CANADIAN NAVAL REVIEW

Defence Policy Review Special Issue

VOLUME 12, NUMBER 1 (2016)

Strategic Considerations for Canada's Navy

What Sort of Future RCN?

The New Defence Policy Needs to Focus on Procurement, Not Prose

Why a Defence Review is Necessary and Why It will be Easy to Get it Wrong in the Arctic

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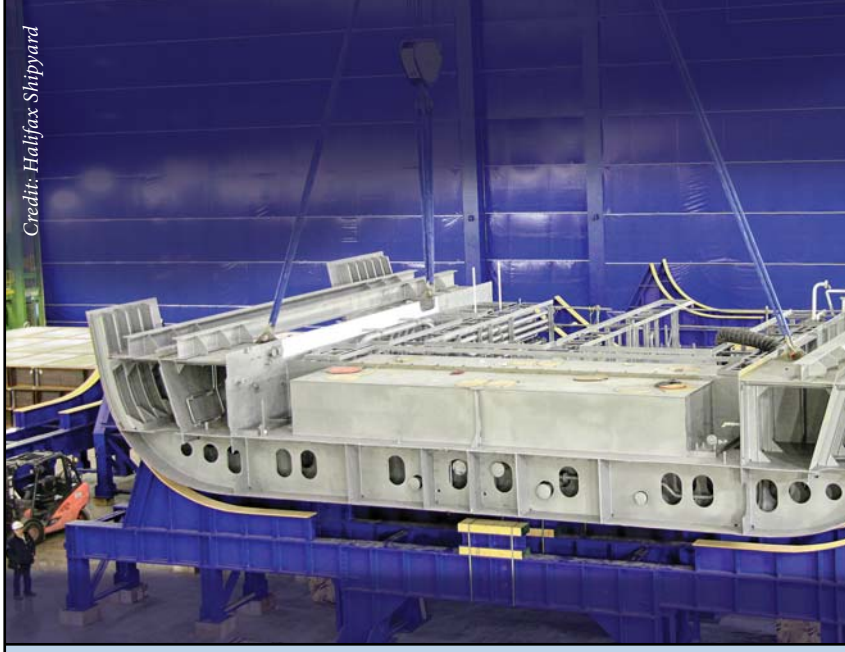

A section of the keel of an Arctic Offshore Patrol Ship. The unit is being moved into the Ultra Hall and placed in the cradle at the Irving Halifax Shipyard.

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Editorial

The Defence Review and Immutable Realities

This Special Edition of *Canadian Naval Review* focuses on the federal government's Defence Review and the naval considerations thereof. The articles in this issue add to the public discourse about the need, benefits and nature of a capable and effective navy. The Naval Association of Canada and the Centre for Foreign Policy Studies welcome all views and opinions on this important matter. This Editorial provides a few introductory thoughts to frame the conversation.

Since the end of the Second World War, Canadian governments have produced at least seven defence policy documents. Ideally, a defence policy should provide, *inter alia*: (1) an assessment of the international security environment; (2) an indication of the role Canada wishes to play in the world, as affirmed by existing foreign policy; (3) a broad articulation of the country's defence objectives; (4) an indication of the long-term resource envelope within which the Department of Defence is to manoeuvre; (5) direction on the type and the extent of missions to be performed by the military; and (6) an indication of the types, qualities and quantities of military capabilities to be acquired and maintained.

Previous policies have generally espoused three recurring objectives, with slight nuances in language and priority. The recurring objectives are to defend Canada, defend North America and contribute to international peace and security. Most previous policies have generally avoided the temptation to weight or prioritize these objectives. Not weighting or prioritizing the objectives, which flows from the fact that it is extremely difficult to predict the future, allows for policy flexibility.

The principal purpose of military forces is to defend a state and its people against external military aggression. Well trained and equipped military forces which can satisfy this over-arching goal are also well positioned to perform less exacting tasks such as sovereignty patrols, humanitarian assistance and peacekeeping. When not engaged in existential missions, military forces can and should be used in pursuit of peace and security interests abroad. Naval forces have been particularly adept at rapidly redeploying to mount UN peace support operations (East Timor), enforcing UN sanctions and peace agreements (Bosnia and Central America), or escorting UN World Food Program convoys (off the coast of Somalia).

International policy practitioners understand the importance of ensuring defence policy is aligned with foreign policy. Appropriately, the mandate letters to the Ministers of Defence and Foreign Affairs included the instructions to "ensure a close link between defence policy, foreign policy and national security." In addition to the need for alignment with foreign policy, a state's defence policy should be based on a rational assessment of the threat of military aggression, at home and abroad, both present and future. The most important threat to assess is the future one; unfortunately, it is also the most difficult to predict.

Credit: Sean Kilpatrick/Canadian Press

Canada's Minister of National Defence, Harjit Sajjan, announces the creation of a Blue Ribbon Panel to review defence policy.

The government of Canada has not been in the habit of publishing official, whole-of-government assessments of present and future threats. It tends to leave this task to the defence planners who depend on such assessments as a primary input for policy and equipment recommendations. An unclear or debatable assessment of the future threats makes it difficult to garner whole-of-government and pan-party support for difficult military equipment choices.

The new government will eventually need to espouse, publically or privately, its own assessment of future threats, and weave the implications thereof into both defence and foreign policy. The world has experienced several significant and negative security environment changes since the publication of the Canada First Defence Strategy in 2008. The government's foreign policy stand needs to be reviewed. For example, what are its positions on: Russia's recent extra-territorial activities? Russia's future intentions? China's recent activities in the South China Sea? North Korea's long-range missile and nuclear weapons ambitions? Can we exclude the possibility that the Canadian Armed Forces might one day be directed to respond to any of these, or other, issues?

Credit: LS Peter Frew, Formation Imaging Services Halifax

*(from left to right) HMCS **Athabaskan**, USS **The Sullivans**, HMCS **Montreal** and US naval supply ship **William McLean** sail in formation in the Atlantic Ocean on 22 September 2015 during TGEX 6-15.*

Optimum military forces, which take years and in some instances decades to design and procure, can only be properly identified if the future threat has been correctly predicted. Herein lies the biggest challenge confronting political leaders and defence planners. Given the difficulty of correctly predicting the future, acquiring balanced, general-purpose military capabilities, on land, in the air, and on and below the seas, seems prudent.

And prudence raises questions of cost. How much should a country spend on its defence? How much is enough? The provision of defence services, as with the provision of any other service, must be economical and provide reasonable bang per taxpayer dollar.

The largest single cost in defence is personnel. The next large costs are related to equipment and real property/infrastructure. To ensure responsible stewardship of taxpayer dollars, it is important to make the right personnel, equipment and real property choices. The key to proper management of defence-related activities, especially time-consuming and expensive equipment procurement, is the provision of stable direction and funding over time.

Regrettably, the only sure way to determine whether or not enough is being spent on defence is when the country's defence is actually put to the test. Spending on defence is like buying insurance: (1) you have to pay for it upfront; (2) you don't know when you will ever need to use its full capacity; and (3) you can't readily acquire more when a crisis suddenly emerges.

At roughly $19 billion, the defence budget represented a little over 1% of Canada's Gross Domestic Product (GDP) in 2014. The new government has indicated that it "will maintain current National Defence spending levels, including current planned increases."[1] As the government faces difficult financial choices, care will have to be taken not to predicate important, long-term defence policy and equipment decisions on current or short-term economic circumstances.

When making such decisions, it is important to remember that oceans and navies have played key roles in the prosperity and security of most, if not all, states, especially littoral ones. Looking forward, the oceans will likely continue to play an important role in Canada's prosperity and security. Because it has always been difficult to predict future threats, Canada will continue to need a capable, effective, balanced and multi-purpose navy. A capable and effective navy cannot be easily and quickly created when a need arises. For it to be of use when needed, it must exist before difficult situations manifest themselves.

Fortunately, the government clearly understands the importance of the Royal Canadian Navy (and the Canadian Coast Guard) and the urgent need for fleet recapitalization. The Liberal election platform made welcome and reassuring commitments about the navy; in particular, it committed to maintaining a blue-water naval fleet.

So far, the government is being true to its words. When she announced additional funds for shipbuilding activities related to the National Shipbuilding Procurement Strategy (NSPS) in Vancouver on 14 March 2016, Public Services and Procurement Minister Judy Foote re-affirmed "the government's long-term commitment to rejuvenate Canada's marine industry and [to] provide the navy and the coast guard with the ships needed to do their jobs."[2]

The method by which the government intends to conduct its Defence Policy Review is not yet clear. Undoubtedly things will happen quickly once a method is determined. The Naval Association of Canada and *CNR* stand ready to contribute to the anticipated public consultation, and to support the government's clear recognition of the need for a capable and effective navy going forward.

Daniel Sing
Naval Association of Canada

Notes

1. Liberal Party of Canada, Election Platform, "Investing in Our Military," 2015.
2. As quoted in "Canadian Government Adds $65 Million to Seaspan Shipbuilding Contracts," *The Vancouver Sun*, 14 March 2016.

Strategic Considerations for Canada's Navy

Dr. Elinor Sloan

Delays in military procurement over the past decade or more mean that, today, the Royal Canadian Navy (RCN) is less militarily capable than at any point since the end of the Cold War. The *Halifax*-class modernization project to upgrade Canada's 12 frigates is on schedule to be complete around 2018, but Canada is without the supply ships it needs to conduct operations as an independent task group and the command and control destroyers that are necessary for area-air defence. In both cases old vessels had to be decommissioned before ships to replace them could be built, and in both cases interim but not ideal solutions have been found. Yet there is a silver lining: the contemporary imperative to rebuild the RCN, recognized by Canada's new government, offers real opportunity to recapitalize the navy in a manner that meets a rapidly changing strategic environment.

Credit: Anton Chmelev/Wkimedia Commons

The Russian nuclear-powered icebreaker ***50 Let Pobedy (50 Years Since Victory)****, 7 October 2006. This is the world's largest nuclear-powered icebreaker.*

This article outlines some strategic considerations for Canada's navy as it recapitalizes, and points to capabilities that naturally arise in light of these factors. The list, which is not exhaustive due to space, includes: the return of great power competition and the intersection of interests in the Arctic; the development of adversary anti-access/area-denial capabilities in the maritime environment; American emphasis on working with allied navies to tackle maritime threats and secure the sea lines of communication; and a seemingly escalating number of humanitarian disasters in littoral regions. Ice-capable vessels, amphibious ships, anti-ship missiles and defences, and submarines – especially air-independent propulsion submarines – are just some of the more obvious naval capabilities that are raised in light of the emerging strategic environment.

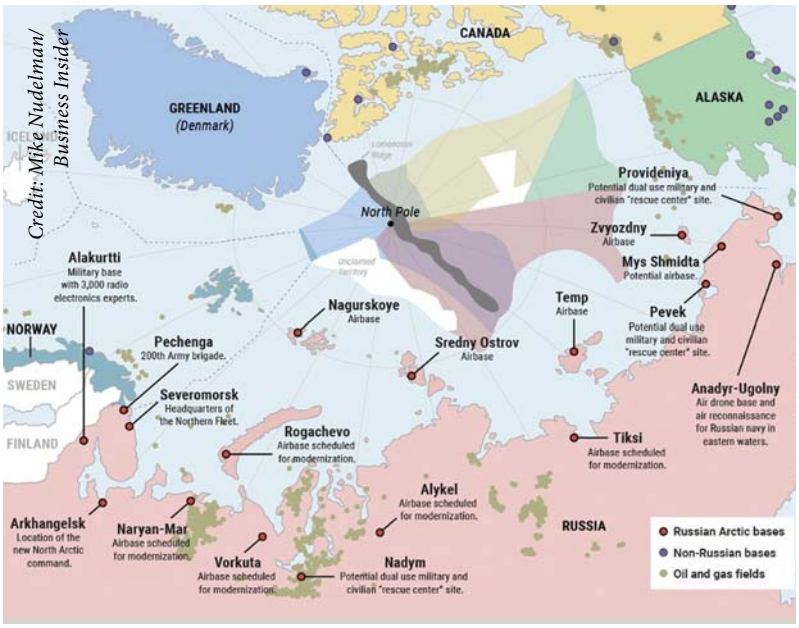
Return of Great Power Competition

Russia

Against the ongoing requirement to address terrorism, non-state actors, civil war and refugees, it can be easy to forget that those actors who most directly affect the lives of the vast majority of mankind are the great powers – and that in the contemporary security environment at least one if not two of those powers is not happy with the status quo. "The existing international security architecture (system) does not ensure equal security for all states," Russia stated in its *Military Doctrine of the Russian Federation* released at the end of 2014, a clear expression of revisionist sentiment. The country's national security strategy of December 2015 also seems to indicate that Russia is not satisfied with its current status in the world.[1]

Russia's percolating revisionism is manifest in its naval policies. The main external military threat it faces, Russia argues, is NATO and its expansion eastward. This involves both NATO's admission of new members from 1999 onward, and its more recent decision (in response to Russia's action in Crimea) to move some of the alliance's infrastructure eastward. The *Maritime Doctrine of the Russian Federation*, released in the summer of 2015, deems this expansion as "unacceptable" and states that Russia will counter by building up its navy in two geostrategic regions: the Arctic and the Atlantic.[2]

Militarization of the Arctic is becoming a prominent part of Russia's security policy. It is constructing several new bases and reopening six bases from the Cold War era to form a network of naval bases to house warships and submarines. Construction is underway for new nuclear-powered ballistic missile submarines and new nuclear attack submarines. Russia has over a dozen heavy icebreakers, seven of them nuclear-powered, and is building a new class of nuclear icebreakers. It also has plans to station a military unit permanently in the Arctic by 2018, and is making operational over a dozen Arctic airfields. As well, it is deploying both long-range interceptors and strategic bombers to the region, and has created a new Arctic Joint Strategic Command which became



Russia's militarization of the Arctic.

operational in 2014. Russia's activity in the north is part of its overall anti-NATO stance, but more importantly it is driven by a desire to control the Northern Sea Route as shipping increases in the wake of climate change and melting ice. By 2030 the route is expected to have nine weeks of open water as compared to two weeks in 2012.[3]

In the south, Russia is constructing a second naval base on the Black Sea shore, as well as adding 28 surface ships, several aircraft and helicopters, and six new *Kilo*-class diesel-electric submarines by 2020, all as a means of developing a "deterrent to the aggressive aspirations of our trans-Atlantic partners and their allies."[4] Russia's firing of two dozen cruise missiles into Syria in 2015 from warships in the Caspian Sea demonstrated that NATO planners must now contend with a Russia that can hit much of Europe with cruise missiles launched from Russian waters. Russia also fired cruise missiles from a submarine in the Mediterranean.

China

Less rhetorically revisionist than Russia, China's subtle policy shifts and concrete actions reveal a country that is also unhappy with the existing international order. *China's Military Strategy*, released in 2015, speaks of a generally favourable external environment that is nonetheless marked by "hegemonism" and "power politics" and an "intensify[ing] international competition for the redistribution of power."[5] The strategy states explicitly for the first time that China will move beyond a longstanding policy of "offshore waters defense" – essentially sea control in China's littoral regions and around Taiwan – to a new approach that combines this ongoing emphasis with "open seas protection." The reference is to blue-water operations to secure China's political and economic interests, including maintaining open the sea lines of communication through the Straits of Malacca and the Indian Ocean, and securing its claim to much of the South China Sea.

China's ambitious naval modernization program involves new ships, amphibious vessels, submarines, patrol aircraft and an aircraft carrier. Like Russia, China is placing a high priority on its submarine force, including nuclear ballistic missile submarines, nuclear attack submarines, and air-independent propulsion diesel-electric submarines.[6] It is expected that a rising power like China would develop a commensurate military capability. The main concern is not with China's military build-up *per se* but with the country's actions that fall outside international norms, such as the maritime coercion of smaller countries in the region, building artificial islands in the South China Sea and militarizing them, and unilaterally declaring an Air Defence Identification Zone over the East China Sea, among other things.

Less discussed is China's growing interest in the Arctic. China has not released an official Arctic policy and the Arctic does not appear in China's 2015 military strategy, nor in its 2013 Defence White Paper. But in 2010 a Chinese Admiral stated that "the North Pole and the surrounding area are the commonwealth of the world's people and do not belong to any one country."[7] Since that time, Chinese scholars have highlighted the importance of the Arctic for reasons of resources, shipping routes and strategic location.[8] Officials have stated that China's polar policy is to increase its status and influence to protect its "polar rights,"[9] and that its policy in the Arctic is related to becoming a maritime power. Lying 1,000 miles from the Arctic Circle, China refers to itself as a "near-Arctic state" and an "Arctic stakeholder."[10]

China's interest in the Arctic is apparent in its actions. The country owns the world's largest non-nuclear icebreaker, *Xuelong*, which has traversed the Arctic conducting research since the late 1990s. In early 2016 it commissioned a second icebreaker that, while smaller than *Xuelong*, has a much stronger icebreaking capacity. The vessel has been assigned to the People's Liberation Army Navy (PLAN) Northern Fleet and is billed as the first in a series of new icebreakers.[11] China is also building ice-strengthened bulk carriers and tankers capable of commercial Arctic navigation, and in 2015 a flotilla of five Chinese warships sailed through the Bering Strait. In terms of permanent infrastructure, in 2003 China opened an Arctic research centre on Norway's Svalbard Islands, and earlier this decade China sought – unsuccessfully – to establish an Arctic shipping hub in Iceland.[12] For some years China sought permanent observer status in the Arctic Council and this was granted in 2013.

Less reported is the emerging great power dynamic between Russia and China in the Arctic. China has been wary of Russian actions in the Arctic since the summer

Credit: antarctica.gov.au

*The Chinese icebreaker **Xuelong (Snow Dragon)** with a 119-member team aboard became the first Chinese polar expedition to sail along the Northern Sea Route into the Barents Sea and upon return sail a straight line from Iceland to the Bering Strait via the North Pole.*

of 2007 when Russia restarted bomber patrols over the region and sent a submarine to the North Pole's ocean floor. China's decision to build a second icebreaker, the funding for which was allocated in 2009, may have been prompted in part by these Russian actions. From the Russian perspective, China's statement in 2010 that no state had sovereignty over the Arctic directly challenged Russia's vital interests. "Russia will increase naval patrols in the Arctic Ocean to defend its interests against nations such as China seeking a share of the area's mineral wealth," a Russian Admiral was quoted as stating in 2010.[13] Russia was suspicious of letting China into the Arctic Council and, notwithstanding its anti-Western rhetoric, much of Russia's military construction in the north appears designed to counter what Russia perceives as a growing Chinese threat.

Anti-access/Area-denial Strategies

For the past decade there has been growing concern with so-called anti-access and area-denial (A2/AD) technologies and approaches to war in the maritime environment. A new term for an old way of war, A2/AD refers to measures to prevent forces from achieving access to an area of operations or, should they gain access, preventing them from operating freely in that area. In the period of the 1990s and early 2000s the United States enjoyed the freedom to operate on the sea and in the air without being threatened. But in the mid- to late 2000s, even as the United States maintained its air superiority, its uncontested access to the world's blue-water and littoral regions started to change. China embarked on a build-up of naval forces optimized to prevent the US Navy from entering waters around Taiwan and even from deploying in the western Pacific in the event of a crisis. Key A2/AD (a term that is not used by China) systems developed or deployed by the PLAN over the past decade include: long-range, precision, anti-ship ballistic missiles; anti-ship and land-attack cruise missiles; nuclear submarines; modern surface ships; and an aircraft carrier.[14] The Air Defence Identification Zone announced in 2013 is also thought to be part of China's A2/AD strategy.

