SUBMARINE INSTITUTE OF AUSTRALIA

SUBMISSION TO 2015 DEFENCE WHITE PAPER

2ND DECEMBER 2014

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<table>
<thead>
<tr>
<th>Issue:</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>2nd Dec. 2014</td>
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<tr>
<td>Number of Pages:</td>
<td></td>
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</tbody>
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Prepared for:
Australian Government 2015 Defence White Paper Committee

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Executive Summary

Australia’s Geopolitical Situation and Overarching Strategic Considerations for National Security

Australia is the world’s largest island continent: it has extensive maritime trade routes and linkages all over the world; our economy relies directly on the security of these trade routes. Within its strategic framework, Australia develops and sustains a multi-role national security capability via a well-equipped, professional defence force -delivering defence of Australian interests and contributing, often in coalition, to regional/international security. Australia’s maritime circumstances make submarines a critically essential choice for strategic defence force projection in our region.

Why Submarines?
The submarine’s primary characteristic is stealth – the ability to operate covertly close to an adversary’s forces, to observe and report or to react and respond to changing circumstances. A covert submarine capability gives the Australian Government a broader range of military response options. Submarines enjoy the advantage of access – the ability to operate independently in sea areas where other ADF platforms cannot, because air and sea control has not been established. It gives them a unique surveillance and strike capability in areas that an adversary considers to be under his own control.

Stealth
The fundamental characteristic of successful submarine operations is stealth. Stealth in the operational area depends on technology in construction and sustainment, competence of the operators and stringent security. Stealth requires access to the best, most cost effective and relevant technology. Australia must be in absolute control of the mix of technologies that make up the Australian submarine capability. It is only in that way that it can be confident that its operations are safe. Stealth, security and the safe conduct of advanced submarine operations are synonymous.
This is about owning our future.

Why Long Range Submarines?
The submarine’s unique characteristics of stealth and surprise are maximised when it is operated in an offensive or ‘forward’ posture. In our context this means that Australian submarines must be capable of sustained deployment and covert operations well north of the Equator. Submarine operations in these forward areas maximise Australia’s ability to influence events in our area of vital strategic interest and emphasise the deterrent effect of the submarine capability. The ability to sustain
such operations – indefinitely if needed – increases their asymmetric value and capitalises on the access demonstrated by a consistent covert presence.

**Future force size**
Acceptance of the strategic argument that Australian submarines must be capable of sustained deployed covert operations well north of the Equator, demands an analytical review of the required force size. The analysis involves a breakdown of the standard submarine operating cycle. The fewer the number of submarines in the total force, the less the number of submarines on operational deployment with a consequent diminution of the value of the strategic deterrent.

**Self Reliance**
Australia’s defence posture is one of self-reliance within the context of the ANZUS alliance and regional cooperation. To the greatest extent possible, we expect to be able to deter and defeat armed attacks without relying on the combat forces of another country. Ultimately, the decision of where to build the Future Submarine is the choice and responsibility of government. Whilst not ruling out an overseas build, the SIA advocates that Australia builds and sustains its submarine force using Australian industry, supported by the US and overseas suppliers. Such a self-reliant strategy is consistent with our broader defence strategy and is the best means to meet national security objectives as discussed above.

**An Informed and Timely Decision**
There are no easy answers to the future development of Australia’s submarine capability and the clock is ticking. We need a national program that delivers a sustainable and affordable capability for the long-term.

**Submarine Industrial Capacity in Australia, Procurement and Whole of Life Costs**
The SIA advocates that Australia builds upon the submarine capacity it has laboured hard to establish and that it integrates, assembles and sustains its submarine force using the best, most cost-effective and relevant technology. Most importantly, Australia must protect its’ sovereign submarine capability to ensure the safe and secure conduct of its future submarine operations.

Employment of Australian commercial skills to design our own submarine in Australia would carry a high risk of cost uncertainty. There are a number of international companies with highly skilled conventional submarine design capabilities who would be willing to enter into a partnership with Australia to transfer and develop those skills here. With the aim of achieving a competitive price on the capital acquisition (including IP for through life support) of a new class of submarine, the SIA strongly advocates for a competitive tender based on a Top Level Requirement, developed to meet Australian strategic requirements for our future submarine force.

