Australian Government
Department of Defence

Senate Economics Reference Committee Inquiry into Australia's Sovereign Naval Shipbuilding Capability

Department of Defence

Written Submission

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Since the release of Australia's first Naval Shipbuilding Plan in 2017, the Government has taken decisive action in selecting industry partners for the design and build of our next-generation of ships and submarines. These decisions have been backed with the investments needed to date to achieve the Government's ambitious agenda to transform our naval shipbuilding and sustainment industry.

Through the concerted efforts of many across Government, industry, the States and Territories and academia, delivery of the key policy initiatives and critical milestones identified in the Naval Shipbuilding Plan are proceeding at pace. Construction on two of the four foundational build programs (*Guardian* class patrol boat and *Arafura* class offshore patrol vessel) commenced on schedule and the design and pre-production efforts on the remaining two continue as planned (*Hunter* class frigate and *Attack* class submarine). Substantial modern and digitally-enabled infrastructure investments have transformed the landscape of the Osborne Naval Shipyard and Henderson Maritime Precinct. Finally, a coordinated and collaborative approach to workforce development and skilling is emerging to support the availability of skilled workers matched to industry's forecast demand.

Notable achievements over the past two and a half years include:

- Two of the three *Hobart* class destroyers are in service with the Royal Australian Navy, with the third having recently completed builders sea and combat system trials prior to delivery in early 2020;
- Operational availability of the *Collins* class submarines at the highest levels ever achieved, exceeding international benchmarks;
- Completion of the structural separation of ASC Pty Ltd into three separate companies;
- The establishment of Australian Naval Infrastructure Pty Ltd (ANI), responsible for the provision of critical infrastructure to the shipbuilding programs;
- Construction of efficient, digitally-enabled surface shipyard infrastructure at Osborne South, on track for completion in early 2020;
- Private investment by Civmec in one of the world's largest single undercover modularisation, repair and maintenance facilities at its Henderson facility;
- Delivery of the first five of 21 *Guardian* class patrol boats as part of Australia's Pacific Maritime Security Program across 12 Pacific island nations and Timor Leste;
- Construction underway for the first two *Arafura* class offshore patrol vessels at the Osborne Naval Shipyard, with construction of the third vessel set to commence in the Henderson Maritime Precinct in the first half of 2020;
- Launch of two *Supply* class replenishment ships, with both arriving in Western Australia through 2020 for final outfitting and delivery;
- Signing of the Head Contract Agreement with ASC Shipbuilding (now a subsidiary of BAE Systems Australia) for the *Hunter* class frigate, with production prototyping set to commence before the end of 2020;
- Signing of the Strategic Partnering Agreement with Naval Group and subsequently the Submarine Design Contract to progress design work on the *Attack* class submarine through until 2021;

- The establishment of the Naval Shipbuilding College headquartered at Osborne in South Australia, to coordinate a national approach to workforce development and skilling;
- A landmark commitment from all major shipbuilding companies to work together to meet projected naval shipbuilding workforce demands;
- The establishment of a Naval Shipbuilding Industry Reference Committee responsible for ensuring skilling requirements for naval shipbuilding and sustainment industries are reflected in national training package qualifications.
- Appointment of an independent, expert Naval Shipbuilding Advisory Board to support oversight of the performance of the naval shipbuilding enterprise and identify emerging challenges that may require further consideration by Government;
- The establishment of a departmental enterprise governance structure, led by the Secretary of Defence and including the Chief of the Defence Force and senior departmental officers from the Departments of Prime Minister and Cabinet and Finance.
- Creation of a Deputy Secretary for National Naval Shipbuilding with a mandate to strengthen the enterprise-level approach to naval shipbuilding and further policy development;
- Reorganisation of the National Naval Shipbuilding Office to focus on integrating, coordinating and reporting on the implementation of the four key enablers identified by Government in the Naval Shipbuilding Plan;
- Establishment of a Secretaries' Committee on Shipbuilding to drive collaborative partnerships across relevant Commonwealth agencies and facilitate regular policy discussion and direction; and
- Deepened engagement and collaboration with State and Territory governments on matters including infrastructure investment, workforce and skills needs and Australian defence industry.