A2/AD is not a generalized approach but rather a strategy that is being implemented by specific countries in specific regions – what NATO's Supreme Allied Commander Europe, General Phillip Breedlove, has characterized as "A2/AD bubbles."[15] Apart from China, the other notable bubbles are Russia in the North Atlantic, Baltic Sea, Black Sea and potentially the eastern Mediterranean,[16] and Iran in the Strait of Hormuz. During the Cold War the line that can be drawn from Greenland to Iceland to the UK was known as the GIUK Gap, across which the US Navy would have to travel to reinforce its European allies. Russia's focus on revamping its naval forces in general and its submarine force in particular, and on deploying such capabilities to Murmansk to conduct operations in the Norwegian Sea, could threaten North American access to Europe. Similarly, Russia's growing naval force based in Kaliningrad may threaten NATO access to the Baltics. The fear is that the small land bridge between Poland and the Baltic states which connects the Baltics to 'mainland' NATO could be blocked by Kaliningrad-based missiles, making it necessary for NATO to support these allies through an access-denied Baltic Sea. Meanwhile, in the south, Russia's occupation of Crimea has given it a forward base to develop an A2/AD capability in the Black Sea, notably anti-ship cruise missiles. Russia's deployment of land-based air defence systems in Syria that are clearly not aimed at ISIS (which has no air force) and can reach far out over the eastern Mediterranean may also be part of an A2/AD strategy in the region.[17]

Iran is also pursuing A2/AD capabilities, primarily by developing anti-ship ballistic missiles that are more accurate than its current missiles. If successful, Iran could target US aircraft carriers in the Persian Gulf, thereby denying access to the Gulf and controlling the flow of oil. Other Iranian A2/AD approaches include unconventional warfare and terrorism by proxy, maritime

exclusion systems such as mines and fast-attack craft, and air defences.[18] In an A2/AD twist, China is reportedly contributing to the Iranian A2/AD effort, supplying or assisting in the indigenous development of anti-ship cruises missiles, as well as surface-to-air and surface-to-surface missiles.[19] China has also sold Iran naval mines and fast-attack craft.[20]

The US Response

The US Navy's (USN) most recent naval strategy document, *A Cooperative Strategy for 21st Century Seapower* (2015) underscores American concern with A2/AD strategies. Jointly prepared by the US Navy, Marine Corps and Coast Guard, the document points to a proliferation of technologies that is allowing potential adversaries to threaten naval and air forces at a greater range.[21] This is complicating US access to maritime regions and inhibiting the military's ability to manoeuvre within those regions, including the littoral regions. The strategy identifies "the ability to project forces into contested areas with sufficient freedom to operate effectively" as critical in light of the ongoing development and fielding of A2/AD capabilities.[22] *A Cooperative Strategy* highlights five essential functions of the USN, at least two of which – all domain access and sea control – pertain directly to addressing the A2/AD challenge. 'All domain access' involves strengths in areas like cyberspace operations and electromagnetic warfare, while 'sea control' involves surface, undersea and mine warfare, as well as air and missile defence.

The other essential functions listed in *A Cooperative Strategy* are deterrence, power projection and maritime security. The latter two are inextricably linked to a key theme that runs through the document: the need for naval forces to address instability brought on by a lack of governance in the littoral regions which comprise both the coastal areas where the vast majority of mankind lives, and the waterways close to the coasts. Maritime security involves all naval actions to guard against piracy, terrorism, weapons proliferation and transnational crime to ensure the sea lines of communication remain unencumbered. Naval power projection includes, among other things, strikes against targets ashore (such as, for example, against ISIS), sea-based fire support to land forces, sea basing of logistics support, and ship-to-shore amphibious operations. Amphibious operations and sea basing are also critical for humanitarian assistance and disaster response.

Capability Requirements

This brief survey of elements of the emerging international security environment points to a number of key capabilities for the navies of Canada and its allies. In the first instance it is clear that the Arctic will be a focal point of the future and in this regard Canada's decision to build Arctic Offshore Patrol Ships and a polar-class icebreaker is a good one. The US Coast Guard has accelerated the timeline for acquiring a new polar-class icebreaker. For its part, the USN has no plans to build ice-capable surface vessels, but will focus instead on air and undersea assets, notably its nuclear-propelled submarines.[23]

Second, anti-submarine warfare has returned as a critical task for Western navies and with it an emphasis on submarines and long-range patrol aircraft. During the Cold War, NATO focused on conventional and nuclear submarines and anti-submarine warfare using long-range patrol aircraft, like Canada's Aurora CP-140s, to maintain open the GIUK Gap. Britain recently announced it would

Credit: PLAN Photo via Global Military Review

*A **Houbei**-class Type 022 Fast-Attack Missile Craft of the People's Liberation Army Navy (PLAN) test fires C-803 anti-ship missiles.*

Credit: U.S. Navy Mass Communication Specialist 2nd Class Corey T. Jones

*Aircraft carrier USS **Theodore Roosevelt** (CVN 71) sails through the South China Sea on patrol in the 7th Fleet area of operation on a declared mission of support of security and stability in the Indo-Asia-Pacific region, 5 November 2015.*

rebuild its maritime patrol aircraft fleet, which it had retired for budgetary reasons in 2010. Its strategy document calls for nine new Boeing P-8 maritime patrol aircraft which, combined with destroyers, frigates and submarines will create "one of the most capable anti-submarine fleets in the world."[24] Norway is looking at maritime patrol aircraft options, and a new class of submarines is in the definition phase.[25] In its 2016 Defence White Paper Australia focuses explicitly on strengthening maritime and anti-submarine warfare capabilities. Australia has begun the acquisition process for 12 submarines (up from six in the current force), with the first to enter service in the early 2030s, and it plans to acquire up to 15 new P-8A Poseidon patrol aircraft by the end of the 2020s.[26] In the next few years Canada must begin to take steps to replace its submarine fleet and, considering the growing importance of the Arctic, to ensure that the next fleet has air-independent propulsion to operate under the ice.

Third, it is expected the United States will want its allies to assist in penetrating A2/AD 'bubbles.' For this the USN and its allies will need platforms that are more impervious to A2/AD strategies, such as submarines, as well as stand-off weaponry for anti-ship missiles. To address A2/AD strategies on the part of Russia and China, the United States is reinvesting in anti-ship missiles. During the Cold War this was an area of US strength but in the post-Cold War period the emphasis shifted to land-attack missiles from the sea on to land. This emphasis continues but, in addition, the United States has a renewed focus on anti-ship missiles. Canada will want to ensure it incorporates advanced anti-ship missiles in the new Canadian Surface Combatant.

Fourth, the emerging security environment reveals the enduring role of the naval task group, a flotilla of naval platforms that are networked/linked together (even if they are physically far apart) with the combined ability to control events in an ocean space. Canada's naval task groups typically comprise one or two warships, a supply ship and a submarine, but allied task groups can be much bigger. The UK's *National Security Strategy and Strategic Defence and Security Review*, released in 2015, paints a future security environment characterized by growing terrorism and extremism, and the resurgence of state-based threats. Its naval response is a maritime task group centred on a *Queen Elizabeth*-class aircraft carrier equipped with F-35 combat aircraft. In future, Canadian naval task groups could be used for independent operations in the Norwegian Sea much as they were during the Cold War, or in maritime areas (for example, off the Horn of Africa) to combat terrorism and piracy.

Finally, amphibious capabilities will increase in importance. The seemingly growing number of humanitarian and natural disasters, combined with the fact that most of humanity lives within 100 miles of the ocean, indicates the imperative of being able to operate from the sea to the shore, sometimes in a contested environment. The United States, with its vast number of amphibious ships, continues to launch new and bigger such vessels. Britain plans to enhance a *Queen Elizabeth*-class aircraft carrier to support an amphibious capability. And Australia has commissioned two large amphibious ships, one each in 2014 and 2015.

Credit: http://vardmarine.com

Artist's conception of Canada's new Arctic Offshore Patrol Ship design.

Credit: U.S. Navy Mass Communication Specialist Seaman Kari R. Bergman

Something for Canada to contemplate? The forward-deployed amphibious assault ship USS ***Essex*** *(LHD 2) performs a stern-gate marriage with Landing Craft Utility (LCU) 1631, assigned to Assault Craft Unit (ACU) 1 while back loading elements of the 31st Marine Expeditionary Unit off the coast of Thailand after completing* ***Cobra Gold 2008*** *(CG08) 9 June 2008.*

Conclusion

The Royal Canadian Navy is entering a period of long-term capital renewal at a time when the dominant background forces of global politics are changing. The overall trend in warfare starting in the early 1990s has been from open ocean blue-water operations of the Cold War to littoral operations. Hence, the USN's *From the Sea* strategy documents of the 1990s,[27] concepts which can be seen in NATO's response to the Balkan Wars of the 1990s, continued to dominate in the 2000s, and today they remain critical, such as offshore precision strikes against ISIS. But in parallel – since about the late 2000s – there has been return in emphasis on blue-water operations, driven by the naval build-ups of Russia and China. A2 strategies demand blue-water responses, whether in the Norwegian Sea or Philippine Sea approaching Taiwan. Even as littoral operations continue in response to humanitarian crises and civil strife, capabilities that were once optimized for Cold War operations are making a dramatic and necessary return.

Notes

1. See Olga Oliker, "Unpacking Russia's New National Security Strategy," *Center for Strategic and International Studies*, 7 January 2016. An English translation of the strategy does not exist.
2. Roland Oliphant, "Russia Will Boost Navy in Atlantic and Arctic to Counter 'Unacceptable' NATO Expansion," *National Post*, 28 July 2015.
3. Sohrab Ahmari, "The New Cold War's Arctic Front," *Wall Street Journal*, 9 June 2015.
4. Bruce Jones, "Russian Navy Focuses on Renewal of Black Sea Submarine Force," *Jane's Navy International*, 24 July 2015.
5. *China's Military Strategy*, 26 May 2015, available at http://news.usni.org/2015/05/26/document-chinas-military-strategy.
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What Sort of Future RCN?

Dr. Norman Friedman*

Warships can last a long time; circumstances usually do not. As it contemplates replacing virtually the whole of its blue-water fleet, the Canadian government faces an unusually difficult task. The last time it carried out such a wholesale replacement, to create the current *Halifax*-class frigates, the international situation seemed far more stable. The main reality of Canadian foreign policy at the time was the ongoing Cold War, which, in the late 1970s and early 1980s, showed no signs of abating. That made the NATO alliance key to Canadian defence policy. The question was to what extent Canada would spend resources to keep its place within the alliance.

About 30 years later Canada is still a major NATO country but the world is a far more complicated place. It is certainly no longer obvious that the primary role of the RCN ought to be blue-water anti-submarine warfare on the Atlantic. For example, is the major problem of, say, the next two decades a resurgent Russia trying to gobble up former Soviet colonies in Central Europe? Is it a metastasized version of the Islamic State threatening to upend the Middle East and the world oil supply? Is it perhaps a wider inter-Islamic war based on religious differences, like the brutal Thirty Years' War in Europe? Ought Europeans see vast flows of refugees as the defining fact of national security? For a Canada with a foot in both the Pacific and the Atlantic Oceans, is it a struggle for supremacy in East Asia? Claims can certainly be made for each of these possibilities.

The Roles of a Canadian Fleet

Ultimately whatever fleet the government chooses to buy has to provide Canada with two things – a useful instrument of foreign policy and a useful way to enhance Canada's influence by allowing it to participate in coalitions. First, warships are the clearest expression of national sovereignty. They are literally national territory, and they are independent enough (compared with, say, troops or land-based aircraft) that the national government can use them as it wants, depending on their capabilities. To the extent that Canada pursues an independent foreign policy, ships are probably the best military way of enforcing it. The second point about ships, and indeed about other Canadian military forces, is that they will usually be employed in coalition operations of some kind – NATO is the great historic example. Ideally, the Canadian government wants to be able to influence what any coalition it joins will do. Probably the only way to do that is to offer the coalition a valuable capability which can be granted or withdrawn.

Credit: Wikimedia Commons

*HMCS **St. John's** (FFH 340) sailing into Charleston, South Carolina, 18 November 2012.*

Particular kinds of naval power seem to offer the best options. Almost anything else requires the consent of other governments and is difficult to withdraw if the coalition begins to violate the wishes of the government. As a case in point, it took non-Canadian ships to move Canadian troops from Afghanistan back to Canada. Their owners enjoyed, in effect, a veto over Canadian participation or non-participation in the NATO Afghan operation (so did Pakistan, through which the troops had to pass). The Royal Canadian Air Force (RCAF) may offer a coalition invaluable air support but someone else owns the airfields it uses, and provides essential logistical support.

The coalition argument might be used to justify concentration on a niche capability, such as mine countermeasures, something some NATO navies have done. The counter-argument is that the specialized capability often is not needed, and it may well not be needed in exactly those cases in which the Canadian government wants to participate and to exert influence on what the coalition is doing. Another counter-argument is that it is difficult to imagine a mine countermeasures force offering the Canadian government much independent leverage. For example, one might imagine a pan-Muslim convulsion in

the Middle East which would endanger Westerners and a few surviving friendly governments. Western navies would be deeply involved in extracting Western citizens under fire, and some Western governments might also want to try to stop the carnage such a convulsion would entail. They would need forces adapted to project power (extraction would be a kind of reverse amphibious operation). Mine countermeasures might be a minor part of the operation, but protection of the evacuation against air and missile attack would be more important.

This is all to suggest the sort of navy Canada would find most useful. Much depends on perception of Canadian maritime interests. Naval strategy is built on the idea that the sea ties the world together; it is the greatest of all highways. Wheat grown in Alberta and Saskatchewan is often sold half a world away, because the seaborne highway on which it travels makes for far more efficient transportation than trucking it a few hundred miles. Much of the Canadian economy is of course tied to the US economy directly across the border, but enough of it extends far overseas that issues like the future of the Far East have (or should have) substantial resonance in Ottawa.

Canada may well find itself vitally interested in operations halfway across the world, hence a Canadian fleet ought to be capable of getting there and staying there. It may well do so in cooperation with another (e.g., US) fleet which supplies important support, for example against air attack, but the Canadian fleet's ability to operate with minimal support would surely be a major plus for a Canadian government attempt to influence the outcome of the operation.

The argument that the point of a deployable Canadian military is to exert influence on coalition partners implies that the Canadian military as a whole should be shaped in such a way that it can be deployed independently, in a way controlled by the government. That would mean, for example, accepting that Canadian military aircraft intended to attack land targets should be associated with Canadian ships from which they can operate; otherwise they are dependent on foreign government permission and it may prove difficult to withdraw them as desired. Much the same might be said about Canadian naval ability to deploy and withdraw troops as desired. None of this is current policy. The last time Canada operated carriers it was to provide a valued naval capability. However, anyone asking about the independence of Canadian military assets might think about whether that is consistent with having to negotiate for foreign bases without which aircraft and troops cannot function.

The Likely Future of Naval Technology

The other side of the story is technology, both in general and in naval terms. The overwhelming fact of technology is still surely Moore's Law, the claim that computer power doubles every 18 months, or perhaps even more rapidly. Moore's Law cannot continue indefinitely, but for the next few years it will probably remain extremely important. It creates smaller and smaller (and cheaper and cheaper) computers, and it offers signal processing which competes with attempts to make ships and aircraft and submarines less visible.

If you believe in Moore's Law, stealth is a losing proposition. Drastic sacrifices to make ships invisible are just a bad bet: under attack future warships can and will be hit. That does not make them pointless, but it suggests that it makes more sense to build in survivability than to hope that stealth will save them. That would make sense even

Credit: Corporal Anthony Chand, Formation Imaging Services

Members of HMCS ***Fredericton*** *air detachment and the ship's divers perform rescue training from the CH-124 Sea King helicopter during* ***Operation Reassurance*** *on 2 March 2016.*

Credit: U.S. Navy

A long-range anti-ship missile is integrated on a F/A-18E/F Super Hornet at NAS Patuxent River, Maryland, 12 August 2015. The program's flight test team is conducting initial testing to ensure proper loading, unloading and handling of the missile on the F/A-18E/F.

without a guess as to the future of Moore's Law. A warship operating close to a hostile coast (as in the sort of mass Middle Eastern evacuation scenario suggested above), will be visible to the human eye, however cleverly it is shaped to make it invisible to missile radar. That eye can be used to guide an anti-ship missile.

Fortunately, the size of anti-ship missiles seems to be limited. During the Cold War the Soviets built huge missiles to kill carriers, but the weapons now available on the international market have much smaller warheads. Such weapons cannot destroy a whole ship, except under particularly favourable circumstances. Instead, they destroy a limited area of a ship. If whatever is in that area is critical to the ship's operation or even survival, a single hit is decisive. If, however, whatever is in the ship is distributed and duplicated, even several hits are unlikely to put it out of action.

There are also underwater weapons which can sink or badly damage a whole ship with a single hit. The most effective explode under a ship's keel, attacking the hull as a whole. Size offers survivability because it makes possible design features which absorb the effect of such an underwater hit. For example, a large ship can be designed with a soft bottom and strength concentrated in vertical bulkheads. Successful under-keel attack entails creation of a gas bubble which rises and bounces against the bottom of the ship. A soft bottom vents the bubble. The ship is still seriously damaged, but her hull may remain intact.[1]

This sort of argument was denigrated during the Cold War, the theory being that any major East-West war would not last long. It would either end in negotiations or quickly escalate into a holocaust after which winning or losing would have only limited meaning. Any ship requiring more than a few weeks for repair was as good as sunk. Now, however, the possibility of nuclear holocaust seems to have receded. Western navies find themselves carrying out important but localized and limited operations. Although any one such operation may not last very long, more always seem to turn up. A ship too badly damaged for one operation is valued for a later one. Ship survivability is now far more significant, although that does not seem to be widely acknowledged.

During the Cold War the view was generally that all incoming weapons had to be stopped, because even a minor hit would be fatal. That was partly a reflection of the view that a ship put out of action temporarily was lost to combat. It also reflected the widespread experience that electronic equipment was delicate, so that even the shock of a hit would probably put a ship out of action. Anyone familiar with modern electronics may take a different

view. Computers, for example those in smart phones, regularly survive being dropped and even dunked in water.

The effect of the Cold War view was to demand a very high – and very expensive – degree of self-defence, whether by missile, automatic gun, or jammer/decoy. But all forms of self-defence could be defeated. For example, ships accommodate only limited numbers of defensive missiles. A clever enemy can mount decoy attacks which cause a ship's commander to waste weapons, after which the real attack arrives. The supposed solution, to try for ever-better ways of recognizing real attacking missiles, fails in a world of vastly varied potentially attacking weapons. Accepting that some weapons will surely get through (while trying to beat off as many as possible) is a counsel of hope, not despair.

The Threat of Mission Obsolescence

Physical survivability can be merged with the technological argument and the political argument. Technology and politics destroy warships by making them obsolete. Anyone investing heavily in ships has to find some way to protect against both weapons and obsolescence. Obsolescence, moreover, covers both radical changes in equipment (mainly weapons, sensors and networking capability) and radical changes in mission.

Past experience suggests that sheer warship size, if it is used properly, may be the solution to both kinds of survivability. Sheer size makes it difficult to sink a ship with one or two weapons with limited explosive power. It offers survivability in the face of underwater attack. Sheer size also makes it much easier to change a ship's weapons and even her mission. In the past, such changes generally required substantial expensive reconstruction, but even that was often worthwhile. The great case in point is the transition Western navies had to undergo after World War II. Until that point, navies were conceived mainly as means of gaining and maintaining control of the sea. That meant that warships were bought largely to fight other warships. The wartime Royal Canadian Navy (RCN), for example, specialized in the fight against German U-boats, the goal being to protect shipping between North America and Europe (largely the United Kingdom).

After 1945, the anti-submarine mission remained, but it seemed clear that the submarines were changing to the point where the wartime mass navy could not cope. New-generation submarines were far too fast for the wartime escorts to counter. The US Navy (USN), for example, found itself converting wartime destroyers, which were not primarily anti-submarine ships, into anti-submarine escorts. So did the Royal Navy and the RCN, but the much larger US ships offered far more postwar potential and they lasted a lot longer in service. When built, they had been derided by some as unduly large, but that turned out to be a major virtue when they confronted a different kind of naval world.

Since 1998, the US Navy's Acoustic Rapid COTS Insertion (ARCI) program has enabled the USN submarine force to outpace the growing anti-submarine warfare threat.

The USN saw a completely different mission in nuclear deterrence, against which the Soviet Union mounted a massive force of missile-bearing bombers. Long-range air defence was a new and vital postwar mission. The USN was fortunate in having built large cruisers which were adaptable to conversion into anti-aircraft missile ships. Smaller cruisers in British service were uneconomical to convert.[2]

The most cautionary example of mission obsolescence came at the end of the Cold War. Most NATO navies, including the RCN, had specialized in anti-submarine warfare, a very natural choice given the huge Soviet submarine fleet and the threat it presented to NATO reinforcement shipping in the Atlantic. When the Cold War ended, the excellent anti-submarine ships seemed useless in a post-Soviet world. NATO navies found themselves scrapping or selling many recently-built ships, at huge cost. Many of the ships retained were effectively wasted in post-Cold War roles. The USN was fortunate in that it had been far less specialized and therefore many more of its ships remained relevant to the new situation. But even it suffered major cuts.