The true cost in a Defence program must be considerable over the “whole of life” cost. The critical stage for programmatic cost and risk reduction is the project initiation stage when requirements are being formed and cost/benefit tradeoffs assessed.
The outcome would be a submarine force of the right size and shape to meet Australia’s strategic needs, supported by an industry with the skills and capacity to evolve and enhance the submarine capability to maintain the leading edge essential in the undersea warfare environment.

Conclusions
Submarines have unique capabilities that make them a formidable deterrent to potential adversaries. Australia depends on its ability to trade by sea and to depend increasingly on offshore resources such that the security of our distant trade shipping routes and offshore structures are vital to us.

Stealth is the key to safe, effective and successful submarine operations. Stealth depends on security and the confidence that Australia’s most sensitive submarine information is secure. Australian access to other nation’s sensitive information is also dependent on our ability to protect that information.

The SIA recognises that in any period of development of the future submarine force there will be financial and other resource constraints. The creation and sustainment of core capabilities involves the development and sustainment of infrastructure: this must be maintained and further developed to meet the strategic requirements of the Australian Government.

A crucial question that should be addressed in the Defence White Paper is what must be afforded year by year to build and sustain the submarine force required by the Australian overarching strategic framework.

Procurement should be via a competitive tender process to ensure value for money against a level of capability which fulfills Australia’s strategic requirements for submarines.
Introduction
Australia’s Geopolitical Situation
Australia is the world’s largest island continent: it has extensive maritime trade routes and linkages all over the world, with increasingly expanding relationships in the Indo-Pacific region. The export of our raw materials – the power house of the Australian economy – relies directly on the security of these trade routes.

Australia’s Overarching Strategic Considerations for National Security
Australia’s international strategy is based on supporting the United Nations based framework of the rule of law for the conduct of international relations. Within this framework, there is a careful balancing, of its’ obligations and benefits under treaties and agreements with the USA (in the context of United States presence and roles throughout Australia’s regional area of interest in the Indo-Pacific region) and Australia’s extensive treaties, trading and commercial relationships with regional powers - especially China as its rising financial and military might increases.

The Australian Defence Force [ADF] is entering a new era, with an increased focus on maritime presence and capability to be effective throughout the region. This strategy includes collaboration with, and support from, its regional and global allies.

The highly visible nature of the amphibious and maritime surface/airborne platforms in a task force so deployed, requires careful planning for force protection and coalition operations. Such planning (to provide force protection ‘in depth’) involves the forward positioning of those critical platforms which are not visible: submarines.

Submarines are covert and effective platforms able to undertake multiple facets of maritime operations from intelligence, surveillance and reconnaissance [ISR] through to interdiction of opposing maritime forces including hostile submarines, and invulnerable land-strike from forward operating areas as well as support of Special Forces the laying of offensive minefields in suitable locations.

Australia’s maritime circumstances make submarines a critically essential choice for strategic defence force projection in our region.

Discussion
Why Submarines?
As stated below, the submarine’s primary characteristic is stealth – the ability to operate covertly close to an adversary’s forces, to observe and report or to react and respond to changing circumstances. A well-positioned and covertly operated submarine is able to strike an adversary hard, without warning, and without support from other ADF forces.

A covert submarine capability gives the Australian Government a broader range of military response options. Submarine forces can be deployed to monitor developing events, remain for long periods, poised to strike, then withdraw covertly as...
The deployment of submarine forces to a theatre of operation can be declared – as subterfuge to influence an adversary's actions – or remain undeclared.

The covert nature of the submarine makes it an asymmetric capability for Australia – a role in which its ability to influence events far outweighs the size and weight of the force. A force able to deploy and sustain capable submarines on covert patrol anywhere in Australia's area of strategic interest requires a disproportionate response from an adversary seeking to counter it; the cost to an adversary, to develop and sustain an effective counterforce, is significant.

