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CDA Institute | Force Development Series

Canada's Future Submarine Capability

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Introduction:

In recognition of the incredible complexity of sustaining defence capabilities, including timely defence procurement, the CDA Institute has initiated the 'Force Development Series', comprised of events involving a diverse range of subject matter experts and reports as a contribution to the national discussion on defence policy. With the generous support of NATO and DND, the second roundtable event of the series was held in late November 2022, on the topic of sustaining Canada's submarine capability.

The objective of the event was to address, at a high level, the challenges ahead in sustaining Canada's submarine capability, including the potential risks and consequences of a capability gap, and fostering open conversations amongst experts to generate creative, multi-stakeholder solutions-focused dialogues. Topics covered during the event included the operational and strategic value of submarines to the Royal Canadian Navy in a changing security environment, high-level requirements and caveats for the Victoria-class replacement, Canadian procurement timelines contrasted with the Victoria-class lifespan, the Canadian political environment in the era of a National Shipbuilding Strategy, and the implications of potential submarine designers/builders' offerings and challenges.

This report summarizes the discussions held during the event, providing a comprehensive overview of the key points made by the invited experts. The report aims to promote better understanding and informed debate about the challenges associated with sustaining this critical capability for Canadians. Complying with the Chatham House rules, the report does not attribute any comments to individuals.



Her Majesty's Canadian Ship (HMCS) VICTORIA returns home through the Straits of Juan De Fuca, from operations with the United States Navy (USN) on February 26, 2015. Photo: LS Zachariah Stopa, MARPAC Imaging Services ET2015-0051-03



Executive Summary:

This report provides a detailed analysis of the critical role of submarines within the Canadian Armed Forces (CAF) and their importance in the shifting international security landscape. Canada's unique geopolitical positioning, surrounded by three oceans underlines the strategic value of submarines in Canadian defence planning.

Submarines serve as strategic deterrents, capable of altering adversaries' decision-making across various maritime theatres of operations. They bolster Canada's overall defence posture through their stealth, power, and unique capabilities. In today's multipolar world, with 41 countries possessing submarine capabilities, it is incumbent upon Canada, in line with our allies, to maintain a modern and capable submarine fleet.

However, the report identifies several challenges to maintaining and enhancing our submarine capabilities. Key among these are procurement issues, personnel shortages, the high costs of the necessary supporting infrastructure, and a lack of domestic expertise in submarine construction. The submarine procurement process is further complicated by public perception and political factors.

Despite these challenges, the report underscores the need to revisit the strategic requirements for Canada's future submarines. Consideration should be given to various factors including technical, engineering, and personnel aspects, along with other critical aspects like the number of vessels, design choices, and crew requirements. To meet these strategic requirements, the report suggests an increase in fleet size, incorporation of under-ice capabilities, the ability to control autonomous vehicles, and a design focusing on stealth, endurance, and lethality.

Given the historical policy and budget constraints that have shaped Canada's approach to submarine procurement, the report outlines three potential procurement routes: a domestic build, an off-the-shelf purchase, or a hybrid model. Each carries pros and cons, with the hybrid model - involving offshore base vessel construction with domestic outfitting of electronics and major components - emerging as the most feasible option.

In conclusion, the report emphasizes the urgency for policy decisions considering the imminent end-of-life for the Victoria-Class submarines and the rapidly shifting international security environment. It calls for strong political leadership, proactive recruitment, retention, and training of skilled personnel, a reassessment of Canada's strategic ambitions, and an update to the national defence policy.

For future discourse, the report proposes several key questions. How do we articulate the importance of submarine capability to both the public and politicians? What strategies should we adopt to develop the technical capacity and personnel needed to support our future submarine fleet? And how can we depoliticize the procurement process to ensure smooth decision-making? Addressing these questions will provide a roadmap for a comprehensive, future-oriented approach to Canada's strategic submarine requirements and underline the critical need for timely action in this sphere.