While substantial progress is evident since the release of the Naval Shipbuilding Plan, we remain in the early stages of a transformation that requires further time and persistence of effort to fully mature. As further progress is gained and new challenges emerge, it is vital not to lose sight of the strategic rationale for adopting a continuous naval shipbuilding and sustainment strategy and the guiding principles upon which the Plan is founded.

Why a sovereign naval shipbuilding industry?

As an island continent, Australia's national security and prosperity is inextricably tied to the sea. Over 99 per cent of Australia's imports and exports by volume and over 79 per cent by value, are dependent on shipping. The importance of secure and efficient maritime trade is critical to support international commerce and the assurance of supply for vital resources, including fuel.

The most important trade routes for Australia are those with countries in the Indo-Pacific region, where the overwhelming bulk of our international trade occurs. However, much of northern Australia, Tasmania and our offshore territories are also heavily reliant on coastal shipping for their existence.

Australia and the Indo-Pacific region are experiencing a period of significant economic transformation, with projections that by 2050 almost half the world's economic output is expected to come from our region. Safeguarding Australia's maritime approaches and resources – and providing capacity for our partners in the Indo-Pacific to protect their security and sovereignty – depends upon a strong, viable and sustainable sovereign shipbuilding industry. Australia's naval capability underpins our ability as a nation to protect seaborne trade and managing unexpected changes in our strategic circumstances[1].

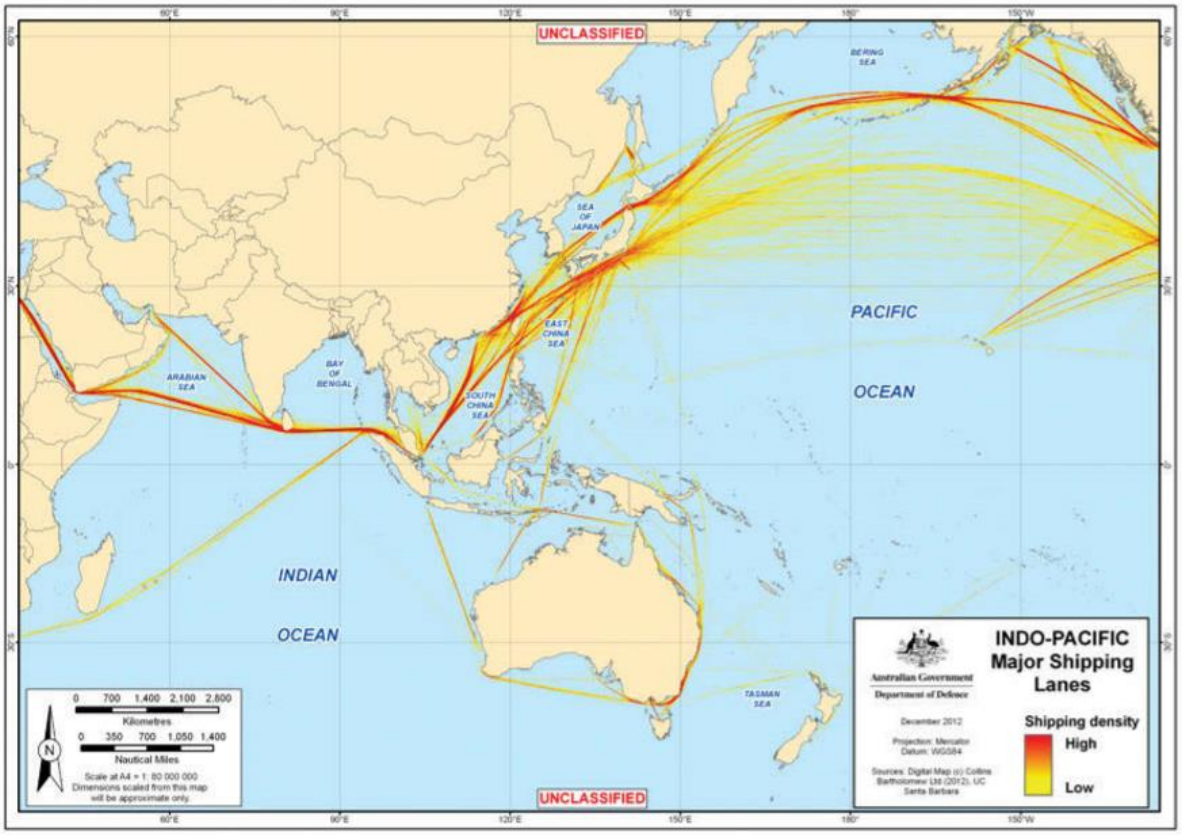

Figure 1 – Maritime shipping routes in the Indo Pacific[2]

