CANADIAN NAVAL REVIEW

VOLUME 12, NUMBER 3 (2016)

Watching the Arctic Ocean: Lessons from the Cold War

The Emergence of Anti-Ship Missiles and the Implications for the RCN

***Operation Unifier*: Canada's Military Training Mission in Ukraine**

Interview with Vice-Admiral Ron Lloyd

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Credit: Photo courtesy of Seaspan

This photo shows the bow of the first Offshore Fisheries Science Vessel being built at Seaspan's Vancouver Shipyards in North Vancouver, British Columbia. This is the first class of vessels Seaspan is building as part of the National Shipbuilding Strategy.

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Editorial

Foreign and Defence Policy Coherence: The Critical Naval Nexus

From August 11th to 14th, at events in St John's, Placentia Bay and Ship Harbour, Canadians, Americans, Brits, military and civilian, gathered for a solemn and joyous commemoration. The 75th anniversary of the Atlantic Charter (originally called the Joint Declaration) afforded all present (including a great grandson of Sir Winston Churchill) a chance to reflect on the vision for a peaceful and prosperous world central to the Charter's provisions. Negotiated between British Prime Minister Winston Churchill and US President Franklin Roosevelt, this Charter became a philosophic and aspirational bridge from the chaos unleashed on the world by the Axis powers, the difficult war being fought against them, and the better world that peace and freedom could bring. The context here is important. Japan had yet to attack Pearl Harbor – that was months away. Adolph Hitler had turned on Joseph Stalin, invading the Soviet Union in June 1941. More than a year earlier, the Luftwaffe had begun the wholesale bombing of London and other British cities. And, while Roosevelt through lend lease and many other initiatives was doing all he could, short of declaring war, to help against forces that encircled Europe, Britain and the Dominions stood alone against the Nazis onslaught.

That Hitler could and should have been stopped in Czechoslovakia in 1938 by French, British and Polish forces, at a fraction of the cost in lives that followed Munich, was not lost on the two leaders aboard HMS *Prince of Wales* and USS *Augusta*, surrounded by surface combatants, submarines and overhead air cover to guard against the U-boat threat. Prime Minister Neville Chamberlain's popular speech "Peace in our Time," given at Munich three years earlier, essentially provided for a horrific, widespread war, replete with death camps, millions of civilian casualties and new and more horrific killing technologies, more widely applied, than ever.

There is a lesson from that history for today's leaders of NATO democracies. Red lines established then vacated are deeply problematic. Naive optimism about the intentions and capacity of one's strategic competitors is rarely constructive or helpful. If needless provocation is never productive, feckless denial of hard realities is equally unhelpful. Our Chinese and Russian strategic competitors have been rapidly building naval assets, above, under and over the seas, with both a littoral and blue-water focus for over a decade. The UK, the United States, France and Germany have been at best at a diminishing level of strength and deployable presence. And Canada's navy has been beset by political and bureaucratic delays that seem always to portend better days tomorrow, but reduced deployable capacity today.


Credit: Jeff Head

The Chinese navy continues to expand its numbers and capabilities.

The Russians and Chinese may well classify Canadian naval reticence or procurement inefficiency (if they think of it at all) as part of the vagaries and indecision that, in their view, infect democracies to their strategic detriment. Nonetheless, whatever Canada's diminished marine deployability, its duties as a charter member of both the United Nations and NAT0 are real. Canada must be prepared to do its part – in intelligence, on, over and under the seas, in the air and on land. Deployed patrol and force projection capacity matter. That capacity is what creates diplomatic influence.

Procurement delays and snafus illustrate the political and administrative neglect of governments that go back to 1993 – without regard to partisan affiliation. Dithering on cutting steel for supply ships and new surface combatants, or helicopter delivery or the F-35 may seem less than central to Ottawa's new 'Canada is back' foreign policy, and to be fair the government elected a year ago did inherit a complex and difficult situation from its predecessors. Soon, the new government will, after a review, issue a new defence priorities policy. The new Defence

Minister, with distinguished combat leadership experience in Afghanistan and Bosnia, certainly deserves both our good wishes and the benefit of the doubt. But Eastern Europe where Canada has committed only half of the battle group actually required to play a lead role NATO has assigned and to which Canada agreed, the Middle East where the Canadian presence is important but modest, and the larger blue-water theatre where the RCN presence is deeply professional, well trained but essentially token, tell the story of how little 'being back' means so far. This applies to Canada and its fellow underspending NATO allies alike.

President Vladimir Putin's strategy is clear and understandable. Weaken the European Union and divide NATO. It is an utterly unremarkable stance for the West's main European competitor. As well, Russia's alliance with Iran, Syria and their respective Shiite ambitions in the Middle East, matters.

China's territorial assertion in the South China Sea and massive naval build-up illustrate a similar strategic need to diminish US hegemony in the Asia-Pacific world to increase China's diplomatic and regional leverage. Both Russia and China speak of peaceful negotiations and problem resolution, while abrogating or ignoring international law. Whether in the Pacific, Atlantic or Indian Oceans, we are not doing our duty to ensure a safer world unless our navy is there, in formation with other allies, with the special mix of diplomatic, combat, humanitarian and intelligence presence only a navy, above, under and on the seas can provide.

The men and women of the RCN perform with immense competence, spirit, patriotism and professionalism, with whatever kit or platforms they have at their disposal. What should be a fighting blue-water and littoral navy of 60 ships, for a country with its trade routes, coastal patrol horizons, allies and population, has never been larger than half that size in recent decades, and is smaller still now. Part of this is an anaemic maritime aspiration by successive Canadian governments since the Korean War in the 1950s; the other part is the strange almost self-reverent insistence that all of our ships must be built and modernized in Canada. This latter focus – on jobs for coastal regions – sees as much engagement and intensity over who builds what and where than over what the navy and the country actually need, in what timeframe, why and at what cost. The navy's self-indulgent insistence, in the past, that Canadian ships need unique design features, which adds years of delay and billions in extra cost, is not without some share in the responsibility for the delays we now face.

*Did Canada miss an opportunity by not pursuing the purchase of FNS **Mistral**?*

'Action This Day' were the words Prime Minister Churchill scrawled on Cabinet and ministry documents to those bureaucrats who wanted delay or non-delivery. The ingenuity applied by outgoing naval chief, Vice Admiral Mark Norman (now Vice-Chief of Defence) in approving the interim solution for bi-coastal supply and refueling with the Chilean and Spanish Navies, and the refit of a modern German commercial freight platform at the Davie shipyard to be a state-of-the-art modern militarized supply ship for Canada much sooner than the actual supply ships can be ready, illustrates the 'Action This Day' spirit. When former Ministers of Defence Gordon O'Connor and Peter McKay moved to refit the Griffon helicopter, lease Chinook helicopters, procure modern Leopard tanks and procure Globemaster (C-17) heavy airlift capacity, Canada's effectiveness as part of the NATO Afghanistan engagement was dramatically enhanced.

It is high time for similar creativity to be engaged in support of the interim needs of the navy. The missed opportunity of the then-available two high-tech *Mistral*-class amphibious assault ships, which the French refused to deliver to Russia after its annexation of Crimea in 2014 (full disclosure, when in the Senate I argued that NATO should step up and share these superb new design ships), was a classic sin of omission by the Conservative government. It speaks well of the Egyptians that they, despite all the challenges they face, did find a way to step up.

If 'Ready Aye Ready' is to mean anything in these challenging times, delaying effective blue-water capacity until the arrival of ships for which steel has yet to be cut, is not an acceptable answer. 'Action This Day' is.

Honourable Hugh Segal, CM

Watching the Arctic Ocean: Lessons from the Cold War

Adam Lajeunesse

Credit: Russian Defense Ministry Press Service/AP

A Russian TU-160 bomber launches a KH-101 cruise missile while being escorted by a SU-30SM fighter on a combat mission against a target in Syria, November 2015.

On 17 November 2015 the Russian Air Force attacked an Islamic State/ISIS position in Syria, a commonplace occurrence but for its choice of weapon: the new KH-101 cruise missile. This stealthy new weapon, with an estimated range of up to 5,000 kilometres, was used against an adversary with no anti-aircraft or early detection capability. There was no military rationale for its employment, meaning the strike can only be understood as a political message to the West – namely, that the Russian military has developed new capabilities, new confidence and a longer reach.

From a Canadian perspective, Russia's new military assertiveness on the global stage is not only unsettling from a political standpoint, it has begun to revive certain strategic threats that most defence analysts had gratefully relegated to the past. Weapons like the KH-101 – or its nuclear equivalent, the KH-102 – offer Russian bombers or submarines a first-strike capability against most North American targets from the largely unpatrolled waters immediately adjacent to the Canadian Arctic archipelago. Carrying these weapons are new or refurbished Russian nuclear attack submarines (SSNs), which continue to be built and upgraded despite that country's failing economy and rapidly depleting foreign currency reserves.

This is not to suggest that Russia intends (or is even remotely likely) to launch such a strike against North America from the Arctic, or elsewhere. However, Moscow's diplomatic *modus operandi* over the past decade has increasingly centred on threats and military posturing. If relations between Russia and the West continue to deteriorate, the Arctic may increasingly be used as a kind of posturing ground, a highly visible place where the Russian military signals its government's displeasure with the West and displays what it considers its 'resistance' to American political and economic pressure. Within this framework, a Russian decision to surface submarines or to publicize

the fact that it has resumed its patrols in that area would achieve this goal in dramatic fashion. Russia's repeated bomber flights to the edge of North American airspace represent a clear example of such tactics. While Canadian and American defence planners recognize the extremely low *probability* that this posturing could degenerate into anything more dangerous, they may be forced by circumstances to focus more on the *possibility* of a Russian attack as relations deteriorate. In such an unfortunate scenario, Canada and the United States may feel forced to revisit joint Arctic maritime defence.

In fact, the Canadian and American militaries have been here before and, to understand the North American response to increased Russian activity in the Arctic basin, history offers an interesting guide. In the mid-1980s the Arctic Ocean emerged as a region of particular concern for the US Navy. Analogous to the current concerns over the KH-101, the Soviet Union's development of the long-range SS-NX-24 cruise missile seemed to give Soviet submarines the option of launching a stealthy first strike against North American targets from within Canadian Arctic waters. In part a response to these capabilities, American naval strategy underwent a significant and aggressive shift north. Articulated for the first time in 1984 by Admiral James D. Watkins, the New Maritime Strategy was a broad concept for the global conduct of war with a focus on defeating Soviet submarines in circumpolar waters.[1]

In support of this strategy came a new emphasis on detection of Soviet submarines in the region. During the 1970s, the Canadian Defence Research Board, in cooperation with American laboratories and defence agencies, established detection systems at chokepoints within the Arctic archipelago to locate vessels attempting to slip through. By the time of the new US maritime strategy, however, Canadian-American priorities had shifted to the Arctic basin, where the two allies sought to construct something far more ambitious. According to newly declassified documents, the goal was an under-ice listening system strung along the continental shelf northwest of the Queen Elizabeth Islands, capable of 'looking' far out into the Arctic Ocean to track Soviet submarines across most of the polar basin. While this Canadian-led joint program never moved past the research phase, it demonstrated the seriousness with which the two governments viewed the Soviet threat from the Arctic and the lengths that the two states were willing to go to counter it.