Points of Consensus:

- The *Victoria*-class submarines are quickly approaching the end of their service lives. It is highly unlikely that Canada will continue to get 'real' value from this capability well into the 2030s.
- The minimum number of submarines required is 8, ideally 12. A fleet of eight submarines would allow for two to operate at sea concurrently, one on each coast (4:1 ratio).
- Under-ice warfare will be likely and should be factored into the design of Canada's future submarine.¹
- Canada does not possess a domestic submarine-building capability and lacks the time to develop one. Given the constraints of time, to ensure a capability gap does not manifest **we will have to buy offshore**.
- We are not there yet for autonomous underwater systems – crew-controlled submarines are here to stay for the time being.
- Loss of capability \neq loss of platform. Given the 4:1 ratio, Canada's capability gap will begin when the first *Victoria*-class submarine reaches the end of service life.
- Canada needs to depoliticize defence procurement.

Points of Contention:

- The recruitment and retention crisis in the Canadian Armed Forces (CAF) raises the question of whether the RCN would have the necessary personnel to operate a larger submarine fleet.
- Nuclear propulsion vs. diesel-electric. Despite agreement that diesel-electric would be the most likely option for Canada's future submarine due to time constraints, infrastructure, and lack of political will, the prospect of nuclear propulsion was raised as a solution to enhancing Canada's under-ice capabilities.
- There is a disconnect between balancing operational requirements and meeting the associated timelines. What should be prioritized in order to minimize the operational impact if the capability gap is unavoidable?
- The optimal build option for Canada. Although participants agreed that Canada lacks the necessary capacity to build submarines domestically, the option of a hybrid build was a source of tension due to not being an integrative process. A modular build could allow for greater integration while also reducing schedule risk.



The Case for Submarines

Value of Submarines for Canada

Submarines hold a unique position within the Canadian Armed Forces' inventory, serving as weapons of strategic deterrence that can profoundly impact an adversary's decision-making across maritime theatres of operations. As a nation bordered by three oceans—Atlantic, Pacific, and Arctic—Canada relies on these versatile vessels to protect its extensive coastline and uphold its strategic interests. Submarines provide a significant deterrent against both conventional and nuclear-armed opponents, reinforcing the nation's overall defence posture with their stealth, power, and unique capabilities. Moreover, it is the only platform in our system that is independent.

The inferred presence of a submarine can alter the way adversaries conduct their operations, as these assets are vital components of a combat fleet for command and control. In essence, merely suspecting that a submarine might be in the vicinity can force an enemy to adjust their tactics and exercise greater caution, providing Canada and its allies with a strategic advantage in naval operations. Submarines are Canada's only platform capable of providing strategic deterrence, making them indispensable in the current era of multi-polar strategic competition.

The proliferation of submarines is indeed staggering, with 41 countries now possessing submarine capabilities. Consequently, Canada must respond in tandem with its allies to maintain a modern fleet capable of addressing emerging threats. To remain a relevant ally, Canada must carry its weight by modernizing all



Her Majesty's Canadian Submarine WINDSOR follows formation along with the other international submarines during Exercise CUTLASS FURY on September 18, 2016. Photo: Corporal Kenneth Galbraith HS03-2016-0872-716

defence capabilities, including its submarine fleet. Current submarine designs are being tailored to address conventional attacks on North America, ensuring preparedness in an ever-evolving strategic landscape.

Submarines are widely considered the most lethal naval asset at sea, as demonstrated by the Argentine cruiser ARA *Belgrano*'s sinking by a Royal Navy submarine during the 1982 Falklands War, which subsequently led Argentina to withdraw its maritime forces from the conflict. A submarine's primary role is to detect, track, classify, and engage enemy vessels, further emphasizing their importance in maintaining a powerful and effective naval force. The best way to counter a submarine threat is by deploying another submarine, highlighting the significance of sustaining a robust and modern fleet.