What would a future flexible warship look like? First, it would be wired so that distributed computers on board would have the maximum potential to connect both to existing and to future sensors. Provision would be made from the outset to accommodate more powerful computers as they became available. The USN has led the way on this with its Acoustic Rapid COTS Insertion (ARCI) program and derivatives.[3]

Second, the ship would be modular so that its function could be changed to reflect changing naval requirements. Large warships are too expensive to build and discard in great numbers. The first examples of such modularity were the Danish StanFlex corvettes of the 1980s. They were practical because of Moore's Law. It was possible for their combat system computers to accommodate a variety of programs corresponding to different modules and hence different roles. The main drawback turned out to be that crews trained for one function could not easily adapt to a different one. And because of this, the vision behind StanFlex, that the Royal Danish Navy would shift seamlessly from one role to another in a crisis and hence could make do with substantially fewer ships, proved flawed.

However, the idea of modularity still makes sense. Perhaps a different application of Moore's Law is called for. The US Littoral Combat Ship (LCS) is also modular but its modules are built around various kinds of unmanned vehicles.[4] The LCS acts as a central data processing node for information these unmanned devices collect. In theory it offers a fleet a wide variety of ways to collect the information it needs to fight in, say, a littoral area. To some extent the idea of the LCS was that littoral areas – strips of adjacent land and sea – would be the future venues of naval action. Most of the world's population lives near coasts, and thus is affected by events in the adjacent sea area. From a technical perspective, the most important point about a littoral area is that it tends to be nightmarish from a sensing point of view because sensor ranges are dramatically limited. For example, the strip of water tends to be shallow with underwater terrain which limits sonar range, and the strip of land is rarely flat so it affords concealment for threats such as mobile missile launchers.

Unmanned vehicles can multiply a ship's presence in important ways. For example, the ship's own sonar may have only a very short range, hence may miss nearby submarines. Strewing sensors along the bottom, or placing them in unmanned vehicles, and having them communicate with a ship what they see helps fill in the picture of what is happening underwater. In the past, that might have been done with dozens of smaller ships, but that approach has not been affordable for some years. Unmanned vehicles can also greatly enlarge other naval footprints, such as the reconnaissance footprint of a submarine, or the mine-hunting footprint. Another advantage of such vehicles is that, because they operate

Credit: Austal USA

The Littoral Combat Ship USS ***Independence*** *(LCS-2) deploys a remote multi-mission vehicle while testing the ship's mine countermeasures mission package off the California coast in August 2013.*

Credit: U.S. Navy Mass Communication Specialist Seaman Apprentice Joshua Adam Nuzzo

The US Navy, in conjunction with Spatial Integrated Systems Incorporated, holds a demonstration of a fully autonomous unmanned surface vehicle (USV) at Fort Monroe, 14 January 2009.

well away from the controlling or commanding ship, they considerably relax requirements on the ship. For example, a mine hunter has to be designed not to trigger the mines it is trying to counter. A mine hunter sending a small unmanned vehicle into a potential minefield from well offshore need not be specially designed, hence can be far less expensive – it can be a multi-purpose ship.

All of this says that size pays off. It is not a new argument for Canadians. The *Halifax*-class frigates were among the largest of their kind within NATO. Their sheer size made it easier to contemplate modernizing them. Size in itself is not inherently expensive – the cost of a warship is run up largely by what is inside.[5] Modularity means that ships can be delivered with relatively little inside, then brought up to greater capability. That is probably the best argument for a future Canadian fleet of large capable surface combatants to face a totally unpredictable world.

Notes

* All opinions expressed are the author's own, and should not be attributed to the US Navy or with any other organization with which he has been associated.

1. Admittedly, no ship of this type has been built, but the idea has been suggested several times, and it has been used to explain why large US aircraft carriers are likely to survive under-keel attack. It would probably take a ship of about 10,000 tons to exploit this kind of design. As well, the ship's vitals would have to be distributed so that when the bubble burst through the ship's keel it did not destroy too much of them.
2. Other NATO navies (France, Italy and the Netherlands) did convert smaller cruisers to missile ships, but only to fire short-range weapons (Terrier). It took a much larger cruiser to fire the long-range Talos missile. Later generation technology made it possible to squeeze long-range missile firepower into smaller ships but it can be argued that without the large ships initially converted, the USN would have been unable to deploy effective long-range air defence missiles (Talos).
3. Acoustic Rapid COTS Insertion (ARCI) was conceived for submarines in the late 1990s; the same ideas were later applied to surface ships and even to aircraft. The idea was that, with the Cold War over, new submarine sensor systems were unaffordable. However, little of the potential of the existing arrays was being exploited because existing processors were so far behind the commercial state of the art. Under ARCI, submarines were fitted with high-capacity fiber-optic networks, which could carry sensor outputs to banks of replaceable commercial-type (COTS) computer servers. The program was designed to keep up with 'the state of the practice' by periodically renewing all software and then all computer hardware. New hardware made it possible to write new software to exploit new capabilities. The program also overcame what had been a major factor slowing computer and software development. Before ARCI, US submarines integrated fire control and the tactical picture formation on the basis of which a submarine might launch weapons. Nearly all modern submarine combat systems still function that way. The USN requires that any system which can fire a weapon be thoroughly tested so that weapons cannot be fired inadvertently (the distributed software of the RCN *Halifax*-class was similarly tested). That took considerable time, far more than the interval between hardware generations. The USN therefore split fire control off from the software function which creates a picture of the underwater situation. The latter is subject to ARCI development, so that the ability to use sonar data gets better and better.
4. This argument has nothing to do with the cost of the very high speed designed into the current versions of the LCS.
5. My favourite example is the old *Spruance*-class destroyers which were derided at the outset for their size and relative emptiness. That was a consequence of strategic uncertainty. The USN did not know how many anti-aircraft ships it would need, and it was less expensive to design a missile ship, and then (on paper) remove the missiles, on the theory that if more anti-aircraft ships were needed the existing destroyers could be upgraded. No *Spruances* were ever converted, but the Shah of Iran ordered six of the missile version. The capacity of the *Spruance* hull made it possible to accommodate the Aegis anti-air system as the *Ticonderoga*-class. *Spruances* were later substantially upgraded, including installation of vertical launchers for Tomahawk anti-ship missiles.

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The New Defence Policy Needs to Focus on Procurement, Not Prose

Dr. Dave Perry

The most necessary outcome of the 2016 Defence Policy Review is to align the current acquisition plans of the Department of National Defence (DND) with the defence budget. During the 2015 federal election, the Liberal Party of Canada rightly recognized that the previous government's defence policy, the 2008 "Canada First Defence Strategy" (CFDS), was "underfunded and out of date."[1] The single biggest policy problem facing the Canadian military is an inadequate supply of funding to recapitalize.

The broad policy contours of the CFDS remain largely valid today. The three defined roles for the armed forces (defending Canada, defending North America and contributing to international peace and security) are unlikely to change, although how they are interpreted by the new government could. Similarly, the six articulated mission types (conduct daily domestic and continental operations, support a major event in Canada, respond to a terrorist attack, support civilian authorities during a crisis in Canada, lead or conduct a major international operation for an extended period of time, and deploy forces elsewhere in the world for shorter periods) are similarly so generic that there is little need of revision.[2] Defence policy will, however, need some updating to account for new threats and technologies and changed geostrategic circumstances, particularly a different relationship with Russia.

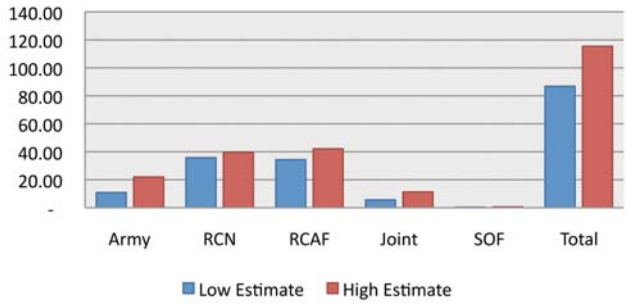
Addressing these policy issues – the prose of our defence policy – is less fundamental than resolving an inadequate supply of capital funding to move forward with military

Credit: Leading Seaman Dan Bard, Formation Imaging Services Halifax

*Will there be future funds to replace the submarines? HMCS **Windsor** returns home to CFB Halifax on 17 December 2015 after taking part in **Joint Warrior** and **Trident Juncture**, coordinated exercises with NATO allies to enhance combat readiness.*

procurement. For the Royal Canadian Navy (RCN) this is a major problem, given the extensive requirements for capital investment needed to keep naval technology current. The navy faces two broad types of funding pressures. First, the adequacy of the project budgets for those major projects that have been approved and included in DND's Investment Plan (the long-term planning document required by the Treasury Board Secretariat), but which are not yet into contract, has been repeatedly called into question.[3] Second, the future of the submarine fleet is in jeopardy because neither a life-extension of the existing *Victoria*-class nor a replacement submarine is funded in the Investment Plan.[4] All of these projects are jeopardized by the inadequate supply of funding for the capital program as a whole. Resolving this recapitalization dilemma is therefore the most pressing concern for future naval policy.

Figure 1. DND's 2015 Acquisition Plan ($B)



Note: The project budgets in the Defence Acquisition Guide were presented as a possible range. As a result the total aggregated value of the projects provides a low and high estimate for their possible costs.

Source: Data taken from the 2015 Defence Acquisition Guide, supplemented with known project budget(s), where these were available to the author.

The Capital, Operations and Personnel Mix

The distribution of the defence budget among the major components of defence spending (Personnel, Operations and Maintenance, and Capital) is just as important as its size. The first category includes pay, allowances and benefits for the military and civilian members of the defence organization. The second category includes the costs associated with operating and maintaining equipment and facilities, conducting deployed operations, routine missions and training exercises. Finally, the third category comprises the costs of acquiring or making major upgrades to equipment or infrastructure.[5]

Maritime power is heavily dependent upon major investments in a naval fleet which means that, like the Royal Canadian Air Force (RCAF), the navy places much more significant demands on the capital share of the defence budget than it does on personnel. Figure 1 includes all of the projects and potential projects in the 2015 Defence Acquisition Guide, DND's list of future capital equipment purchases. That document itemized planned projects with their costs estimated across a likely range. Supplemented with known information about actual project budgets (such as those for the Canadian Surface Combatant and the Joint Support Ship) that data is presented in Figure 1. It shows that both the RCN and RCAF have capital requirements significantly larger than those for the Canadian Army, Special Operations Forces (SOF) or other joint capabilities.

The RCN employs far fewer people than the RCAF and especially the army – the RCN has less than 9,000 Regular Forces personnel, the army has roughly 23,000, and the RCAF has roughly 13,500.[6] As a result, the RCN depends significantly more on the capital budget and less on the personnel budget to generate capability than does the army and, to a lesser extent, the RCAF. The share of the defence budget allocated to capital is therefore an important determinant of future naval capabilities as they rely disproportionately on significant capital spending.[7]

For decades, DND has established targets for how large a share of its budget should be allocated to capital. This occurred first in the 1964 White Paper which set a target of 25% of the budget being devoted to capital equipment.[8] The same target was endorsed in the 1987 White Paper,[9] and Defence Policy 1992 increased it to 26% immediately, with a long-term objective of 30%.[10] During the 1990s as the Chrétien government wrestled the deficit into submission, though, defence funding was slashed and spending on capital especially so. By the early 2000s, the Canadian military was facing a recapitalization crisis, with many major platforms extremely advanced in age.

Efforts to correct this started with the 2005 budget which provided DND with a significant increase in funding for capital, followed by the 2006 budget which did the same. Then the CFDS provided a unique funding arrangement to provide long-term funding for capital. Despite all of the additional capital funding promised in the mid-2000s, the CFDS curiously set the 20-year spending target for this sector at only 20%. Given the significant backlog of recapitalization that accrued during the 1990s, this was surprising, and several analysts questioned early on whether the funding for individual acquisitions was adequate.[11] More broadly, Eric Lerhe argued presciently in 2010 that the overall CFDS allocation of only 20% of the total funding to capital was inadequate to provide funding for recapitalization. In particular, he noted that the

plans to increase troop strength to 70,000 were unaffordable, leaving insufficient funds allocated for major fleet procurement, and thus argued that the size of the military should be held at 64,000 Regular Forces to allow for proper recapitalization.[12] This assessment was remarkably apt, as significant shortfalls in the overall availability of capital funding have become clear. The funding gap has also been exacerbated by the inability of the Canadian procurement system to obtain needed equipment on schedule.

The 2016 Budget Context

The portions of the defence budget devoted to personnel and operations and maintenance are subject to different rules than the portion for capital. The most significant of these is that DND's personnel and operations and maintenance funds (both denoted as Vote 1 in the Estimates) are automatically increased every year. DND is unique for having a built in 'escalator' applied to its Vote 1 baseline funding. Under the terms of the CFDS, in 2011/2012 the amount of this annual increase rose to 2% annually. In its final budget, in 2015, the Harper government committed to increase the escalator to 3% a year between 2017/2018 and 2026/2027.[13] Beyond this escalator, like other federal departments, DND also benefits from additional funding that offsets the impact of wage increases for its personnel.[14]

In its 2015 campaign platform, the Liberal Party of Canada pledged to "maintain current National Defence spending levels, including current planned increases,"[15] a commitment that presumably refers to the existing escalator arrangements. While the 2016 federal budget made no mention of the escalator specifically, officials from the Department of Finance confirmed that those arrangements were left untouched in the budget. Consequently, DND will receive an additional $361M in Vote 1 funding for 2016/2017.

Credit: Cpl Anthony Laviolette, Shearwater, NS

*A CH-148 Cyclone helicopter prepares to land on HMCS **Montreal** off Halifax Harbour, Shearwater, Nova Scotia on 3 March 2016.*

Despite these built-in funding mechanisms, governments can, and recently have, cut defence funding while still providing DND with its annual escalator. Starting in 2010, two separate operating budget freezes obviated the normal offsetting funding increases to compensate for rising wages. Further, DND's Strategic Review and the Deficit Reduction Action Plan cut a combined $2.1B in defence funding.[16] These measures resulted in significant reductions to DND's operations and maintenance funds. The effects of some measures taken as a result, including cuts to DND's national procurement funds (those for equipment repair and overhaul), are still being felt. But because of the automatic annual increase through the escalator, the pressures on the operations and maintenance budget as a whole are no longer acute.

In contrast, there are real funding shortfalls with respect to capital funds, largely because these have not benefitted from automatic annual increases. DND actually has two separate types of capital funding. The first is roughly $1.5B annually in A-base Vote 5. These funds are intended to provide for the replacement of existing capabilities. Finance officials state that DND could choose to apply some of its annual escalator increase to its A-base Vote 5, but to date this has not happened.

In addition to its A-base Vote 5, DND also has a second source of capital funding. As the 2016 budget stated, "funding to support large-scale capital projects for defence, including the associated operating and sustainment costs, is set aside in the fiscal framework and managed on an accrual basis."[17] This funding is known colloquially in National Defence Headquarters as the 'accrual space.' This funding mechanism was introduced with the CFDS which set aside the long-term funds needed for the new capabilities promised in that policy document.[18] The size of the accrual space is fixed, as the defence escalator does not apply to that portion of DND's funding.

For projects funded in the accrual space, DND requests the funds it needs for procurements as 'Investment Cash,' the money required to make payments for a procurement on an annual basis. This is denoted as Vote 5 funding in the Estimates. The full value of the Investment Cash used annually is not counted against the defence budget, however. Instead, the full costs of capital projects are amortized over their expected life, and only an annual amortization expense is accounted for in DND's accrual space.[19] Even though the funding for these purchases is

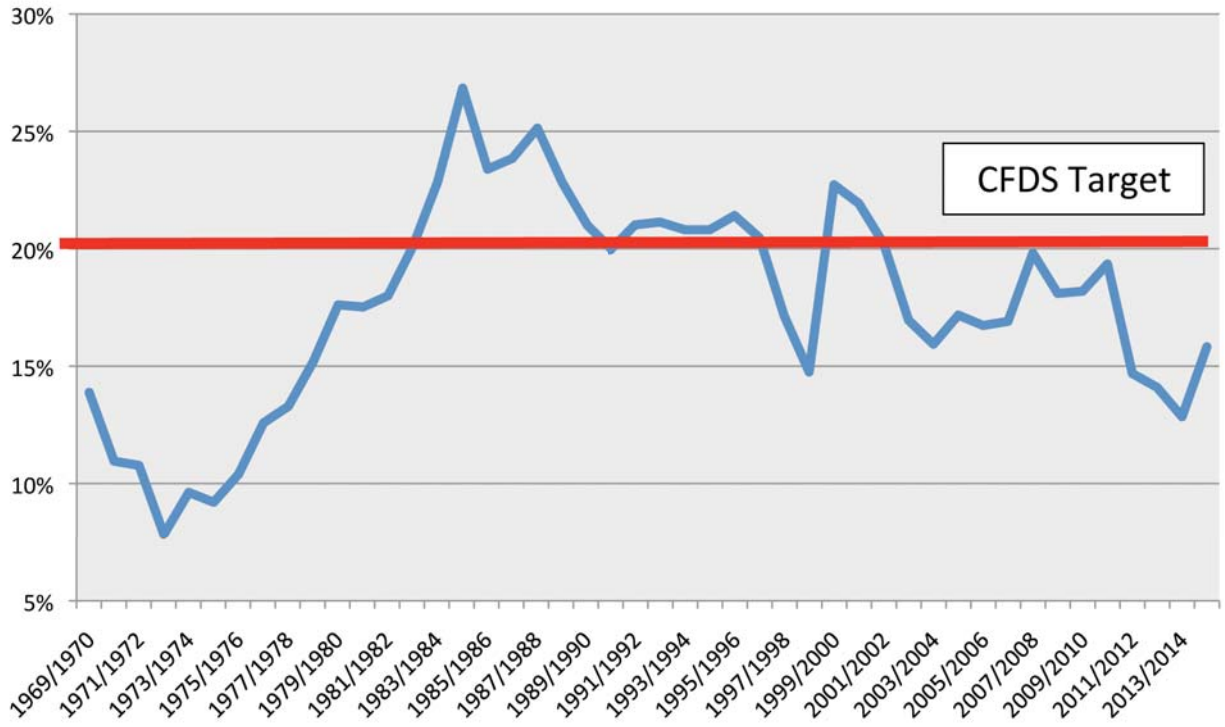
set aside in the fiscal framework for defence purchases, DND does not actually have any amortization expenses to account for in the accrual space unless it actually procures something. This, however, has been problematic.

The ongoing problems with the defence procurement system in Canada are well documented. For multiple reasons beyond the scope of this article, the pace of procurement has fallen well short of the existing supply of capital funding. Because of this, procurements for which funding is allocated have not proceeded on schedule and, as a result, billions of dollars set aside to account for their amortization expenses have not been needed. The 2016 budget marked the third time in four years that a federal budget has made a statement along the lines of "[t]o ensure that funding is available when key capital acquisitions will be made, funding that is not yet allocated to specific projects, or that cannot be spent due to unforeseen delays in planned projects, can be moved forward into future years when it will be needed."[20] Due to the inability to procure funds on the needed schedule, $3.7B worth of accrual space was reprofiled into the future. Combined with similar measures in 2012 and 2014, more than $10B in fiscal room allocated for defence purchases between 2011 and 2021 has been shifted into the future. This inability to spend the allocated funding has meant that, since 2008, DND has fallen well short of its goal of spending a fifth of its budget on capital. As Figure 2 shows, the percentage of the defence budget devoted to capital has dropped to levels not seen since the late 1970s.

The chronic delays in the procurement system present an ongoing problem, particularly because the accrual space is unprotected from the impact of inflation. While the RAND Corporation has estimated that the costs of naval surface combatants escalate at a rate of almost 11% a year, the funds budgeted for Canada's next surface combatant are fixed.[21] Improving the procurement process must be a focus of the Defence Policy Review to preserve the purchasing power of the capital budget.

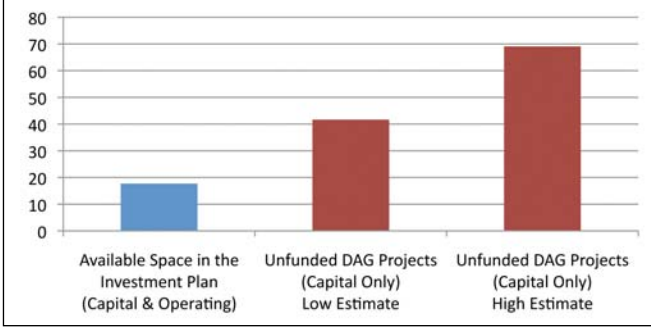
This is particularly the case because the unallocated funding room in DND's Investment Plan for new purchases is vastly outstripped by the demands for new acquisition. The left-hand column in Figure 3 denotes the available room left in the Investment Plan. It also provides estimates for both the low and high ranges of total capital expenditures outlined in the 2015 Defence Acquisition Guide (DAG). The latter estimates were calculated by taking the total data presented in the DAG, including known project budgets, and removing those projects known to be funded

Figure 2. Capital Share of the Defence Budget



Source: These are the author's calculations using data from Table 3, Volume 2, of the Public Accounts of Canada, 1969/1970 – 2014/2015.