While many of the details concerning this program remain classified, field testing appears to have begun in earnest in 1986. In an exercise labeled Nansen 86,


Credit: Lev Fedoseev

The emerging threat. Russia's third ***Borei****-class nuclear-powered ballistic missile submarine* ***Vladimir Monomakh*** *at the Russian Northern Fleet base in Gadzhiyevo, Russia, December 2014.*

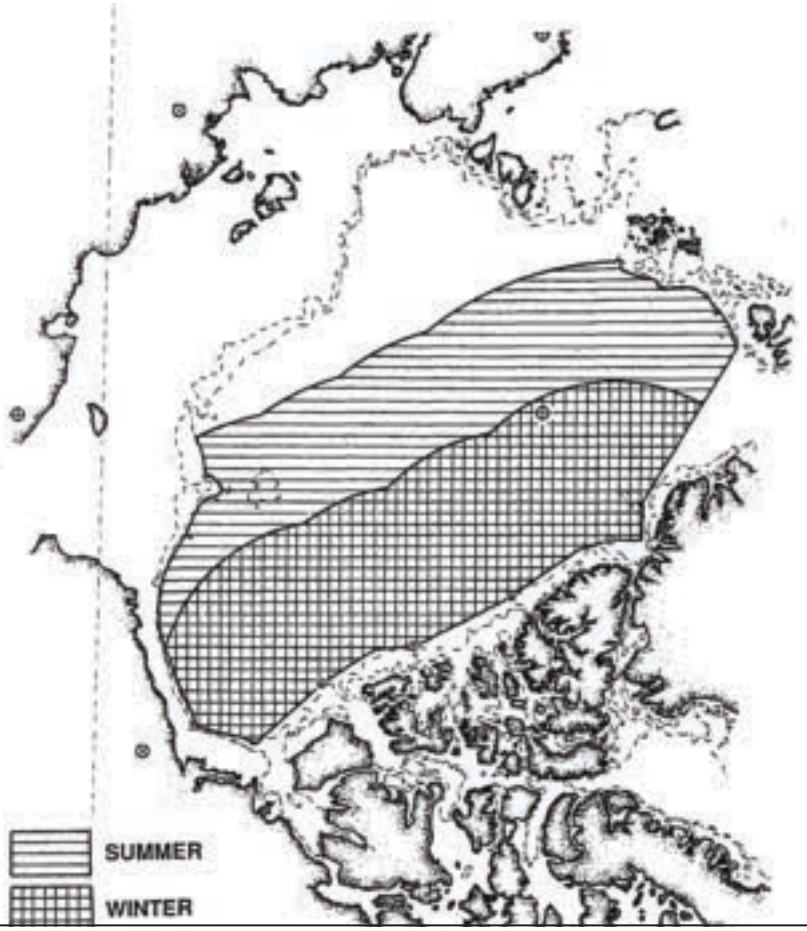
Canada's Defence Research Establishment Pacific (DREP) partnered with American agencies to deploy an experimental array suspended from an ice plug[2] at the mouth of Nansen Sound off the northwest coast of Ellesmere Island. The target was an American SSN operating in the vicinity. Initial tracking results were good and the Canadians noted their ability to monitor the boat out to a range of about 550 km – or roughly one-quarter of the distance between the sensors and the USSR's northern submarine bases along the Kola Peninsula.[3]

The work was considered a success but mounting sensors on the bottom of the sea ice presented problems. To begin with, ice moves and a permanent system needed a more permanent setting. Secondly, the jagged ice pinnacles (called pingos) that protrude downwards from the ice canopy limited the sensor's angle of detection, resulting in a pie-shaped area in which tracking could be successful. In spite of these limitations, Nansen 86 was a success and the next year the decision was made to mount a new array consisting of approximately 100 hydrophones on the edge of the continental shelf in the Lincoln Sea – roughly 110 km north of Ellesmere Island.[4] This operation was labeled Iceshelf 87 and, again, involved a US Navy SSN invited by DREP to operate off the Canadian coast. This system was to be connected to a relay station at Stuckberry Point, Ellesmere Island, by underwater cable, and then by radio link to Canadian Forces Base Alert, roughly 70 km to the east. These experiments continued into 1988 with Iceshelf 88, when DREP and its American partners again tested acoustic reception and background noise filtering while tracking an American SSN. A separate series of experiments was being run concurrently to the southwest at

Nansen Sound as the teams of scientists tried to determine the optimal location for their new systems.[5]

Developing these sensor networks was understood to be a long-term project. In 1988, DREP estimated that another five to seven years of research would be required simply to get the technology to a point where it could begin to be deployed. Nevertheless, the initial results suggested that this was very possible. More than a decade of joint under-ice detection experiments in the chokepoints of the Northwest Passage had built a solid base in Arctic acoustics and that knowledge, technology and experience was transferred to the polar basin activities. The 1987 experiments in the Lincoln Sea, using a bottom-mounted array, offered an estimated detection capability that covered the majority of the Arctic basin (during the summer). By 1988, DREP was anticipating even broader coverage using multiple sensor nodes spread hundreds of kilometres apart along the edge of the continental shelf.[6] Figure 1 illustrates the intent for this system against the anticipated future threat from newer, quieter Soviet boats (with the map showing the range in which a 50% possibility of detection could be expected).

Figure 1. Proposed acoustic tracking system with estimated coverage, assuming a 50% probability of detection



Credit: Author

A map depicting the intended coverage of under-ice sensor nodes to detect submarines along the Arctic shelf for summer and winter conditions, circa 1988.

Research into Arctic Ocean surveillance appears to have been abandoned after the collapse of the Soviet Union in 1991. With the once-powerful Soviet submarine fleet literally rusting in port there was no need to continue with such an expensive program.[7] Canada's detection systems in the Arctic archipelago were allowed to fall into disrepair and an Arctic sub-surface monitoring capability remained an after-thought until 2000 when the receding sea ice and new prospects for commercial shipping in the north inspired the Department of National Defence (DND) Maritime R&D Overview Group to recommend a renewed effort to maintain Canada's under-ice knowledge as part of the broader National Maritime Surveillance Strategy of the Canadian Forces.[8] Efforts to re-establish the capability were started in 2008 through Canada's experimental Northern Watch program, located in Barrow Strait. Work on Northern Watch has been fraught with difficulties but it has been continued in an effort to monitor surface and sub-surface transits through the Northwest Passage. What has not been discussed publicly is the possibility of renewing Canada's efforts to re-extend that capability into the Arctic Ocean.

The reasons for this focus on the archipelago over the polar basin are very simple. Northern Watch is largely intended to monitor surface traffic through one of the most transited sections of the Northwest Passage. As resource shipping, tourist expeditions and other activity increase in the region that kind of situational awareness will become increasingly essential – not only from a conventional defence perspective but for a broad array of public safety, law enforcement and regulatory requirements. The Arctic Ocean, conversely, is unlikely to see any traffic beyond nuclear submarine operations for quite some time,[9] and the existential threat posed by the Soviet Union in the late 1980s has obviously been downgraded for Russia, if not entirely dismissed. As such, Canada and the United States are not likely to revisit that Cold War program in the near term and, in a time of constrained defence spending, that is likely for the best.

In spite of its many headline-catching activities, Russia is not seeking conflict in the region or even to project power beyond

its littoral zone. The majority of Russia's Arctic exercises take place within its own territory and territorial waters and should primarily be seen as domestic exercises by a regime looking to brandish its nationalistic credentials with military posturing. A realistic appraisal of Russia's strategic interests points to a requirement for peace, stability and cooperation in the Arctic region. Stability is essential since much of Russia's future oil and gas development will have to take place in its north and any sign of conflict will make foreign capital and providers of badly needed technology wary about investing in the region. In the near term, the probability of Russian activity provoking a return to these kinds of Cold War-era detection systems is, therefore, very low and, to its credit, the Canadian government has not overreacted with investments in conventional military capabilities for the Arctic.

Nevertheless, the events since the annexation of Crimea in 2014 have demonstrated the possibility of a new and prolonged geopolitical conflict that some commentators are already calling a new Cold War. If global politics should continue to degenerate and the Russian government feels it to be in its political interest to expand its Arctic military posturing from bomber flights to include persistent submarine operations, then defence calculations in Ottawa and Washington may change.[10] Today, signs of renewed Russian emphasis on the Arctic have begun to emerge even if they are not yet close to the point of causing serious fear akin to what defence analysts felt in the late 1980s. Moscow is investing considerable sums into Russia's nuclear submarine fleet, including refurbishing existing classes and constructing new SSN and ballistic missile submarine (SSBN) classes.[11] President Vladimir Putin has also put significant emphasis on the north as both a strategic resource base and a region requiring military protection while labeling NATO the principal external military danger to Russia.[12] Amendments to Russia's 2001 Maritime Doctrine, adopted in July 2015, have also drawn the country's maritime focus to the Arctic and Atlantic.[13]

These activities and statements may not portend future aggression but, nevertheless, the effect has been to heighten tension and generate unease within Canada and the United States. This perception of a renewed Russian threat has, for instance, already moved North American Aerospace Defence (NORAD) Command to advocate for new all-domain responsibilities – meaning an expansion of its surveillance and response duties to water, ice and perhaps even land.[14] The new Canadian government has also earmarked $133 million over five years for Defence Research and Development Canada

Credit: Lev Fedoseev

*The crew of Russia's Delta-IV nuclear-powered submarine **Yekaterinburg** on deck as it returns to its base in the Murmansk region. In February 2015, Russian nuclear submarines engaged in exercises under the North Pole.*

Credit: http://www.businessinsider.com

This map illustrates Russia's militarization of the Arctic.

(DRDC) to "enhance all domain situational awareness" of the air, sea and underwater approaches in the Arctic.[15]

The probability of conventional conflict in the North American Arctic is extremely low and the situation very different from what defence planners faced when last they considered the defence of the Arctic Ocean area. Still, the danger exists that a prolonged period of geopolitical tension and the large-scale return to Arctic Ocean patrol routes of Russian submarines may force a similar Canadian and American return to the region. These detection systems have remained a highly classified secret and only now can we understand how seriously Canada and the United States took this threat, and how much they were willing to invest to address it. Furthermore, this system's initial promise showed that large-scale tracking is not only possible but was well on its way to becoming a reality before the end of the Cold War. If fear and mistrust come to define East-West relations in the 21st century, as they did in the 20th, then these plans may yet be dusted off once again.

Notes

1. "The Maritime Strategy, 1984," Document Two, in John B. Hattendorf and Peter M. Swartz (eds), *US Naval Strategy in the 1980s: Selected Documents*, Naval War College Newport Papers No. 33 (Newport: Naval War College Press, 2008), pp. 45-104.
2. An ice plug is a semi-permanent feature connected to the shore.
3. J.M. Thorleifson, "Overview of Surveillance in the Arctic Basin," 31 October 1988, Library and Archives of Canada (LAC), RG 24, Vol. 1, File 3060-1.
4. "Status of DREP Acoustic Research in the Arctic – March 1988," 7 April 1988, LAC, RG 24, Vol. 1, File 3060-1.
5. Thorleifson, "Overview of Surveillance in the Arctic Basin."
6. *Ibid*.
7. During the early 1990s there was still some interest in developing sensor systems inside the Arctic archipelago, however these too were abandoned on the basis of cost by 1994. See Adam Lajeunesse and William Carruthers, "The Ice has Ears: The Development of Canadian SOSUS," *Canadian Naval Review*, Vol. 9, No. 3 (Fall 2013), p. 6.
8. Captain (N) G.J. Romanow, "Maintaining an Arctic Operational and Research Capability," 2 March 2000, LAC, RG 24, Vol. 1, File 3060-1.
9. There are many reports which make this assessment. See for instance: Arctic Council, Protection of the Arctic Marine Environment (PAME) working group, "Arctic Marine Shipping Assessment," 2009.
10. On this see Rob Huebert, "Canada and Future Challenges in the Arctic," *Polar Initiative Policy Brief Series*, September 2014.
11. For more see US Office of Naval Intelligence, "The Russian Navy," December 2015, p. 18.
12. See Russia, "Basics of the State Policy of the Russian Federation," 2008; Russia, "Strategy for the Development of the Arctic Zone of the Russian Federation," 2013; and Russia, "Military Doctrine of the Russian Federation," 2014.
13. Russian Federation, "Maritime Doctrine of the Russian Federation 2020," approved 27 July 2001.
14. See for instance Statement of Admiral William Gortney before the Senate Armed Services Committee, 12 March 2015, available at www.norad.mil/Portals/29/Documents/Gortney_03-12-15_posture%20statement.pdf.
15. David Pugliese, "Liberal Government Will Spend $133 Million in Five Years for Research to Keep an Eye on the Arctic," *National Post*, 12 April 2016.

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The Emergence of Anti-Ship Missiles and the Implications for the RCN

Major Ed Stokes

Credit: U.S. Navy

*During Exercise Stellar Avenger, the **Aegis**-class destroyer USS **Hopper** (DDG 70) launches a standard missile 3 Block IA, successfully intercepting a sub-scale short-range ballistic missile launched from the Kauai Test Facility, Pacific Missile Range Facility, Kauai, 2009.*

As technology develops, anti-ship cruise and ballistic missiles are becoming more accurate, traveling greater distances, possessing increased lethality, with more sophisticated guidance and avoidance systems. This means they pose a greater threat now to all navies in both the littoral and blue-water environments. With that in mind, this article examines the anti-ship cruise missile (ASCM) and emerging anti-ship ballistic missile (ASBM) threats to the Royal Canadian Navy (RCN). There are many challenges inherent in defending against these missiles, and this article will discuss these challenges by analyzing the *sense*, *command* and *act* operational functions.[1] The paper concludes by providing recommendations for the RCN.

Over the coming decades, the RCN will procure logistic supply and surface combatant ships to maintain its capability to meet its domestic and international obligations. The Canadian Surface Combatant Concept of Employment states that the RCN will be required to form and lead a maritime task force and if required, deploy independently or as part of a multinational group.[2] This will require the RCN to provide anti-ship weapon defence of its frigates, as well as defence for supply, merchant and/or commercial ships operating in the littoral or blue-water environments.[3] Complicating the battlespace are ASCMs and ASBMs which play a significant role in supporting the anti-access/area-denial (A2/AD) operations of our

Credit: AP/Pu Haiyang

*The US Office of Naval Intelligence has confirmed the Chinese government's claims that the newest class, the **Luyang III** destroyer, is fitted with the new vertically-launched YJ-18 anti-ship cruise missile.*

adversaries.[4] This will challenge the RCN's defensive anti-ship weapon capabilities. Consequently, the RCN will need to overcome these threats in order to gain temporary sea control over an area to allow land operations to occur.[5]

ASCM and ASBM Characteristics and Development

Anti-ship cruise missiles are generally multi-stage missiles that can be launched from ships, submarines, or air-/land-based platforms with ranges up to 1,000 nautical miles. Due to technological advancements, these missiles are now capable of supersonic (Mach 1–5) speeds, and research programs are underway in the United States, China, Russia, India, Japan, South Korea and Taiwan to develop hypersonic (>Mach 5) missiles.[6] The payloads of these missiles can vary from high explosive warheads to chemical, biological, nuclear and radiological weapons. The integration of sophisticated sensors and guidance systems into these missiles is making them even more challenging to defend against. Some ASCMs, such as the Russian P-700 Granit, are also capable of salvo and cooperative engagement tactics to overwhelm the ship's defence and increase the probability of successful attack.[7] Currently, the leaders in ASCM development are the United States, Russia, India, China and Iran.