As threats facing Canada and its allies continue to grow, adopting a proactive defence strategy is crucial rather than merely hoping for positive outcomes in global conflicts or areas of tension, such as those in Ukraine, Taiwan, North Korea, and Iran. Canada must proactively prepare to face these challenges by investing in a



capable submarine fleet. Doing so will enable the nation to confront emerging threats and maintain its position as a responsible and reliable ally in a complex and dynamic geopolitical landscape. This underscores the importance of acquiring and modernizing submarines to ensure that Canada remains capable of defending its national interests.

International Security Environment

The evolving and increasingly complex international security environment necessitates a thorough examination of the enduring risks and threats posed by great powers, particularly China and Russia. The Indo-Pacific region is characterized by its vast scale and complexity, with the Indian and Pacific Oceans inextricably linked through energy, economics, and military variables. In the case of Canada, the “colossal” distances involved in terms of deployment pose major logistical challenges, particularly for submarine operations. If Canada would be called upon to respond to hostilities on the Asian shores, we would be operating at a significant disadvantage.

In looking at the South China Sea, it is clear that China has taken a page out of the Russian playbook. Taiwan, the “jewel in the crown” of the first island chain, is critical to Chinese anti-access area denial (A2/AD) strategies² and the loss of it would be “catastrophic” for Western navies attempting to operate close to the Chinese coast. Furthermore, China's aggressive development of artificial “islands” in the South China Sea, which do not meet the United Nations Convention on the Law of the Sea (UNCLOS) criteria for legitimate territory, has exacerbated tensions in the



Her Majesty's Canadian Submarine WINDSOR participates in Exercise CUTLASS FURY on September 18, 2016. Photo: Cpl Chris Ringius, Formation Imaging Services Halifax HS01-2016-0876-118

region. Despite assurances to the contrary, China has been observed to be resolutely defending these artificial creations, which are essentially a series of lily pads that enable the movement of airpower across the South China Sea. From a naval perspective, although highly illegal, this is part of a larger strategy to keep adversaries at arm's length from the Chinese mainland. Furthermore, China is pursuing a complementary strategy of consolidating their control over coastal waters by wearing down their opponents through constant incursions into their maritime space.

The United States Navy (USN) has experienced a significant reduction in fleet size due to budgetary constraints over the past three decades. The phenomenon reflects a broader trend among the “old, classic great navies like the Royal Navy.” Concurrently, China has rapidly expanded its naval forces and is projected to reach a fleet of 400 ships before 2030. In 2019 alone, the People's Liberation Army Navy (PLAN) commissioned more warships during the first eight months than almost the entirety of the RCN's major surface fleet. In terms of capacity and ambition, China has become a juggernaut, but a lack of



warfighting experience raises the question of 'quality vs. quantity' when evaluating Chinese naval capabilities.

In addition to its expanding navy, China's coast guard contains warships whose size and function blur the line between military and civilian roles. The country also maintains a fishing boat maritime militia, which acts as an adjunct to the PLAN, further complicating the security landscape. These developments pose a significant challenge to the USN, which is grappling with determining the proper way forward. However, defence spending indicates they are preparing to fight, especially through developments in delivery systems (e.g., *Columbia*-class SSBNs, hypersonics, autonomous underwater vehicles, etc.) and cognizance of the hybrid environment. The US has also re-evaluated their strategic thinking since the Ukraine conflict, shifting towards a more active role in warfighting, as opposed to constabulary activities.

China's increasingly assertive posture and 'Wolf-Warrior' diplomacy have sparked a shift in global attitudes. Japan has emerged as a more assertive regional actor since the late Shinzo Abe's tenure, while South Korea and Japan are working towards reconciliation. Additionally, multilateral arrangements such as the Quadrilateral Security Dialogue (Quad) and the Australia-United Kingdom-United States (AUKUS) alliance further reflect the changing dynamics in the region. While Russia and

China see themselves as 'strategic partners', the marriage of convenience remains troubled by deep suspicion and difficult power dynamics between the two. As Russia becomes increasingly dependent on Chinese resources and economic support, China leverages this dependence to gain a stronger position in the Sino-Russian relationship. Eager to expand its economy, China is capitalizing on Russian energy and resources.