Australia's search and rescue region covers one tenth of the Earth's surface, encompassing large areas of the Indian, Pacific and Southern oceans as well as the Australian Antarctic territories. Not only is this 53 million square kilometers area large but it also represents a diverse range of oceanographic operating environments, from the shallow tropical seas to the north to the extreme wave and wind conditions in the Southern Ocean. Except for our northern approaches, the continental shelf surrounding Australia extends out up to 350 nautical miles from the coast, beyond which is open-ocean with significant water depths of thousands of meters.

[1] Vice Admiral Tim Barrett, *The Navy and the Nation: Australia's Maritime Power in the 21st Century* (Melbourne University Press, 2017), p. 36.
[2] Department of Defence, *2013 Defence White Paper* (Commonwealth of Australia, 2013), p. 13.

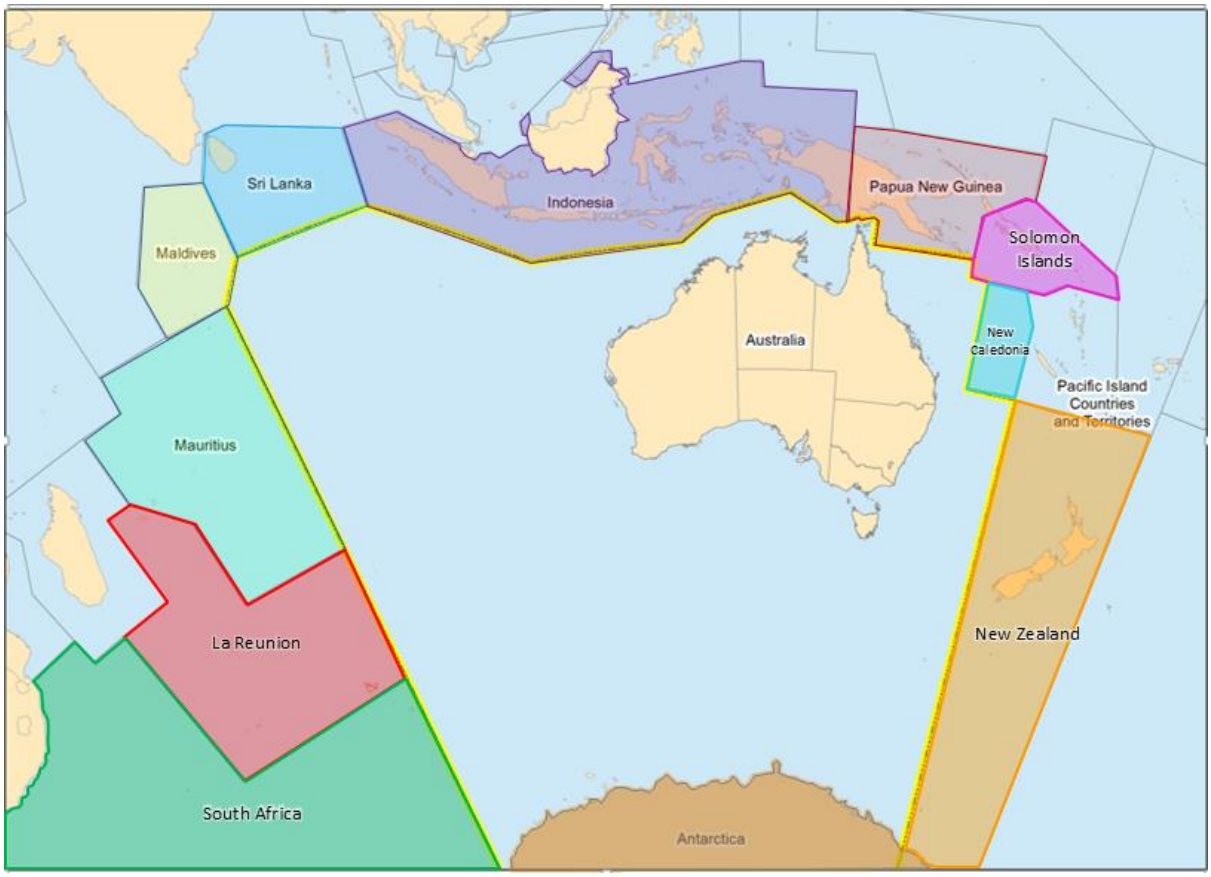

Figure 2 – Search and rescue regions bordering Australia, Australian Maritime Safety Authority, 2019[3]

