

Strategic Analysis Paper

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The Future Submarine Project: Implications for West Australia

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Key Points

- Australia is to acquire 12 new submarines. A project of this magnitude comes with inherent risks; a bespoke “son of *Collins-class*” vessel, built in South Australia, will significantly increase these potential challenges.
- The Future Submarine Project should engage Western Australia as the key location for development, recognising the state’s infrastructure, naval, maritime and information technology credentials.
- A WA-based programme provides further opportunities for synergies with the United States Navy.

Summary

The Australian Defence Force (ADF), as confirmed by the 2009 White Paper, plays a major role in countering potential threats and challenges to Australian security. Consistent with this, the ADF will, over the coming decades, undergo many innovations in weapon, intelligence, logistics, communications, command and control capabilities.

Amidst this climate of change, a major element of future force structure will be the acquisition of 12 new submarines. While these vessels are more than a decade from entering into active service, critical considerations must be addressed swiftly, to avoid cost and capability challenges. Featuring prominently in these deliberations, regardless of the ultimate makeup of the fleet, should be the role that WA may play in the Future Submarine project. With an advanced and capable manufacturing and technology sector, accompanied by requisite experience in complex projects, WA could play an enhanced role in the acquisition programme, operating within the strict parameters required by the Department of Defence.

Analysis

Submarines form the cornerstone of the Royal Australian Navy's (RAN) maritime strategy and, more broadly, a vital component of the greater national defence doctrine. Since the RAN's formation in 1911, with the procurement of the British-built HMAS AE1, to the contemporary, Australian-built and designed, *Collins*-class vessels, submarines have featured among Australia's most critical defence infrastructure.

Recognising this, as the *Collins* vessels move towards the retirement phase of their lifecycle in the mid to late 2030s, Australia has committed to acquiring a \$30 billion fleet of 12 new submarines. Foreshadowed in the 2009 Defence White Paper, the procurement project will be the largest and most complex programme in the history of the Department of Defence. The requirements for the replacement submarines, known as the "Future Submarine" project, will be much greater than for its predecessors. Defence analysts and senior decision makers have suggested that the vessels would 'travel farther, stay on patrol longer, support more missions, and provide more capabilities'.¹ Additionally, 12 Future Submarines will represent a significant increase from the current, six-vessel, *Collins* fleet.

Despite the significant budget cuts recently imposed on the Department of Defence and ADF, geopolitical realities will likely ensure that the Future Submarine project will continue. The Future Submarines, in cooperation with broader RAN assets, will increasingly be tested in their role of promoting security within the national and regional maritime environment.

Predictably, the constabulary role of the submarines will continue: collecting intelligence; maintaining an ADF presence within the national strategic sphere; promoting the ADF's deterrence capability; and supporting broader operations. Yet, the Future Submarine may be expected to play an enhanced security role in the future, as regional and subregional actors advance their surveillance, missile, air and naval capabilities.

Over the coming decades, Australia's regional military pre-eminence is likely to be eroded. Parallel geopolitical competition in the Indo-Pacific region provides the climate for new contingencies in which the ADF is likely to feature. It is within this context that the Future Submarine will enter service. Recognising this, the vessel must be prepared and equipped to meet the changing strategic balance and demanding nature of the future security environment.

The issue that remains, and one much debated in recent weeks by both sides of government, commentators and analysts, is the form that the Future Submarine will take.

Diesel-electric Submarine

Currently, the Government and the ADF seem to favour an Australian, or modified European, "off the shelf" diesel- electric propulsion model.

Generally, diesel submarines are propelled by an electric motor powered by lead-acid batteries, charged via diesel generators. Unlike nuclear vessels, diesel submarines are

¹ RAND National Security Research Division, Australia's Domestic Submarine Design Capabilities: Options for the Future Submarine, December 2011, p.1.

compact, stealthy and manoeuvrable; operating in their element in littoral areas within 200 kilometres of land. This “green water” zone is a likely theatre within which Australia’s future vessels will be expected to operate, including the critical chokepoints of Lombok, Sunda, Makassar and Malacca; the Northern Archipelago region, from East Timor to the Solomon Islands; and the South China Sea.

A significant Achilles heel of diesel propulsion is the requirement for generators to “air breathe”. A replacement submarine making use of diesel generators would be regularly required to surface or come to periscope depth to operate; a significant weakness given the intelligence requirements of the Future Submarine. Alternatively, investment in air-independent propulsion capabilities, such as fuel cells or closed-cycle heat engines, may mitigate the need to surface or come to shallower depths. These options would, however, come with corresponding financial and technical barriers.