Figure 3. The Future Capital Shortfall ($B)



in the Investment Plan.[22] The remaining list of projects represents potential acquisitions for which funding in the Investment Plan may not be assured, ranging from a low estimate of roughly $42B to a high estimate of $69B. The midpoint between these upper and lower ranges would be roughly $55B in future demand for capital.

At present, there is less than $18B in available Investment Plan room, comprised of both A-base Vote 5 and accrual space. The accrual space portion must also account for operating and sustainment costs of the capital projects funded from within it, and the remaining Investment Plan as a whole must reserve some space to account for possible cost escalation due to inflation, exchange rate fluctuations and other contingencies. As a consequence, there is more than three times more demand for capital funding than room in the Investment Plan.

Ways Forward

Three options exist for rectifying this problem: (1) increase the funding available for capital; (2) reallocate the balance of funding within DND's overall budget; or (3) reduce the ambition of Canada's defence policy, thereby reducing the demands for capital purchases.

The first option could be achieved in three ways: (a) increase the overall defence budget above the planned escalator increases; (b) apply the escalator to DND's A-base Vote 5, thereby increasing it over time; or (c) allow DND to expand its useful budgetary room for capital by converting some of its A-base Vote 5 capital into its accrual space, thus allowing for long-term amortization of more of its program. Any one of these three options could have a benefit by increasing the capital share immediately, increasing it slowly over time, or applying more favourable accounting rules to the budget it has at present.

The second option would be to reallocate funding internally within DND. One such plan is underway, through Defence Renewal, which is implementing a range of efficiency, cost-saving and cost-avoidance measures to improve the operation of the defence business enterprise. This effort could produce a recurring reinvestment potential of between $500-600M by 2019/2020.[23] This would help address the shortfall, but likely not resolve it completely, and achieving this will take concerted action by senior departmental leaders.

An additional means of reallocating funds internally would be to adjust the overall distribution of spending between personnel and capital. Reducing the size of the Canadian Armed Forces is an option that would allow for an internal reallocation of the defence budget, to shift funds from personnel, to devote them to capital. Former Chief of Defence Staff Rick Hillier recently argued that scaling back the size of the military should be considered as a means of ensuring proper recapitalization.[24] However, when asked whether he would examine such an option, the Minister of National Defence replied "[w]e are not looking at reducing our personnel…. In fact, the conversation I'm having right now is about where do we need to increase some of the personnel."[25]

If DND cannot otherwise increase its capital funding, reducing the size of the armed forces should be given careful consideration. At present, the annual cost of each 1,000 members of the Regular Forces is approximately $105M. To place that in perspective, the annual amortization cost of a $3B capital asset with a 30-year lifespan would be $100M. Reducing the size of the armed forces by just a few thousand people could therefore free up the fiscal space needed for an additional $10B in capital spending.

Credit: LS Ogle Henry, HMCS ***Winnipeg***

HMCS ***Winnipeg*** *sails on the Atlantic Ocean en route to Exercise Trident Juncture during* ***Operation Reassurance*** *on 21 October 2015.*

Credit: Master Corporal Sebastian Allain, HMCS Fredericton Air Detachment

*HMCS **Fredericton** (337) with the Romanian frigate **Ros Regina Maria** (F222) while on patrol in the Black Sea during **Operation Reassurance**, 5 April 2016.*

The third option available for rectifying the mismatch between the capital budget and capital demand would be for the policy review to indicate policy changes from which a reduced set of capabilities could be produced. The existing plans in the DAG emanate from the existing interpretations of defence policy. If no further funding is forthcoming, and no reallocations can be made, this would be the only remaining choice.

Conclusion

The most significant defence policy problem from a naval perspective is a lack of funding for capital in the defence budget. Whatever else the policy review accomplishes, bringing the mismatch between funding and capital plans into closer alignment must be a priority. While the inclination to perfect the defence policy prose will be strong, the real emphasis needs to be on finding the money to get on with the procurement.

Notes

1. Liberal Party of Canada, "A New Plan for a Strong Middle Class," 2015.
2. Canada. Department of National Defence (DND), "Canada First Defence Strategy," 2008.
3. Canada, Office of the Parliamentary Budget Officer, "Feasibility of Budget for Acquisition of Two Joint Support Ships," 2013; James Cudmore, "Warship Cost Could Rise to $30B, Vice-Admiral Mark Norman Confirms," CBC, 2 December 2015.
4. A life extension has been identified as one of 18 investment priorities for the next version of the Investment Plan all of which have been identified as important, but none of which are actually funded.
5. Lieutenant Colonel Ross Fetterly, "Budgeting within Defence," in Craig Stone (ed.), *The Public Management of Defence in Canada* (Toronto: Breakout Education Network, 2009), pp. 53-91.
6. DND Public Affairs email to the author, 4 April 2016.
7. John M. Treddenick, "Distributing the Defence Budget," in Douglas Bland (ed.), *Issues in Defence Management* (Kingston: School of Policy Studies, Queen's University, 1997), pp. 57-82.
8. Canada, *White Paper on Defence* (Ottawa: Queen's Printer, 1964).
9. Canada, DND, *Challenge and Commitment* (Ottawa: 1987).
10. Canada, DND, *Canadian Defence Policy* (Ottawa: 1992).
11. Elinor C. Sloan, "Stretched to the Breaking Point," *National Post*, 17 June 2008; Lieutenant-General (Ret'd) George Macdonald, *The Canada First Defence Strategy: One Year Later* (Calgary: Canadian Defence and Foreign Affairs Institute, 2009).
12. Commodore (Ret'd) Eric Lerhe, "Getting the Capital and Personnel Mix Right," in Ann Griffiths and Eric Lerhe (eds), *Naval Gazing* (Halifax: Centre for Foreign Policy Studies, 2010), pp. 54-95.
13. Canada, Department of Finance Canada, "Economic Action Plan 2015," 2015.
14. Unless the government invokes an operating budget freeze.
15. Liberal Party of Canada, "A New Plan for a Strong Middle Class," p. 69.
16. David Perry. *The Growing Gap Between Defence Ends and Means* (Ottawa: Conference of Defence Associations Institute, 2014).
17. Canada, Department of Finance Canada, "Growing the Middle Class," Budget Plan 2016.
18. Funding for an expansion of the military, and the funds to operate, sustain and make it ready was also set aside in the accrual space.
19. Other project expenses such as the cost of the Project Management Office, Initial Logistics Setup and Initial Spare Parts are also counted in the accrual space in the year these expenses are incurred.
20. Canada, Department of Finance Canada, "Growing the Middle Class," Budget Plan 2016.
21. Mark V. Arena, Irv Blickstein, Obaid Younossi and Clifford A. Grammich, *Why Has the Cost of Navy Ships Risen?* (Pittsburgh: RAND Corporation, 2006).
22. This removed the following projects from the total: the Arctic Offshore Patrol Ship; Canadian Surface Combatant; Fixed Wing Search and Rescue Aircraft; Future Fighter Capability; Joint Support Ship; Joint Unmanned Surveillance and Target Acquisition System; Point Defence Missile System Upgrade; Underwater Warfare Suite Upgrade.
23. Canada, DND, "Defence Renewal Annual Report 2014-2015," 2016; David Perry, *Doing Less with Less* (Ottawa: Conference of Defence Associations Institute, 2014). This amount was calculated by subtracting the dollar value equivalent of the full-time equivalent efficiencies the original Defence Renewal Plan intended to realize from the revised reinvestment target published in the 2014-2015 Defence Renewal Annual Report (which appear to include potential efficiencies with respect to full-time equivalents expressed as a dollar value). The Liberal campaign platform had committed to "implement the recommendations made in the Canadian Forces' Report on Transformation," which proposed more significant savings. The Minister of National Defence's mandate letter did not direct him to do so, however, and this objective appears to have been abandoned.
24. Andrea Janus, "Canada 'Just Can't Get Around' Army Cuts, Hillier Says," CTV News, 23 September 2013.
25. Lee Berthiume, "Liberals Reject Cutting the Size of Canadian Military. Instead, They're Looking to Expand," *National Post*, 18 February 2016.

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Why a Defence Review is Necessary and Why it will be Easy to Get it Wrong in the Arctic

Dr. Rob Huebert

There are growing expectations regarding the Defence Review promised by the new Liberal government. Given the security complexities faced by Canada in the international system and the intent of the government to do things differently from the preceding government, many are looking to the promised review with anticipation. There is little question that a properly conducted Defence Review is necessary for rethinking and reframing Canadian defence policy. However there is always a risk that when improperly done, such reviews may create more damage than good.

This is particularly true regarding the role of the navy in the Arctic. There are significant challenges facing Canada as its third ocean continues to open up. This is requiring Canada's navy to become a three-ocean navy for the first time in its existence. So how is this to be done? What is the main purpose that the Canadian navy will have in the Arctic and how will the navy accomplish it?

Before considering the core issues that are facing Canada, it is necessary to consider what reviews are and why they are undertaken. Based on Canada's experiences with Defence Reviews, there are normally four different but interconnected objectives: (1) to assess the international security environment in which Canada must operate; (2) to provide guidance on future procurement decisions; (3) to achieve political purposes; and (4) to orientate the bureaucracy to the directions and objectives the government wishes to pursue regarding defence issues.[1]

The core objective of any Defence Review and perhaps one of the most difficult to get right, is to determine the security environment facing Canada and to identify the major threats to Canadian national security. Once this has been accomplished, the next task is to determine the options that Canada has to provide for the defence of the country. Traditionally the depth to which this is developed in reviews varies from government to government. The third task of reviews tends to be more implicit and away from official justifications for the review, but still remains an important element. Canadian defence reviews have been taken at the beginning of the mandate of a new government.[2] New governments see a Defence Review – and often a Foreign Policy Review as well – as the means to establish themselves as different from the preceding government. The fourth reason (which flows from the third) for conducting a Defence Review is to get the bureaucracy and Canadian Armed Forces (CAF) aligned with the new government.

Artist's conception of the proposed polar icebreaker, CCG ***John G. Diefenbaker*** *during icebreaking operations.*

The actual process will always be very demanding on both the civilian and military members of CAF. Reviews will require the senior members of the Department of National Defence (DND) to dedicate significant attention to what the new government wants to do and will also require them to acclimatize to their new political leaders. It is equally important that this process allows the bureaucracy to educate the members of the new government as to what is possible and what is not.

So what does this mean for the navy and the Arctic and the coming Defence Review? First and most important is the manner in which the review frames and understands the rapidly transforming Arctic security environment. Any consideration of the future security threats in the Arctic faces a number of challenges that, if misunderstood, can seriously misdirect Canadian northern naval requirements. The region is being transformed by a wide variety of factors. These include – but are not limited to – climate change, changing economic activities, the ongoing political development/devolution of the Canadian north, and the transforming geopolitical realities of the world.

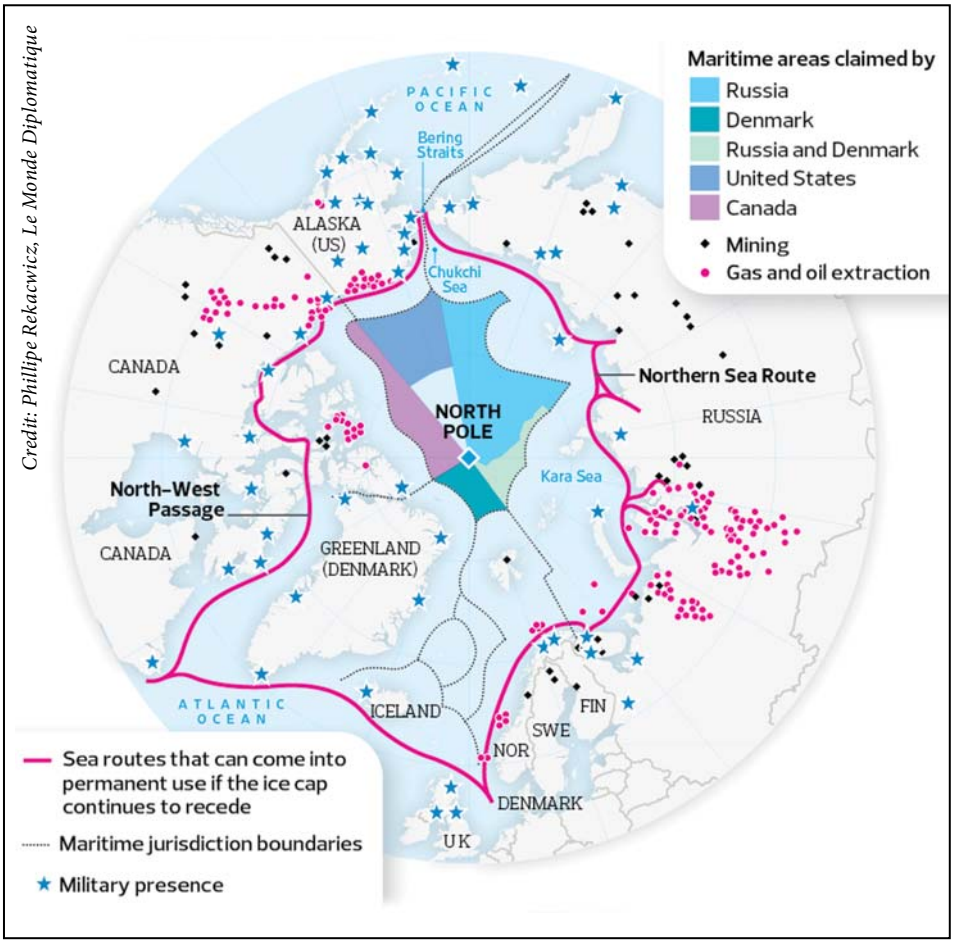
The Arctic is warming more rapidly than the rest of the world.[3] But the specific elements of that change and the speed of the change are not yet fully understood. It is expected that the permanent ice-cover will soon be gone, but the exact date is not known. In the face of this uncertainty the Royal Canadian Navy (RCN) needs to prepare for an increasingly open Arctic Ocean. The question is how? This warming process will not occur in a linear fashion and, thus, there will be a significant period of time when ice conditions will continue to be very difficult. Even once all of the permanent ice is gone, much of the Arctic Ocean will still re-freeze in the winter months. Furthermore, there will be other environmental factors that will be altered by the changing climate such as increased precipitation, increased storms and in the longer term rising sea-levels caused by the melting Greenland ice-cap that will have serious impacts on the navy's operations in the region.[4] The rising sea-levels will be a factor not only in the Arctic, but will affect the navy's operations worldwide.

In short, the navy will need to be concerned about increasing operations in a vast area that will remain a very environmentally challenging region. The navy will need to have new capabilities to operate in waters that will be opening, but will also retain various degrees of ice. These waters are not well charted and will remain dangerous for operations until they are properly charted. And regardless of the degree of open water, the region is geographically huge with a minimum of infrastructure support.

The second factor that is very dynamic and will remain critically important for future naval operations will be the magnitude of economic activity in the region. As climate change melts the ice-cover and as new technologies are developed to operate in the north, there will be increasing economic activity in the region. However, non-Arctic factors such as the global markets will play a deciding role in the pace of the development of any resources. The search for oil in the north clearly illustrates this reality.[5] As the ice melted and new means of searching for oil in Arctic waters developed, combined with high world-wide prices, there was a period in the 2000s when many believed that the Arctic region would be the location of a new "bonanza" of oil production.[6] The crash of world oil prices in 2014 has crushed many of these expectations in the short term.

Nevertheless, there is still an increase in some economic activity such as tourism and specifically cruise ships operating in the Canadian north. In the longer term, it is probable that world oil world prices will rebound and that there will be an increase in economic activity in the region including oil and gas, but also other resources such as iron ore from Baffin Island. As these activities increase, the navy will be asked to act in a supporting role to provide security.

While it is unlikely to be called upon to be the lead agency, the navy will increasingly be tasked to provide assistance in the event of any accidents or incidents that occur because of the increased economic activities. As commercial activity develops in the region there is an increased possibility of incidents such as an oil spill or ship grounding or worse. In these instances the navy will be required to respond in cooperation with other agencies such as the Coast Guard and the RCMP. It will need to dedicate significant resources to respond to constabulary roles that are not the normal role of the navy but that will be important in the region. To do this the navy must have a robust ability to operate over vast distances in difficult conditions and be prepared to operate quickly with other



Sea routes, jurisdictional claims and resources in the Arctic.

branches of government at all levels and with the local communities.

The third factor that is often overlooked but will play an increasingly important role for future naval operations in the region is the evolving political environment regarding governance in the region. As the federal government continues the process of devolving responsibilities to the three territories, they will take on more responsibilities for the region. At the same time the implementation of the various land claim agreements will also continue. These factors will need to be considered in future naval operations to ensure that all operations conducted in the region do so with a full understanding of the domestic situation.

Ultimately the most important question that the Defence Review must consider is: what is the security environment of the Arctic region? This will be very difficult to answer due to three reasons, but it is essential that the review get this as correct as possible. First the core factors shaping the Arctic security environment are in continual flux. The security environment in 2016 is not the same security environment that existed in 2006.

Second, it is becoming increasingly apparent that the elements that have allowed the Arctic security environment to remain distinct from the global security environment are rapidly disintegrating. The melting ice by itself means that the Arctic Ocean is becoming an ocean that is connected to all other oceans – and this is only one of the factors! Thus the challenges of the non-polar world are increasingly becoming the problems of the Arctic.

Third, there remains a divide in Canada about whether the Arctic will be a region of cooperation or conflict.[7] There are many influential researchers and government officials who are committed to the assumption that the region is a zone of peace and will remain so into the future. There is a smaller number of researchers and officials who see the Arctic region as more complicated and that there are critical and dangerous security issues that are now developing. This divide becomes important in determining the assumptions and starting point of the Defence Review, so it is important that the review recognizes these complexities. There will be a different endpoint for a review that begins with the assumption that the region is one of peace and cooperation and one that begins with the assumption that there are growing security challenges that the navy will need to address.

What then are the key issues that can be agreed upon that are now shaping the security environment? The first is the geopolitical nature of the region. The geographic reality is

Credit: Corporal Felicia Ogunniya, 12 Wing Imaging Services, Shearwater, N.S

*HMCS **Moncton**, a **Kingston**-class Maritime Coastal Defence Vessel sits anchored alongside the CCG ship **Pierre Radisson** for fuelling in Nunavut during **Operation Qimmiq** on 14 September 2015.*

Credit: Ministry of Defence of the Russian Federation/ Wikipedia

*One of the new **Dolgorukiy**-class of nuclear-powered ballistic missile submarines, **Alexander Nevsky** (K 550) – commissioned in December 2013 – in Vilyuchinsk, Russia, 30 September 2015.*

that Russia and the United States are Canada's two closest Arctic neighbours and that will continue to be the security reality facing Canada. The security actions of these two states will ultimately be the most important consideration in attempting to determine the future course of action of the navy. An examination of the actions of these two states demonstrates that the maritime security dimension of the region is growing increasingly complicated. Both states officially affirm their desire to keep the region an area of peace and international cooperation.[8] This is found in both Russian and American policy documents. But since the mid-2000s both countries have begun to build up their military forces in the region for non-Arctic purposes – the Russians more than the Americans. These forces are substantial and are altering the security dynamics of the region.

Since the mid-2000s, the Russians have been redeveloping their submarine-based nuclear deterrence. To date most of their efforts have focused on rebuilding their northern fleet. Russia has also begun a process of building and rebuilding northern military bases along the Northern Sea Route.[9] Most of these efforts are focused on modernizing and strengthening the Russian nuclear deterrent and providing security to an increasingly ice-free northern coastline. But this increased regional military capability is also being used against Russia's Arctic neighbours. Thus, when the Ukrainian crisis erupted, Russian air and sea assets in the region were used to signal Russian displeasure with the Western response to its actions in Ukraine.

At the same time, the Americans continue to see the defence of their homeland as one of their most important security requirements and this includes their northern border. There are two major ramifications for the RCN. First, the Americans are strengthening their anti-ballistic missile capabilities in Alaska.[10] This is not currently to defend against a northern-based missile threat, but instead is focused on defending against a North Korean threat. But as relations with China continue to become more challenging, it is possible that this capability will form the basis for defending against a Chinese long-range missile threat. If that happens, it is possible that the Americans will look to augmenting their existing capability with maritime assets.