Anti-ship ballistic missiles currently adopt one of two technologies – terminally guided ballistic missiles and boost-glide missiles.[8] (Table 1 lists the major differences between the two technologies.) There has been ongoing development of ballistic missiles since the early 1990s, but the recent Chinese tests of hypersonic boost-glide missiles have caused concern. Between 2014 and November 2015, the Chinese conducted six tests of their DF-ZF hypersonic boost-glide missile that can reportedly travel at Mach 10 and perform manoeuvres to intercept moving targets.[9] Academic James Acton of the Carnegie Institute assesses that the initial operating capabilities of boost-glide missiles will be achieved between 2018 and 2024.[10]

Table 1. Key Differences between ASBM Technologies

	Terminally Guided Ballistic Missiles	Boost-Glide Weapons
Maximum range	Intercontinental	Global
Mid-course manoeuvrability	Zero	High
Terminal manoeuvrability	Limited or very limited	Medium or high
Ballistic flight path over the majority of trajectory	Yes	No
Cooperative engagement capability	No; but likely to employ salvo tactics to produce saturation of defensive processes	In development

*Sources: Modified from Eleni Ekmektsioglou, "Hypersonic Weapons and Escalation Control in East Asia," **Strategic Studies Quarterly**, Vol. 9, No. 2 (Summer 2015), p. 46; and Pacific Maritime Conference 2010, "Evolving Naval Anti-ship Weapons Threat."*

Challenges for the Royal Canadian Navy

The advances in anti-ship cruise missiles and the emergence of anti-ship ballistic missiles pose significant challenges for the RCN, especially when deployed as part of a maritime task force. The high capital cost and strategic implications of losing an aircraft carrier, an amphibian, a logistics support or a commercial ship to one of these missiles justifies their continued development. Thus, for example, in 2014 the estimated costs for long-range anti-ship cruise missiles and ballistic missiles were $1-3 *million* and $6-10 million respectively while the estimated costs of a US destroyer and carrier were $1-2 *billion* and $11 billion respectively.[11] As is clear from this, the cost of producing the weapons is reasonable if you can destroy a much higher-value target belonging to an enemy.

The proliferation of these weapons among state and non-state actors will create issues for the RCN. And in fact some non-state actors already have them. *Jane's Defence* reported, in as early as 1996, that 75 countries already possessed 130 cruise missile types.[12] Hezbollah's successful deployment of a land-based ASCM against an Israeli frigate in 2006 demonstrated the missile's accessibility to a non-state actor, as well as its effectiveness. The evolution of hypersonic missiles will make anti-air weapon defence extremely challenging in the foreseeable future. At a Congressional hearing in January 2014, the Technical Director of the US National Air and Space Intelligence Center stated that "[h]ypersonic missiles of any kind ... are extremely difficult to defend against because the time is so compressed between initial detection, being able to get a fire solution, and then just being able to have a weapon that can intercept them."[13] Consequently, it is imperative for the RCN to take a holistic approach to counter these threats, and to contribute to this approach, I would like to provide a critical analysis of the *sense*, *command* and *act* operational functions.

Sense Operational Function

The *sense* operational function provides a commander with information by integrating the data from detection systems.[14] This information can then be used to plan and execute actions. This function provides the commander with enough information to make good decisions and the ability to proceed with defence against the threat. The sense function primarily involves detection, tracking and identification of threats.

There are a number of challenges posed by ASCMs and ASBMs, and for successful defence, these need to be overcome. The main challenges with cruise missile detection, tracking and identification include the following:

- Terrain masking. Low-altitude cruise missiles use terrain-hugging techniques to limit their exposure to ground-, air- or sea-based radar systems. This is a particular concern for naval platforms operating in the littoral environment where the range may be extremely close. Additionally, sea-skimming ASCMs hide below sensor elevations and amongst the littoral land formations and vessels in the area.
- Low observability. Improvements in stealth technology through the reduction of radar cross-section and multispectral emissions will enable missiles to avoid detection.
- Mission planning. Adversaries will plan flight paths that circumvent sensors and defensive weapon coverage.
- Suppression of air defences. Adversaries will employ

Credit: Wikipedia

The joint India-Russia developed BrahMos is a short-range supersonic cruise missile that can be launched from submarines, ships, aircraft or land. Shown here June 2007.

electronic warfare techniques from a combination of platforms, including the attacking cruise missile, to confuse or interrupt the response functions.
- Multiple speed profiles. The missiles may vary their speed (for example, from subsonic to supersonic or hypersonic) making sensor tracking extremely difficult.

The main challenge with detecting an anti-ship ballistic missile is the significant distance between the launch location and the maritime target. Ballistic missiles have a trajectory that takes them outside of the atmosphere making their detection more complicated due to space debris and the potential deployment of decoys.[15]

As both the anti-ship cruise and ballistic missiles become more sophisticated, sensing them will become significantly more challenging. This situation is especially applicable in the littoral environment where complex physical terrain is common. Consequently, the RCN will need to adopt a comprehensive approach to the sense function, utilizing manned and/or unmanned airborne early warning, advanced ship-based radar, over-the-horizon-radar, electronic support and space-based multispectral sensors to ensure confidence in detecting the approach of a missile. The fusion of sensor information will be critical in the establishment of a recognized air picture, which will provide early detection and improved tracking and identification. In the situation where the Canadian Armed Forces (CAF) have no access to Canadian detection assets, the RCN will need access – in near-real-time feeds[16] – to other naval assets possessed by allies and partners, especially for ASBM detection during the launch and cruise phases.

Credit: Global Military Review

The Chinese continue to develop cruise missiles. Shown here is the C-602/YJ-62 long-range anti-ship cruise missile.

Additionally, Canada must emphasize the effective employment of sense assets to ensure that vulnerabilities are mitigated and sensor capabilities are maximized. The sense function should be a priority in a complex battlespace because adversaries are continually developing technologies and techniques that will result in missiles staying below the detection threshold until it is too late to respond.

Command Operational Function

The *command* operational function takes the outputs of the sense function to determine the current situation in order to make a decision on how to respond.[17] Once this assessment is complete, the command function will plan and direct actions to counter the missile threats. This process is vital for effective defence, with a high reliance on computing, communications and procedures. As missile capabilities increase and the battlespace becomes more complex, the requirement for effective command of the anti-air weapon battle will be even more critical. Consequently, the RCN should be focusing its efforts on three main areas.

The first area is integration. The command function must be capable of seamlessly integrating sea, land, air and space capabilities into its environment. This will require significant cooperation and planning with joint, inter-agency and coalition partners in an effort to resolve command and control issues. Additionally, it will require maximum situational awareness to minimize fratricide.

The second area is having enough reliable information to make the correct decision in response. This is associated with synthesizing sensor information, determining fire-control options – using a combination of computer processing and cognitive thinking – and then responding. This will be extremely challenging against high-speed and manoeuvrable cruise and ballistic missiles that may utilize their cooperative engagement capability in salvo tactics. The time from the detection of a cruise missile in blue water to the impact could be less than 10 seconds (based on a hypersonic missile traveling at Mach 8 being detected at 30 kilometres). Restrictive rules of engagement, difficulties in positive identification, integration of joint assets, and multiple friendly and/or neutral airborne and seaborne assets in the battlespace may further complicate the command environment. This will obviously create a situation where the command function will be placed under significant pressure.

Credit: U.S. Navy photo by Mass Communication Specialist 2nd Class Gary Granger Jr.

The US Navy amphibious transport dock ship USS ***New Orleans*** *(LPD-18) fires a RIM-116 surface-to-air intercept missile from its rolling airframe missile launcher while off the coast of California during a live-fire exercise, May 2013.*

And, finally, the third area is communications. Currently, the naval communications architecture is based around Link 16 tactical data exchange network, which is well suited to the current operating environment. However, as battlespace complexity increases, Link 16 will need to advance accordingly. This will require near-real-time transfer of information across the sense, command and act functions to engage missile threats over an extended area. Furthermore, time constraints associated with joining the Link 16 network should be reduced to allow for seamless integration, as well as robust jamming countermeasures.[18]

What are the implications for the Royal Canadian Navy? To be effective in the future anti-air weapon defence operating environment, the RCN must ensure that it leads the development of a joint concept of operations in an effort to understand these complex challenges. This must be complemented with a defence combat system that is capable of determining defence fire-control options for a commander in real time. This system must also be interoperable with allied weapons systems and capable of upgrades to ensure effectiveness against emerging threats and new technology. Importantly, fully automatic fire-control solutions must be examined because traditional command processes will be vulnerable and potentially unable to process the sensor and fire-control information in extremely compressed timelines.

Act Operational Function

The *act* operational function involves making a response to counter cruise and ballistic missile threats.[19] The key to doing so is synchronizing kinetic lethal and non-kinetic lethal effects in a multilayered approach. Such an approach in the defensive anti-air weapon battle entails the employment of area and close-in weapon systems, platform manoeuvres, and electronic countermeasures (ECMs). However, several challenges are associated with the threats. First, the emergence of cooperative engagement capability and salvo tactics with terminal stage manoeuvres will challenge current anti-air weapon systems. This may result in multiple cruise and/or ballistic missiles attacking a platform by using multi-axis tactics to overwhelm anti-air weapon defence systems. Second, the supersonic and hypersonic speeds of new missiles will make an effective kinetic response challenging. Conventional defence systems will have insufficient time to launch and intercept these threats. Additionally, close-in weapon systems will be ineffective due to the kinetic energy of the missiles – i.e., even if the missile can be hit, its forward propulsion would still lead to damage. This will create significant problems in countering this threat.

The RCN's current suite of kinetic defence weapons such as Evolved Sea Sparrow Missile and Phalanx Close-in Weapon System will be challenged by the emerging threats. However, non-kinetic weapons and tactics in the form of ECMs or manoeuvres may be capable of providing one layer of defence. What will also be required are advances in weapon systems, including electromagnetic railguns and directed energy lasers. The RCN will need to work with allies and partners in the development of both these defensive capabilities. If these options are prohibitive in terms of cost and technology, then an aggressive ECM program should be conducted. The challenge with effective ECM, however, is that it generally requires an understanding of an adversary's sensor and guidance systems. Additionally, the RCN should invest significant thinking to developing tactics that will minimize the threats.

Conclusions and Recommendations

The development of anti-ship cruise and ballistic missile technologies will pose significant challenges for the RCN in providing air defence within both the littoral and blue-water environments. This article has highlighted the characteristics and development of cruise missiles and ballistic missiles, and the procedures to defend against them. The *sense*, *command* and *act* operational functions have been used to demonstrate the RCN's future difficulties in countering the threats. As the RCN moves forward and leads or contributes to a maritime task force, it must

Credit: U.S. Navy photo by Mass Communication Specialist Seaman Matthew J. Haran

*An RIM-162 Evolved Sea Sparrow missile is launched from the aircraft carrier USS **Carl Vinson** (CVN-70) off the coast of California, July 2010.*

be ready to counter the ASCM and ASBM threats. This initiative will require the RCN to have cognitive and technological capability so that it can seamlessly integrate with its allies and partners.

I'd like to conclude with the following recommendations:

1. The RCN should lead the development of a joint anti-air weapon defence concept of operations for the littoral and blue-water environments.
2. The integration of joint, inter-agency and allied tactical, operational and strategic sensors must be examined to ensure that a robust air picture is established to provide sufficient time to counter incoming missiles.
3. The RCN anti-air weapon defence combat system must remain fully interoperable with allied systems.
4. Defence Research and Development Canada should work with allies and partners in the development of weapon systems that are capable of countering anti-ship cruise and ballistic missiles.
5. The Canadian Forces Maritime Warfare Centre should pursue the development of tactics to minimize the threat.

It is not likely that anti-ship cruise and ballistic missiles will disappear in the future. We can bet that they will continue to be developed and their technology will be increasingly sophisticated. The RCN must, therefore, consider this threat, and prepare to defend against it.