Australia's unique geography and oceanography in turn drives requirements for a versatile naval fleet capable of safeguarding and securing our strategic interests in the Indo Pacific region. Australia has – and continues – to successfully adapt and operate vessels designed by international partners for use by the Royal Australian Navy. Platform modifications are often required to increase range, habitability and endurance or to ensure the design can operate across the spectrum of environmental conditions from Australia's cold southern oceans to our northern tropical waters. Combat system modifications are often driven by interoperability requirements, whether these be standardised equipment and weapon systems across platforms or with international allies, including the United States. A further driver is the integration of sensors and weapons specially developed by Australian defence industry for our unique operating environment, such as the world-leading phased array radar developed by CEA Technologies or the Nulka active missile decoy system.

The shipbuilding capability lifecycle

Design modification to complex warships represents a significant challenge. The change-out of major weapons and sensors are seldom a one-for-one fit. Often seemingly modest design changes have a ripple effect through a vessel's structural design, as well as its power, space, weight and cooling margins and the vessel's hydrodynamic, acoustic and electromagnetic signatures.

[3] https://www.amsa.gov.au/files/search-and-rescue-regions-bordering-australiapng

Over the last two decades Australia has developed considerable expertise in modifying international warship designs to accommodate unique Australian requirements, such as the *Hobart* class guided missile destroyer, the *Anzac* class Anti-Ship Missile Defence program, and the *Adelaide* class guided missile frigate upgrade. These modifications resulted in the Royal Australian Navy operating world's best capability of its kind on each platform. However each program also ran in to significant cost, schedule and technical issues during the design modification and installation phase due to the complexities inherent in modifying complex warship designs. Much like the boom-bust cycle that have afflicted naval construction in Australia, major combat system upgrades have also experienced cycles of peaks and troughs. As such the skills and expertise gained during the design, modification, operational test and evaluation and operation of these programs has been hard gained only to then dissipate at the conclusion of the upgrade program. Preserving this industrial capability provides Australia with the sovereign capacity to manage future upgrades and the cadence of new build programs relative to our strategic circumstances.

The adoption of an enterprise approach to naval shipbuilding and sustainment aims to set a more stable and predictable demand profile for naval construction and maintenance. Making this commitment provides certainty to Australian industry through the retention and further development of specialist skills, and drives further investment and efficiencies amongst local Australia suppliers. Current upgrades to the *Anzac* class frigates demonstrate this concept in practice. The *Anzac* Midlife Capability Assurance Program is leveraging the experience gained by the Warship Asset Management Agreement industry alliance during the earlier *Anzac* Anti-Ship Missile Defence program. The first ship in this program, HMAS *Arunta*, is now at sea with CEA Technologies' CEAFAR2-L long-range air search radar and integrated Identification Friend or Foe capability operating in a new mast superstructure. The experience gained by Australian industry in this project will be further leveraged for the integrated mast for the *Hunter* class frigates.

Figure 3 – HMAS *Arunta* post- upgrade, Department of Defence, 2019

The successful transformation of Collins submarine sustainment also demonstrates the advantages of well-considered usage and upkeep plans. The revised usage and upkeep cycle for the *Collins* class fleet has resulted in improved efficiency and productivity gains amongst industry partners. Alongside the improvement of Collins fleet availability to levels above international benchmarks, this has allowed capability enhancements to be planned and undertaken during routine docking activities, including the installation of new bow and flank sonar arrays as well as improved communications and electronic warfare capabilities. These upgrades and ongoing updates across the *Collins* fleet will ensure we retain a potent and agile submarine capability as we introduce the *Attack* class submarine from the early 2030s.