Second, regardless of the American legal preoccupation with the Northwest Passage, the overall security concern is to ensure that the northern border of the United States remains as secure as the southern border against external threats. As the ice melts and increased activity occurs, Americans will increasingly become concerned about the region. In addition, it is no longer possible to rule out an increasing presence of the Chinese navy in the north. While such considerations were previously considered unrealistic, this is no longer the case. It is becoming clear that the Chinese are determined to become at least a regional hegemon. To this end, China has increasingly looked to strengthen its navy. In 2015, its navy appeared in northern waters in both the Pacific and Atlantic.[11] While it is impossible to predict with any certainty what Chinese

Credit: RCN

*Artist's impression of the **Harry Dewolf**-Class Arctic Offshore Patrol Ship. Canada's answer to constabulary roles in the Arctic.*

naval policy will be in the Arctic, it is necessary to begin thinking of the ramifications for Canada.

Thus the core strategic challenge facing the RCN is to understand what it will need to do in the Arctic. As the ice melts and economic activity unfolds, the navy will need to prepare for new activities that will put new pressures to perform additional security activities in the region. At the same time, the navy will need to consider how to prepare to respond to the changing strategic dynamic in the Arctic. The region is about to become much more important to both the United States and Russia. Where Canada fits in this regard will ultimately become the most important consideration for the navy in the region. This will emerge as the most important question that the Defence Review needs to address on this matter. It will need to ask how the RCN will respond to three differing requirements.

First, how can the RCN best respond to the constabulary requirements of a more accessible Arctic? What does it need to ensure that it can provide the same security that it does on the East and West Coasts of Canada? The Defence Review also needs to consider how to incorporate the other agencies with which the RCN must work. In particular this requires that any Defence Review includes discussion of the Coast Guard and the RCMP. This has not been done before, but it must be done in this review.

Second, how can the navy best act as an agent of stabilization in a region where US and Russian core strategic interests are expected to grow? What are the means by which Canada can ensure that misunderstandings do not drive an uncontrollable dynamic that leads the Arctic to become a region of competition and conflict?

Finally, how can the navy best be prepared to respond if relations with Russia deteriorate? If the Defence Review finds that the increased tensions are being caused by a Russia that is acting more aggressively in the Arctic and the world, then it must determine what Canada must do to ensure that its Arctic security is protected. This will require a consideration of the equipment and policies that Canada can pursue on its own, but also the actions it needs to take in cooperation with its allies in the region. This will include (but not be limited to) the United States and in particular cooperation through NORAD, and also cooperation with European allies through NATO.

This will not be easy. There are a wide number of unknowns that could lead Canada into very different security environments in the Arctic. Nevertheless, given the importance of the region, it is imperative that the government give this careful consideration in order to gets its Arctic security policy as correct as possible.

Notes

1. Canadian Defence Reviews follow a range of formats. Since 1964 there have been six such exercises that have produced either a Defence White Paper or something similar. (1) government of Lester B. Pearson (Liberal), *White Paper on Defence* (1964); (2) government of Pierre Trudeau (Liberal), *Defence in the 70s: White Paper on Defence* (1971); (3) government of Brian Mulroney (Conservative), *Challenge and Commitment: A Defence Policy for Canada* (1987); (4) Government of Jean Chretien (Liberal), *1994 Defence White Paper* (1994); (5) Government of Paul Martin (Liberal), *Canada's International Policy Statement: A Role of Pride and Influence in the World - Defence* (2005); and (6) government of Stephen Harper (Conservative), "Canada First Defence Strategy" (2008).
2. An exception is the 1947 Defence Review that was conducted by Prime Minister William Lyon MacKenzie King. This was done at the end of his term in office.
3. Susan Joy Hassol, *Impacts of a Warming Arctic: Arctic Climate Impact Assessment* (Cambridge: Cambridge University Press, 2004).
4. Eric Rignot, Isabella Velicogna, Michiel van den Broeke, Andrew Monaghan, and Jan T.M. Lenaerts, "Acceleration of the Contribution of the Greenland and Antarctic Ice Sheets to Sea Level Rise," *Geophysics Research Letters*, Vol. 38, No. 5 (March 2011).
5. US Geological Survey, *Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle*, July 2008.
6. See for example Roger Howard, *The Arctic Gold Rush: The New Race for Tomorrow's Natural Resources* (London: Continuum, 2009); and Richard Sale and Eugene Potapov, *The Scramble for the Arctic: Ownership, Exploitation and Conflict in the Far North* (London: Frances Lincoln, 2010).
7. For a good consideration of some of the key difference see Franklyn Griffiths, Rob Huebert and Whitney Lackenbauer, *Canada and the Changing Arctic: Sovereignty, Security and Stewardship* (London ON: Wilfrid Laurier University Press, 2011).
8. For the assessment of Russia see Alexander Sergunion and Valery Konyshev, *Russia in the Arctic: Hard or Soft Power* (New York: Ibidem Press, Columbia University, 2015); for the United States see Whitney Lackenbauer and Rob Huebert, "Premier Partners: Canada, the United States and Arctic Security," *Canadian Foreign Policy Journal*, Vol. 21 (2015), pp. 1-16.
9. Katarzyna Zysk, "Russia Turns North, Again: Interests, Policies and the Search for Coherence," in Leif Christian Jensen and Geir Honneland (eds), *Handbook of the Politics of the Arctic* (Cheltenham: Edward Elgar, 2015).
10. Robert Burns, "US to Beef up Missile Defence against North Korea," *Alaska Journal of Commerce*, 21 May 2013.
11. Missy Ryan and Dan Lamothe, "Chinese Naval Shops came within 12 Nautical Miles of American Soil," *Washington Post*, 4 September 2015; and Shannon Tiezzi, "China's Navy Makes First-Ever Tour of Europe's Arctic States," *The Diplomat*, 2 October 2015.

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The Royal Canadian Navy: The Ocean at our Gates

Rear-Admiral John Newton

Seaward of Canada's naval bases at Halifax and Esquimalt, vast ocean moats separate us from mankind's insecurities. To the north, we are defended by a polar palisade. That said, nature's Maginot Lines, seemingly protective barriers in peace, are strategic vulnerabilities if left untended.

In two World Wars, hard-fought victory at sea enabled success ashore. In the Cold War, substantial investment in surveillance defended the north; the desolate ice and archipelago aiding our adversary's bomber and ballistic missile capabilities. Despite the march of time and technology, long range and stealth still give submarines a disruptive advantage against coastal state authority. Regional wars threaten broader stability, the ocean approaches and anti-access strategies deter the peace-minded interventions by any league of united nations.

Today, we enjoy the benefits of a globalized economy, fueled by hydrocarbons and on-time trade transported on the oceans and through strategic chokepoints. Sadly, sea lanes equally facilitate the smuggling of illicit cargos, transnational criminality and deadly migrant flows. Effective and constant effort by maritime authorities is required to thwart these in addition to terror plots, piracy, illegal arms shipments, and unregulated fisheries and natural resource exploitation. Meanwhile, select countries are investing in powerful navies, some of them pressuring others to accept the terms of their hegemony.

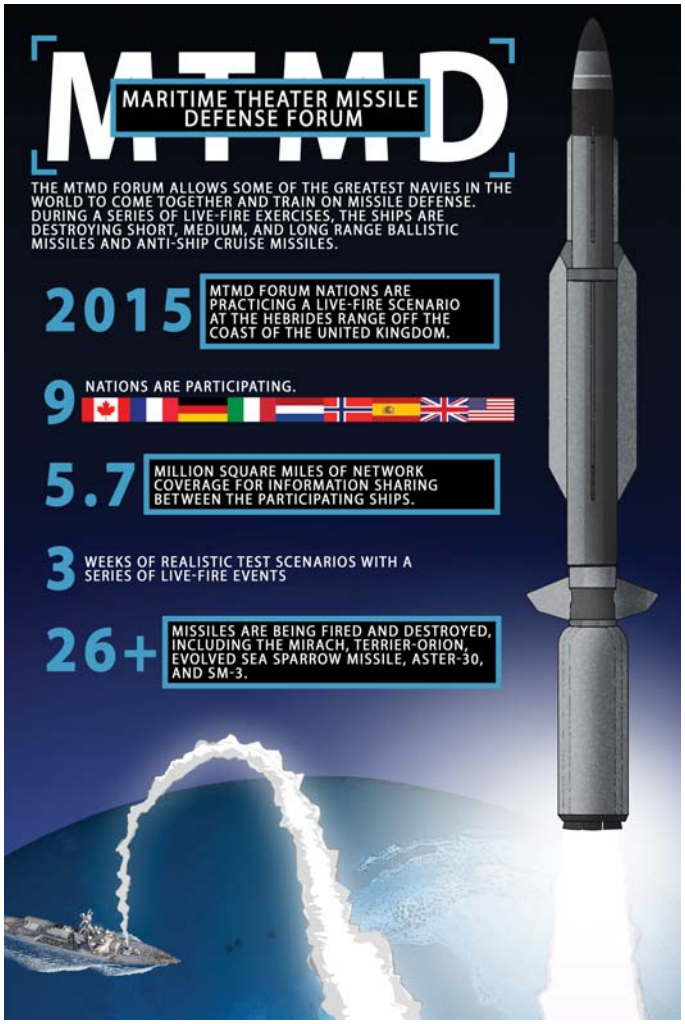
Consequently, Canada cannot rest assured that its ocean frontiers protect its national interests. Working with other government department partners in the maritime domain, operating jointly with army and air forces, collaborating with allies and demonstrating resolve to confront maritime challenges by deploying into exercises, patrols and capacity-building endeavours, the utility of the Royal Canadian Navy (RCN) is maximized. What follows are the highlights of recent operational activities as the modernization of the *Halifax*-class enters its third trimester, the first ship of the Arctic Offshore Patrol Ship class is being built and an Interim Auxiliary Oiler Replenishment ship is prepared for delivery in 2017.

While the east is the normal entry route for Arctic naval patrols, warships entered the north via the west for the first time since 1955. At the Mackenzie River, two *Kingston*-class ships joined federal and territorial partners, army and air forces in exercising a response to a major fuel spill, while supporting domestic policing and border security scenarios. These were hardly far-fetched activities as Arctic Council members prepare contingency plans for cruise ship traffic through the Northwest Passage in 2016. In the central Arctic, a patrol ship from the Atlantic supported the Canadian Hydrographic Service, assuring safety along the navigation corridors with precision multi-beam sonar surveys. At the eastern entrance of the passage, a fourth ship serviced surveillance systems with defence research partners, timely innovation as shipping interests warm to the changing ice regime.

The ability to sense and act in all of Canada's lands and waters is the essence of sovereignty, and foundational to this effort is effective partnerships within the broader federal family in support of policing, border security, fisheries protection, shipping safety and environmental stewardship. The RCN is a foremost partner in Canada's Marine Security Operations Centres, which are successful whole-of-government collaborations now enjoying 10 years of operational success. With these domestic experiences, including winter ice-diving at the HMS *Erebus* wreck site, RCN sailors have broadened their competency base and are expressing enthusiasm to join the first crew of HMCS *Harry DeWolf* in 2017, a ship now being built under the auspices of the National Shipbuilding Strategy (NSS).

In Newfoundland and Labrador, the modernized frigate HMCS *Charlottetown* carried the Lieutenant-Governor through dangerous channels to the coastal communities from Nain to Rigolet. Canadians who live at the extremes of geography and climate need to see and believe in their military's readiness to respond to domestic contingencies no matter the great distances or difficulties of access. It is exciting to witness the convergence of military capabilities with the navy's *Harry DeWolf*-class. The Canadian

*HMCS **Summerside** assists with the seizure of more than 300 kilograms of cocaine on 7 March 2016, off the coast of Nicaragua while participating in **Operation Caribbe**, the multinational campaign against transnational criminal organizations in the Pacific Ocean and the Caribbean.*



It is important to maintain technological proficiency by practicing with allied navies to keep up with evolving threats.

Armed Forces now boast specialized Arctic ground forces, Rangers, dirt-strip-capable large transport planes, modernized long-range patrol aviation, powerful heavy-lift helicopters, long-range communications and effective operational command and control via the Regional Task Forces. Consequently, it is easy to envisage a joint mission approach for the new Arctic patrol ships. They are being purpose-built to provide sealift, surveillance, search and rescue, command and control, and coordinated air-sea interdiction, with benefit too for federal partners, science, communities and a wide range of traditional missions including humanitarian aid and disaster relief.

From Canada's Atlantic base, HMCS *Athabaskan*, *Montreal* and *Halifax* joined American forces for naval exercises around the British Isles. HMCS *Windsor* sailed independently, disappearing into the depths of the north Atlantic before rendezvousing overseas with allied counterparts. Trust, integration and interoperability among allies is the essence of naval power, and it is noteworthy that the Canadian Fleet Commander had command of international forces, charged with elevating the readiness of all under his control. Interoperability standards and procedural commonality is the fruit of decades of labour by NATO. But it takes practice in complex operational scenarios to sustain the operational proficiency of crews, and among air, land and sea forces, and 28 allies. The flagship, HMCS *Halifax* was selected for its specialized command and control capabilities and additional communications installed in the first four modernized frigates, a bridging capacity to the future naval command and control requirements to be satisfied by the Canadian Surface Combatant now progressing through key program milestones of the NSS.

Joint Warrior, NATO's massive Trident Juncture, and the equally large Rim of the Pacific (RIMPAC) events are more than just exercises. They are strategic signals of intent, highlighting broad-based coalition harmony on the many security issues troubling the oceans. Moreover, the steady flow of modernized frigates, including HMCS *Winnipeg*, *Fredericton* and *Charlottetown*, in addition to mine countermeasure forces, are solid contributions to the Standing NATO Maritime Groups and provide clear reassurance to allies feeling the effects of proximal wars.

Ships are not the only contributions worth noting. Canadian leadership at sea is eagerly sought. In Trident Juncture, the Task Group Commander led a large international force. In the International Mine Countermeasures Exercise 2016 in the Persian Gulf, a Captain led the largest of three mine countermeasure groups, commanding multiple ships, helicopters, mine-hunting capabilities and dive teams. Preparing for deployment, a Commodore and staff will command Combined Task Force 150 for maritime security operations in the Arabian Sea in late 2016 with staff support from Australia. In RIMPAC 2016, a Rear-Admiral will lead as Deputy Commander of the 25-state event, with a Captain and staff providing at-sea leadership of a major surface force.

An example of the RCN's advancement into new capability domains was highlighted by HMCS *Montreal*. In October 2015, she took her place on the firing line at the giant Hebrides missile range, participating in advanced maritime theatre missile defence tests with partners from the Netherlands, Italy, Norway, Spain, the United Kingdom and United States. A state-of-the-art, high-speed data link plugged the ship into an international ground-air-space network, providing warning of distant missile launches and precision tracking. Early warning and speed of response are key to defending against latest generation missile threats, and *Montreal*'s crew validated significant elements of the combat system modernization of the *Halifax*-class. With *Montreal* successfully engaging sea-skimming cruise missiles, a US Navy destroyer engaged missiles arcing across space in the first-ever demonstration of theatre missile defence in a multilateral maritime forum in Europe.

Not to be outdone, the aging HMCS *Athabaskan* sortied her two helicopters in some of the most difficult conditions imaginable, perfecting launch and recovery, anti-submarine warfare and surface surveillance: essential learning for aviators as the tempo of transition to the new Cyclone helicopter picks up aboard HMCS *Halifax* and *Montreal*. Concurrently, *Athabaskan* sailors honed their skills. Maritime operations have a foundation of competencies that are perishable including communications, damage control, seamanship, helicopter operations, maintenance at sea, refueling while underway, and boarding operations to name but a few. While *Athabaskan* is in the twilight of her service, she remains instrumental in sustaining these skills for hundreds of sailors as they await the last of the *Halifax*-class returning from modernization refits.

In the Pacific, where distances are greater, and partner state relationships that much more important to sustain deployments, the fleet was active. Working with 14 Central and South American states, a maritime and aviation task force was employed in an integrated surveillance and interdiction effort. HMCS *Brandon*, *Whitehorse* and *Vancouver* had historic success in winter 2015, interdicting over five metric tonnes of cocaine, disrupting a trade that weakens governments and terrorizes populations. Most recently, HMCS *Saskatoon*, *Brandon*, *Summerside* and *Moncton* working in close partnership with the US Coast Guard accomplished a string of major interdictions.

The RCN is also a key partner in the North American Security Initiative with the United States and Mexico, developing and proving tactics for operations against threats to regional security. Additionally, patrol ships and specialists annually support capacity-building efforts in Caribbean states, instructing seamanship, watchkeeping, boarding and diving operations. Contributions to regional peace and security have not gone unnoticed. This summer, Commander RCN will host the Chiefs of regional navies at the Inter-American Naval Conference in Halifax, examining the future security environment affecting the hemisphere.

Esquimalt-based crews in modernized frigates have integrated into Combat Strike Groups of the US Navy, most recently in November 2015. HMCS *Winnipeg*, recently returned from over eight months on the NATO Reassurance mission, is being readied to deploy again into the Indo-Asia-Pacific region to work closely with allies. Notably, she carried the first Enhanced Naval Boarding Party, a combat team capable of obstructed boardings and support to Special Operations Forces. HMCS *Vancouver* just deployed to Chile, emphasizing a relationship with one of Canada's foremost allies in South America. Chile has helped train junior naval officers for years and seconded an auxiliary ship to sustain vital Canadian replenishment-at-sea skills while we await an Interim Replenishment Oiler solution in 2017 (and Joint Support Ship thereafter). In return, Canada has helped train Chilean naval specialists, and provided leadership support to undertake multinational force command in the RIMPAC exercise. Of keen interest to the greater Canadian Armed Forces, HMCS *Vancouver* undertook a major live-fire, Joint Targeting Exercise, exploring the interactions among land, sea and air forces, and commanders ashore when delivering long-range ordnance from warships into the land battle.

Nowhere is defence collaboration more important than in undersea warfare. Staffs have paved the way for effective *Victoria*-class submarine operations in the Pacific and Atlantic Oceans, a theatre-scale effort necessary to prevent underwater collisions and maximize the detection opportunities for allied forces against sub-sea tracks of interest. Deploying HMCS *Windsor* to Trident Juncture necessitated close coordination among international forces at sea, command authorities ashore and intelligence agencies. But once deployed, *Windsor* and RCAF long-range patrol aircraft were important elements in a broad oceanic effort to detect and track a surge of foreign naval interests in late 2015. Additionally, months of training and development between Canadian Special Operations Forces and submarines culminated in a demonstration of mobility and stealth delivering assaulting forces to distant shores and then repatriating them safely. Home for a short respite, coastal operations, training and scheduled maintenance, Canadian submarines are being prepared to deploy yet again on defence tasks in 2016. One such event is Exercise Cutlass Fury 16, a Canadian-led, international undersea warfare event being hosted by Canada in the Atlantic in October.

These examples are but a sampling of the busy tempo of activity being undertaken by the RCN. Excellence at sea occurs against a backdrop of a broader executive plan designed to increase the readiness and effect of the navy, its Reserve and Regular Force members, and civilian support staff ashore. In concert with other government departments and allies keen to undertake maritime security operations at home and abroad, RCN sailors stand toe-to-toe with foreign counterparts by any measure of skill, readiness and employability in the worst security scenarios imaginable. Canada's ocean frontiers are safer because of them.

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Making Waves

Is 'Maritime' Still in the Future of Maritime Air?

Colonel (Ret'd) John Orr

The decision by the government of Canada to withdraw the CF-18 Hornets from *Operation Impact* (Air Task Force - Iraq) met with considerable debate within the Canadian defence community. What has provoked much less debate is the equally significant decision to leave two CP-140M Aurora aircraft in theatre along with a CC-150T Polaris tanker. This article will examine this decision and how it may presage decisions with respect to 'Maritime Air' in the Defence Review.

In one respect, the decision to leave the Auroras in theatre can be viewed as a token contribution to the Middle East Stabilization Force – the multinational coalition intended to halt and degrade the Islamic State of Iraq and the Levant (ISIL). In this sense, a decision to stay is merely another illustration of the minimalist principle of Canadian participation in an alliance. Indeed, Dr. Joel Sokolsky opined that instead of asking "How much is enough?" Canada's political leaders phrased the question as "How much is just enough?"[1]

In another respect, the decision to leave the Auroras in theatre principally to conduct intelligence, surveillance and reconnaissance (ISR) missions reflects the hard reality that there can never be enough intelligence. This is an age-old challenge and the modern-day Nelsons out there will decry their lack of surveillance assets as much as Nelson begged for more frigates.[2]

I would argue, however, that the decision to leave two Auroras in theatre as part of *Operation Impact* reflects the changing nature of Canadian Armed Forces (CAF) operations and should be reflected in the Defence Review. Of course, the impressive ISR capability of this platform makes such a decision very easy. (Readers of this journal will certainly be aware of the updated Auroras' capabilities as described by Colonel Iain Huddleston in the Spring 2015 issue of *Canadian Naval Review*.[3]) The decision to equip the Aurora with an overland-capable synthetic aperture radar (SAR) along with an accompanying real-time data link reflects well on the foresight of the Royal Canadian Air Force (RCAF) operational and procurement staffs in National Defence Headquarters as well as the competence of the Canadian aviation industry. That this was accomplished in a time of reduced budgets is even more impressive.