Notes

1. This paper will only focus on defensive anti-air warfare challenges facing the RCN. It is acknowledged that there are offensive options in countering the ASCM and ASBM threats which involve deploying offensive weapon capabilities from within the joint environment to strike the threats before they are deployed. This aspect of research is beyond the scope of this paper.
2. The Canadian Surface Combatant Concept of Employment document states that the RCN must be able execute the following tasks: multi-threat warfare; support to forces ashore; embargo operations; maritime interdiction; non-combatant evacuation; counter piracy; contribute to NORAD; maritime domain awareness; sovereignty patrol; public service and assistance to law enforcement agencies; search and rescue; humanitarian assistance and disaster relief; overseas regional engagement; and domestic community engagement. Department of National Defence, Canadian Surface Combatant – Concept of Employment, Ottawa: Directorate of Maritime Force Development, 2011, pp. 11, 15-16.
3. This means the RCN will be responsible for both point and area defence. "Point defence is posture designed for the protection of an individual ship, whereas area defence is the co-ordinated defence of a specific area (for example a Maritime Task Force) by a variety of systems." (UK) Ministry of Defence, Joint Warfare Publication 3-63, *Joint Air Defence* (Shrivenham: Joint Doctrine and Concepts Centre, 2003), pp. 1-11.
4. "Anti-access (A2) capabilities are associated with denying access to major fixed-point targets, especially large forward bases, whereas area-denial (AD) capabilities threaten mobile targets over an area of operations, principally maritime forces, to include beyond the littorals." Andrew Krepinevich, "Why Air Sea Battle?" (Washington, DC: Center for Strategic and Budgetary Assessments, 2010), p. 8.
5. This is in line with Sir Julian Corbett's naval theory in *Some Principles of Maritime Strategy* (1911), reprint introduced by Eric J. Grove (Annapolis: Naval Institute Press, 1988), p. 16.
6. Nayef Al-Rodhan, "Hypersonic Missiles and Global Security," *The Diplomat*, 13 November 2015.
7. Carlo Kopp, "Evolving Naval Anti-ship Weapons Threat," Pacific Maritime Conference – 2010; *IHS Janes*, "P-500 Bazal't (SS-N-12 'Sandbox')/P-700 Granit (SS-N-19 'Shipwreck')," 2015.
8. James M. Acton, *The Silver Bullet* (Washington, DC: Carnegie Endowment for International Peace, 2013), p. 37.
9. Al-Rodhan, "Hypersonic Missiles and Global Security"; *IHS Janes*, "US Officials Confirm Sixth Chinese Hypersonic Manoeuvring Strike Vehicle Test," 26 November 2015.
10. Acton, *The Silver Bullet*, p. 49.
11. Bryan Clark, *Commanding the Seas* (Washington, DC: Center for Strategic and Budgetary Assessments, 2014), p. 18.
12. *IHS Janes Defence*, "Cruise Missiles," 2016.
13. US Congressional Hearing, "Hearing before the US-China Economic and Security Review Commission," Washington, DC, 2014, pp. 37-38.
14. Department of National Defence, *Land Operations* (Ottawa: DND Canada, B-GL-300-001/FP-001, 2008), pp. 4-19.
15. A. Berman *et al*, *Naval Forces' Capability for Theater Missile Defence* (Washington, DC: Naval Studies Board, National Research Council, National Academy Press, 2001), p. 46.
16. Near-real-time is information that is seen in a platform which is relayed from external sources over tactical data links. Real-time information is that seen in a platform's tactical data system from its own sensors; (UK) Ministry of Defence, Joint Warfare Publication 6-00, *Communications and Information Systems Support to Joint Operations* (Shrivenham: Joint Doctrine and Concepts Centre, 2003), Annex 4J, Tactical Data Links.
17. Department of National Defence, *Aerospace Command Doctrine* (Ottawa: DND Canada, B-GA-401-000/FP-001, 2008), pp. 1-2.
18. Berman *et al*, *Naval Forces' Capability for Theater Missile Defence*, p. 22.
19. Department of National Defence, *Land Operations*, pp. 4-19.

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Operation Unifier: Canada's Military Training Mission in Ukraine

Tim Dunne

Credit: Cpl Blaine Sewell, Formation Imagery Services

*HMCS **Charlottetown**'s Naval Boarding Party transits to Italian Naval Frigate **Fasan** to conduct a naval boarding training exercise during **Operation Reassurance** in the Mediterranean Sea, 20 September 2016.*

With the demise of the Warsaw Pact military alliance, the collapse of the Soviet Union in 1991, and the gradual gravitation of many former Soviet bloc countries to NATO, it appeared that the hopes and dreams of a more pacific world were on the verge of achievement. These dreams were shattered with the resurgence of an increasingly hostile Russia. This could be seen in the 2008 Russo-Georgian war, and became even more apparent when Crimea was annexed from Ukraine in March 2014 and hostilities broke out in Donbass in eastern Ukraine shortly afterwards.

Canada was one of the earliest to condemn Russia's expansionism and remains one of Ukraine's strongest international supporters in its efforts to establish a stable and secure environment and implement democratic and economic reforms. Since the collapse of the Soviet Union and the achievement of independence, Ukraine has had a series of political convulsions. The country is torn between those who favour increased ties with the West (including NATO and the European Union), and those who want to maintain historic ties with Russia. This can be seen in the continuing conflict along the eastern part of the country – which reflects differences in perspective for the future of Ukraine that have taken a violent turn. In response to continuing conflict in the east of the country, and accusations of Russian military aggression and illegal occupation in support of Ukrainians who favour closer ties with Russia, Canada has taken an active role to support the Ukrainian people, government and military as they try to resolve their internal challenges and differences with Russia.

In addition to supporting Ukraine with its aspirations to move closer to the West, NATO has increased its activities in the Baltic states and in its Eastern European member countries to address growing Russian military adventurism. Canada has deployed army, air force and

Canadian Armed Forces personnel await transportation to the International Peacekeeping and Security Centre in Yavoriv, Ukraine, after their arrival at Lviv International Airport on 25 August 2015 during ***Operation Unifier****.*

navy assets and personnel to the region. It deployed six CF-18 fighter aircraft and ground support personnel to a NATO air-policing mission in Poland. As well, Canada has assigned Royal Canadian Navy (RCN) ships to the Black Sea in support of NATO missions, starting with HMCS *Fredericton*, then HMCS *Toronto* in 2014. HMCS *Winnipeg* also spent time in the Black Sea in 2015, and HMCS *Fredericton* took over as part of Standing NATO Maritime Group 2 (SNMG2) Task Unit 02 deployed to the Black Sea in April 2016, to conduct operations in concert with Romanian, Bulgarian and Turkish ships as part of *Operation Reassurance*.

Canada also launched a military training mission under the rubric *Operation Unifier*, in coordination with the United States and the United Kingdom, to enhance Ukraine's military capacity to deal with threats to its sovereignty. The focus of this article is *Operation Unifier*, the military training mission. The article is for the most part based on an 8 June 2016 telephone interview with Lieutenant-Colonel Jason Guiney, commanding officer of the first battalion, The Royal Canadian Regiment – and commander of Rotation 0 of Joint Task Force-Ukraine (JTF-U). Lieutenant-Colonel Guiney is a veteran of operations in Ethiopia and Eritrea (2001), Haiti (2004) with the United Nations, Pakistan Disaster Assistance Relief Team after the 2005 earthquake in northern Pakistan, and operations in Afghanistan 2008-09.

The current mandate of *Operation Unifier* is two years, set to expire on 31 March 2017. Of the states participating in this program, Canada was among the earliest contributors and has one of the longer term mandates. *Operation Unifier* began with the deployment of 185 Canadian soldiers by CC-177 Globemaster aircraft arriving at Lviv International Airport, Ukraine, in two groups, on 25 and 31 August 2015. Coming from various units of the Canadian Armed Forces, the task force included navy clearance divers from Esquimalt and infantrymen from Petawawa but the bulk of the personnel came from Second Mechanized Brigade Group in Petawawa. At first sight, one might ask why navy clearance divers were included in a land force training operation. However, among the many skills of a navy clearance diver is explosive ordnance disposal, better known by its more popular name of bomb disposal.

This group comprised Rotation 0 (ROTO 0) of Canada's military training mission in Ukraine. During the two-year mandate, the Canadians are there to teach essential military skills to soldiers of the Ukrainian Armed Forces. "What we're doing is critical," Lieutenant-Colonel Guiney told me. "Certainly from my experience as commander, what I saw was a country and armed forces very much in need. The Ukrainian military is undergoing an interesting period. There was significant political turmoil in the country of which Russia took advantage. [It] seized Crimea,

and then became engaged in a home-grown insurgency in the Donbass region. So the whole of Ukraine was under a cloud of uncertainty and upheaval, their armed forces had been neglected for a long time, so this war was thrust upon them at the worst possible time, making the skillsets we were delivering to them much needed."

Canada's mission is to build capacity and train the Ukrainian armed forces, along four pillars, or lines of effort: development, security, democracy and humanitarian aid. This is based on formal requests from the Ukrainian Ministry of Defence. All parties work through the Multinational Joint Commission, formed in July 2014 and chaired by Ukraine and the United States, with participation of Canada, the United Kingdom and several other states. The joint commission is the overarching body to determine in which areas Ukraine should modernize its armed forces, as well as part of Ukraine's Defence Education Enhancement Program (DEEP).

Soon after the arrival of ROTO 1 in January 2016, three additional lines of effort were added – flight safety training, logistics modernization, and a group of trainers from the Military Training and Cooperation Program conducting seminars in public affairs and operational planning courses. ROTO 1 is composed of troops from the 2nd Canadian Division Québec.

Canada's Training Mission in Ukraine

The largest component of the effort is an infantry training company, comprising approximately 150 troops. The Canadian task force's principal focus is tactical training at the Ukrainian Armed Forces International Peacekeeping and Security Centre in Yavoriv, roughly 30 kilometres from the Ukraine-Poland border. The task force provides additional specialized training to Ukrainian troops elsewhere in the host state and in Canada. Some medical trainers worked alongside the infantry training company, and these trainers were particularly valued, as I'll discuss later.

Credit: DND, Joint Task Force Ukraine

Canadian Combat Engineers conduct a demonstration for Ukrainian soldiers as part of explosive ordnance disposal training during ***Operation Unifier*** *at the Ukrainian Demining Centre, Kamyanets-Podilsky, Ukraine, 15 August 2016.*

There is also a small team of specialists in countering improvised explosive devices (IEDs). Eight Canadian Armed Forces personnel in the field of explosive ordnance disposal and IED disposal pre-deployed to observe training, and prepare training plans for Canadian military engineers who arrived with the main body. The Canadians, in particular RCN clearance divers, work with Ukrainian soldiers to enhance counter-IED operations with explosive ordnance disposal and IED disposal instruction at the Ukrainian Ministry of Defence Demining Centre in Kamyanets-Podilsky. Canada also sent a small contingent of Military Police who are working with their Ukrainian counterparts in Kiev. Outside the capital of Kiev, Canadian Military Police trainers are teaching specialized courses on the use of force and investigation techniques to their Ukrainian counterparts.

Much of the challenge regarding doctrinal, operational and cultural transformation is reflected in the uniforms of the Ukrainian military, which still bear Soviet design, with many of their insignia and medals appearing to be Soviet. That is part of their military tradition, much like the appearance of the Canadian army's uniforms – and Canadian navy and air force – recall British roots. The irony here is that Ukraine is now fighting forces believed to be supported and often supplemented by Russia (although this is denied by President Vladimir Putin), two countries that were both part of Soviet military training and tradition.

So what is Canada doing to help facilitate this transformation? According to Lieutenant-Colonel Guiney:

> We are very much involved. When we first went in, we thought we were to train them at the tactical level and train them in the skills. But we discovered that their institutions needed attention as well. They are a very top-heavy, Soviet-type armed forces, so decision-making is centralized at the top and there is a very rigid command structure completely different than anything we are used to here in the West. And there is a huge appetite for reform, much like there is a huge appetite for political reform, there is a huge appetite for military reform, particularly among the younger generation. They have a long and challenging path ahead of them.

Canadians may think that the Canadian Forces are spending all their time teaching military skills to the Ukrainian forces, but that isn't necessarily the case. "If I were asked about the biggest challenge my soldiers and I faced while we were there, I would say it's the military culture," Lieutenant-Colonel Guiney explained. "The Ukrainian armed forces still retain the old guard who were in the Soviet military." This means that the military culture reflects the Soviet traditions, and this has led to a clash "with the modern day generation of highly-motivated, patriotic young military members, and recruits who come into this antiquated system." According to Guiney, the mobilization system is also antiquated. And it's extremely hard to re-organize the military while you're trying to fight a conflict within your territory.

In some ways, this experience parallels the experiences of the Canadian Armed Forces, as an example. That institution went through a huge transformation following operations in Somalia in the early 1990s and through operations in Afghanistan. The Canadian military is known to be an adaptable military force, able to accept change and to be flexible in its ability to integrate new technologies and embrace new concepts of military doctrine and operations. Yet it took decades for the Canadian military to arrive where it is today. "So you can imagine having this old bureaucratic system that is resistant to change while at the same time you are trying to transform it," said Guiney. But he notes that "we are not there to reform the Ukrainian military, we are there to help them reform themselves."

Holistically, the training is going well. ROTO 0's first attention was to two Ukrainian units which had freshly rotated out of the Donbass region. They were the first to receive instruction from Canada's military representatives at the tactical level. These Ukrainian soldiers came from the front lines and were a cross-section of differing levels of experience and expertise, from some who had been there for a year to troops who had just been mobilized. Most appreciated the relevance and usefulness of the training. In particular, the first aid training was valued. Every Canadian soldier is trained to a very high standard of combat-related first aid, but currently Ukrainian forces receive virtually none.