In the Indo-Pacific, submarines are the "coin of the realm" and a source of national pride for many, with over 200 currently operational. Similarly, when it comes to the Arctic, submarines have enormous potential, but they tend to be perceived as part of a longer-term play. The strategic environment is shaped by new geopolitical challenges, including Russia's renewed assertiveness and the rise of Chinese power. Although there is a tendency to focus on the Russian threat with China as an afterthought, what drives Arctic security is the US response. Understanding the intricate three-way dynamic at play is essential to effectively address the challenges and opportunities on the horizon.

Russia has consistently relied on its nuclear deterrence strategy as its ultimate defence. With the Arctic region opening up as a new ocean, Russia is determined to defend its interests, particularly given its dependence on Arctic oil and gas (20-25% of GDP). NATO, particularly Article 2 (the Canadian clause), is perceived as a significant threat to Russia's authoritarian and expansionist government. Russia has responded through hybrid tactics to create disunity amongst Arctic nations. Russia's isolationist approach aims to keep Arctic nations separated and maintain its sphere of influence. The resumption of Russian long-



His Majesty's Canadian Submarine Chicoutimi (SSK 877)

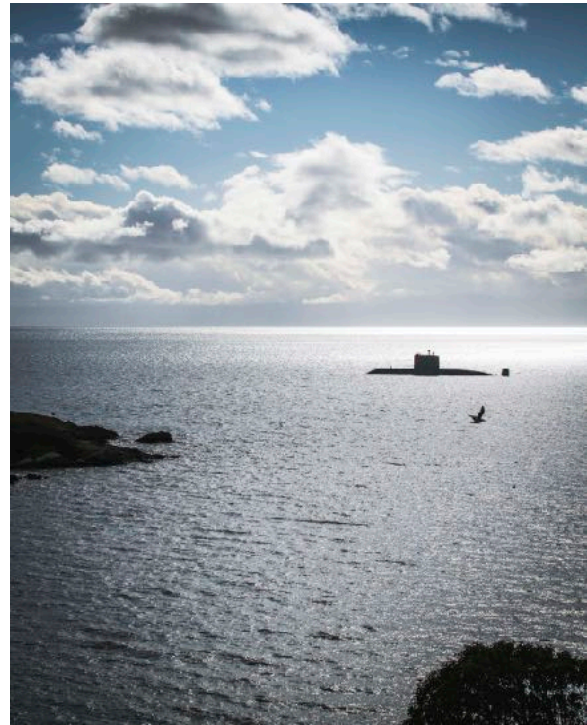


range bomber flights probing NORAD defences, increasing maritime capabilities, and strengthening of their nuclear deterrent bastion strategy through the construction of northern bases, demonstrates the nation's enduring commitment to asserting its presence in the region and developing the capabilities needed to strike North America.

The security environment in the Arctic is evolving with new geopolitical challenges and emerging weapons systems. A new era of naval warfare is developing, characterized by underwater unmanned vehicles that are revolutionizing the battlespace. Discourse is shifting from nuclear deterrence towards nuclear warfighting, something Canada must acknowledge, address, and be prepared for. With Finland's accession into the NATO alliance, and Sweden not far behind, the situation becomes increasingly tense. Canada and the United States must be ready for potential conflict in a remilitarized Arctic that holds significant importance for both Russia's national security and, their national identity.