Submarines enjoy the advantage of access – the ability to operate independently in sea areas where other ADF platforms cannot, because air and sea control has not been established. It gives them a unique surveillance and strike capability in areas that an adversary considers to be under his own control.

The primary characteristics of submarine capability – stealth, asymmetry and access – make it a significant deterrent against an adversary who threatens Australian interests in our area of strategic interest. A strong and credible submarine force demonstrates our ability to impose prohibitive costs on potential aggressors and hence influence events in this area.

**Stealth**
The fundamental characteristic of successful submarine operations is stealth. Stealth in the operational area depends on technology in construction and sustainment, competence of the operators and stringent security. The need to maintain stealth and security in submarine matters is all pervading.

**Access to the Best, Most Cost Effective and Relevant Technology**
We have a longstanding, mutually beneficial security relationship with the US and the UK on many levels. The US relationship is significant as our current combat systems partner and provider of weapons. Whichever platform we choose for the Future Submarine, it must be compatible with our mutually beneficial security relationships.

However, the US and the UK are not the only sources of submarine technology. France, Germany and Sweden are also important contributors to Australia’s submarine capability. If Japanese technology meets the Australian requirement we should consider the advantage it may offer.

Those suppliers will only contribute if they can be confident that Australia will respect and protect their security and their intellectual property. Suppliers of technology from country A may be very happy to provide their technology to Australia, but unwilling to give country B or C any visibility of the same technology. If the submarines are assembled in a country other than Australia, there is an increasing risk that certain technology (that can only be installed in the assembly phase) may not be made available.

If Australia is to continue to have access to the most advanced overseas technologies, it must demonstrate its capacity to protect that technology.
Equally, Australia must be in absolute control of the mix of technologies that make up the Australian submarine capability. It is only in that way that it can be confident that its operations are safe.

Stealth, security and the safe conduct of advanced submarine operations are synonymous.

This is about owning our future.

**Increasing Strategic Uncertainty**

Australia has an enormous area of strategic interest. Our economic security depends on our ability to trade by sea, therefore defending that ability has to be a core focus for the ADF. Much of our trade passes along Sea Lines of Communication [SLOC] traversing the Indonesian and Philippine archipelagos, the South China Sea and beyond. Maritime security along our SLOCs is a core defence interest.

The balance of power in the Indo-Pacific region is shifting as China and India grow and the US rebalances its posture in response. Some historical Asian disputes remain unresolved and have the potential to destabilize regional relationships as nations grow in economic and military strength. Smaller nations will have to review their own posture in response to changing power structures, with potential for friction or conflict, which could easily impact on our SLOCs.

Submarine acquisition is proliferating in our region as nations recognise the value of operating their own covert maritime forces. Countering the threat of these submarines will be an increasingly difficult task for the future ADF, hence the importance to Australia’s of improving and extending strategic surveillance and warning capabilities – particularly those of a covert nature.

Maintaining strong military capabilities, able to provide asymmetric, covert presence along our SLOCs, is a vital hedging strategy as Australia moves ahead into a more uncertain security environment.

**Why Long Range Submarines?**

Australia’s size, location and far-reaching interests lead logically to a strategy of defence in depth. Our defence strategy must include the ability to counter an adversary’s forces close to its bases, training and exercise areas and likely transit routes – at arm’s length from Australia.

The submarine’s unique characteristics of stealth and surprise are maximised when it is operated in an offensive or ‘forward’ posture. In our context this means that Australian submarines must be capable of sustained deployment and covert operations well north of the Equator. Submarine operations in these forward areas maximise Australia’s ability to influence events in our area of vital strategic interest and emphasise the deterrent effect of the submarine capability. The ability to sustain such operations – indefinitely if needed – increases their asymmetric value and capitalises on the access demonstrated by a consistent covert presence. Additionally, the strategic warning provided by a forward-deployed submarine force offers the Government options to adjust strategy to avoid conflict.
Since the introduction of submarines in the early 20th century, successful campaign strategies have invariably been those, which have employed submarines offensively at long range from their bases.