The Canadian task force adopts a collaborative approach to the training program, recognizing that the Ukrainian military's methods of conducting tactical training are very different than Canada's. It is as much a learning experience for the Canadians as it is for the Ukrainians. The Canadian mentors and instructors do not simply say 'here is the right way to do things.' They listen to their clients, prepare a training plan and adapt it to the Ukrainian concept of operations at the front. "You have to be able to train them in ways that they can use," Guiney underscored.

Their Ukrainian colleagues and counterparts proved to be

*Ukrainian soldiers manoeuvre a BMP-2 armoured vehicle on a range at the International Peacekeeping and Security Centre during **Operation Unifier** in Ukraine, 6 November 2015.*

very receptive. There is a huge appetite among the Defence Ministry and senior military staff to train to the NATO standard, to align themselves more with NATO and to become more interoperable with the alliance's member states. The Ukrainian military is very enthusiastic to learn NATO's operational processes and doctrines.

The Canadian instructors work closely with Americans and Lithuanians, and to a lesser degree, the British, and endeavour to demonstrate that the program is more than simply teaching soldiers to shoot better and how to do first aid. As Guiney noted, "we are doing more than just training their soldiers in specific skills. We're also training their instructional cadre, we're training the trainers, so that when we leave, either at the end of this mandate, or later, if the Canadian government decides to extend the mandate, we leave them with the ability to train themselves."

Ukraine also needs to invest in doctrinal, institutional and organizational level reform and it needs to develop a professional non-commissioned officer (NCO) corps. Ukraine's long-time military experience is based on Soviet doctrine and organization, which assigns to sometimes very senior commissioned officers responsibilities and training which in the Canadian Army would be accomplished by non-commissioned officers. "One of the many strengths of the Canadian Army is our very experienced NCOs, the backbone of the Army, who can leverage experience not only from Afghanistan but also from humanitarian operations, from peace support and peacekeeping missions," Guiney effused with obvious pride. As he said,

> We have a phenomenal professional development system in the Canadian Army in particular, and in the Canadian Armed Forces in general. All Canadian military personnel have leadership training, marksmanship and medical instruction, and when you do security force capacity building all those skills come out. The quality and effectiveness is drawn from missions and operations, and rather than using them on an adversary, we are imparting them to the Ukrainian troops. That's the most important aspect of what we did over there. We applied what we did on the training mission.

It's important not to see *Operation Unifier* as a one-way street. Guiney made it clear to his own personnel and to

*Sergeant Yann Gauthier receives a commendation from the Ukrainian Minister of Defence, General Stepan Poltorak, during **Operation Unifier** at the International Peacekeeping and Security Centre in Ukraine, 15 March 2016.*

his Ukrainian colleagues that Canadian forces are there to learn as well as to teach and train. "Both Ukrainian and Canadian Armed Forces have benefitted from *Operation Unifier*. More than just basic training, this is an opportunity for exchanging real life military and battlefield experiences," said Canadian Ambassador to Ukraine, Roman Waschuk. Because there are Russian weapons systems being deployed in the Donbass conflict, the Canadian personnel learned a lot about modern Russian weapon systems, capabilities and weaknesses. Guiney noted that:

> We brought back a lot of lessons learned from the Donbass region, a lot about how Russian-backed insurgents conduct their fighting. We learned about the tactics that are being employed there. These are great lessons for the Canadian Army, and it's a bit of a wake-up call to what NATO is calling hybrid warfare. In Donbass the Ukrainians are facing conventional tank-on-tank, insurgents, road-side bombs, electronic warfare, unmanned aerial vehicles, and we are able to get a window on that, and bring it back to Canada.

Furthermore, this training and instruction goes to the very root of interoperability. This permits military participants who previously had incompatible doctrine, training and education to work cooperatively in international military operations. "IED training, for example," Guiney noted, "is the same type of training conducted by the United States, the United Kingdom and other allied nations, so if we co-locate we can expect that same level of quality and effectiveness from them." This introduction to interoperability means that Ukrainian forces – while not members of NATO – may be able to work effectively with NATO forces in, for example, UN peacekeeping operations in the future.

Following any deployment, after-action reports are written. These reports, Guiney explained, capture "our observations, our experiences with the mission, what we did well, what we could have done better, as well as lessons learned, based on what the Ukrainians are telling us is going on in Donbass. We do this so the next Canadian ROTO can build on our experience." These elements also find their way into the army's professional development sessions, the results of which can then be incorporated into the training, tactics and operations as extremely detailed knowledge and observations, some of which is classified and some not.

Conclusion

Under the previous federal government Canada was very vocal about Russia's occupation of Crimea and its interference in Donbass. By putting 200 Canadian soldiers on the ground in western Ukraine, Canada is standing behind its statements, and standing with partners in an area where Russian and Canadian interests are colliding. The current government is less vocal but has not ended the operation. Canadian forces are in the region at the request of the Ukrainian government to help Ukraine, a friend in need.

The leadership from Ukraine's 2nd Battalion 25th Airborne Brigade poses with the command team from the training company, Master-Warrant Officer Michel Dub and Major Pat Cantin, and the Joint Task Force Ukraine command team, Lieutenant-Colonel Tim Arsenault and Chief-Warrant Officer Daniel Parenteau, after the graduation parade for a course in Starychi, Ukraine, 29 April 2016.

By June 2016, about a year after the mission had started, more than 1,300 Ukrainian Armed Forces members had participated in the individual training provided by the Canadian Armed Forces. The training is conducted in specific areas such as small team training, combat first aid, explosive ordnance disposal and IED disposal, military police techniques, logistics modernization, flight safety training and other training under the Military Training and Cooperation Program (MTCP).

Lieutenant-Colonel Guiney described his enduring sentiment from his experience in Ukraine:

> It was an honour to be part of that mission. I really believe what Canada is doing there is the right thing. Canadians can be proud of their men and women in uniform, not just in Ukraine, but throughout the world. Of all the things I've done, from peacekeeping to war fighting, this was one of the most challenging and rewarding endeavours I've done. I walk away feeling proud not only of our soldiers, the Canadian Army and the Canadian Armed Forces, but also of Canada, writ large.

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Interview with Vice-Admiral Ron Lloyd

This is the transcript of an interview conducted by Dr. Dave Perry for ***CNR*** *with Vice-Admiral Ron Lloyd, Commander Royal Canadian Navy, in Ottawa on 3 October 2016. (The interview has been edited for publication.)*

CNR: Admiral, first off, thank you for taking the time today to talk to me, and congratulations on your promotion!

I was struck in reading *Leadmark 2050* (*LM2050*) by the extensive discussion about the North, and the changes to the security environment there. In the last year there was active RCN contribution to operations off the Norwegian coast, and the Warsaw communiqué spoke about the importance of operations in the North Atlantic. You have the Arctic Offshore Patrol Vessels (AOPVs) under construction. What do you see as the future operating concept for the North, both in our own waters and more broadly with our allies? And what additional capabilities would you need to work there effectively in the future?

Vice-Admiral Ron Lloyd: There's a lot in that question! Let's start with the *Harry DeWolf*-class, and the tremendous capability that she'll provide the RCN. When I say this I mean tremendous capability she'll provide the navy not only in the Arctic but offshore as well.

We have to appreciate that it won't just be the RCN operating in the Arctic by itself. We're very much partners in terms of the whole-of-government approach, working with the Canadian Coast Guard (CCG), the RCAF and other government departments and stakeholders. As all lines of longitude meet at the North Pole, so too do a number of world trends converge in the Arctic. Although the RCN has operated there in the past, it was years ago. We're looking forward to the *Harry DeWolf* commissioning and being able to deploy into the Arctic to help the whole of government leverage all the lessons that we're learning through the *Operation Nanook* series of exercises. We're also very interested in really reinforcing safety and security in the Arctic as we go forward.

Also in terms of the North, as you articulated, we're working with our NATO allies and there are a lot of things that we're doing in terms of conducting operations together. For example, HMCS *Windsor* participated in Exercise Dynamic Mongoose (DM), a NATO anti-submarine warfare (ASW) exercise. We're really happy that she was able to provide her extraordinary capability. And while I'm not sure Canadians fully appreciate just how sophisticated the capabilities are in that submarine, it's not a stretch to say that the bow sonar system in our *Victoria*-class submarines is world class. I'm prepared to say that the system is only found in the newest US attack submarines, it is highly sophisticated technology that brings a lot to the ASW battle space. It was also great that *Windsor*

Credit: Petty Officer Second Class Belinda Groves, Task Force Image Technician

Maritime Coastal Defence Vessel, HMCS ***Moncton****, arrives near Rankin Inlet, Nunavut, during* ***Operation Nanook****, 23 August 2016.*

Rear-Admiral John Newton, Commander Maritime Forces Atlantic (left), and Vice-Admiral Ron Lloyd, Commander Royal Canadian Navy (right), join HMCS ***Windsor*** *as it returns to Halifax from the NATO anti-submarine warfare Exercise Dynamic Mongoose 2016 on 9 August 2016.*

was participating in DM because when real world events occur, then NATO has the ability to address them.

I was really happy that NATO asked for member nations to provide resources to help out in the ASW battle space, and I was even happier when Canada was in a position to offer *Windsor*'s participation, and extremely pleased that Canada did so. In response to NATO's request, we extended *Windsor*'s deployment and allowed that re-tasking to take place. I wanted to make sure I visited *Windsor* when she arrived back in Halifax not just to thank the ship's company for the extraordinary work they did, but equally important, to thank their families for their sacrifice and support of their loved ones that enables them to do these important missions on behalf of the government of Canada.

CNR: To keep going on the ASW theme, there's been a long discussion about submarine activity in the Asia-Pacific region. As well, your American colleagues have described the current pace of submarine activity in the Atlantic as unprecedented since the end of the Cold War. Where do you see RCN participation in ASW going in the future, relative to other theatres? And how crucial is a submarine life extension program to maintain our ability to conduct ASW?

VARL: ASW is the most difficult area of warfare to be successful in. And the best capability to defeat a submarine is a submarine. If you want to have an awareness of your water column, you need to understand what's above, on and below it. Understanding what's going on below the water column is the most difficult and demanding of tasks. In terms of ASW, it's not by accident that we just had Exercise Cutlass Fury on the East Coast. Because we understand the challenges associated with ASW, we know you aren't going to get good at it unless you practice it. So that's why *Windsor*'s participation in Exercise DM was also very important, so our subs know how to look for subs. Equally important is fully understanding ASW because as crucial as submarines are, it's a team sport. You need your maritime patrol aircraft (MPA), maritime helicopters and surface ships all being able to work together to defeat a submarine. Those skills need to be practiced, they're perishable, they need to be maintained, and that's why we were very happy to host Cutlass Fury.

You raise another good point regarding ASW, because it isn't just about the Atlantic Ocean. The largest proliferation of submarines globally has been in the Pacific Ocean. That's another area of the world we need to be familiar with. Whereas the Atlantic has the NATO alliance underpinning a lot of our tactics and procedures, in the Indo-Asia Pacific (IAP) region, that framework doesn't currently exist. So that's why we're happy that HMCS *Vancouver* is operating in the IAP and it should come as no surprise. The Minister of Defence (MND) and Chief of the Defence Staff (CDS) have said that we'll be more persistent in the IAP, so we'll be working there over the next several years more persistently.

And we have to work in those two paradigms – the NATO paradigm, and figuring out the paradigm in the IAP region. HMCS *Vancouver* is there participating in Exercise Kakadu [a biennial exercise hosted by the Royal Australian Navy], reinforcing partnerships and relationships and building new ones so when we send our forces into the theatre next year, they have a basis on which to build. Alliances like NATO are all about trust and, as you would have heard many people say, in times of crisis, you can always surge forces, but you can't always surge trust.

We have the NATO alliance in the Atlantic, but we need something similar in the IAP region. We need those trust-based relationships that will allow us to operate in the IAP regardless of what confronts the world.

Vice-Admiral Ron Lloyd, Commander of the Royal Canadian Navy, speaks with Commander Clive Butler, Commanding Officer of HMCS ***Vancouver*** *while it was in the Pacific Ocean near Hawaii, during RIMPAC 16 on 17 July 2016.*

CNR: So looking ahead, how difficult would it be to contribute to ASW without a submarine life extension program and retaining that capability?

VARL: You've seen the front page of the paper and seen when there's a Russian bomber and on its wing is a CF18. We knew the Russian plane was coming, and vectored the CF18s to intercept. So we get a great photo showing how that aircraft has intercepted that bomber and we're defending the security and defence of Canada. Well, in ASW, you need to understand what's coming to your coast from well off the coast. If you're intercepting that bomber inside your airspace, you've probably not delivered on your mission. If we have other submarines operating in our water space without our awareness, that's probably not in the best interests of Canada.

We're defending the world's longest coastline, second largest continental shelf, and the fifth largest Exclusive Economic Zone (EEZ) in the world. So we have a responsibility to be able to ensure the sovereignty and security and defence of those vast maritime estates. A submarine needs to be able to be out there as part of whichever alliance you're working with, being able to position those forces that would be your interceptors – the MPA or surface ships – to do that really important role. The likelihood of us ever seeing a photo of one of our submarines on the 'wing' of another submarine is small – let's be frank, it's something we'll never see. That's unfortunate because Canadians should know that their submarines are extremely capable and are invaluable to the security and defence of the country and its maritime estates.