Chinese geo-economic ambitions also play a crucial role in shaping the Arctic's security landscape. Although Beijing's long-term ambitions remain unclear, there are indications of its direction. As China develops its military capabilities, questions arise about its intentions to provide under-ice capabilities for its submarines, potentially centralizing the Arctic in nuclear discussions. The potential of China's Type-093 nuclear-powered submarines, combined with hypersonic technology, is "alarming", particularly given the PLAN interest in operating in the Bering Sea.

Audience questions explored the Canada-US security and economic relationship,



Her Majesty's Canadian Submarine VICTORIA sails in the vicinity of Esquimalt Harbour while wearing a poppy on its sail in Esquimalt, British Columbia on 5 November 2021. Please credit: S1 Kendrick Grasby, Canadian Armed Forces Photo

which is largely dependent on the US administration in power. Concerns were raised about the long-term implications of the mid-level politicization of the relationship during the Trump administration for Canada-US cooperation. Another question addressed the potential consequences of the US challenging Canada on its commitments, with advancements in technology potentially negating historical geographical advantages. To address these challenges, Canada must re-evaluate its military capabilities, logistical dependence on the United States, and approach to international cooperation. Following through on policy and investments in defence, in addition to greater collaboration with allies, will be critical in navigating the complex security environment presented by China and Russia.



Obstacles

Sustaining a submarine capability in Canada presents numerous obstacles, primarily due to the nation's historical and political context. Canada has not built a submarine domestically since 1915 and has instead relied on procuring them from other countries.³

The procurement of new submarines to replace Canada's aging Victoria-class fleet presents multiple challenges. Among the primary obstacles is the nation's shipbuilding program, which has faced difficulties in the past, impacting the discourse surrounding Canadian naval procurement. This has led to a lack of enthusiasm among the Canadian population to invest in submarine capabilities, further complicating the process.

Decisions must be made regarding whether to build submarines domestically, offshore, or pursue a hybrid model. Building a submarine domestically demands extensive expertise, which Canada currently lacks. Additionally, by 2024, 5% of all procurement must have Indigenous content. This requirement adds complexity during the procurement process, necessitating collaboration with Indigenous businesses and communities without delaying or hindering an already complex, time-consuming process.

Fleet size is another critical factor. Operating in Canada's three oceans requires a larger fleet than the current Victoria-class submarines provide. Determining the optimal fleet size is essential to ensure Canada's strategic objectives are met while balancing budgetary constraints. Personnel issues also pose a significant concern, as the

Canadian Armed Forces struggle to crew submarines and fill related positions. Developing targeted recruitment campaigns and improving retention efforts will be necessary to ensure a sufficient cadre of submariners.

The substantial infrastructure requirements of submarines entail high costs that must be considered when planning the acquisition of new submarines. These costs include not only the submarines themselves, but also the necessary support infrastructure, such as ports, maintenance facilities, and training centres. A comprehensive assessment of these costs and their long-term implications is essential for effective budgetary planning.

Canada's limited domestic expertise in submarine construction raises questions about the nation's ability to build submarines. Engaging industry, academia, and former military and government members in the development of a new submarine capability is essential to meet the 15-year timeframe before the Victoria-class submarines are decommissioned. Maintaining strong relationships with international partners who possess submarine-building expertise can also facilitate the development of Canada's domestic capabilities.

The political aspect of submarine procurement cannot be ignored. Public perception of the value of submarines varies across Canada, leading to a highly politicized process. Overcoming this obstacle requires clear communication of the strategic importance of submarines and their role in defending Canada and protecting our interests at home and abroad.