To consider planning which limits the deployment of Australian submarines to the sea-air gap, in a simple sea denial role against an adversary’s forces, is a fundamentally flawed strategy. It is a defensive tactic that fails to exploit the submarine’s abilities to seize the initiative well before a defensive role is required: it denies Government the ability to influence events beyond the sea-air gap. Such a strategy would surrender the initiative and severely constrain the military options open to Government.

Conventional submarines do not have the same tactical speed of advance as nuclear submarines, surface ships or aircraft, but they are extremely difficult to detect. This means that our submarines operate most effectively in areas close to those from which the enemy must deploy—his own bases, focal areas and choke points—rather than in ways which could give him the potential to evade the underwater threat outright. The passive ‘point defence’ construct—implicit in submarine defence of the sea-air gap—lacks an appreciation of how the geography of our vast northern areas limits the tactical employment of conventional submarines. There would be significant risk that our limited number of conventional submarines patrolling the sea-air gap would be in the wrong place at the wrong time.

A strategy of deploying shorter-range submarines operating from a forward base or tender ship, to conduct forward-deployed operations, is also a high-risk strategy. Australia has no ‘forward’ territory so our submarine operations would be entirely dependent on the good will of host nations. Forward positioning of a tender ship would also require the approval of a host nation and would require protection both in transit to the forward port and whilst on station (a particularly vulnerable situation when submarines are being replenished or maintained alongside a tender).

The most significant consequence of the selection of these forward deployment options would be the reduction in strategic uncertainty for the adversary, by reducing the size of the potential area in which Australian submarine operations were being conducted.

The US Navy currently conducts forward-deployed submarine operations in our region from forward operating bases in Japan and Guam. We note however that, while operating from these bases is a cost-effective strategy in the current threat environment, the USN has no expectation that they will remain accessible in a higher threat future and that US submarines are more than capable of conducting their operations from US mainland and Hawaiian bases. 1

Furthermore current Australian defence planning does not countenance a serious threat from a rapidly expanding invasion force (as seen in Japanese advances through the south east Asia in the Second World War). Consequently the

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1 Note that the Australian ports of Fremantle and Brisbane were forward operating bases for the USN Pacific Submarine Force, as well as British and Dutch submarines in World 2.
requirement for Australia to mount ISR, land strike or interdiction of opposing forces might well occur at any point throughout the Indo-Pacific region. This makes forward basing an outmoded and inflexible option in Australia’s strategic context.

Submarine Systems Capability
Submarines are multi-task platforms. As stated earlier, submarines offer covert, widely effective capabilities for all stages of maritime operations: from intelligence, surveillance and reconnaissance [ISR] through to insertion of special forces, interdiction of opposing maritime forces including hostile submarines, and invulnerable land-strike from forward locations.

A submarine is a system of systems; in a submarine it is critical that the systems must complement, not compromise, the stealth of the platform. Signatures (all-source acoustic, magnetic, electro-magnetic, mast Radar Cross Section etc) must all be minimized to reduce the risk of counter detection. All systems (hull, propulsion, sensors, tactical data management, weapons, communications and domestic) must all be selected to provide discrete, stealthy operation and a capability edge over potential adversaries. It is an inconvenient truth that MOTs combat, sensor and weapons systems rarely (if ever) offer capability edge. The country of origin will sell the ‘export’ version. The best systems for Australian conditions and operations should be integrated and maintained in Australia: self-reliance (spares, support, sustainment) is critical – particularly in a time of conflict. The most effective means of maintaining a ‘capability edge’ is to engage in a ‘continuous improvement’ / spiral development program, which integrates technology and advances submarine systems ahead of any adversary or threat.

Future Force Size
Acceptance of the strategic argument that Australian submarines must be capable of sustained deployed covert operations well north of the Equator, demands an analytical review of the required force size. The analysis involves a breakdown of the standard submarine operating cycle. This cycle allows for refits, training, work-ups, operational deployments, mid-cycle maintenance, training, work-up etc. The cycle overlaps to allow for the number of submarines in the total force. This analysis shows that to maintain two submarines on operational deployment at a range of 3,500NM and two at 2,000NM, a force of at least 12 conventional submarines is required.