Not necessarily a weakness, and representing something of a significant economic opportunity, a locally-built submarine would require a workforce of approximately 1,000 skilled workers from the public and private sectors. This capability does not presently exist. According to a November 2011 report, published by American think-tank RAND, given the right circumstances this workforce could, however, be developed within the scope of the Future Submarine project. Importantly, to maximise technical potential and prevent cost overruns, the Government must renegotiate its stubborn commitment to South Australia as the preferred location for the project.

With an advanced engineering and information technology sector, WA should feature prominently in Commonwealth Government considerations. With a sustained demand for technical skills and expertise from the resource and energy sectors, WA has an existing and expanding capability to engage in highly sophisticated projects. The current highly-specialised workforce may be harnessed and bring relevant experience to defence projects, including the Future Submarine programme, particularly as the current high-intensity phase of the state’s “resource boom” slows.

The breadth of engineering and technical requirements for the WA economy would ensure a sustainable workforce. The upwardly mobile nature of the technical workforce has meant that Defence has, in the recent past, lost the requisite expertise to maintain and modify defence materiel. Demand from other sectors of the WA economy is likely to maintain the required labour market and, importantly, bring proficiency from other sectors with applications for defence including automation, geospatial information skills, and information technology.

While South Australia maintains the only submarine construction facility in Australia, West Australia has proven maritime potential that could play a greater role in the Future Submarine project. The State Government has heavily invested in this sector, to create a ‘world-class defence shipbuilding hub’.² Since June 2010, the Australian Submarine Corporation (ASC), the body responsible for the *Collins*-class production and maintenance, has supported the vessels at ASC West in Henderson, South of Perth. Located at the

² Department of Commerce, Report on the West Australian Marine Industry, March 2010, p.6.

Australian Marine Complex, the \$35 million purpose-built facility has increased its maintenance efficiency, ensuring that up to three vessels can be serviced at a time. Vitaly, the Perth facility, to be complemented in the future by a complex in the Pilbara in north-west Australia, is close to potential strategic theatres of operation and current basing facilities, that is Fleet Base West.

Nuclear Propulsion

Nuclear-propelled submarines, such as those used by the United Kingdom, China, India, the United States, Russia, and France, either use steam created by a nuclear reactor to power turbines or directly generate electricity from the vessel's nuclear reactor. Accordingly, nuclear powered submarines are largely autonomous, unrestricted vessels, able to maintain long-term operations at high speed without refuelling. Nuclear cores, which last the entire twenty-five year lifecycle of the submarine, produce enough additional energy to support the complementary combat and data management requirements of the vessel.

Submarines, like all defence capabilities, rely upon credibility of deterrence to be effective and dissuade potential adversaries. The *Collins*-class vessels have failed to meet these expectations. As argued in April 2011 by the *Asia Pacific Defence Reporter*, the failures or perceived shortcomings of the current fleet should serve as a lesson to be acted upon in the selection of the Future Submarine.³ A nuclear powered fleet would certainly provide greater capabilities upon which to base the ADF's deterrence and dissuasion credibility. The increased maritime capabilities would ensure greater regional depth and the ability to contribute to potential contingencies. The growth of asymmetric security challenges, increases in the strategic awareness of the Indo-Pacific nations, and an expanding theatre of ADF operations, as demonstrated by the 2011 Force Posture Review, suggest widening concerns for Defence over the coming decades. The ADF no longer has the convenience of focussing on one primary threat, on the assumption that posturing to meet that threat will enable it to handle any lesser threats than might simultaneously emerge.

Operationally, nuclear submarines have a range of tactical advantages, particularly within the Australian maritime context. An enhanced operational capability to submerge and deploy would greatly improve efficiency, meeting RAN and broader ADF strategic objectives. Aside from the limits of the crew, nuclear submarines may remain in operation indefinitely. Significantly, this capability would ensure a "true" tactical presence within Australia's strategic theatre, rather than potentially being simply present. A nuclear submarine would enhance the entire gamut of maritime defence contingencies, from regional diplomacy to deterrence of potential state threats.

A nuclear vessel, particularly the *Virginia*-class submarine proposed by Ross Babbage,⁴ would dramatically improve interoperability and, accordingly, security and economic relations between the ADF and the United States military. Since World War Two, the ANZUS alliance has acted as the cornerstone of Australia's security posture, with the United States

³ Asia-Pacific Defence Reporter, Roles and Requirements for Australia's Future Submarine, April 2011

⁴ Ross Babbage, Why Australia Needs Nuclear Subs, The Diplomat, November 2011

acting as the guarantor of Australia's security. For both nations, the relationship has been of substantial value. Based on shared security and economic interests, in addition to a dedication to democratic values and a number of other cultural similarities, trends suggest that the rise of the Indo-Pacific as a vital strategic theatre will further enhance this relationship.

As outlined in the 2010 Melbourne Statement,⁵ Washington and Canberra hold shared views on many international issues. They include the desire for stable, peaceful and prosperous Asian and Indian Ocean regions, and the continuation and enhancement of the rules-based international order currently underwritten by the US, and which has benefitted it and Australia tremendously.

