, Innovation and Science (2019) available at <<https://www.industry.gov.au/funding-and-incentives/manufacturing/industry-40>>
- <sup>11</sup> AISC, Naval Shipbuilding Industry Reference Committee, accessed 20 June 2019, available at <<https://www.aisc.net.au/irc/shipbuilding-industry-reference-committee>>
- <sup>12</sup> Australian Submarine Corporation (2019) *Collins Class Submarines*, accessed 20 June 2019, available at <<https://www.asc.com.au/submarines/collins-class-submarines/>>
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- <sup>17</sup> Department of Defence website, accessed 18 March 2019, available at <<http://www.defence.gov.au/casg/aboutcasg/ourstructure/maritime/futuresubmarineprogram/default.aspx>>
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- <sup>19</sup> Austal website, accessed 18 March 2019, available at <<https://www.austal.com/ships/guardian-class-patrol-boat-pacific-patrol-boat-replacement>>
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- <sup>22</sup> Highest tier in a hierarchy of job segmentation within a workforce. The purpose of a job family is to split the workforce into logical and practical segments to allow deeper workforce analysis to occur. A job family is a grouping of similar jobs at the highest level that usually consists of several job functions.
- <sup>23</sup> Second highest tier in a hierarchy of job segmentation within a workforce. A job function is a subgroup of jobs within a job family that require similar skills, capabilities, knowledge and training (i.e. quality control and safety management).
- <sup>24</sup> Subgroup of jobs within a job function that allows for further refining and grouping of required skills, capabilities, knowledge and training (i.e. Work Health and Safety Representative).
- <sup>25</sup> Department of Defence (2017) *Naval Shipbuilding Plan*
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- <sup>27</sup> IBIS World (2018) *Shipbuilding and Repair Services in Australia, Industry Report C2391*
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- <sup>32</sup> Australian Bureau of Statistics (2016) *Employment and income census – ANZSIC code 2391 Shipbuilding and repair services*
- <sup>33</sup> Australian Bureau of Statistics (2016) *Employment and income census – ANZSIC code 2391 Shipbuilding and repair services*
- <sup>34</sup> IBIS World (2018) *Shipbuilding and Repair Services in Australia, Industry Report C2391*
- <sup>35</sup> From industry consultation for the 2019 ISF

## Appendix C

### NSC needs analysis plan

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- 84 Defence Connect (2018) *Digital shipyard to lead sovereign shipbuilding capability*

## Appendix C

### NSC needs analysis plan

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- <sup>85</sup> Defence Connect (2018) *Digital shipyard to lead sovereign shipbuilding capability*
- <sup>86</sup> From industry consultation for the 2019 ISF
- <sup>87</sup> From industry consultation for the 2019 ISF
- <sup>88</sup> Department of Defence (2019) *Defence Industry Skilling and STEM Strategy*
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- <sup>102</sup> Department of Defence (2019) *Defence Industry Skilling and STEM Strategy*
- <sup>103</sup> Written feedback provided by Stephen van Duin and John Norrish (University of Wollongong)
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