But, and there is always a but, the deployment of two CP-140M Auroras to *Operation Impact* means that there are two less airframes available for operational (Force Employment) tasking in the traditional deep ocean preserve of maritime aviation. When you consider that two aircraft in theatre necessitate up to six airframes to meet the requirement, the impact on a fleet of only 14 aircraft is brought out in stark relief. Any offsetting reduction in training (Force Generation) might be appealing in the short term but should be rejected out of hand as it would have disastrous effects downstream.

Turning now to the rotary wing side of maritime air, while it is late and still will not achieve its full operational capability for months to come, the CH-148 Cyclone is at some point going to replace the Sea King helicopters on Royal Canadian Navy (RCN) ships. It is currently intended that the Cyclone will capitalize on the work carried out on the Auroras, especially in the area of overland ISR. Once this capability materializes, it is likely that, as in the case of the Sea Kings in and over Somalia during *Operation Deliverance* in the early 1990s, Cyclones could be operated either from ashore or from platforms in littoral waters to provide ISR support to ground forces.

It is critical, therefore, that the Defence Review address where and how the CAF are to be employed in the future. Will the government decide to revert to more traditional concepts of alliance warfare or will there be more operations like *Operation Impact*? Whatever the decision, it will have a significant bearing on the future employment of the Auroras and the Cyclones.

Credit: Op Impact, DND

An aircraft technician from Air Task Force – Iraq marshals a CP-140 Aurora aircraft into Camp Canada in Kuwait during ***Operation Impact****, December 2015.*

If I were to hazard a guess, I'd guess that there will be many more *Impact* types of operations in the future and an accompanying call for the overland ISR capabilities that both the Aurora and Cyclone possess. There will, however, be an equal pull for both platforms to return to their traditional roles, especially the Aurora. As a recent news release noted, the US Navy is redeploying its P-8 maritime patrol aircraft to its Cold War base in Keflavik, Iceland, to counter Russian submarine activity. And keen observers will have noted that Auroras have been deployed to the United Kingdom to assist the Royal Air Force/Royal Navy in their maritime surveillance operations as a result of an ill-advised decision by the British government to cancel the refit of the British maritime patrol aircraft fleet.

Is there a solution to alleviate the burden on the already stretched maritime air fleets? Possibly, but it would require further capital expenditure and will pose a moderate to high technological/implementation risk.

There has been a longstanding project on the books to acquire unmanned aerial systems (UAS) for the CAF. However, Project

Joint Uninhabited Surveillance and Target Acquisition System (JUSTAS) has yet to emerge from the procurement swamp for a variety of reasons – not the least of which is the lack of a strong sponsor, always a hazard for a 'joint' project. Furthermore, an agreed statement of requirement has yet to emerge and the recent musings by the Chief of the Defence Staff regarding whether such UAS platforms should be armed indicate that there is still a debate ongoing inside National Defence Headquarters.

A decision to acquire one of the several unarmed Medium Altitude Long Endurance (MALE) UAS platforms currently available would go a long way to free up the Auroras for non-traditional operations such as *Operation Impact*. But a word of caution, this is a new capability and will not be cheap to acquire either in terms of equipment or personnel.

In the case of the Cyclones, UASs may also provide at least part of the answer. The RCN has operated small UASs borrowed from the army to provide short-range aviation support in the absence of Sea King helicopter detachments. In the event that *Operation Deliverance*-type operations occur again, it is highly likely that there will be a drawdown of ship-based Cyclones to meet a requirement for the support of ground forces ashore. This will leave operational RCN ships without an aviation capability unless a dedicated UAS project is undertaken in the immediate future.

So the challenge for the drafters of the Defence Review is to choose a path to the future for the Canadian Armed Forces (CAF). Whatever path is chosen will have an important impact on maritime air forces.

Returning to a Cold War paradigm of deep-ocean anti-submarine operations within an alliance framework is well within the capability of the current and projected aircraft fleets although there will be limited flexibility due to the low numbers of platforms. Given the nature of recent operations by the CAF, however, this is unlikely to materialize.

What is far more likely to occur is that future operations will place a high priority on the overland ISR capabilities of both maritime air fleets. If projects such as JUSTAS are funded and fielded in the near future, unmanned aerial systems can pick up the deep-ocean and coastal surveillance of the approaches to North America. Without JUSTAS, the difficult becomes impossible.

On the rotary-wing side, operations such as *Operation Deliverance* where helicopters provided a host of functions to ground forces ashore from a supply ship/oiler-type platform are more than likely to materialize. In this event, helicopters from operational ships will be retasked and there do not appear to be any UAS contenders available to fill the aviation gap for the frigates of the surface fleet.

All in all, the Defence Review will have a profound impact on the way that maritime air forces are employed in the future and, as argued here, there may be less and less 'maritime' in maritime air.

Notes

1. See Joel J. Sokolsky "Realism Canadian Style: National Security Policy and the Chrétien Legacy," Institute for Research on Public Policy, *Policy Matters*, Vol. 5, No. 2 (June 2004).
2. "Was I to die this moment, 'Want of Frigates' would be found stamped on my heart," Horatio Nelson to Earl Spencer 9 August 1798, quoted in www.wtj.com/archives/nelson/1798_08b.htm.
3. Colonel Iain Huddleston, "Changing with the Times: The Evolution of Canada's CP-140 Aurora," *Canadian Naval Review*, Vol. 11, No. 1 (Spring 2015), pp. 10-15.

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Is There a 'Made in Canada' Premium for Building Warships?

Dr. Eric Lerhe

There is probably no aspect of the National Shipbuilding Strategy (NSS) more contentious than the premium Canadian taxpayers pay for constructing warships in Canada. It has been argued that Canada will pay five times what the Koreans might charge for the supply ships and seven times what a Polish-built Arctic patrol ship would cost.[1] Yet in 1999, DND's audit office, the Chief of Review Services (CRS), compared the cost of the Canadian Patrol Frigate (CPF) with the costs of other Western-built warships and found that "the production cost for the last ship is reasonably competitive with other nations."[2]

There was no way to corroborate or update the CRS findings until the publication of the 2014 RAND report "Australia's Naval Shipbuilding Enterprise."[3] I will be making the case that this study provides lessons in cost premiums and shipbuilding efficiency for the NSS and particularly the Canadian Surface Combatant (CSC).

CRS Cost and Capability Comparison 1999

The CRS report compared the costs and capabilities of the CPF with seven to 11 other Western frigates. The centrepiece of its comparison was the CPF "Sailaway Cost Comparison" graph and the assertion that the cost of the last Canadian frigate built was 'reasonably competitive' with its Western counterparts.

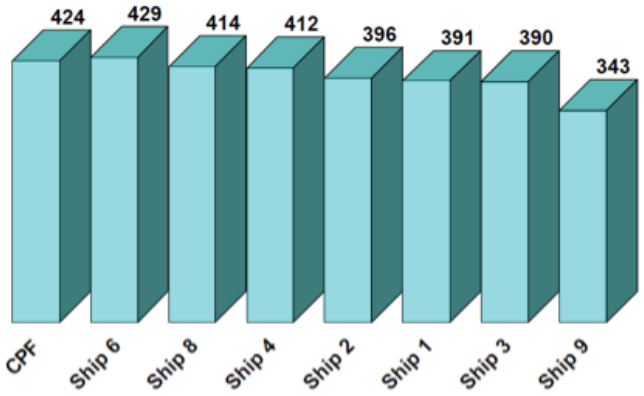
Figure 1 makes clear that the CPF costs were within 7% of the average cost of the counterpart ships. As you can see from the figure, only seven ships of the 11 ships could be compared for sail-away cost because of incompatible or missing data.[4]

The CRS study also compared the fighting capability of the CPF with its Western equivalents. The study concluded that the CPF was the combat superior to all of the ships under consideration except for one which was its apparent equal.[5] An annex provided the warship details to allow a ship-to-ship measuring of the actual capability differences. In more subjective areas

like systems integration the CRS report relied on outside assessors, such as the US-based group Forecast International or major international journals to make the case. An article in the journal *Naval Forces*, for example, described the CPF's successful and fully distributed command system as a world "first."[6]

The CRS report hinted at problems other ships had in the command system category. Ship 1 was the British Type 23, which an article in the respected journal *SIGNAL* described as a "worst-case scenario" of combat system "disintegration," noting "[t]he first seven ships, F230 to F236, were at sea for more than 10 years without any combat display system at all."[7] Ship 2 was the USS *Oliver Hazard Perry*-class frigate (FFG-7), and the first of these was delivered without a naval tactical data system or towed array. Ship 4 was the French *Lafayette*-class, which the CRS report notes lacked a sonar, towed array and anti-submarine torpedo tubes. Moreover, the detailed capability annex to the CRS report show its anti-surface and anti-air weapons were inferior to the CPF. Regrettably, the CRS report did not relate ship combat capability to ship cost. There are now, however, studies that partially resolve this.

Figure 1. CPF Sailaway Cost Comparison with Frigates from 7 States ($M)



Note: Design, facility, depot spares, PMO, documentation and training costs are not included in NATO sailaway costs.

Source: DND, Chief Review Services, "Report on Canadian Patrol Frigate Cost and Capability Comparison," Figure 4, p. 10.

In 2014 the RAND Corporation was engaged by the Australian Department of Defence to examine Australia's shipbuilding industry, suggest alternate approaches, and gauge the 'made in Australia' premium for warships. Given that the Australian experience is also one of 'boom and bust' offset by a navy that needed advanced warships, there are obvious parallels to Canada.

The Australian study too had difficulty extracting national ship cost data and, like the DND CRS study, relied on a modified form of sailaway cost it termed the 'unit procurement' cost or 'purchase price' that also excluded design costs. However, in a partial effort to include capability within its costing comparisons it used cost per ton (CPT) data rather than simple cost as it compared the *Anzac* frigate to a range of foreign warships including, thankfully, the USN FFG-7 that was also measured in the 1999 Canadian study. In fact, throughout the RAND study, US equipment and costs were the baseline against which Australia was measured. This allows one to input Canadian CPF data into the same calculations and the results are shown in Table 1.

This table shows that the Australian *Anzac* frigate had a cost per ton that was some 42% higher than the USN FFG-7 baseline (the number was obtained by adding 1.36 and 1.48, and dividing by 2). The CPF cost per ton range averages out to only 4.5% higher. This comparison certainly shows that Canada should not be expecting a significant 'made in Canada' premium based on CPT data.

The RAND report also partially offsets the problematic warship costing data by examining a spread of inputs that include shipyard labour rates, broad industry construction costs and productivity instead of relying on costing data alone. Many of these input data sources are available on the internet and are pulled from credible sources – like the US Bureau of Labor Statistics. The logic underpinning the RAND analysis is that labour costs and yard productivity have a direct bearing on warship costs (representing up to 40% of their value) because the remaining material costs are likely to be equal given that much of the combat systems and ship machinery is purchased on the international market.[8] An Industry Canada analysis of warships and patrol vessels came to the same conclusion.[9]

RAND begins the labour and productivity comparison by comparing shipbuilding wages in Australia with those of other states baselined against the United States. I have added the 2013 Canadian data from Industry Canada which uses the same index as RAND's US source and I have done the currency conversion.

While the Australian shipyard rates were 39% higher than the US baseline rates in 2013, Canadian rates were 17% less. This indicates significantly lower actual labour costs combined with a cost-favourable currency exchange rate with regard to the United States.

A similar effort was made to compare hourly compensation costs which add sick pay, vacation, health insurance, unemployment insurance and payroll taxes to the basic national manufacturing labour cost. The same US Bureau of Labor Statistics "International Comparisons" source used by the RAND report shows Canada's rate as 4% higher than the US baseline rate while Australia's is 34% higher.

The RAND report then compares construction costs using Compass International data on the oil and gas industry as the shipbuilding industry employs many of the same trades and contractors.[10] This combined labour, equipment and construction costs, and I used the same source and ratios to derive like Canadian oil and gas costs. The results show Canada's Gas Plant Construction costs as 20% higher than the US costs, in part reflecting Compass International assigning a 1.15 labour

Table 1. Unit Procurement Cost and Relative Index Cost Data, Frigates

		Relative CPT Index[a]	
Ship	**Country**	**Low**	**High**
F590 FREMM	Italy	0.95	1.00
D650 FREMM	France	1.18	1.24
De Zeven Provinciën LCF	Netherlands	1.00	1.07
Iver Huitfeldt	Denmark	0.56	0.62
Anzac	Australia	1.36	1.48
Incheon	Korea	0.65	0.75
Oliver Hazard Perry FFG-7	United States	0.93	1.07
Littoral Combat Ship[b]	United States	1.42	1.44
Canadian Patrol Frigate	**Canada**	**0.83**	**1.26**

Notes: (a) *Oliver Hazard Perry*-class FFG-7 is set to 1.0; (b) because the authors did not have costs split by variants, they reported an average cost instead. Also, these costs do not include mission module costs.

Source: With the exception of the Canadian data, this data is taken from Table 5.9 of RAND, "Australia's Naval shipbuilding Enterprise," 2015.
Sources for Canadian data: The average cost per ton ratio between the CPF and FFG-7 was 104%. The CPF data shown comes from CRS, "Report on Canadian Patrol Frigate Cost and Capability Comparison," the combined DND/PWGSC report, and interview data then converted to cost per ton. This is then based-lined to the FFG-7. The latter is 1150 tons less than the CPF's 5235 tons. For FFG-7 costs I used the NAVSEA 017 Ship Acquisition Database data quoted in Robert Francis Dudolevitch, "A Cost Comparison between Active and Naval Reserve Force FFG Seven Class Ships," Thesis, Naval Postgraduate School, Monterey, California, 1993, p. 7. I also used Forecast International, "FFG-7 Oliver Hazard Perry Class (archived)," August 2002, p. 4.

productivity index to Canadian industrial labour overall. RAND calculated the same percentile for the Australian gas plant costs.

RAND then used First Marine International (FMI) shipyard productivity data to assess relative Australian construction costs. These costs were assessed as 45% higher than the US baseline relying primarily on the problematic Australian Air Warfare Destroyer (AWD) program.[11] While the RAND report based its relative construction costs on a 'compensated gross tonnage' system that included no Canadian data, the report notes that those results are "consistent with the view of that program's [the AWD] performance." That and the extensive use of FMI standards by both Australia and Canada allow a credible comparison with current Canadian productivity within the NSS.

The Australian approach to building the AWD relied on a distributed construction approach whereby three different yards built large modules which were transported for assembly in the Australian Submarine Corporation (ASC) yard near Adelaide. However very early it was discovered that the contributing BAE yard in Williamstown had one of its blocks "out of dimensional tolerance" and "distorted" according to the Australian National Audit Office (ANAO).[12] The remaining module work assigned to BAE then had to be transferred to Navantia's Spanish and British yards.

FMI, a recognized assessor of shipyard productivity, was brought in to advise the government at construction start. It reported to the government, and its role towards the shipyards was one of suggestion and focused on productivity improvements. Three years later, however, FMI claimed that only 5% of the issues it had raised with the shipyards had been "resolved," with another 24% partially resolved. And 68% were "issues where little effective action had been taken," or new issues.[13] Moreover, the project's program manager reported that the "call for improvement has not been consistently accepted by the shipbuilder."[14] Unsurprisingly, the program was late and over budget.

Table 2. Direct Hourly Wage Rates for Boat and Ship Building

Country	Direct Pay per Hour	Converted Direct Pay (AUD per hour)	Relative Pay (USA = 1.0)	**Source**
Australia	AUD 38.80[a]	38.80	139%	Australian Bureau of Statistics, "Employee Earnings and Hours, Australia," May 2013
USA	USD 24.50	27.84	100%	US Bureau of Labor Statistics, "National Industry-Specific Occupational Employment and Wage Estimates: NAICS 336600 – Ship and Boat Building," May 2013
UK	£ 16.35	29.75	107%	UK Office for National Statistics, "Weekly Pay – Gross (£) – for Full-Time Employee Jobs: United Kingdom, SIC2007, Table 16.1a," 2013
Canada	**CAD 23.00**	**23.23**	**83%**	**Industry Canada, "Ship and Boat Building: Salaries and Wages," NAICS 3366, 2013**

Notes: Values are reported on a fixed 2013 basis; (a) value has been escalated from 2012 to 2013 to be on a comparable basis.

Source: With the exception of the Canadian data, this table came from RAND, "Australia's Naval Shipbuilding Enterprise," Table 5.1. The Canadian data was obtained from Industry Canada, as noted in the source column.

Table 3. Summary Metrics for Australian and Canadian Shipbuilding Costs Relative to a US Basis

Method	Metric	Approximate Australian Premium Relative to a US Basis (%)	Approximate Canadian Premium Relative to a US Basis (%)
Input	• Direct shipbuilding labor wages • Manufacturing labor costs • Oil and gas industry construction • Construction costs adjusted to FMI shipbuilding productivity	40 35 20 45	-17 04 20 -12.5 to +12.5
Comparative	• Frigate costs • Destroyer costs • Amphibious ship costs	40 30 12	-17 to +26 N/A N/A
Parametric		35	N/A

Source: The Australian data is from RAND, Australia's Naval Shipbuilding Enterprise," 2015, Table 5.13. The Canadian data is a summary of Canadian data presented in previous tables here.

The situation in Canada under the NSS is quite different, especially in the more powerful role played by FMI as the productivity monitor. In Canada's case, FMI was brought in as a third-party assessor by the government five years before construction began. It assessed which two of the five competing Canadian shipyards were likely to be able to meet international standards for efficiency and it outlined to the winning yards precisely what productivity investments were needed. It will assess whether the Halifax and Vancouver yards have met the 'target state' production efficiency that will place them in the top quartile of shipyard productivity in the world. Undoubtedly, once reached, one can expect ongoing measurement to ensure efficiency is maintained and improved. Moreover, follow-on shipbuilding contracts are understood to be conditional on them maintaining 'top quartile' standards.[15] There have been public reports that they are meeting those goals and the two yards openly supported the FMI process.[16] They are specifically not resorting to the distributed construction approach used in the Australian AWD. The Irving yard will also have its CSC workforce prepared by five years work on the Arctic Offshore Patrol Ship. All of this suggests that Canadian productivity is likely to be within the top quartile of efficiency demanded by the contracts. This should, as a result, mean relative costs will be in a 25% band centred on the US baseline.

Table 3 shows the Canadian data from the previous tables, save for 'parametric' data, 'Destroyer costs' and 'Amphibious ship costs.' There is no matching recent Canadian data on the latter two, and the parametric process used within the RAND report is not accessible. Where RAND argued the Australian premium was in the 30-40% range, my data suggest that the 'made in Canada' premium for warships lies in a band -17 to +26% centred on 4%, a result not far from the 1999 CRS result. I fully admit that I should be ready to have other researchers expand that band. But what is absolutely clear is that no foreign yard offers the possibility of warships five to seven times cheaper.

Conclusion

The RAND report argued that it could reduce the 'made in Australia' shipbuilding premium from 30-40% to 20% if the government moved to a continuous shipbuilding strategy and introduced a form of continuous improvement, much like that within the Canadian NSS process. It also argued that the long-term allocation of government warship work would encourage the needed investments in shipyards and worker upgrading also seen in Canada.

A year later, the Australian government followed that recommendation and assigned frigate and patrol shipbuilding contracts worth (AUD)$40 billion to ensure a continuous series of work would follow the AWD project. As the Canadian NSS process had started that same path six years earlier, it seems difficult to believe that Canada's building premium could exceed Australia's targeted 20% rating.

These two studies demonstrate that a country will only be able to maintain low national premiums for shipbuilding if it learns certain lessons, including:

- Shipyards building government vessels will only invest in modern facilities and trained workers if there is predictable long-term government work. The NSS needs to maintain its 30-year outlook.
- Within that long-term outlook governments also have a responsibility to ensure their ship needs do not arrive in a boom-and-bust cycle. Load leveling is needed, otherwise shipyards face gaps and difficulty retaining skilled workers.
- Shipyards, in return, must continue the drive for efficiency and the government has every right to monitor this via mechanisms such as FMI assessments.
- Governments have recognized and must continue to recognize that there is no point allowing new, and especially unreformed, shipyards into this mix.
- All the ships of one class must be built in one yard and not distributed to provide short-term regional benefits. This can reduce the learning curve and lead to greater efficiency.