Given the significant role played by the RAN in underscoring diplomatic activity, an advanced submarine fleet would contribute greatly to the security of both countries by enhancing regional stability in the East Asian and Indian Ocean regions. Additionally, a nuclear-powered submarine fleet would significantly enhance the RAN's role as a guarantor of the global commons. Correspondingly, it would go some way to securing the international trading system upon which so much of Australia's wealth depends.

As well as providing defence symmetries, *Virginia*-class submarines would present further economic opportunities for WA through increased port calls. Increased interoperability between the RAN and the United States Navy (USN) could be complemented by increasing the attractiveness of Fleet Base West to the US Navy. While Diego Garcia is likely to remain the primary Indian Ocean port for the USN in the near future, Fleet Base West has the potential to play a greater role in USN defence posture. Furthermore, the attendant economic benefits of port calls cannot be underestimated.

Despite potential tactical and operational advantages, a nuclear powered fleet is unlikely to feature in the final consideration phases of the Future Submarine project. Acknowledged even by proponents of the project, the advantages provided by nuclear power are likely to be outweighed by public perceptions of the propulsion system. Ross Babbage contends that leasing vessels with an exemplary safety track record for the period of service, to be returned to the supplier for disposal, would go some way towards mitigating community concerns.

Perhaps the greater concern, however, is how the acquisition of such advanced materiel would be perceived within the region. Analysts contend that a submarine arms race already exists within the Indo-Pacific. Malaysia, Indonesia and India are currently engaged in expansion projects for their fleets, while Vietnam, is for the first time, working to acquire submarines. Were Australia to procure a nuclear-powered submarine, the security environment within the region could become further complicated. The perceptions of regional states, a vital consideration in defence procurements and postures, could potentially be adversely effected by nuclear developments, complicating, rather than

⁵ Kevin Rudd, Minister for Foreign Affairs and Hilary Clinton, US Secretary of State, The Melbourne Statement, November 2010

securing, the RAN's area of operations. Even among key allies, nuclear submarines would add a more complicated dimension to relations. For instance, policy in New Zealand since the mid-1980s precludes nuclear vessels, such as the *Virginia*-class submarines, accessing port facilities.

Most significantly, however, Australia does not have the requisite local nuclear capability to manage a nuclear submarine fleet. Acquisition of the *Virginia*-class, or any nuclear-powered vessel, would take a high-level of autonomy away from the ADF, a critical consideration within the defence sphere. Additionally, like all advanced defence materiel, a nuclear Future Submarine would require substantial ongoing capital investment. Significant expenditure on training, operations and maintenance, would pose a significant challenge. The lack of a nuclear industry within Australia dictates that this expenditure would occur offshore. This represents a considerable missed economic opportunity, particularly given WA's maritime capability.

Further Considerations:

The RAN's expansive area of operations, combined with personnel challenges, particularly within the submarine division, suggest the need for greater investment in Unmanned Underwater Vehicles (UUVs). Currently, the effectiveness of UUVs has yet to be fully realised, particularly in combat operations. Trends within the military, however, suggest an increased role for remote and automated maritime capabilities in the near future. For example, according to the *Unmanned Undersea Vehicle Master Plan*, published in 2004, during Operation *Iraqi Freedom* in 2003, UUVs enhanced underwater sensing and detection capabilities, thus reducing diver workload and exposure to potential hazards.⁶ The adoption of UUVs would yield increased capabilities to meet future contingencies. After initial technical barriers are resolved, they can help mitigate the personnel challenges the RAN is likely to continue to experience.

A key component of the Future Submarines function will be persistent intelligence, surveillance and reconnaissance (ISR) operations. Over the coming decades, WA's mineral and energy sectors will continue to expand. Offshore hydrocarbon projects, from the Carnarvon, Bonaparte, and Browse Basins will reach production stage, potentially making Australia the world's largest liquefied natural gas supplier. Within the mineral sector, Australia will continue to capitalise on its strategic share of iron ore and base metals. Good order at sea, with unfettered sealanes for commerce, is imperative to maintain Australia's competitive advantage and ensure future national prosperity. A major element in meeting that objective will be intelligence from the north-west maritime frontier.

WA's economic profile is a major component of the national security interest. It is therefore imperative that the region has greater Signal, Electronic Measurement and Imaging (SIGINT)

⁶ Department of the Navy, United States of America, *The Navy Unmanned Undersea Vehicle (UUV) Master Plan*, November 2004, p.6.

intelligence, meteorology and oceanography data capabilities. The inherently deployable, persistent, autonomous and adaptable features of UUVs make their application ideal. UUVs could dramatically improve operational performance, while simultaneously reducing costs and expediting mission timelines. Further, UUVs may enhance the intelligence capability along the north-west flank by acting as a force multiplier, increasing the number of sensors in the RAN's theatre.