HMCS Windsor returns home to Canadian Forces Base Halifax on December 17, 2015 after taking part in JOINT WARRIOR and TRIDENT JUNCTURE, coordinated exercises with NATO allies to enhance combat readiness. Photo: Leading Seaman Dan Bard, Formation Imaging Services Halifax HS2015-1121-001

However, the development of Canada's submarine capability, a long-standing objective of the RCN, has historically been omitted from the broader national strategic dialogue.⁴ Even when submarines came under national consideration during the 1987 attempt to purchase SSNs, the proposal was framed in terms of affordability, reflecting a lack of commitment to this strategic capability. The acquisition of the *Victoria*-class highlights this lack of strategic focus; absent the British "fire sale" of their last SSK class, Canada's submarine capability may have expired entirely. Driven by affordability, insufficient funds were allocated to maintaining the operational performance of these vessels, resulting in extended delays in achieving the policy

objectives (i.e., keeping at least one submarine operational on each coast) and significant personnel crises within the submarine service.

The adverse consequences of such underinvestment underscore the pressing need for a comprehensive, strategically oriented, and properly funded approach to Canada's submarine capability, integrating this vital aspect into the broader tapestry of our national defence policy. Given the haste with which the *Victoria*-class submarines must be replaced, it is necessary that Canada's submarine capability is integrated into the strategic discourse. Continuing to react to circumstances rather than proactively planning is certain to result in



further delays – as whatever political momentum to replace the capability as may currently exist could easily evaporate under different fiscal conditions in the near future.

In order to expedite the procurement process, dialogue and cooperation between the Navy, academia, and industry is necessary. Encouraging this cooperation will be critical in overcoming the challenges faced during the procurement process and ensuring the successful acquisition and operation of Canada's new submarines.

Strategic Requirements

Canada's current submarine fleet was established with a focus on extending the nation's capabilities rather than addressing specific operational and strategic requirements. As global conditions change, it is crucial that Canada's Armed Forces (CAF) adapt their submarine capabilities accordingly. The strategic requirements for Canada's future submarines must consider several system-level variables, including technical, engineering, and personnel aspects, as well as the number of vessels, design choices, and crew requirements.

From a technical perspective, nuclear submarines would be a valuable addition to the fleet, but their acquisition would necessitate significant political leadership and enduring multi-party support. It is desirable that future submarines be adaptable, capable of supporting land and maritime operations, and possess the ability to operate under Arctic ice.⁵ Canada's identity as an Arctic nation demands under-ice capabilities, with a minimum of eight submarines needed, and ideally twelve.

In order to achieve these goals, submarines must combine stealth, persistence, and lethality. Stealth is crucial for survivability, which involves not only being quiet but also maintaining a minimal radar cross-section⁶ of periscopes and other masts, and sufficient power generation and storage systems, to minimize the time required to run generators at periscope depth and hence, increase the risk of counter-detection. The maintenance of stealth throughout the vessel's lifecycle requires rigid adherence to planned maintenance and a team of well-trained, well-supported shore-based technicians. Additionally, the design of future submarines should minimize crew size without compromising mission effectiveness or crew safety. The ability to launch, recover, and control autonomous vehicles should also be a consideration.

Canadian submarines must be able to traverse vast distances, regardless of whether they begin on the east or west coast. They will need to carry the fuel, rations, spare parts, and technical competencies needed for extended, unsupported missions whether in Canada's own vast ocean estate or around the globe. For the Canadian submarine and submariner, everywhere is far, our submarines must be able to get there and conduct sustained operations.

Submarine lethality changes the way adversaries operate, holding a nation's critical seafaring capabilities at risk, especially in an era of "come as you are warfare." Cruise missile capability adds a new element to submarine lethality. Even the humble diesel submarine can now hold military, economic, industrial, transportation, and other targets at risk during times of crisis and conflict. However, any



requirement that adds this capability to a future Canadian submarine will most certainly necessitate a complex budget, schedule, and capability trade-off analysis which inevitably consumes limited schedule slack.

Canada's requirements for globally capable submarines are shared by its allies, but differing national perceptions of capability may differ. Under-ice warfare is expected to play a significant role in future conflict, especially as the Arctic becomes an increasingly noisy environment for submarine operations.⁷ China's interest in mapping potential bastions in the Arctic highlights the need for Canada to strengthen its under-ice capabilities.