Notes

1. Terry Milewski, "Canada's Vast Shipbuilding Plan Still at Starting Line," *CBC News,* 4 May 2015.
2. Department of National Defence (DND), Chief Review Services (CRS), "Report on Canadian Patrol Frigate Cost and Capability Comparison," 7050-11-11 (CRS), 26 March 1999.
3. John Birkler, et al, *Australia's Naval Shipbuilding Enterprise: Preparing for the 21st Century* (Santa Monica, CA: RAND Corp. 2015).
4. The CRS study found that four of the ships had sailaway costs that were greater than acquisition costs. Some elements of this comparison were criticized, with one reviewer pointing out the report's elimination of design costs potentially skewed the cost calculations in favour of the 12 ship CPF program (and other smaller ship runs). The CRS report was justified in so doing given the lack of such data from most of the other ships, coupled to the fact that during the FFG-7 project (one of the ships

compared with the CPF), the Congressional Budget Office reported that the US Navy did not pay for detailed design work with production funds. There were other complications, including the Canadian government's insistence that the salaries and benefits of the 300 personnel in project management be included in the project's costs as well as a decision to provide the CPF with 15 times the spares of comparable US or NATO ships.

5. CRS, "Report on Canadian Patrol Frigate Cost and Capability Comparison," p. 10/13. From Annex A it is also relatively easy to identify Ship 1 as UK Type 23, Ship 2 as USS *Oliver Hazard Perry*-class frigate, Ship 4 as French *Lafayette*-class, and Ship 7 as Australian *Anzac*-class. I am not certain of the identity of the others due to their lack of distinctive features.
6. Anthony Reston, "Seeing the Big Picture," *Naval Forces*, November 1994, Volume XV.
7. James C. Bussert "Foreign Navies Combat System Dis-Integration," *SIGNAL*, March 2003, p. 1.
8. RAND, *Australia's Naval Shipbuilding Enterprise*, p. 104 and p. 108, footnote 14.
9. Mott MacDonald, "Economic Analysis of National Shipbuilding Procurement Practices: International Comparison of Ship Construction Costs – Deliverable C," report prepared for Industry Canada, May 2009, Report has been redacted, p. 3-1.
10. RAND, *Australia's Naval Shipbuilding Enterprise*; and Compass International, *2014 Global Construction Costs Yearbook* (Morrisville: Compass International, 2014).
11. *Ibid*.
12. Australia, National Audit Office, "Audit Report No. 22 2013–14 - Performance Audit Air Warfare Destroyer Program," Canberra, March 2014, p. 223.
13. *Ibid*., p. 255. The missing 3% is not explained.
14. *Ibid*., p. 257.
15. Tom Ring, "The National Shipbuilding Procurement Strategy: How Did We Get to Where We are Now?" Canadian Global Affairs Institute Policy Update, March 2016, pp. 4, 9.
16. *Ibid*., pp. 4, 5.

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Canada and Modern Submarines

Peter T. Haydon

Submarines have always been highly controversial in Canada. From politicians, to bureaucrats, to special interest groups, and within the navy itself, the submarine has its opponents and advocates. Opposition derives mainly from two schools of belief: first, that the navy doesn't need them to do its job; and second, that the inherent stealth of submarines is not compatible with the non-offensive Canadian way of using the military. Left over false images of German U-boats and Cold War nuclear submarine cat and mouse games still cloud many minds. Advocates obviously accept the inclusion of modern submarines in the Canadian fleet in both practice and theory. That said, and historical arguments put aside because they distort the present argument, the real difference between the two schools of thought comes down to the level of understanding of modern submarine capabilities and the associated technology.

The 21st Century Submarine

Modern submarines – those designed and built in the 21st century and incorporating the latest technology – are as technologically sophisticated as a spacecraft. Some older technology may be included especially where it is still as good as anything else on the market, but it is the way in which individual systems are integrated into the complete system, a system of systems if you prefer, that establishes a submarine's degree of modernity.

Credit: Björn Wilke/ German Navy

Germany's new Type 212 U-boat U35 (S185) undergoing tests and trials.

The propulsion and power generation capacity of modern submarines creates two distinct types: nuclear-powered and non-nuclear-powered. A non-nuclear-powered submarine can have operational systems as modern as a nuclear-powered submarine but lacks the endurance, speed and versatility. At one time we talked about 'conventional' submarines, meaning that they relied on a diesel-electric system for propulsion and power generation; with recent advances in air-independent propulsion (AIP) and battery technology, the concept of 'conventional' is meaningless.

The basic operational characteristics of modern submarines are endurance, stealth, freedom of movement and versatility. Packaged together these characteristics provide strategic and operational superiority at sea in both close and distant defence against attack. Those characteristics also give submarines the edge in sea control and power projection operations, as well as in intelligence gathering especially with the use of unmanned underwater vehicles (UUVs).

I'll use four examples of non-nuclear submarines currently in production to help explain the technological advances that have been made in recent years. And discuss two modern nuclear-powered submarines to give an overview of those very different platforms.

The German Type 212A submarine has acquired a reputation as one of the most modern non-nuclear submarines in the world. It displaces about 1,800 metric tonnes and the design is under

constant improvement as new technologies are incorporated. U-36 has just been commissioned and will be followed by two nearly identical sister ships. They will also be equipped with the HDW air-independent fuel cell propulsion system which has already given excellent results in operations with the submarines of the first batch. U-32 showed this in April 2013 when on the way to participate in naval exercises in the United States it produced a new record for non-nuclear submarines with an 18-day submerged transit without snorkeling.

Changes planned for the next (second) batch include:

- a network-centric warfare compatible communications system;
- an integrated command, sensor and weapons control system;
- modern sonar arrays;
- replacement of one periscope by an optronics mast (i.e., a telescopic mast supporting several digital optical/electronic devices in lieu of a traditional periscope);
- an antenna buoy to enable communication from deep;
- a lock system to allow swimmers (i.e., Special Operations Forces) to exit and re-enter the submarine while dived; and
- habitability changes to enable worldwide operations.

The cost for a new Type 212A is thought to be about US$600M which seems fairly standard for European-built, modern submarines.

Also with a surface displacement of about 1,800 metric tonnes, the Swedish A-26 is intended primarily for littoral operations, although it is also able to conduct open ocean patrols. In addition to standard torpedo tubes, it has a 6 x 1.5 metre multi-mission lock system that makes it easy for swimmers to enter and exit the submarine, and is also large enough to allow the launch and retrieval of UUVs, which are expected to play a larger role in future submarine operations especially in surveillance. The A-26 is equipped with a Kockums Stirling AIP system that allows it to remain underwater for up to 18 days at relatively slow speeds. Cost data for the A-26 are not available.

The Japanese *Soryu*-class submarines are diesel-electric submarines that entered service with the Japan Maritime Self-Defense Force in 2009. At 2,900 metric tonnes surface displacement the *Soryu*-class submarines are the largest built in post-war Japan and are Japan's first AIP submarines, using a system based on Kockums Stirling engines built by Kawasaki Heavy Industries. At roughly $US540M each, they are large, expensive submarines able to fire torpedoes and Harpoon missiles. The last submarines in the class (the 11th and 12th) will have greater underwater endurance through the use of lithium-ion batteries.

Variants of the French *Scorpene*-class of diesel-electric submarines, displacing around 1,600 metric tonnes are able to fire torpedoes and Exocet missiles, and lay mines. They are also in use in India, Brazil, Malaysia and Chile, with Poland showing interest. Some of the later Indian-built version of the submarine will be fitted with AIP. Like its counterparts in other navies, *Scorpene* is proving to be a versatile submarine hull into which modern technologies can be installed.

The *Virginia*- and *Astute*-classes of nuclear-powered submarines epitomize the modern submarine by having virtually unlimited range and endurance with high underwater speed. They are limited only by their weapon load and the need for fresh food. The British *Astute*-class at 7,400 tonnes is slightly smaller than its American counterpart but both submarines are able to fire torpedoes and cruise missiles. Of the two, the *Virginia*-class is more technologically sophisticated, using a propulsor (pump jet) instead of a multi-bladed propeller and fitted with a fly-by-wire ship control system. At UK£1.5B ($US2.16B) each, *Astute*-class submarines are very expensive, partly due to cost overruns and unforeseen expenses. The numerically larger *Virginia*-class will cost about US$1.5B per submarine.

I have not included either Russian or Chinese submarine development in the discussion because it is difficult to obtain reliable information. Even though ambitious building programs for a new Russian submarine fleet were announced recently, a lot of scepticism exists over Russia's ability to complete the building programs due to lack of money and materials.

A Modern Submarine for Canada

A discussion on the need for modern submarines for Canada cannot be based on technology and what that technology can do for national security despite the fact that technology is a major factor in the equation. As we saw in 1987-89 discussions about submarines, regardless of the logic of acquiring submarines, political issues invariably determine the final outcome. This is unfortunate. We live in a complex era where threats to national security are diverse and largely unpredictable. To avoid being caught unprepared, Canada needs to begin moving to a position where national security decisions are made outside the fog of partisan politics or the mandate of a specific government. That said, the question still remains, why does Canada need submarines?

Here, some simple facts to frame the answer to that question:

- Despite fiscal problems, Canada is an economic and moral world leader and, as such, Canada has an obligation to help maintain order in the world.
- That obligation requires, if not demands, that Canada share the burden of maintaining order in the world including the use of force when necessary.
- Idealistic notions of trying to share the burden through peacekeeping and the provision of aid are as delusional as they are ineffective in the initial phases of crisis management.
- No one can predict where or when the next crisis will occur or what impact it will have on world security; anyone who thinks they can is either a fool or a charlatan.
- The uncertainty of world order today requires that

states maintain versatile, combat-capable and rapidly deployable military forces. As we should have learned from the Syrian War, crises must be contained before they spread.
- Through their inherent mobility and flexibility, navies and other sea-based forces will nearly always be the first responders to global crises.
- In many cases, a submarine can be the first vessel on scene to act as eyes and ears for the main force. The British use of submarines in the 1982 Falklands War showed that the rapid deployment of submarines can provide a significant strategic advantage.

If we assume that strategic analysis concludes that modern submarines would be useful additions to the Canadian fleet, the next question is what sort of submarine? The decision comes from answers to three basic questions:

1. Will the new submarines be required to operate freely throughout the Arctic?
2. In a period of enhanced national vigilance (when a new threat to Canada from the sea is considered possible) how much of Canada's vast ocean space must be kept under surveillance and at what distance from shore?
3. Could Canadian submarines make a significant contribution to allied and combined security operations?

The answers to these questions essentially determine the endurance and versatility requirements: nuclear-powered or non-nuclear-powered. The choice of which sensors and weapons as well as other capabilities such as multi-mission lock will be driven by consideration of the following questions:

- How and where will the submarine be employed?
- How many are required?
- What are the national fiscal constraints?
- Where will they be built or from where will they be acquired?
- Will there be requirements for new national infrastructure?
- What will be the industrial and scientific benefits from a submarine program?
- Do the technologies pose any environmental concerns?
- What are the expected levels of political and public support?

None of this is new. The RCN has run a political and bureaucratic gauntlet for every submarine acquisition proposal since the late 1950s. Had the Naval Staff of the day spent more time answering these questions, political rejection of their plan would not have been so damaging to the overall naval force plan.

Conclusion

It boils down to a single question, can a modern non-nuclear-powered submarine, such as the German U-36, substitute for a nuclear-powered submarine which the 1987 analysis argued was necessary for Canada's future maritime security?

I do not intend to answer that question or the other questions posed in this essay, it would take an entire edition of *Canadian Naval Review* to do so; rather, I offer them up for others to address publicly.

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Australian Defence Strategy and the Defence White Paper 2016

Brian K. Wentzell

On 26 February 2016 the government of Australia released its Defence White Paper 2016, the successor to the White Paper issued in early 2013. The Defence White Paper 2009, "Defending Australia in the Asia Pacific Century: Force 2030," established as a policy objective a schedule for the release of White Papers at approximately five-year intervals. Adherence to the schedule has permitted the expectations created in 2009 to be further developed for implementation. When these documents are read together, it is clear that the strategy remains sound and is being methodically implemented.

While territorial security has been the traditional justification for maintenance of defence forces, the Australian government has recognized that the "Australian strategic outlook over the coming decades will continue to be shaped by the changing global distribution of economic, political and military power, and by the future role and weight of the United States."[1] In addition to acknowledging the role of the United States in the region, "Force 2030" identified strategic interests as the security of Australia and its immediate neighbourhood, the stability of the Asia-Pacific region, and maintenance of rules-based order in the world.[2] The rules-based international order includes the economic system that is essential to facilitate not just Australia's prosperity, but also world trade and economic prosperity.

Credit: Hpeterswald/ Wikimedia Commons

*An **Anzac**-class frigate of the Royal Australian Navy, HMAS **Perth**, 6 October 2013.*

The Defence White Paper 2013 expanded the country's security interests from the Asia-Pacific region to include the Indo-Pacific region.[3] The Defence White Paper 2016 defined, as had earlier White Papers, the country's strategic interests as:

1. A secure, resilient Australia, with secure northern approaches and proximate sea lines of communication;
2. A secure nearer region, encompassing maritime South-east Asia and the South Pacific; and
3. A stable Indo-Pacific region and a rules-based global order.[4]

The emphasis upon maritime security and a rules-based global order has been the subject of presentations and discussions by defence leaders and thinkers in Australia for years. Unlike the case in other countries, there appears to be unanimous agreement by the three Australian Chiefs of Service that maritime strategy is the kernel of the defence strategy and the overall security strategy for their country.

The Sea Power Conference hosted by the Royal Australian Navy in 2013 illustrated this nicely. Vice-Admiral Ray Griggs, the Australian Chief of Navy, addressed the conference and reviewed the increasing role of naval forces as the practitioners of naval diplomacy. This is because humanity is increasingly using the maritime environment for trade and resource harvesting. As a result, national economies are more closely linked than ever and "the influence of the global maritime trading system is all persuasive."[5] The Admiral concluded his speech with several thoughts. First, he noted that no one state has the capacity to protect its own maritime interests because of the global character of the maritime system.[6] Second, he noted that good order at sea is based on a rules-based system that benefits all states.[7] And, finally, he noted that:

> Mahan, Corbett, Cable, Booth, and others could not have reasonably understood the challenges that we face today and into the future. In Australia there is an emerging school of maritime strategic thought that challenges traditional continental and expeditionary schools of thought.[8]

The global circumstances of today seem to take us beyond the theories outlined by these maritime strategists. But there is still a rule-based maritime system, and states will have to create and maintain maritime forces that observe and enforce such rules.

The Admiral's thoughts were reinforced by Lieutenant General David Morrison, the Chief of Army, who said,

> Our trade flows freely, our petrol stations are replenished, our supermarket shelves are full to meet our whims and our commerce flourishes. Yet, Australians collectively do not reflect on the enormous national investment involved in sustaining the maritime conditions for that happy state of affairs, nor do they consider overly that much of it is also underwritten by the United States as the leading power of our age.[9]

The General attributed this "cognitive failure"[10] to a strategic mindset set in continentalism.

A spokesman for the Australian Chief of Air Force stated that the Royal Australian Air Force (RAAF) is "alert to the fact that Australia's strategic context is one defined by its maritime circumstances."[11] Thus, there is unity amongst the service chiefs on defence and security strategy.

This shared vision of the importance of the maritime environment to security means that Australia has incentive/opportunity to enhance its ability for its military forces to operate jointly, something other states have struggled to do. As Admiral Griggs said at the Sea Power Conference, "Australia, like many nations, has been on a journey to build joint (maritime) forces."[12]

While the Australian Defence Forces (ADF) have an overarching role in the maintenance of maritime security, there are many security activities that are handled through other federal departments or agencies or contracted parties. Immigration and border services have specific responsibilities with respect to people smuggling and the importation of illegal goods and substances. Marine search and rescue services are contracted out to civilian companies. Australian Federal Police enforce criminal laws. Maritime security is a whole-of-government effort.

Beyond national territories and maritime areas, the ADF may operate either independently or in cooperation with allies or friendly states. Such activities may be led by Australia, or an ally or another state. The operations may range from combat, through anti-piracy operations in the northern Indian Ocean-Persian Gulf areas, to peacekeeping in East Timor, or the delivery of humanitarian assistance to Pacific Ocean islands such as Fiji. With active force strength of about 58,000 soldiers, sailors, and airmen and women, the ADF can only do so much independently. Therefore the participation of allies and friendly countries is crucial in most extra-territorial operations, exercises and training.

The three White Papers discuss procurement at some length. Alliances and joint programs fulfill a wide range of military and naval needs, including intelligence gathering and sharing, science and technology research, and equipment. The procurement of naval surface vessels and submarines from Australian shipyards is provided for. This permits the Australian government to use national business enterprises where appropriate and to buy key components, technology, aircraft, or other military equipment offshore. This procurement strategy assists in the development of close relationships with national and international suppliers and countries.

Over the period from 2009 through 2016 there has been consistency in the number and types of ships and aircraft to be procured for service through the 2030s. The future fleet will include the two *Canberra*-class landing ships, which have just entered service, as the initial units, plus three anti-air warfare

destroyers that are in the advanced stages of construction, 12 advanced patrol submarines to replace the *Collins*-class, nine new frigates to replace the *Anzac*-class, two new replenishment ships, plus new ocean patrol vessels, mine warfare vessels and hydrographic vessels. New helicopters – MH30R Seahawks – are entering service starting this year. As well, 15 P8A Poseidon maritime patrol aircraft will be procured in three tranches to replace the existing P3 Orion fleet.[13] The Australian Army will procure amphibious equipment to equip an infantry battalion landing group.

It is important to note that there is a funding plan for the program, which is apparently to remain in place regardless of changes in government.[14] The Australian government, with broad support of its citizens, continues to be a significant participant and supporter of the rules-based maritime global order. Its armed forces continue to strengthen their competencies to maintain global maritime order in geographic areas of strategic interest.

Notes

1. Commonwealth of Australia, Department of Defence, "Defending Australia in the Asia Pacific Century: Force 2030," Defence White Paper 2009, p. 30.
2. *Ibid*., pp. 41-45.
3. Commonwealth of Australia, Department of Defence, "Defending Australia and its National Interests," Defence White Paper 2013, pp. 24-27.
4. Commonwealth of Australia, Department of Defence, Defence White Paper 2016, p. 68.
5. "Naval Diplomacy and Maritime Power Projection," Proceedings of the Royal Australian Navy Sea Power Conference 2013, Australia, 2014, p. 5.
6. *Ibid*., p. 6.
7. *Ibid*.
8. *Ibid*.
9. *Ibid*., p. 9.
10. *Ibid*., p. 10.
11. *Ibid*., p. 15.
12. *Ibid*.
13. Commonwealth of Australia, Department of Defence, Defence White Paper 2016, pp. 76-90.
14. Commonwealth of Australia, 2016 Integrated Investment Program.

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Our Voice Matters

Cal Mofford

Canadians have the good fortune of living in the northern half of a continent surrounded by vast oceans with a friendly neighbour to the south. Over the last decades of the 20th century the biggest threat to Canada was the fallout of a Cold War nuclear exchange delivered from the oceans, bombers, or land-based ballistic missiles. The risk of invasion from Soviet forces was non-existent; however, the risk to the reinforcement of European allies as a consequence of Soviet invasion was real, given the character of the Soviet fleet.

HMCS ***Windsor*** *and Canadian Special Operations Forces conduct final preparations for deployment to European waters, September 2015.*

But the Cold War is over and this threat has dissipated so why bother having a navy? Canadians need to ask this question within the broader context of what role they want Canada to play in developing and maintaining a stable interconnected world where local armed conflicts are prevented from spreading to regional or worldwide conflict.

Let's not kid ourselves, Canada does not have the means or the inclination to be one of the world's policemen. However, Canada does want its voice to be heard and heeded in the United Nations, NATO and other security bodies. If it is to be taken seriously, it needs to offer the Canadian perspective, while demonstrating tangible involvement and commitment to resolving the conflicts.

Canada can be insular with a navy designed to patrol its vast ocean borders. Or it can be outward looking and have a modern but modest general purpose navy capable of participating with like-minded allies to bring an effect from the sea in areas of conflict.

The United Nations Convention on the Law of the Sea (UNCLOS) provides the overarching framework for Canada to regulate, safeguard and responsibly exploit both the living and mineral resources of the ocean approaches to the exclusion of other states. However, notwithstanding the UNCLOS framework, there continue to be challenges to these rights, most recently in the Arctic but historically on both coasts including the Grand Banks, Georges Bank, the Gulf of St Lawrence, the Beaufort Sea and the Dixon Entrance. The current build of Arctic Offshore Patrol Ships (AOPS) will help provide an appropriate constabulary response to future challenges, allowing Canada to exercise sovereignty consistent with UNCLOS and international agreements.