Adopting a long-term enterprise profile for naval construction and sustainment ensures events are managed as a continuum rather than a federated series of discrete activities. It covers all elements of the shipbuilding lifecycle – from initial concept design, production planning, construction, trials, test and evaluation, in-service support and upgrades through to decommissioning and disposal – as a coordinated system of interconnected dependencies.

Viewed through this prism, each stage of the shipbuilding lifecycle must be carefully planned so that seemingly innocuous decisions made during early stages of design and construction are balanced against the through-life cost and capability implications spanning multiple decades.

Reforming the demand-supply relationship

Hard fought gains can be easily lost if the guiding principles underpinning the Naval Shipbuilding Plan are not preserved. Prior studies undertaken into the industry highlighted the past boom-bust cycles of naval shipbuilding had resulted in Australia becoming one of the most expensive places to build complex naval vessels. Without reform, the Defence budget cannot afford to cover cost premiums associated with local production while still delivering the capabilities needed for a balanced force structure. To ensure that the Australian Defence Force remains a balanced force, with the highest levels of capability and protection our nation can afford, our shipbuilding industrial base must deliver capability that is value for money and internationally cost-competitive.

The shared commitment to reform remains strong between Government and industry. The Government made adjustments to the demand profile for new naval vessels with 57 vessels identified for local construction across the two designated shipbuilding precincts at Osborne Naval Shipyard (23) and the Henderson Maritime Precinct (34). Defence has adjusted its acquisition and contracting processes, through the adoption of Competitive Evaluation Processes and tailored acquisition strategies, to meet the decisive schedule targets set by Government to commence continuous naval shipbuilding as soon as practicable.

Industry too is reforming to deliver capability that is value for money and internationally cost-competitive. This is evident by the scale of private sector investment, supported by State and Territory governments, to compete for future opportunities, such as the construction of new covered assembly and maintenance hall facilities by Civmec at Henderson in Western Australia and a new Ship Lift Facility and marine industry precinct in Darwin. When complete, Civmec's 53,000m^2 facility will be one of the largest, most efficient and innovative undercover modularisation and maintenance facilities in the world. The Darwin Ship Lift Facility has been designed to meet Defence's current and long-term needs and those of the Australian Border Force, along with commercial and private vessels from the oil, gas and marine industries.

Each of the major shipbuilding companies and integrators have also pledged to work collaboratively on the development of a cost-competitive and productive workforce, through the signing of a landmark Naval Shipbuilding Industry Strategic Workforce Plan. Such leadership from industry is vital to attract, train and retain the skilled workforce needed during the ramp-up of national activity to support naval shipbuilding and sustainment. While industry remains best placed to make staffing and skilling decisions related to its current and future workforce, the Government continues the play an active role in facilitating use of shared workforce resources – such as the Naval Shipbuilding College.

Oversight and governance

The complexity of near simultaneous submarine, frigate, and infrastructure projects demands significantly more capable program management structures than most previous Australian defence projects. Within the Department, governance of the enterprise is led directly by the Secretary of Defence with the Chief of the Defence Force and senior departmental officers from the Department of Prime Minister and Cabinet and the Department of Finance. In 2018, Defence established a new Deputy Secretary for National Naval Shipbuilding within the Capability Acquisition and Sustainment Group as the senior officer responsible for delivery of the Naval Shipbuilding Plan and as the single point of coordination and integration of shipbuilding matters within Defence and across government.

In recognition of the transition between policy development and implementation and the enduring nature of continuous naval shipbuilding, the former Naval Shipbuilding Taskforce also transitioned from Strategic Policy and Intelligence Group to Capability Acquisition and Sustainment Group. The renamed National Naval Shipbuilding Office reports directly to the Deputy Secretary National Naval Shipbuilding and is focused on integrating, coordinating and reporting on the implementation of the four key enablers identified by Government in the Naval Shipbuilding Plan:

a. delivery of modern, innovative and secure naval shipbuilding infrastructure;
b. workforce growth and development;
c. a sustainable and cost-competitive Australian industrial base; and
d. a national collaborative approach.

A key reform, brought in under the 2015 First Principles Review of Defence, has been the expansion of Defence's Investment Committee to include representatives from central agencies. The early participation of officials from the Department of Prime Minister and Cabinet and the Department of Finance in the development of capability plans has contributed substantially to the improved quality of capability proposals put forward to Government.