In addition to under-ice warfare, future Canadian submarines must be prepared for various operational scenarios. Submarines should have a combat system that supports modern weapons and ensures interoperability within the Five Eyes community. Furthermore, the submarines should ideally have enhanced operational availability compared to the existing capability.

Submarine design represents an optimization problem, with trade-offs impacting size, supporting infrastructure, and cost. Longer ranges of operation require more fuel which leads to a larger submarine. A larger submarine requires larger infrastructure (docking facilities, jetties), greater power generation and distribution capacity and is more expensive. Of course, people will always be central to submarine operations for the foreseeable future; habitability and comfort for the crew will be essential to attract and deploy sailors in the challenging environment of a submarine.

The strategic requirements for Canada's future submarines highlight the importance of cooperation and coordination with international partners. Engaging with submarine designers, builders, and combat systems integrators will contribute to the development of a large displacement diesel-electric powered submarine that meets Canada's specific operational and strategic requirements.

By addressing these strategic requirements, Canada can develop a submarine fleet that effectively protects its interests and



His Majesty's Canadian Submarine Victoria (SSK 876)

contributes to global security. Building a fleet with enhanced capabilities, adaptability, and interoperability will ensure that Canada remains prepared for the challenges of the evolving global landscape.

Design Considerations

Policy and budget limitations, rather than naval strategy, have driven Canada's approach to submarine procurement. For example, the *Victoria*-class acquisition was based on a desire for capability extension rather than specific operational and strategic requirements. Although described as "the deal of the century," Canada's struggle to maintain the four ex-*Upholder* submarines has demonstrated the risks of inheriting an 'orphan' class – particularly one that was never designed for Canadian operations. Canada's future submarine fleet must be designed to accommodate the RCN's strategic requirements, as well as infrastructure.

Several technical requirements have been identified for the next class of submarines, including the need for ocean-going vessels with significant endurance (at least 3,500 tonnes⁸), the ability to surface through the ice, a modern combat system that is interoperable with the United States Navy, the capacity to launch autonomous vehicles,

and a minimum of eight vessels.⁹ The new platform will likely be diesel-electric, due to significant time constraints and lack of political will to pursue nuclear capability.

The target delivery date for the new submarines is 2034, but it is acknowledged that projects rarely advance ahead of schedule. To support the vessel for 40 years, domestic sustainment capacity is required, with the ability to complete some in-country outfitting, although not full construction. In light of the strategic requirements and the various challenges, Canada faces three main options for procuring new submarines: domestic build, off-the-shelf, or hybrid build.

1. Domestic build: This option would involve constructing the entire platform in Canada. However, it is not feasible due to the lack of capacity and the necessary infrastructure to support submarine production.
2. Off-the-shelf: This approach entails purchasing an entire submarine produced offshore. While this option would likely be faster, it is unlikely to gain public approval, as it would not create jobs for Canadians. Moreover, Canada has not had a foreign program management office since the 1980s, adding another layer of complexity to this option.
3. Hybrid build: This option involves constructing the base vessel offshore while outfitting the electronics and other major components domestically. This approach appears to be the most viable, as it addresses various conditions, such as providing domestic job opportunities, minimizing costs compared to a domestic build, and ensuring a common combat management system.



A review of the current players in ocean-faring submarine production reveals a limited number of options, including the Japanese Taigei, Korean KSS III, Swedish Blekinge, German Type 216, French ShortFin Barracuda, and Spanish Isaac Peral S-80. The Japanese offering has the fastest build time (48 months), followed by Korea, Italy, Germany, Sweden, France, and Spain.

Time is the ultimate challenge. The optimal Canadian design may not exist yet, but avoiding the looming capability gap is the most important variable as “perfection is the enemy of good enough”. Therefore, modifications to existing conventional submarine platforms should be considered. The question of who can build an ocean-going conventional submarine with a compressed timeline remains, and a competition to determine procurement partners will likely be necessary. Given the strategic requirements and various challenges, the hybrid build option, with the base vessel constructed offshore and electronics and major components outfitted domestically, appears to be the most viable solution for Canada.