CNR: You just touched on the idea of persistence, but one of the other aspects and themes in *LM2050* is *responsiveness*. For decades the RCN was the government's 'go to service' for responding quickly. You're coming through a period when that's been very difficult because of the frigate modernization, but you're now getting close to having the entire fleet, extensively modernized, back on line. Do you see the RCN re-assuming that quick response role?

VARL: Thanks for bringing up the Halifax-class Modernization (HCM) program. That $4.2B investment is our transition to our future fleet. The transition to the Canadian Surface Combatant (CSC) is assured by the HCM project that is on budget and on time. As I tell everyone, you probably haven't heard about the HCM project because it's on budget and on time, and we're really proud of that. What's equally impressive from a Canadian industry perspective is that the Royal New Zealand Navy is going to send two of its *Anzac* frigates to Canada to undergo a similar modernization program. Not only is New Zealand committed but there are other navies interested in seeing what they might be able to have as a modernization project. So that's a feather in the cap of Canadian industry and I wish them every success in those follow-on programs.

Back to your question about first responders for Canada. Few Canadians are aware that in May 1940 when the Allies' backs were against the water, literally, Canada reacted swiftly by sending a Canadian task group (TG). The navy also deployed a task group on behalf of Canada to Korea in 1950, again after the invasion of Kuwait by Iraq in 1990, after 9/11, and even to respond to Hurricane Katrina in 2005.

In terms of your comment about the navy being the nation's first responders, I think that's something the government will continue to look to the RCN for because of the simple fact that it gives the government the option to make that decision unilaterally and with alacrity to indicate commitment, support and leadership on world events.

We had a bit of problem of capacity in recent years that you've articulated. While we're on the other side of that issue, if the government said we need to send a naval TG right now, it would be a bit problematic from the sustainment perspective. Everyone is aware of the supply ship capability gap that we have, and we're looking forward to the interim AOR [supply ship] closing that gap, hopefully towards the end of next calendar year.

CNR: One thing I've heard you mention before is the concept of generating forward. Can you talk about that?

VARL: 'Generating forward' is a new concept that we introduced in the last year or so. Basically, what we have done historically is have our medium readiness ships maintain their skills on the East and West Coast of Canada. So what we've said with the concept of 'generating forward' was, we need to take a look at what other navies are doing, such as the Japanese Naval Self-Defence Force, the Australian, Norwegian and British navies, when they need to generate their ships to the highest levels of readiness. If we push our ships forward geographically to work with other navies far from our own shores, they can have the same types of opportunities they used to have off our coasts in terms of developing skills, while also developing new relationships and partnerships overseas.

And because they're already positioned abroad, it gives the government more options. You just talked about being able to respond quickly – by generating forward, the intent is that a medium readiness frigate could be doing work-ups in, say, the Pacific. If the government wanted to send it somewhere in that region, the ship might need some additional enhancements or crew or ammunition before it could respond fully to government direction, but the fact remains that it would already be in the region. We can work on getting that sent into theatre and in the meantime have the ship quickly turned around steaming to where the government wants it to go. Because it was forward to begin with, we no longer have to worry about the long transit time it would have taken under our old process to get from the West Coast to the Pacific or from the East Coast to the Indian Ocean.

I think the generate forward concept will not only provide the government and CDS with more options, but it will provide our sailors with more opportunity to do what they wanted to do when they joined, which is see the world and operate with other navies. The fact that HMCS *Vancouver* is currently exercising with 19 different countries in Exercise Kakadu 16 is impressive. We've just sent about 15 reservists to join *Vancouver*, and to have the opportunity to sail in the Pacific is an exciting opportunity for our reservists. It supports our 'one navy' concept – something that you've probably read about in our strategic plan – a concept that for us underpins energizing the institution, one of our core priorities.

CNR: One of the things the MND has spoken about a number of different times is the Canadian Armed Forces being more involved in crisis prevention, and getting involved earlier in the conflict cycle abroad. It seems like there's a lot of complementarity here, being present, etc.

VARL: That's the business of navies. Naval diplomacy means getting involved in operations left of bang [pre-conflict]. Navies are there to prevent conflict and to ensure trust-based relationships. Navies are there to promote security, to provide capacity-building opportunities. So we are one tool in the government toolbox in order to be able to conduct those types of activities. But, at the same time, you still need a platform that's equally capable of operating on the right side of bang. That full spectrum of capability is what our frigates represent in terms of being able to operate forward.

CNR: There's been a lot of discussion in the last couple of years about increasing the RCN's ability to provide humanitarian assistance/disaster relief (HADR). We've

Credit: RCN

*HMCS **Winnipeg** showcased the benefits of the **Halifax**-Class Modernization program at the Defence and Security Equipment International Exhibition, September 2015 in London.*

Credit: Kayla Hayes

*HMCS **Charlottetown** in the Black Sea after passing through Istanbul, Turkey, 18 July 2016. Part of Standing NATO Maritime Group Two, these ships are permanently available to NATO to perform tasks and serve as a consistently ready force to support the NATO Very High Readiness Joint Task Force.*

done that before, but with ships not built for the purpose. If the government wanted to pursue that capability, what would that add to the ability to respond in a humanitarian crisis, or in the littoral regions?

VARL: About 80% of the world's population lives within 100 km of the ocean. In terms of climate change and what that represents, there's a great likelihood that we'll have more HADR incidents if the trends continue the way they are. If you have purpose-built HADR capability that can respond, obviously it'll be more able to deliver on those types of operations.

CNR: The government has embraced the rebranded National Shipbuilding Strategy (NSS), and is pushing forward quite vigorously on CSC. You mentioned the frigate life-extension/HCM program earlier, what lessons has the navy drawn from that experience, now that AOPV is underway and the CSC is progressing, to enable the wider shipbuilding effort?

VARL: I'd like to go back to what lessons we learned from the *Halifax*-class in the early 1990s. What I think we learned in the 1990s is that the actual introduction of the ships is one of the factors, but probably not the most important factor. Obviously getting the new ships is really important, but right now, the navy is in what I'd refer to as a wholesale transformation because it's preparing to be ready for new capabilities and new platforms. We've had to ask ourselves some pretty challenging questions. What does our training system have to do? What about our command and control (C2) organization? As well, the whole way we've employed reservists is currently being transformed.

So when we accept these world-class surface combatants, the navy will be in all respects ready aye ready to receive and introduce them and their capability. We've already started doing that. We're modifying our trade structures so we have more depth and breadth in our occupations so that when we start dealing with the smaller ships' company of HMCS *Harry DeWolf* we'll have more capacity in those small ship companies.

But in terms of the lessons, people need to go to Irving Shipbuilding to see the phenomenal capability – ship *building* capability, not to be confused with ship *repair* – that is resident in Halifax. People need to get to Vancouver to see what great work they're doing in terms of delivering ships. I'm surprised when I speak to Canadians that they keep asking when we're going to start building ships. My response is we *are* building ships. *Harry DeWolf*, the first of class, is well underway, the second AOPV (named *Margaret Brooke*) is under construction, and before we know it, we'll have four ships under construction.

So we need to keep learning. Our priority as it comes to the future fleet is to enable that transition, and it's not just the RCN because we work with all government stakeholders, in terms of coming together to make sure that we're going to deliver a program that Canadians and the government can be proud of. With every program we've learned lessons to improve the overall process, so I'm extraordinarily happy that the government has embraced the NSS and I've committed on a number of

occasions that the RCN will put winds in the sails of the new procurement process for CSC. If we can take years off the acquisition, then we will help do that.

As we've articulated countless times, although most of our current ships will be around for a number of years, we must continue to evolve their roles as new ships come online and as threats change over time. For example, while the *Iroquois*-class is no longer effective in a high threat environment, the ships are very capable for force generation activities, and very effective for allowing the Sea King to conduct operations. They're still doing tremendous work for us. Similarly, in about 15-20 years, it will be unrealistic to expect that we will be able to deploy the *Halifax*-class the same way we do today. So, in short, we must keep learning, evolving and looking forward.

CNR: What other issues are front and centre for you?

VARL: We have four priorities. Number One is to ensure excellence at sea. The verb *ensure* is by design because the RCN can control that. It begins with leadership and that's why Scott Bishop was the deputy commander at RIMPAC, why Craig Baines was leading Cutlass Fury, and why Jason Boyd was the sea combat commander with HMCS *Calgary* protecting a carrier strike group from submarines and surface threats. It means *Vancouver* developing relations and partnerships in the Asia-Pacific region, and *Charlottetown* upholding the government's commitment to NATO.

The Maritime Coastal Defence Vessels (MCDVs) have already this year seized almost 3,000 kg of cocaine and 1,500 kg of marijuana to keep drugs off the streets of North America and Europe. Very impressive for these small vessels, and it's in addition to what they're doing in the North for *Operation Nanook*.

Priority Number Two is to enable the transition to the future fleet. Number Three is evolving the business of the business – the transformation that is currently underway. Then energizing the institution is Number Four.

What's not in those priorities, and I have to reinforce at every opportunity, is people. People are fundamental to everything we do. In the navy we're animating a conversation about people first, mission always. We're trying to make sure that we look after our people because you might have the best combatant coming out, but if you don't have people coming out and energized to deliver on the missions, then you don't have anything, you only have steel. So right now we're really working on the CDS priorities of respectful workplaces, free of sexual misconduct. We've actually incorporated the principles of *Operation Honour* in the RCN code of conduct – it's foundational.

This isn't to say we aren't going to send our people into harm's way, because we will. This isn't to say we won't send people to put out a fire, knowing that the likelihood of them returning is slim, because we will. But people will be our first consideration. And we'll have done everything we can to enable them to excel. People are foundational to each and every one of our priorities.

Credit: Canadian Department of National Defence photo by Cpl Blaine Sewell

*HMCS **Vancouver** sails with Republic of Singapore Navy ships RSS **Vigour** and RSS **Valiant** through the Northern Australian Exercise Area during Exercise Kakadu 2016.*

CNR: How's the 'one navy' plan evolving so far?

VARL: In practice, from my perspective the 'one navy' concept is working well in a number of areas. So let's look at command and control. It used to be that there were schools on the East Coast and the West Coast, both teaching sailors how to be sailors. But in effect we had two navies – our schools were competing – we weren't one navy. So now we've said to Rear-Admiral Macdonald, you have the one navy training system, make the decision for the whole RCN training establishment. We've said to Rear-Admiral Newton, you are the one navy force employer, Maritime Component Commander, make it work. So although *Vancouver* is a West Coast frigate, currently operating in the IAP region, she's actually working for Rear-Admiral Newton. So training as you operate would be the operative phrase here.

We aren't going to have the reserves singularly focused on the MCDVs any more because the reserves are part of the entire navy, not just a piece of it. Our reservists are operating on all our platforms, except submarines, right now because we're trying to reinforce the fact that the reserves, the regular force and civilians all operate as one navy. Just to make sure everyone understands, our ships don't deploy unless all three components of the defence team are working together because that's what's truly going to make us all successful.

CNR: Admiral, thanks for talking to me.

Making Waves

The National Shipbuilding Strategy: Alive and Well on Canada's West Coast

Tim Page, Seaspan

The National Shipbuilding Strategy (NSS) has come under a good deal of scrutiny in the media over the past year with a consistent focus on reported cost overruns, schedule slippage, the government's efforts to strengthen its own program governance and unsolicited offers supporting foreign-built capability.

In the process, and perhaps this is innately Canadian, not enough positive attention has been given to the long-term program's early successes or to the underlying principles that resulted in the creation of the NSS in the first place. In this article, I appreciate the opportunity to discuss both in the hope of encouraging readers to do the same within the communities where they live and work.

As a maritime nation, the principles of the NSS are not only sound, they are unassailable – build ships in Canada through a long-term program to:

- protect and promote Canada's maritime interests;
- develop and sustain economic activity in a strategic sector of the Canadian economy;
- create value-added jobs for generations; and
- avoid the boom-and-bust cycles that have defined previous federal shipbuilding programs.

Today's government in Ottawa endorses these foundational principles for the NSS program which were established under the previous government. To deliver on these principles, the NSS established long-term supplier relationships with competitively selected shipyards on Canada's East and West Coasts. Seaspan has the privilege to work with Canada to manufacture vessels over 1,000 gross tonnes for the Canadian Coast Guard (CCG) and with the Canadian Navy to build its Joint Support Ships from our Vancouver and Victoria Shipyards.

So, how is it going? Since signing the Umbrella Agreement with Canada in 2012 and entirely at our own cost, we have invested $170 million to create, on the north shore of Vancouver, the most modern, purpose-built, advanced manufacturing shipyard of its kind in North America. We are now flexing the Vancouver Shipyard (VSY) muscles through the construction of our first class of vessels for the Coast Guard known as the Offshore Fisheries Science Vessel (OFSV). We have the first two of three OFSVs under construction with the third to begin before the end of 2016.