This new era of collaboration across the Commonwealth is further complimented by the establishment of a Secretaries Committee on Shipbuilding, which harnesses expertise across the education and training, employment, industry and science, infrastructure and regional development portfolios. Defence is leveraging knowledge from agencies outside of the traditional national security community and applying an innovative approach for staff secondments and joint initiatives as part of the unprecedented whole of government approach to deliver the Naval Shipbuilding Plan.

Implementation of the Naval Shipbuilding Plan is subject to unprecedented levels of oversight and accountability. Given its significant complexity with multiple pressure points and interdependencies, the Government continues to monitor implementation through six-monthly updates to the National Security Committee of Cabinet.

To further mitigate enterprise-level risks, the Naval Shipbuilding Advisory Board has provided independent, expert advice to the Government since its formation in January 2017. The Board comprises eminent experts from Australia and overseas in complex national programs, including the practicalities inherent in ship design, construction, test and evaluation and maintenance. The Advisory Board's advice on best practices and lessons learned acknowledges the inherent risks associated with an endeavor of this size and complexity and the need to build resilience to overcome inevitable challenges as they are encountered.

The foundational programs and mobilisation effort to support naval construction have also been subject to a number of performance audits by Australian National Audit Office (ANAO). The ANAO previously found Defence effectively designed and implemented a competitive evaluation process to select an international partner for the Future Submarine program[4]. The ANAO also identified that Defence previously advised Government in 2016 of the high to extreme levels of risk the concurrent shipbuilding programs present and the subsequent mitigation strategies that the Government adopted to manage and retire these risks[5]. While considerable effort has been expended to meet early milestones, there will inevitably be occasions where compromises are necessary to maintain momentum. Like most ambitious and far-reaching Government policy initiatives, the development of a national naval shipbuilding enterprise will need time to learn and apply lessons and build the resiliency necessary to overcome inevitable challenges as they arise.

Learning from experience

Volumes of empirical evidence within Australia and our international partners demonstrate the challenges and complexities associated with lead-ship design and construction programs. While Defence is actively applying such lessons across the four near-simultaneous new-build programs, it would be naïve to assume that significant challenges will not be encountered in the future. In many respects, our ability to identify and respond appropriately to such issues will ultimately determine the overall success of each program.

A recurring lesson from comparable programs is to ensure a high level of design maturity before construction and ensure sufficient time to conduct adequate pre-production system engineering reviews. As noted by the ANAO in its performance audit of the Air Warfare Destroyer Program, construction should only commence when the infrastructure, resources and construction data are stable enough to allow production to commence within manageable cost and schedule risk profiles[6].

[4] Grant Hehir, *Audit Report No. 48 2016-17: Future Submarine – Competitive Evaluation Process* (Australian National Audit Office, 2017), p. 7
[5] Grant Hehir, *Audit Report No. 39 2017-18: Naval Construction Programs – Mobilisation* (Australian National Audit Office, 2018), p. 7
[6] Ian McPhee, *Audit Report No. 22 2013-14: Air Warfare Destroyer* (Australian National Audit Office, 2014), p. 33.

Figure 4 – Osborne Naval Shipyard (South), Australian Naval Infrastructure, 2019

In response to earlier advice from Defence on the risk levels presented by concurrent build programs, the Government agreed to mitigate these risks by decoupling and proceeding with the surface shipyard infrastructure redevelopment at the Osborne Naval Shipyard in parallel to finalising source selection for the design and build of the *Hunter* class program. Both elements remain on track to commence prototyping by the end of 2020, with a stage of production prototyping to validate workflows, quality assurance and upskilling of the workforce in a modern, digitally-enabled shipyard environment to commence 'cutting steel' on prototype ship blocks by the end of 2020.

With head contracts and agreements now signed with each of the shipbuilding prime contractors, Defence continues to actively work with our industry partners to ensure they deliver on the agreed Australian industry participation in the design, build and sustainment phases of each program. Levels of Australian industry involvement depend on various factors including, but not limited to, individual contractual arrangements, schedule to commence construction, capability requirements and the phase of each project in the design and construction process. Defence is also actively applying past lessons to ensure the transfer of technology and knowledge to not just achieve sovereign build but also sovereign operation and sustainment.