Conclusion

As the *Victoria*-Class submarines approach the 40-year mark, concerns about the capability of the fleet are growing. While there is a policy framework in place for continental defence renewal, it does not explicitly reference the maritime domain, including the submarine fleet. Moreover, Canada's current defence policy, *Strong, Secure, Engaged*, only indicates the modernization of the aging capability rather than its replacement. This may change with

the upcoming Defence Policy Update, announced in the 2022 Federal Budget, but there cannot be any guarantee without strong, political leadership. The lack of public support, CAF personnel shortages, and an increasingly volatile strategic environment also add to the complexity of the situation.

The current shipbuilding program has faced various challenges, prompting discussions on alternative approaches such as modular and integrative processes. A key advantage of investing in submarines is the real offset benefits provided by long-term maintenance contracts in Canadian shipyards. By adopting more holistic procurement approaches, we can maximize job opportunities and value for Canada's economy, even if the majority of the project is constructed abroad.

Personnel shortages and technical capacity limitations are critical issues that need to be addressed to ensure the operational readiness of our future submarine fleet. As the capability gap becomes unavoidable, Canada must focus on the recruitment, retention, and training of sailors with detailed technical skills and generic submarine skills. This includes the development of Commanding Officers, as gaps in experience and skillsets become more apparent. However, the current fleet of four submarines provides very limited opportunity for personnel to gain the necessary experience (4:1 ratio), highlighting that the loss of capability precedes the loss of the platform. To minimize the operational impact, we must explore various solution spaces and find efficiencies in training and development.

The issue of managing this capability gap and the lack of foresight in anticipating it



raises several political concerns. The Canadian public's awareness and prioritization of submarine procurement have been diminished due to various factors, including climate change and economic pressures. To address this, we must advocate for the importance of this capability by engaging the public and politicians in meaningful discussions and exploring ways to shift their interests and perceptions.

Canada's grand strategy on the international stage is rooted in an older era's myth and an unwillingness to invest resources in military options. With only one submarine working at any given time and three coastlines to protect, it is crucial to determine the optimal number of submarines and their specific maintenance and crew requirements. This involves reassessing Canada's strategic ambitions and balancing them with realistic resource allocation.

For future discussion, the following questions were identified by those in attendance:

1. How can Canada better articulate and advocate for the importance of submarine capability to both the public and politicians?
2. What strategies should be adopted to develop the technical capacity and personnel required to support the future submarine fleet?
3. How can the procurement process be depoliticized to ensure consistency across governments and streamline decision-making?



¹ This was predicated on non-nuclear-powered submarines and therefore infers ice-capability at the ice edge, not deep under the arctic ice.

² Submarines and naval mines remain the most effective platform of access denial.

³ The British H-class submarine was built by a Canadian Vickers Ltd in Montreal in 1915, but were never operated by Canada. Canada has never built submarines for its own use.

⁴ While significant operational transformations have occurred, such as the SOUP upgrade to the Oberon-class (equipping Mk 48 torpedo), these were largely limited to internal RCN discussion and never featured in the then-existing defence white paper

⁵ Not deep under the ice-pack, but more than simply ice-edge operations submerged.

⁶ This is less of an issue when submerged as radar does not work underwater.

⁷ Increased traffic and ice floe movement contribute to the noise.

⁸ This is not a calculated figure, rather it is an assumption based on the fact that the Australian Collins-class submarines (3400 tons dived displacement) have insufficient range/endurance to support long distant transit and patrols of a similar requirement to Canada.

⁹ Submarine fleets have a 4:1 ratio. Four submarines will get you: 1 out on operations; 1 ready; 1 alongside for regenerations; 1 in deep maintenance.

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