Only five years ago, VSY had less than 100 tradesmen and women working in its shipyard due to the boom-and-bust nature of the business. Today, there are 430 people working at VSY on the OFSV build program and that number is expected to climb to 1,000 on a sustained basis by 2018 as additional NSS projects reach their build phases. With OFSV well underway, simultaneously, we are also engaged in the design, planning and acquisition of long-lead items phases for our next two NSS build programs – the Offshore Oceanographic Science Vessel for the Coast Guard and Joint Support Ships for the Canadian Navy. In support of all of this work across three concurrent programs, we now employ 365 engineers, program, production, estimating, finance and supply chain professionals and other staff.

Credit: Seaspan

An artist's rendering of the first Offshore Fisheries Science Vessel, ***Sir John Franklin****. Seaspan is building three of these vessels before moving on to build one Offshore Oceanographic Science Vessel for the government of Canada.*

Seaspan is committed to teaching and training the next generation of Canadian shipbuilders and ship designers through a number of long-term partnerships. These multi-year, multi-million dollar investments include the British Columbia Institute of Technology (BCIT) to support Aboriginals in trades, Camosun College to support women in trades, the Canadian Welding Association (CWA) Foundation for both new welding equipment and teacher professional development at the high school level. In addition, Seaspan has assisted in recruiting professors and enhancing the Naval Architecture and Marine Engineering programs at the University of British Columbia's Faculty of Applied Science.

In addition, Seaspan runs its own intern and trade apprentices programs. Over the past two years, almost 60 interns have benefited from work terms at Seaspan and 20% of our 2016 cohort of apprentices originate from the Aboriginal community.

The investment we are making in our people and shipyards is matched by our commitment to work with Canadian suppliers whenever their products and services meet the operational needs of the CCG and RCN and can be delivered reliably, cost competitively and to the highest quality standards. Although it is still early days, Seaspan's commitment to developing a domestic supply chain is already delivering strong results for Canadians across the country. To date, we have spent hundreds of millions of dollars through a growing number of Canadian suppliers. Over the first 10 years of NSS, we are projecting that we will spend upwards of $1.3 billion in Canadian industry.

We accept our responsibility with humility and commitment. While there is a great deal to celebrate from our work under the NSS to date, it would be fair to say that it has not all been clear sailing – a comment as applicable to Seaspan as it is to the federal government as we both endeavour to rebuild capacity and capability to deliver results. However, supported by the opinions of the federal government's shipbuilding advisors, we are confident that we are on a predictable and positive learning curve. In effect, we are experiencing the growing pains faced by shipyards around the world on a first of class vessel being built in a newly modernized shipyard. In the process, we are capturing and applying lessons learned to reduce program risk and improve cost containment and schedule adherence for the future work.

Even at this stage of the NSS we have learned some early lessons. First, we have learned the importance of an on-site presence and active involvement of the Coast Guard and Canadian Navy at VSY that allows us to learn and grow together in real time. Since there is no shortage of government oversight on NSS, we believe program results will be best delivered on-site as much as possible for early, effective decision-making and course corrections rather than from 4,300 kilometres away in Ottawa. This is a point that was proven through the on-site management of the multi-year *Halifax*-class Modernization/Frigate Life Extension program in Victoria that was completed this spring on-time and on-budget.

Seaspan's Vancouver Shipyards was transformed into a modern shipyard after a $170 million injection into new technology and facilities in late 2014.

Second, we have learned to work from a defined and agreed-to requirement, complete design work before construction and apply as many repeatable manufacturing steps as possible in the production process to reduce program risks and create greater cost certainty and schedule adherence for our customers.

A third lesson is to set construction budgets only when enough is known about the vessel mission and design. This will result in greater cost assurances for materials and person-hours required to build the vessel. An associated lesson is to begin to construct the vessel as soon as practicable after the build budget is set to minimize the impact of inflationary costs and commodity price fluctuation. Setting the budget for the OFSV program in 2004 before enough was known about the vessel design and 11 years before construction began was bound to create a budget gap. The Minister of Public Service and Procurement Canada, the Honourable Judy Foote, acknowledged these shortcomings at a speech delivered at CANSEC 2016

and promised a new approach moving forward which, once implemented, will reduce program risk.

Fourth, we've learned that it is important to establish procurement rules that encourage commonality of equipment and contractual models that promote long-term supplier relationships. This will leverage Canadian content better than is currently occurring through a more piecemeal contracts per project approach.

Fifth, we've learned that we should talk more consistently in the public domain about the NSS program and the benefits that are flowing across the country from its early execution. We should encourage those who support the principles of the NSS to do the same.

And, finally, we've learned that we need to stay the course. The journey is a long one, and will continue to be worth the effort and deliver optimal results for Canada so long as we don't alter our bearings for the sake of short-term expediency. For instance, there has been talk in the media of unsolicited proposals that if adopted would negatively affect and undermine the principles of the NSS. Rest assured, the life-cycle price tag of these options will be more than the initial costs of acquiring a 'hodge podge' of older vessels from the international marketplace. Analysis must assess the higher downstream costs associated with crewing, training, sparing and maintenance of a mixed fleet of vessels that will not have been purpose-built to meet the specific operational needs of the Canadian customer.

Canadians should not doubt our ingenuity, capability and commitment to build ships to meet Canada's maritime needs under the NSS. We have done it successfully before and we are doing it again today – we don't need to stand in anyone's shadow along the way. We invite *CNR* readers to climb on board and support the NSS with all of its attendant long-term benefits and value to Canada.

You are Never Too Old (or Too Senior) to Learn

Vice-Admiral Sir Jeremy Blackham

The Royal Navy (RN) faces a huge challenge with which its history and culture do not well equip it to deal. This challenge provides, as I shall explain, an opportunity for other navies, such as the RCN, if it wishes to seize it, although it will need some significant changes in ways of thinking. It is these that the present author seeks to identify.

At the outset of the Second World War, the RN was still

Credit: Lt. Cmdr. Corey Barker U.S. Navy

*The Royal Navy destroyer HMS **Dauntless** (D-33), a Type 45 **Daring**-class air defence destroyer, in the Caribbean Sea, 2012. In April 2016 the vessel was relegated to use as a training ship due to manpower and technical shortages.*

briefly the largest navy in the world with a century of naval domination behind it. But as that war was to show, it was unable for some time to learn lessons that other newer navies, the US Navy, the Imperial Japanese Navy or the Kriegsmarine, for example, might have taught it about sea-air power coordination, the use of fleet support trains and amphibious assault operations. It had to learn for itself reluctantly, painfully and almost catastrophically; its own self-image was perhaps a barrier to learning from newer, more 'junior' navies. Under the extreme pressure of threatened national survival, it did learn, but it was, as the Duke of Wellington once observed, "A damn nice thing … the nearest run thing you ever saw."

The Royal Navy today faces a challenge WW2 RN leaders could not even have imagined. In just 15 years or so the size of the fleet has almost halved. From six or seven major ships it is down to four, all of which it is unlikely to be able to man simultaneously. From around 32 destroyers and frigates, there are now 19, two of which are at present in a reduced state because they cannot be manned. Instead of 10, there are now seven attack submarines, and a reduction of about 40% in mine countermeasures and other small craft. The fixed-wing aircraft capability has gone although it is planned to recreate it by 2023. Similarly, the maritime patrol capability is gone although this is now planned to be replaced at a lower level in the next five years or so. Nevertheless, a 12-year skill and capability gap is not easy to fill quickly.

RN manpower is still shrinking, to a level at which it will be impossible to man the planned fleet, let alone the

increase in ships which was half promised in a decade or so by a government which is no longer in office. Along the way modern ships with less than 10 years' service have been sold, to give the RN a surface combatant fleet which will shortly operate ships with one of the highest average ages in the developed world. Whole categories of skills have gone, some of which must now be expensively recreated. Moreover, there is at least some strong anecdotal evidence that promising younger members of the service are leaving because they can no longer see the career opportunities to which they once aspired. All this seems to have been done with barely a dissenting voice being raised.

For a nation with the maritime and naval tradition of the UK, a country with worldwide interests and ambitions and committed to the globalization of trade – a maritime phenomenon if ever there was one – this is an extraordinary thing to have happened, not by accident, but by deliberate political choice. Of course today's world is very different from that of WW2. Geopolitics and alliances have changed, and wars are likely to be fought in new, as well as old, ways. But it has indisputably been a major systemic shock, even if the UK forces are not the only ones to have suffered it. Tempted though I am to comment on the wisdom of the choices made, it is one of the consequences of this substantial systemic shock that I particularly want to address here and one that may have some interest for readers of *Canadian Naval Review*.

The RN has not, for many generations, been 'small.' Its expertise has been built on the ownership of a wide range of ship types, allowing the maintenance of sizeable pools of different trades, the use of smaller vessels to do a range of constabulary duties and provide excellent seamanship and command experience for many junior personnel. For example your author had, by the time he was 26, already been *inter alia* Executive Officer and Captain of a minesweeper, and Navigator of a frigate, all on the Persian Gulf or Far Eastern stations, and this was not unusual. The number and range of ships the RN then owned enabled many tasks that took the navy to ports and naval bases around the UK (there were still, nationwide, seven bases and more than 15 Naval Reserve depots), and allowed many missions in home waters, with huge benefits in public awareness and understanding of the navy.

Today the Royal Navy is distinctly small. It is rarely seen outside Portsmouth and Plymouth, and operations in home waters are rare. Most citizens of the UK never see a ship or a sailor, and have little or no comprehension of what either actually do.

The consequences of this shrinkage for manpower, training and support organizations are significant and deleterious. There are no sea training vessels; anti-submarine warfare training has mostly to be done without live targets; there is no manpower margin for quite a number of possible civic needs, or for operational surge, without effectively disabling operational ships; there is no reserve; ships lost and ammunition expended in combat (as sooner or later they will be) will be replaceable only at considerable expense of time and money, even if the industrial capacity exists. It has become difficult to preserve any continuity of industrial capacity, particularly in shipbuilding and weapons manufacture – a problem with which Canadian readers will be very familiar. In the UK the government is virtually the only customer for ships and appears unwilling to commit to ship orders at a rate that will sustain the relevant skills at a reasonable cost. It even became necessary to conclude an agreement with our only warship builder that requires the Ministry of Defence to pay the company, whether or not ships are actually ordered, in order to persuade that company to remain in shipbuilding at all. But of course even if such a relationship maintains the appropriate infrastructure, it will not develop and exercise the range of skills required without actual ships being built, and they are likely under this arrangement to be very expensive.


Credit: Internet

RFA ***Tidespring****, the first of four fleet tankers being built in South Korea to support RN operations, still has not been accepted by the British Ministry of Defence. Some reports suggest that manning shortfalls are one cause of the delay.*

Even if one accepts the strange logic which has enabled the British government to say that the world is 'more dangerous than ever' and then conclude that the level of national income to be devoted to confronting the dangers should be the lowest for well over 100 years, this can be very bewildering. Yet more bewildering is that it has happened at a very great rate – compare the pre-1997 defence review

navy with the post-2015 review navy for proof. For a navy that has a very grand self-image, sees itself as the closest partner of the US Navy and has always felt itself to be a model for other smaller navies (which is to say most of them), it is uncomfortable. A new set of problems has arisen in areas which had always been taken for granted.

The RN is much more used to teaching other navies than learning from them. Yet many of the problems it faces today are well known to smaller navies. These navies have necessarily learned to live with the problems, developed strategies for dealing with them and learned the hard way that, whilst they cannot do everything, they can do some things supremely well. This, I suspect, is the watershed the RN is facing unless there is a major reversal of government policy. Indeed, it may be the watershed all the UK services are facing. Talking up unduly the value of investment in equipment and giving less attention to the non-material elements of true military capability is very tempting for any politician but is no substitute for 'the real thing.' As T.S. Eliot wrote in "The Hollow Men," "[b]etween the idea and the reality ... falls the shadow."

Perhaps the time has come for the RN to take a rather more open, generous, even humbler, view of other navies, particularly other friendly navies who also work closely with the USN, such as the RCN and the RAN, with whom the RN's traditional close links have, for various (perhaps understandable) reasons, somewhat weakened in the last generation. It is after all the whole Western world and its order that is threatened and what matters is the totality of its defence and security capacity. It may not be over-alarmist to suggest that the UK's decision in favour of Brexit makes this even more urgent.

I am proposing that the RN has a great deal to learn from the experience of smaller navies as its size decreases further, and would do well to recognise just what it has to learn from them. A new and somewhat different set of relationships is needed in the complex, difficult and greatly changed circumstance in which the RN finds itself. And it is needed urgently.

Maritime Safety: The Dangers of Servicing

C.S.P. Hunter

Improper servicing and testing of both watertight integrity and fire safety in the maritime industry can have devastating results. Using traditional methods of testing and servicing provides a set of challenges, often meaning that integral safety cannot be assured. Often issues arise because the traditional methods of testing and servicing can be costly, inefficient or inaccurate and therefore neglected. Examples such as the *Emma Maersk* incident in 2013 and *Nerpa* accident in 2008 prove that these risks can be fatal and/or costly. Ultrasonic technology presents a solution by providing a means of servicing that can avoid the dangers discussed here.