For example, the first major equipment subcontract for the *Attack* class submarine was signed in April 2019 by Naval Group and MTU Friedrichshafen GmbH (MTU) for the design of the Diesel Generator Rectifier. As part of this contract, MTU has committed to developing industrial capacity in Australia including by growing its existing strategic partnership with Penske Power Systems Australia. Recently, Defence approved Naval Group's recommendation to select Schneider Electric France for the design of the Main Direct Current Switchboard, which manages power distribution between the batteries, diesel generator, main motor and auxiliary power systems. Under Schneider Electric's plan, Schneider Electric Australia will have responsibility for manufacturing, quality control and factory acceptance testing in Australia, building upon its local presence supporting the *Collins* class submarine. This partnership will also extend in to the *Arafura* class offshore patrol vessel program, where MTU will train Penske Power Systems Australia to manage the assembly, test and installation of the MTU propulsion diesel engines in Australia. Penske Power Systems Australia will assemble the third ship set of propulsion diesel engines under guidance from MTU, then all remaining ship sets through the progressive transfer of skills that will result in Penske providing all servicing functions for the propulsion diesel engines, main gearbox and fuel filtration system in Australia and the ability to conduct major overhauls.

Similarly, the Government recently announced Safran Electronics & Defense Australasia has signed a subcontract with Lockheed Martin Australia for the design of the optronics search and attack sensors, navigation radar and navigation data distribution components for the *Attack* class submarine. Safran will establish sovereign capabilities at its new facility in Botany, New South Wales, for the build, integration and ongoing sustainment of these components. As part of its delivery, Safran will subcontract Australian companies Acacia Systems and Thomas Global Systems for the design and development of software and hardware. The scope of this contract also includes the delivery of prototypes and interface simulators to enable Lockheed Martin Australia to conduct further test activities and validate the integrated performance of the combat system in its Combat System Architecture Laboratory in Adelaide.

These examples illustrate the interaction between international suppliers and local businesses to build the capacity needed for the sovereign build, operation and sustainment of key equipment in Australia. This extends to the transfer of 'know how' and 'know why' to Australians and Australian industry. This approach contributes to improving the quality of Australian manufacturing and systems integration on a national scale.

Developing the workforce

Matching the supply of experienced workers to production schedules presents an ongoing risk facing the naval shipbuilding enterprise. While the selected shipbuilding primes retain responsibility for the commercial recruitment and retention decisions that they are best placed to make, the Government is playing an active role in facilitating the development of a coordinated and collaborative approach to workforce development and skilling. The Government is also conscious of the competition for skilled people within the broader workforce environment in which naval shipbuilding and sustainment operates in Australia, including competition from other large defence programs, national and state civil infrastructure projects, the mining and resources sector and advanced manufacturing industries.

The Naval Shipbuilding Plan identified that leaving workforce development solely to industry could result in multiple different approaches to workforce skilling with little or no coordination at the national level and little consideration to meeting the workforce needs of the broader naval shipbuilding enterprise. The landmark commitment at the Pacific 2019 International Maritime Exhibition that all major shipbuilding companies and system integrators will work together to meet projected naval shipbuilding workforce demands is an encouraging demonstration of the leadership and maturity of Australian industry.

The progressive establishment of the Naval Shipbuilding College has played an important role in facilitating collaboration across the sector. The College is a unique and innovative construct aimed at facilitating collaboration to develop endorsed programs delivered through existing higher education and vocational providers in Australia. The College has engaged with the top nine shipbuilding companies in Australia, to form a consistent workforce demand model, including an agreed taxonomy of job roles. This demand data added greater fidelity to earlier workforce estimates contained in the Naval Shipbuilding Plan and will be further updated to incorporate workforce data from the sustainment and the supply chains. The College has analysed 37 high priority shipbuilding job roles, which has informed the development of eight training solutions. The College's network of endorsed education and training providers includes 26 institutions across every State and Territory in Australia.

The College's Workforce Register is helping to manage the shipbuilding careers of more than 1,600 Australians through capturing interest, skills and providing educational and job referrals. Almost 1,200 of these 1,600 candidates have completed a screening process and are now receiving weekly job opportunities. The College is also implementing a secondary school strategy, extending the Work-Ready online platform to provide defence industry and naval shipbuilding career information to all high schools in Australia. Since the launch of the new modules, take up of the Work-Ready platform by schools across Australia has more than doubled.