But the real strategic challenge to the well-being of Canadians is

a breakdown in the world order as a result of armed conflict. In a multipolar world regional powers and non-state actors have continued to use armed force to pursue their agendas. States such as Russia (Georgia, Crimea and the Ukraine), China (East and South China Seas) and North Korea (nuclear weapons and ballistic missile tests) use direct and indirect military force, or the threat of it, to destabilize and bend regions to their wills. The Middle East and North Africa (Israel (Palestine), Syria, Lebanon, Iraq, Libya, Somalia and Yemen) continue to be a hotbed of conflict with regional powers and non-state actors (some as proxies to regional powers) either directly or indirectly using armed force for their own purposes. Many parts of Africa continue to suffer under despots and armed rebel conflict. Thousands of people have lost their lives and millions have been displaced. The world is not a safe place for many.

Experience shows that humanitarian aid works best if there is an overarching security framework. Peacekeeping works where the warring factions have agreed to be separated. Economic sanctions work against states that have a developed economy and where the ruling classes are concerned about maintaining control and avoiding a civil war (North Korea is a blatant outlier). While direct armed interventions by external actors have their limitations, they can provide some stability as a political compromise is pursued. More importantly, they can contain the spread of the conflict.

Political rhetoric that posits that humanitarian aid is the only solution to the multiple conflicts in the world ignores the power dynamics that exist and the wide availability of arms. The genocide in Rwanda demonstrates that weapons don't have to be sophisticated to be deadly.

An attractive feature of interventions with navies in conflict areas is that their effect can be nuanced and graduated. They can be committed and recalled readily. They can be used in a graduated response ranging from: simple presence (current NATO operations in the Black Sea); embargo/economic sanctions (Somalia, Yemen, Syria, Iraq, Gaza Strip); protection of commercial and World Food Organization shipping (against Somali and Straits of Malacca pirates); and naval forces can conduct operations from sea control to the landing and support of land and air forces (Afghanistan, Yemen, Russian bombardment of Syria from the Caspian Sea). The Canadian navy has participated in some of these mission sets in the recent past.

To some degree the question boils down to what role Canada wants to play in maintaining economic and political stability in the world and at what cost. Whether measured in terms of the level of humanitarian aid or the controlled use of armed forces, Canada has lagged behind most of its allies of comparable economic capability. The reason for this may simply be the good fortune that conflicts are not at its doorstep. Canadians should recognize that this influences their world view. However, they should also recognize that Canadian pronouncements on how the world should work will fall on deaf ears to those faced with conflict in their region if Canada does little to help deal with their existential threats.

The Canadian navy is modest, consisting of a dozen recently modernized general purpose frigates, an obsolescent destroyer, four submarines and a dozen general purpose but limited coastal patrol vessels. The modernization of the *Halifax*-class frigates will allow them to be effective into late in the next decade. The remaining *Iroquois*-class destroyer cannot be modernized. The same is true of the *Protecteur*-class replenishment ships which have been paid off.

Although a modern warship's hull, main and auxiliary machinery have a useful life of approximately 30 years, naval weapon and sensor systems have a useful life of about 15 years before they become difficult to support, unreliable and less capable of dealing with current threats. In addition, the time required to plan for, identify the resources required and schedule and build modern warships is measured not in years but in decades. Therefore, decisions need to be made today as to what the Canadian navy will look like in the future as the *Halifax*-class frigates and the submarines come to the end of their useful lives.

This is ultimately a political decision reflecting Canadian values and preferences. The National Shipbuilding Procurement Strategy (NSPS) provides a rationale for building both warships and government ships in Canada economically. The Arctic Offshore Patrol Ships are the first class of warships being built under this strategy and will provide a test case as to whether the strategy has real merit. The next challenge is determining when, with what and how to replace the current frigates, destroyers and submarines.

Part of the current national debate centres on the likely cost of these replacements and, as a consequence, the numbers of hulls that can be built and their capabilities. This is not an easy discussion since any real capability will have a significant cost. Given that armed conflict is unlikely to disappear, the question returns to what role Canada wants to play in attempting to lessen the severity of these conflicts and in having its voice heard. In the building of a world order that is peaceful and where Canadian values can be advanced, some meaningful expenditure will be required.

An evolution of the capabilities inherent in the current Canadian patrol frigates or those in similar European navies would be a good place to start in looking for a Canadian-built replacement fleet. Pursuit of sophisticated air defence and command and control destroyers or cruisers would require too much of a cost tradeoff, resulting in too few numbers to be able to respond to national and international requirements. The enduring Canadian navy strategy of a modest general purpose combat capable fleet remains an achievable Canadian compromise.

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A View from the West:

Because It's 2016: Returning Canada to the Indo-Pacific Region

Brett Witthoeft

In his interview with *Embassy Magazine* on 12 January 2016, Defence Minister Harjit Sajjan promised a comprehensive Defence Review that will outline Canada's defence policy for the next 10 to 20 years. The usual priorities were set – the defence of Canadians, maintaining Arctic sovereignty, and working with NORAD and NATO – but Sajjan also pointed out that the review needs to be placed in a wider context, suggesting that the global geopolitical landscape will be considered.

So what are key current and future geopolitical developments of which Canada should be aware? The global geopolitical landscape is not lacking in future challenges. South America is characterized by domestic instability, from decades-long narcotics insurgencies to fiscal mismanagement and rampant corruption. Europe continues its centuries-old Great Power jousting, albeit with new tactics (for example, 'little green men' in Ukraine). The Middle East remains a cauldron of instability, with both local and cross-border conflicts raging, creating power vacuums into which terrorist organizations have stepped. And Africa still suffers from weak and failed states, in which militant groups have seized opportunities to exert influence. Despite these challenges, there is one region that – by any metric – is on track to be the geopolitical centre of the world for the foreseeable future.

The Indo-Pacific (from Hollywood to Bollywood, as it were) is home to a plethora of traditional and non-traditional security challenges. Arguably at the centre of the region is China, which has seen economic growth over the past two decades unlike any other time in history. As the Chinese boat has risen on its economic tide, its neighbours' boats have similarly risen, leading to widespread increases in prosperity across the region. However, as Beijing has increasingly looked abroad for both resources and markets, the Chinese military has also modernized at a tremendous rate in order to protect these interests. There are at least two unfortunate results of China's rapid expansion. First, the expansion has created or revived territorial disputes. Second, it has created a classic security dilemma, whereby China's military advances have made its neighbours feel more insecure, thus prompting them to build up their security forces in response.

Perhaps the most visible Indo-Pacific security issues are the disputes in the South China Sea (SCS). No fewer than seven countries (although China, the Philippines and Vietnam are the main actors) claim some or all of the land features in the SCS. China in particular has been active in consolidating its holdings, mainly by building up the reefs and shoals in the Spratly archipelago, building runways and radar stations on the artificial islands, but also strengthening its hand in the Paracel Islands by deploying military planes, surface-to-air missiles and anti-ship cruise missiles to Woody Island.

Credit: Indian Navy

*INS **Kalvari** (S-50) is the first of the Indian Navy's six **Kalvari**-class diesel-electric attack submarines being built in India based on the French **Scorpene** design. It is shown here at its undocking ceremony in Mumbai, 28 October 2015.*

This rapid militarization (no matter what the Chinese Foreign Ministry calls it) has alarmed the other SCS claimants, who have turned to the United States to balance against Chinese strength. Washington has been happy to respond to Beijing, in part because the augmentation of the SCS features, along with greater boldness of the People's Liberation Army Navy (PLAN), Chinese Coast Guard and maritime militia, are challenging the heretofore unchallenged US operations in the SCS. After years of silence, Washington has been pushing back most notably with freedom of navigation operations in October 2015 and January 2016. Furthermore, the SCS issue is becoming ever-more internationalized, as Japan is reaching out to the Philippines and Vietnam in an attempt to divide Beijing's attention and resources from its dispute with Tokyo in the East China Sea, while India, to a lesser degree, is partnering with Vietnam to distract China from the Indian Ocean.

These recent developments in the SCS provide strong reasons for significant regional arms procurement and modernization; indeed, the Stockholm International Peace Research Institute noted that Asia and Oceania retains the title of greatest arms importing region, with imports rising 26% between 2006-10 and 2011-15.[1] In northeast Asia, China, Japan and South Korea have all added significant surface ships to their fleets, including advanced missile destroyers, a refurbished aircraft carrier for China, and de facto helicopter carriers in Japan. Southeast Asian states, too, have added to their maritime inventory.

One trend of note in this overall build-up is submarine acquisition. China is at the forefront of this trend, having built at least 13 conventional and six nuclear-powered boats over the past decade, with two more nuclear boats to come by 2017. South Korea is not far behind as it is in the process of building nine Type 214 boats by 2017, and plans to construct nine KSS-III boats beginning in the 2020s. Japan has commissioned five *Soryu* submarines since 2009, and five more have been authorized. Between 2011-15, Vietnam received four advanced *Kilo*-class submarines from Russia, with two more to be delivered in 2016. Indonesia has ordered three Type 209 submarines from South Korea, for delivery by 2020. This deal includes technology and skill transfers to Indonesia and, as the third boat will be built in Indonesia, around 200 Indonesian engineers have been seconded to the South Korean builder since early 2015. And, finally, Malaysia received two *Scorpene*-class boats in 2009-10. These acquisitions highlight a profound shift in regional maritime thought. Since submarines deter the presence of other naval vessels, regardless whether the submarines are actually in the area, regional leaders are setting the stage for the East and South China Seas to become increasingly unstable.[2]

Indo-Pacific security issues are not exclusively traditional, though. Even now the effects of climate change are becoming clear, with more frequent and more devastating natural disasters. A November 2015 UN report found that the number of natural disasters worldwide between 1995-2015 rose 14% from 1995-2004, with Asia taking the brunt, with 332,000 people killed and 3.7 billion others affected.[3] Flooding and storms were the most common and deadliest disasters, including Cyclone Nargis which killed 138,000 Burmese in 2008, and Cyclone Winston which ravaged Fiji in February 2016. The responses to such disasters are overwhelmingly naval, as navy ships are able to transport supplies and trained disaster responders to effected areas quickly, and most importantly, can operate independently and do not take up strained resources in disaster zones.

It is worth considering what domains are under threat in the Indo-Pacific region, and which are most relevant to Canada. Asia is primarily a maritime region, and the countries in the region are both connected and divided by the seas. Canada's geography – bordering a friendly neighbour and protected by the Atlantic, Pacific and Arctic Oceans – means that Canada has little to fear from land forces. Canada is most at risk from maritime and aerial threats, including missiles and space-based weapons (although the probability of these threats is low, at least for the moment). So, if Canada is not threatened by direct attack, what are its interests in the Indo-Pacific region, and what capabilities should the Department of National Defence prioritize in the Defence Review?

The simple answer is more of the same, at the very least. The Canadian Armed Forces already have maritime and aerial platforms capable of addressing threats, both independently and integrated into allied operations. Upgrades and additions to existing systems – such as full integration of unmanned systems to extend the range of and reduce the risk to manned platforms[4] – will be necessary, but otherwise the RCN's multi-role frigates and RCAF's maritime helicopters and patrol aircraft are satisfactory. This base threshold must be maintained, else Canada will be without relevant options in Asia, and will be relegated to the sidelines.

What is more important is that the hardware component of the Defence Review should be accompanied by strong software in the form of consistent regional defence diplomacy which complements wider foreign policy. For better or worse, many Indo-Pacific political leaders are former military leaders, or have close ties to their militaries. Military relationships built and consistently maintained with the region over time will ensure that, even if Canada cannot become involved, officials are aware of implications. Australia, which bears so many similarities to Canada, has already achieved this with its latest Defence White Paper. Now it is time to show that Canada is up to the task as well.

Notes

1. Aude Fleurant, Sam Perlo-Freeman, Pieter D. Wezeman and Siemon T. Wezeman, "Trends in International Arms Transfers, 2015," Stockholm International Peace Research Institute, February 2016, p. 6.
2. International Institute for Security Studies, *The Military Balance 2016*, "Chapter Six: Asia," pp. 211-306.
3. United Nations Office for Disaster Risk Reduction, "The Human Cost of Weather Related Disasters, 1995-2015," November 2015, p. 5.
4. It appears that DND is already moving in this direction. See Defence Research and Development Canada press release, "Enhancing the Navy's Protection against Modern Threats," 16 March 2016.

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Warship Developments:
How Big is 'Big Enough'?

Doug Thomas

> *We will make investing in the Royal Canadian Navy a top priority.*
>
> *By purchasing more affordable alternatives to the F-35s, we will be able to invest in strengthening our Navy, while also meeting the commitments that were made as part of the National Shipbuilding Procurement Strategy. Unlike Stephen Harper, we will have the funds that we need to build promised icebreakers, supply ships, Arctic and offshore patrol ships, surface combatants, and other resources required by the Navy.*
>
> *These investments will ensure that the Royal Canadian Navy is able to operate as a true blue-water maritime force.*[1]

Canada *is* a maritime nation and it has operated a blue-water navy (open-ocean rather than coastal, with world-wide capabilities) since the end of World War II. It is the second largest country in land area, with the longest coastline of any country – eight of 10 provinces and all of the territories have salt water coastlines – and a vast offshore estate equal to about two-thirds of the land area. Much of Canada's extensive trade with other states is dependent on secure sea lanes and Canada has assumed responsibilities and commitments to assist in maintaining law and order on navigable waters around the globe.

One of Canada's capabilities in fulfilling that role is the ability to assemble and deploy a national naval task group[1] anywhere in the world it is needed to safeguard national and international interests. It must be capable of operating in concert with major allies, requiring that the task group has compatible command and control facilities that will allow it to communicate and exchange tactical information with allies, suitable area-air defence, surface and anti-submarine warfare capabilities, and an underway replenishment ship carrying supplies, spares, ammunition and helicopter repair facilities for the ships and their embarked helicopters.

In addition, Canada is one of a comparatively small number of states with the ability to take effective charge of a force of foreign naval vessels. It has done this very effectively on numerous occasions since 1990 in the Persian Gulf and Adriatic during *Operation Sharp Guard* and *Operation Apollo*. Such a capability is described in the Defence White Paper of 1994, the most recent such government blueprint.[2]

There is much more to having a capable navy than

Credit: Christopher P. Cavas

HMDS ***Niels Juel*** *(F363), the third of the Danish* ***Iver Huitfeldt****-class frigates, is a contender in the Canadian Surface Combatant project.*

numbers of ships, but numbers cannot be dismissed as unimportant in our high-tech age. Quality and capability are important characteristics, but quantity brings a quality all its own – especially for a country as large as Canada with very challenging waters off its shores. The size of the RCN has steadily declined since the Cold War build-up of the 1950s, 1960s and early 1970s, with the *St. Laurent*-class destroyers and derivatives (20 ships), the aircraft carrier *Bonaventure* (until late 1969), three underway replenishment ships (AORs), three *Oberon*-class diesel-electric submarines and four gas-turbine-powered and missile-equipped *Iroquois*-class destroyers. From that peak in capability, the decline and 'rust-out' of the navy continued for nearly 20 years before its strength peaked once again in the 1990s with the completion of 12 new *Halifax*-class frigates and the rejuvenated *Tribal*-class destroyers.

Underway Replenishment and Patrol

Studies have shown that a task group which includes an underway replenishment support capability (AOR) – providing fuel, food, ammunition, second-line support for helicopters, and medical and dental support to the other ships in company – is able to remain on station for six times longer than a task group without this type of support. This has been a huge force-multiplier for the past 50 years, but is now missing with the demise of HMC Ships *Protecteur* and *Preserver*. The capability will be restored to the RCN in 2018 by Project Resolve, an interim AOR

Credit: NJ64/Fleetmon.com

The German Navy supply ship FGS ***Bonn****, shown on 12 March 2016, is the design upon which Canada's new Joint Support Ship will be based.*

capability supplied by a reconfigured vessel leased from Davie Shipyard in Quebec City, and two purpose-built *Improved Berlin*-class AORs to be delivered by Vancouver's Seaspan Shipyard in 2021-2022.

The Arctic Offshore Patrol Ships (AOPS) program will provide very capable vessels for national operations on the coasts and in the Arctic. But the ships are unlikely to be deployed abroad unless there is a need for international patrols in polar regions. That leaves the general-purpose surface combatants and supporting AORs for blue-water operations.

The *Halifax*-class frigates, commissioned 1992-1996, will be about 30 years old in 2025. All will have undergone an extensive mid-life modernization during the period 2010-2017 and will be nearing the end of their service lives. Current plans call for the laying-down of the first of 15 Canadian Surface Combatants (CSC) in the early 2020s after the completion of the AOPS program. All CSC units will share a common hull and propulsion system for ease of training and support, but will be built in two batches with different combat systems – weapons, sensors and command and control equipment. The first vessels (likely three in number) should be the replacements for the *Iroquois*-class destroyers, an area-air defence variant capable of providing a defensive umbrella with a radius of perhaps 100 nautical miles against aircraft and missiles posing a threat to the rest of the force. The ships can also embark a Task Group Commander and his staff to control operations over a broad sea area anywhere in the world.

These will be the most complex and expensive units of the next fleet, comparable to ships with similar capabilities in Germany, the Netherlands, Australia and other medium-sized navies. The remaining units of the planned 15 vessels will be less expensive general-purpose frigates, specializing in anti-submarine warfare operations but capable of defending themselves and other vessels in close company from threats above, on and under the water. These surface combatants will form the core of the RCN from about 2030 as the current frigates are retired. They will allow Canada to provide single units for operations with other like-minded states in areas of concern, such as we now see in the eastern Mediterranean and Arabian Seas, and national task groups composed of three or four surface combatants and an AOR, together with other elements (a submarine, Special Forces teams, helicopters) as needed to tailor the task group for a specific mission.

Conclusions

So what would be an adequate number of ships for the near future – say 2025 when deliveries of the first Canadian Surface Combatants should be starting to take place and the Joint Support Ships (AOR replacements) should be newly commissioned?

A White Paper on Defence should spell out expectations for the Canadian Armed Forces and hopefully it will recognize the many contributions of the RCN in furthering foreign policy objectives in recent decades. In my opinion, the navy cannot be shrunk below its recent size (15 surface combatants, two AOR/JSS, four submarines, 28 maritime helicopters) and still perform the roles that this country has come to expect of it. These are the numbers we need – at a minimum. If the new Liberal government sees a more proactive role for Canada on the world stage, then a strong navy is a prerequisite.

Notes

1. Liberal Party of Canada, 2015 Election Campaign Platform.
2. The 1994 Defence White Paper states "Canada will maintain a naval task group in the Pacific and Atlantic comprised of destroyers, frigates, submarines, a support ship, and maritime air."

Doug Thomas is a retired naval officer, a Fellow of the Centre for Foreign Policy Studies and Executive Director of the Canadian Naval Memorial Trust which owns and operates HMCS Sackville, the last WW II corvette.

2016 Canadian Naval Memorial Trust Essay Competition

Canadian Naval Review will be holding its annual essay competition again in 2016. There will be a prize of $1,000 for the best essay, provided by the **Canadian Naval Memorial Trust**. The winning essay will be published in *CNR*. (Other non-winning essays will also be considered for publication, subject to editorial review.)

Essays submitted to the contest should relate to the following topics:

- Canadian maritime security
- Canadian naval policy
- Canadian naval issues
- Canadian naval operations
- History/historical operations of the Canadian Navy
- Global maritime issues (such as piracy, smuggling, fishing, environment)
- Canadian oceans policy and issues
- Arctic maritime issues
- Maritime transport and shipping

If you have any questions about a particular topic, contact naval.review@dal.ca.

Contest Guidelines and Judging

- Submissions for the 2016 *CNR* essay competition must be received at naval.review@dal.ca by Friday, **10 June 2016**.
- Submissions are not to exceed 3,000 words. Longer submissions will be penalized in the adjudication process.
- Submissions cannot have been published elsewhere.
- All submissions must be in electronic format and any accompanying photographs, images, or other graphics and tables must also be included as a separate file.

The essays will be assessed by a panel of judges on the basis of a number of criteria including readability, breadth, importance, accessibility and relevance. The decision of the judges is final. All authors will be notified of the judges' decision within two months of the submission deadline.

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http://navalassoc.ca/occasions/2016-agm-and-conference/

Artist's impression of the **Harry Dewolf**-class Arctic Offshore Patrol Ship (AOPS) underway in the Arctic.
Credit: RCN