The expansion of north-west Australia's seaborne trade over the coming decades will lead to a proliferation of maritime challenges in Australia's sea-lines of communication. According to the *Unmanned Undersea Vehicle Master Plan*, significant scope exists for UUVs to 'search for undersea threats to ships, piers, and harbour infrastructure'. It is a particularly vital attribute, especially given the current, and projected, congestion in Pilbara ports. Agents wishing to cause disproportionate damage could target vessels in the ports, effectively closing operations and having significant ramifications at a national level. Using unmanned vessels in a constabulary role in ports and along critical littoral sea lines of communication, would dramatically decrease the potential complications of asymmetric contingencies.

Significantly, as demonstrated by the military application of Unmanned Aerial Vehicles, further scope exists for UUVs to act in a precursor and enabling role in other defence operations.⁷

Given the advantages of UUVs, a range of military forces and defence contractors are currently engaged in advanced unmanned maritime capability programmes. Understandably, UUVs have become a key focus for the USN. Recognising the various symmetries between the ADF and the United States military, Australia should seek to maximise opportunities within the UUV program for shared benefits. The current Joint Strike Fighter Program represents a potential model of cooperation. Importantly though, Australia, and particularly WA, could play an expanded role in a UUV project. The expansion of the state's minerals and energy sectors has allowed significant developments in other complementary industries, particularly within the Information and Communication Technology (ICT) sector and Geographic Information Systems (GIS) technologies. A UUV project with significant Western Australian involvement would benefit from advanced, and proven, business/logistics information management systems, systems integration and electronic products, originally designed for the resource sector, yet with a direct application to a UUV project.

Conclusion and Policy Recommendations:

The speed and endurance of nuclear powered vessels make them an attractive prospect. At USD 2.5 billion, the *Virginia*-class submarine would also be within budgetary constraints. In a post-Fukushima environment, however, the Government is unlikely to pursue this option,

⁷ Navy Unveils UUV Master Plan – New Capabilities, New Vehicle Classes, Undersea Warfare, Spring 2005, Vol.7 No. 3

given public pressure. Moreover, such a rapid increase in capability could risk alienating other countries in the region.

A local submarine programme brings a host of capability and cost risks. Designed and built in Australia, the Future Submarine would likely be another “orphan” vessel, operated solely by the RAN. According to commentators, this represents a significant weakness, as it prevents the sharing of experiences between the RAN and other navies operating the same type of submarine.⁸

Given these circumstances, the Future Submarine will likely be selected from the range of current submarines in production in France, Sweden, Spain or Germany. While having a reduced capability, particularly in comparison to a nuclear vessel, the submarines have a demonstrated competence and present opportunities within which to exploit synergies with other militaries.

An imported Future Submarine will require significant modification to ensure it is appropriately equipped for Australian operations. According to *Learning From Experience: Lessons from Australia’s Collins Submarine Program*, support and involvement of the Navy in the early stages of the programme is vital, to avoid the difficulties experienced within the current fleet. A modification programme, based in Henderson, would support the implementation of this recommendation. The maritime credentials of the site are undisputed, with demonstrated potential to service and support a submarine fleet during modification. The proximity of the facility to Fleet Base West ensures that another key theme of the report, creating a collegial and interactive environment between the navy and the new vessel, could be developed.

Significantly, an imported Future Submarine would leave substantial capability gaps. For this reason, an accompanying fleet of UUVs is imperative. Undoubtedly, this programme will be led by the American military. Opportunities, however, exist for Western Australian industry involvement. The involvement of Perth-based aerospace company, Quickstep in the JSF programme demonstrates that WA has a demonstrated capability to contribute to advanced international defence projects. WA is well-placed to assist in the development of a UUV. It has an advanced technologically-able economy with niche capabilities, including ICT, marine and cyber security.

Conclusion:

In a 2009 ASPI publication, Sean Costello and Andrew Davies noted that financial, industrial and engineering parameters will constrain, and perhaps temper, the Future Submarine. To maximise potential, it is therefore imperative that South Australia and the ASC are not considered *fait accompli*. WA presents the most economic and technical opportunities with

⁸ John Thornton, *Beyond the Collins Class: what next for Australia's submarines?*, The Conversation, August, 2011

which to deliver a capable and commercially viable submarine. The State has demonstrated experience and infrastructure to support the programme. The connections with Fleet Base West will promote support within the RAN. Finally, the location of WA on the Indian Ocean, the most likely theatre of future operations, means a Western Australian submarine not only makes economic sense, but also demonstrates military logic.

Any opinions or views expressed in this paper are those of the individual author, unless stated to be those of Future Directions International.

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