The work of the College has also supported the establishment and early work of the Naval Shipbuilding Industry Reference Committee (IRC), established by the Australian Industry and Skills Committee in September 2018. Membership of the Naval Shipbuilding IRC includes representatives from prime contractors, small business, industry associations, peak bodies, trade unions, education providers and government agencies. The Naval Shipbuilding IRC has examined relevant competencies and skillsets to address any gaps specific to the needs of the naval shipbuilding and sustainment industries. The Naval Shipbuilding IRC is also working in partnership with other relevant IRC's to ensure qualifications deliver the right skills, to the right standard for this expanding highly-skilled industry.

Skilled workforce demand is expected to increase across adjacent sectors over the next decade for similar professions and trades to those needed to support naval shipbuilding and sustainment, including project managers, engineers, schedulers, logisticians, designers, electricians, piping fabricators, machinists, quality assurance, safety and certification. The point of differentiation for naval shipbuilding and sustainment will be an emphasis on advanced manufacturing, given the *Hunter* class frigate and *Attack* class submarines will be amongst some of the most complex and challenging programs undertaken in Australia. The long-term demand profile for new naval vessels provides confidence that the skilled and experienced workforce will be retained from one new construction program to the next and the ability to invest in long-term productivity improvements.

Since the release of the Naval Shipbuilding Plan, considerable effort has been given to the retention of skills and experience – not just in terms of total workforce numbers but in preserving proficient and experienced teams. While the retention of current shipbuilders offsets some costs associated with recruiting and training a pipeline of new entrants, it preserves a cadre of leaders and supervisors with the experience to pre-empt and correct potential issues before they emerge. The rate of workforce growth over the next decade will not just be limited by the number of new graduates and apprentices entering the naval shipbuilding sector but also the core of experienced supervisors preserved to mentor and develop these new teams. Given the technology and knowledge transfer associated with our international partners working with Australian industry, small numbers of overseas sourced specialists familiar with the specific production techniques and processes of their parent companies will be needed to transfer and develop these skills in the Australian workforce. This will coincide with a period of increased global demand in the design and build of complex warships and submarines, which further emphasises the importance of adopting an enterprise approach to building the long-term capacity and resiliency in Australia's sovereign shipbuilding workforce.

Summary

Australia's ambitious agenda of concurrent naval design, construction and maintenance programs is unparalleled in our post-war history. The Naval Shipbuilding Plan represents the nation's largest capital investment in maritime capability and in the sovereign industry that will build and sustain these vessels over many decades. The national naval shipbuilding enterprise supports Australia's enhanced engagement in the region, establishing a strong and capable Navy to protect our maritime interests across the Indo-Pacific region. Early achievements are translating directly in to capability, both for Australia and our partners in the Indo-Pacific.

Figure 5 – *Guardian* class Patrol Boat HMTSS *Te Mataili* (802) alongside *Pacific* class Patrol Boats RVS *Tukoro* (02) and RSIPV *Auki* (04), Australian High Commission Vanuatu, 2019

While the four foundational naval construction programs form the base for creating a sovereign national enterprise, naval shipbuilding extends much further than the production of naval ships and submarines. It covers all elements of the capability lifecycle – from initial concept design, production planning, construction, test and evaluation, in-service support and upgrades through to decommissioning and disposal – as a coordinated system of interconnected dependencies.

Critical to the achievement of early milestones of this generations-long national endeavor has been the establishment of a coordinated network of productive partnerships across government agencies, Australian industry, the States and Territories, academia and our international partners. We are now witnessing unprecedented collaboration between key national and international stakeholders on workforce development and skilling aimed at ensuring the availability of a world-class workforce matched to forecast demands over the coming decade and beyond.

Although substantial progress has been achieved to date, past experience demonstrates the inherent challenges and complexities associated with the design and construction of lead-ships and the integration of complex weapon systems. While build programs are currently proceeding on schedule and budget, maintaining vigilance and building resiliency to respond appropriately to issues as they emerge is paramount. The sheer scale of this national effort will continue to test and challenge the Commonwealth. As such it is important the positive momentum and unity of purpose gained be carried forward to realise the Government's ambitious agenda for naval shipbuilding.