The fewer the number of submarines in the total force, the less the number of submarines on operational deployment with a consequent diminution of the value of the strategic deterrent.

The size of the submarine force within the Australian Defence Force is a serious matter of both investment and of sustainment costs and benefits. The force must be large and cohesive enough to sustain a critical mass of expertise, both in operations and in sustainment. It must also provide the Australian Government with credible and potent force capability to deal with a wide range of circumstances and international developments.

However of even greater importance is the assurance of continuity of the investment in both infrastructure, in submarines themselves and in the development and
sustainment of the workforces for operations and sustainment. In WW2, Australia came to realize the enormous deficiency resulting from the lack of any sovereign submarine capability: the country was entirely reliant on the submarine forces of the USA and the UK to provide this essential capability.

Submarine forces are complex and hence require very large investment in acquisition and sustainment. The Defence White Paper will acknowledge this, but this is not of itself any reason to lower the force structure target. What must be done instead is to place the greatest emphasis on the employment of deeply experienced people and organisations in the design and development of the submarine force.

The very best way to meet all of these objectives is to create and sustain a continuous submarine building and capability enhancement infrastructure in Australia, thereby providing the Australian Government with the flexibility to accelerate or vary the building program into the future.

This also reduces the risk of gradual obsolescence of any single design baseline.

**Self Reliance**

Australia’s defence posture is one of self-reliance within the context of the ANZUS alliance and regional cooperation. To the greatest extent possible, we expect to be able to deter and defeat armed attacks without relying on the combat forces of another country.

The ANZUS Alliance offers Australia direct military support from the US if threatened by a major power with capabilities far beyond our own. It is, however, incumbent upon Australia to make military capability available as part of that alliance. A force of 12 submarines offers a significant capability; at almost half of the US Navy's Pacific submarine force (25 attack submarines in 2040) it would represent a significant contribution to any allied operation.

Despite some misinformed press regarding the Collins class, Australia is held in high regard in the region as a very professional operator of very capable submarines. The respect in which our submarine force is held will be significantly enhanced as its size and capability increases. Such leadership and respect is a firm foundation for strong regional alliances and friendships.

Submarine technologies are amongst the most closely-held. No nation allows export of its best submarine technologies and even close allies share only some, although our alliance with the US does give us privileged access to USN submarine weapons and sensor technologies. Long-range conventional submarines are not readily available in the world market but we continue to see export of very capable (albeit shorter range) submarines on a global basis.

Australia needs to develop the submarine design and supporting infrastructure with (where appropriate) the assistance of experienced overseas organizations: we must ensure that we can support (sustain and upgrade) throughout their life via appropriate investment in infrastructure and workforces. Through the Collins Class
The submarine program, Australia has excellent infrastructure and some very experienced people to support this approach. Australia needs to focus on developing scientific, technological and engineering skills to enhance the experience already gained. Some of these skills will come from experienced overseas organisations by negotiating commercial and intellectual property agreements to cover the life of the submarines and the supporting infrastructure.

Ultimately, the decision of where to build the Future Submarine is the choice and responsibility of government. Whilst not ruling out an overseas build, the SIA advocates that Australia builds and sustains its submarine force using Australian industry, supported by the US and overseas suppliers. Such a self-reliant strategy is consistent with our broader defence strategy and is the best means to meet national security objectives as discussed above.

Lessons Learnt From The Collins Class Experience
In the Collins class, Australia has developed a world leading large conventionally powered submarine. That was not an easy process: who else has that experience? We have proven that as a nation we have the resources and skills to do so.

Through this process, we have learnt some valuable lessons – lessons we should adhere to in order to ensure we select the ‘right’ submarine to meet our long-term strategic defence needs.

Five key lessons the SIA would like to highlight specifically are:

- It took time to learn that we are the “parent Navy” of our submarines. In retrospect it is obvious – if we are to be able to protect our most sensitive secrets then we must take ownership of them. This is what is meant by sovereignty in the context of Australian submarine capability.
- We cannot give the responsibility for our sovereignty to another country.
- We need ongoing and respectful relationships with suitable suppliers.
- A dedicated program of maintenance and investment is absolutely essential to ensure our submarine fleet is fully operable, capable and available.
- More than six submarines are required to provide an effective deterrent.
  - while various numbers have been discussed, we calculate that at least 12 submarines are required.
  - The limitations on training opportunities have been a continuing constraint in sustaining the number of trained submarine personnel for effective operations.

An Informed And Timely Decision
There are no easy answers to the future development of Australia's submarine capability and the clock is ticking. We need a national program that delivers a sustainable and affordable capability for the long-term, not just a 'quick fix' replacement of the Collins submarines.

Indeed – there are no “quick fixes” as there also no “MOTS” options. Even the most capable of available of overseas submarines will require modification. That will rely on Australian industrial capability. We have the capacity to be an “informed” buyer. We can ensure that we have continued access to the submarine technology most
relevant to our strategic environment. We must guarantee that we can sustain, maintain and upgrade our submarine capability throughout the next 100 years.

**Submarine Industrial Capacity in Australia**
The SIA advocates that Australia builds upon the submarine capacity it has laboured hard to establish and that it integrates, assembles and sustains its submarine force using the best, most cost-effective and relevant technology. Most importantly, Australia must protect its sovereign submarine capability to ensure the safe and secure conduct of its future submarine operations.

**Whole of Life Costs**
There are any number of estimates of the costs of the Future Submarine available in the public domain.

The true cost in a Defence program must be considerable over the “whole of life” cost. The critical stage for programmatic cost and risk reduction is the project initiation stage when requirements are being formed and cost/benefit tradeoffs assessed.

A continuous build program would allow a balance against available resources and could be sustained over many decades.

The outcome would be a submarine force of the right size and shape to meet Australia’s strategic needs, supported by an industry with the skills and capacity to evolve and enhance the submarine capability to maintain the leading edge essential in the undersea warfare environment.

**A Collaborative Approach To Submarine Construction And Sustainment**
We need a collaborative approach, building on our current and past investment in assets, infrastructure, workforce skills and, most importantly, experience.

**Procurement**
Employment of Australian commercial skills to design our own submarine in Australia would carry a high risk of cost uncertainty. There are a number of international companies with highly skilled conventional submarine design capabilities who would be willing to enter into a partnership with Australia to transfer and develop those skills here. With the aim of achieving a competitive price on the capital acquisition (including IP for through life support) of a new class of submarine, the SIA strongly advocates for a competitive tender based on a Top Level Requirement, developed to meet Australian strategic requirements for our future submarine force.

**Conclusions**
Submarines have unique capabilities that make them a formidable deterrent to potential adversaries. Australia depends on its ability to trade by sea and to depend increasingly on offshore resources such that the security of our distant trade shipping routes and offshore structures are vital to us.
A middle power like Australia can influence events far from home by employing asymmetric capabilities such as long-range submarines. A large force of long-range submarines would be a significant contribution to the US alliance and could give Australia a leadership role in regional coalitions.

Stealth is the key to safe, effective and successful submarine operations. Stealth depends on security and the confidence that Australia's most sensitive submarine information is secure. Australian access to other nation's sensitive information is also dependent on our ability to protect that information.

The SIA recognises that in any period of development of the future submarine force there will be financial and other resource constraints. The creation and sustainment of core capabilities involves the development and sustainment of infrastructure: this must be maintained and further developed to meet the strategic requirements of the Australian Government. The current competent and experienced workforce which both operates and sustains a complex force, has taken many years to develop: it must continue to develop and be a force-in-being for the future.

A crucial question that should be addressed in the Defence White Paper is what must be afforded year by year to build and sustain the submarine force required by the Australian overarching strategic framework. This must be a commitment that has bipartisan support and is not vulnerable to cyclic revisions to meet short-term goals: the sustained submarine force building program in other countries are examples of how this approach can work with sustained goals and resource budgets.

Procurement should be via a competitive tender process to ensure value for money against a level of capability which fulfills Australia's strategic requirements for submarines.

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