The world's largest container ship ***Emma Maersk*** *experienced an accident and flooding in the engine room in February 2013. The container ship had just started its southbound transit through the Suez Canal sailing to Asia.*

The maintenance and testing of how watertight a hatch or sealing is on both commercial and military ships is essential. A lack of proper servicing of these hatches and seals can lead to deterioration which can endanger the ship, cargo and lives of the workers through flooding and the potential of capsizing.

A watertight hatch cover is designed to prevent the passage of water in either direction when under the pressure for which the surrounding structure is designed. Although they are often considered robust, it is possible that even 4 millimetres (mm) wear from steel-to-steel contact on the hatch is enough to cause damage to rubber sealing gaskets beyond repair. Four millimetres of wear can create a 5 mm sag along the cross joints of a hatch, creating a large gap between the compress bar and gasket. If the hatch is no longer watertight, an ingress of water could happen and cause severe damage.

A watertight seal is expected to cope with extreme operational pressures especially in warships. Most large vessels are sub-divided into watertight compartments using bulkheads, often with installation of hatches and

cable transits. On a vessel, a watertight door as small as one square metre can be expected to resist the weight of 30 tonnes of water without buckling or flooding. Seals can become worn due to repeated compression and stress relaxation, and a failure to identify and repair or replace these seals again endangers the crew, ship and cargo.

An example of the dangers that are presented from insufficient servicing and maintenance comes from a 2013 incident on the Suez Canal. A severe leakage occurred on the container ship *Emma Maersk* – which was loaded with 14,000 containers – because of cable penetration sealings which were not effective.[1] After a severe ingress of water in the shaft tunnel, four cable penetration sealings in a watertight bulkhead gave way to water pressure which filled the engine room with water. One of the conclusions drawn by the Danish Maritime Accident Investigation Board suggested that improper installation and poor inspection led to the failure of the sealings and also that "[t]here was no readily available testing method for assuring the quality of the fitted cable penetration system."[2]

As the Danish board suggested, traditional testing methods can be insufficient to ensure full watertight integrity. There are several traditional methods to check whether seals are watertight. First, there is chalk testing. In this method, chalk is applied to compressional seals and hatches which are closed, sealed and then re-opened. It should be possible to identify where seal compression is low by seeing where the chalk has not rubbed off on to the opposite side of the seal. A problem with this test is that it cannot be performed on air vents or seals which cannot be easily opened or closed. The test also does not identify erosion points on the seal or weak areas which may give way under high pressures.

The second method is hose pressure testing. In this method a seal is sprayed with a high pressure hose. An operator then opens up the hatch to look for any areas where water has leaked through. A problem with this method is that it lacks scientific accuracy as no precise leak point is identified. Spraying with the high pressure water can also be damaging to sensitive equipment and requires a thorough clean up.

There is a third method that is newer in the industry – ultrasonic testing. This is a process whereby a generator emitting ultrasound pulses is placed in the compartment to be tested. The operator then holds the receiver which 'listens' to the ultrasound emitted from the generator. Closing the compartment door/hatch, the operator directs the receiver 'wand' – a handheld sensor on an extension rod – around the seal to pinpoint precisely to 0.06 mm (+/-0.02 mm) any areas of weak seal compression or leak sites. This technology is capable of testing the watertight integrity of seals and is sensitive and accurate which means that it is well suited for seals that are meant for high pressure watertight protection. It also requires less clean up or set up than hose pressure or chalk testing.

Watertight integrity is not the only servicing that provides challenges. Ships' fire extinguishing systems are required to be serviced under the Fire Suppression System (FSS) code of the International Maritime Organization's Safety of Life at Sea (SOLAS) regulations. Marine servicing companies bid to service a ship's carbon dioxide (CO2) system to regulatory standards. As with many elements of business, there are economic pressures, and this means that the servicing is done at the most economical cost.

Ships can have up to 300 CO2 cylinders, each weighing 45 kilograms, and inspection of these is traditionally done manually by the service crew shutting down the CO2 system, dismantling a cylinder individually and then weighing it. The whole process including recording and re-installation takes 200 man-hours on a ship with 300 cylinders. This indicates that the four hours which ships usually make available to the marine servicing contractor are inadequate.

Because a cylinder is under high pressure – they contain 50 bars of pressure – and the highest probability of discharge occurs during maintenance, manual servicing of a cylinder places a crew at risk of potentially catastrophic danger. Given that it is a dangerous task, it is

Credit: Coltraco

An example of a portable watertight indicator.

shocking that there are times when unskilled, unreliable and untrained low-rate servicing crews are relied upon for cylinder servicing. It is also shocking that there are servicing companies which have randomly checked some of the cylinders and then placed 'tested' stickers on the others. Anecdotal experiences have shown that some systems have actually been filled with water and that 20% of marine CO2 cylinders have been installed empty or partially filled.

It is no surprise that within the past 10 years, there have been some accidents as a result of this neglect. In 2008 on the Russian nuclear submarine *Nerpa* (Akula II K-152) at least 20 people died when a Halon fire extinguishing system was activated by mistake. In 2015 22 Marines were injured in California when a Halon fire extinguisher discharged accidentally. In 2014 at Port Hedland, a fire broke out in the engine room on board the bulk carrier *Marigold*, however when the Halon system was activated, a full release did not occur – it was also a problem that the engine room was not effectively sealed.

Because of the risks that are present both in servicing cylinders and due to improper servicing, it is essential that the standards must be raised above minimal compliance. Ultrasonic technology can highly accurately and remotely service a cylinder by removing the need for manual inspection. Ultrasonic technology does not require the system to be shut down or dismantled, or each cylinder removed by personnel, which is back-breaking work when completing a full system check over a few days solid testing. This means it is far less risky than weighing because the fire system stays on, protecting the vessel, cargo and crew for the duration of testing. It also means the testing is more likely to be conducted on all the cylinders rather than just randomly checking a few because the servicing team can rely on the portable ultrasonic liquid level indicator to save them time, increase the minimum levels of safety and fully complete the mandatory checks with accuracy of finding a leak by identifying the liquid level to +/-1.5mm. These fixed and portable technologies allow service technicians to inspect the liquid level of extinguishant in a cylinder which can then be translated into mass/weight.

Conclusion

In the maritime sector, watertight integrity tests and fire cylinder servicing are absolutely essential to avoid loss of life and economic damages and losses. Traditional watertight integrity tests are not always sufficiently accurate and the problems that can be caused when they are not accurate enough are shown in the example of *Emma Maersk*. Improper fire cylinder servicing can lead to catastrophic effects both at the time of the servicing and after. Ultrasonic testing can provide a solution to maritime safety needs by providing accurate and effective watertight integrity tests and cylinder servicing.

Notes

1. Danish Maritime Accident Investigation Board (DMAIB), Marine Accident Report, "Flooding of Engine Room – *Emma Maersk* on 1 February 2013, report issued December 2013.
2. See *ibid*.

Russia's Missile Defence Dilemma

Debalina Ghoshal

For a number of years, the United States has been apprehensive of the ballistic missile threats to its forward bases in Europe and the Middle East emanating from Iran and North Korea. The US initiative to develop the European Phased Adaptive Approach (EPAA) system requires the United States to field a ballistic missile defence system and related technologies in European forward bases to counter possible missile threats from these sources.

The EPAA was first proposed in September 2009 by President Barack Obama. Russia quickly opposed the US proposal on the grounds that the system negates Russia's nuclear deterrent capability. The United States responded that the shield posed no threat to Russia and was meant to counter Iranian and North Korean missile threats.

With the Joint Plan of Action (JPA) in 2013 and the Joint Comprehensive Plan of Action (JCPOA) coming into force in 2015, Iran's ability to develop nuclear weapons has been restricted. Russia, therefore, feels that there is no need to field missile defence in Europe as the nuclear weapons threat from Iran no longer exists. However, the United States has responded that even though the nuclear weapons threat does not exist, Iran possesses sophisticated long-range ballistic and cruise missiles that could target US forward bases. Initially, the Russians requested a legally binding agreement from the United States stating that the EPAA is not aimed at Russia but the United States refused to provide that. The United States further clarified that its missile defence system in Europe has limited capability and does not pose a threat to Russia's intercontinental ballistic missiles (ICBM).

The United States and Missile Defence

Despite Russian apprehensions regarding the EPAA, the United States went ahead with its EPAA plans. The United States argues that protection of European territory is a commitment to protect its NATO allies under Article 5

Credit: United States Navy

*A standard missile 3 is launched from the guided missile cruiser USS **Shiloh** (CG 67) during a joint Missile Defense Agency, US Navy ballistic missile flight test, June 2006.*

of the Washington Treaty. The first phase of the EPAA has been operationalized in the Mediterranean Sea with the SM-3 interceptors on Aegis ships and forward-based radar in Turkey.

In 2016, the United States operationalized the second phase of the EPAA, the Aegis Ashore Missile Defence System (AAMDS) which is ground-based but similar to the US naval missile destroyers and cruisers. The United States is also to post four naval destroyers in Rota, Spain. The ships would be capable of intercepting ballistic missiles with the help of the Aegis radar system and SM-3 interceptors. A sea-based missile defence system located in Spain would mean greater coverage for the interception capability. Half of the EPAA components are sea-based. Ballistic missile defence (BMD) capabilities at sea are expected to protect the US/UK radar station at Fylingdales in the United Kingdom, which is crucial to protecting both the British and American homelands. Some NATO countries also possess land- and sea-based sensors that could be linked into the missile defence system and can provide point defence.

The Kremlin's Apprehensions

Russian President Vladimir Putin does not buy the US argument and fears that the EPAA is aimed at Russia rather than to counter missile threats from Iran and North Korea. There are concerns that the system will neutralize the potential of nuclear weapon states like Russia. According to Putin, the United States is "attempting to achieve strategic military superiority, with all the consequences that entails."[1] Putin believes that EPAA is defensive only in name. He sees it as forming a component of the US strategic offensive potential.

At the Federal Assembly in 2010 then President Dmitry Medvedev proposed a "fully-fledged joint mechanism of co-operation"[2] on the EPAA, failing which he feared an arms race. In 2012, NATO and Russia also conducted a joint missile defence exercise under the framework of the Russia-NATO Council. But there has not been much progress made on building confidence in Russia regarding the EPAA in Europe.

Russia views the deployment of the EPAA system, for instance the decision to field the Aegis ground-based interceptors in Eastern and Central Europe, as US expansion of its influence in areas close to Russian borders. In addition, Poland's decision to field the Patriot system as a component of Poland's Wisla project has further made Russia wary of the EPAA as Poland borders the Russian exclave of Kaliningrad.

The United States also plans to deploy the Mark 41 Vertical Launch System (VLS) as a component of its EPAA strategy in Poland and Romania. Russia argues that the MK41 VLS can be used to launch cruise missiles. Land-based versions of the VLS system are prohibited under the Intermediate Range Nuclear Forces (INF) Treaty. Moscow has threatened to withdraw from both the Strategic Arms Reduction Treaty (START) and the INF Treaty should the United States continue to develop missile defence systems.

Credit: U.S. Missile Defense Agency

The Aegis ashore site in Romania was declared operational in May 2016.

Credit: http://globalmilitaryreview.blogspot.ca

The S-400 Triumph/SA-21 Growler is a long-range air defence missile system which is capable of targeting fighter jets, unmanned aerial vehicles, stealthy cruise missiles and ballistic missiles.

As well, Russia has threatened to resort to a pre-emptive strike option rather than its usual preventive strike.

In response to American actions, Russia has been working on developing both offensive and defensive capabilities. Missiles like Bulava and Yars are being fitted with multiple warheads to be able to evade enemy missile defence systems. Russia is also working on a hypersonic glide vehicle (HGV) that is believed to be nuclear capable. Not only is Russia improving its offensive capabilities, but it has also increased its defensive capabilities. It is already working on its own national missile defence system and the A-135 anti-ballistic missile systems are already deployed around Moscow. Some of the other systems include the S-350 Vityaz and the S-500 missile defence systems which will be deployed soon.

Solutions

In his Prague speech in 2009, President Obama stressed the need to cooperate with Russia on the EPAA. This sentiment was echoed by Frank A. Rose, Deputy Assistant Secretary of State for Arms Control, Verification and Compliance, at the 2013 Pugwash Conference on World Security. According to Rose, "rather than legal guarantees, we believe that the best way for Russia to see that US and NATO missile defenses in Europe do not undermine its strategic deterrent would be for it to cooperate with us and to engage in mutual transparency measures."[3]

However, while including Russia in the missile defence program was a desired option for the United States and NATO, with the events in Crimea/Ukraine starting in 2014 and Russian involvement in the conflict in Syria, movement in this direction has been stalled. Amid the growing concerns between NATO and the United States, on one side, and Russia, on the other, over Syria and Ukraine, cooperation on joint missile defence systems seems unlikely.

Notes

1. "Putin: US Missile Defense Aimed at Neutralizing Russian Nukes, N. Korea and Iran are Just a Cover," RT.com, 10 November 2015, available at www.rt.com/news/321434-us-missile-shield-putin/>.
2. "Medvedev Sees Arms Race if Missile Shield Not Agreed," BBC News, 6 March 2012.
3. Frank A. Rose, US Deputy Assistant Secretary, Bureau of Arms Control, Verification and Compliance, Speech at the 16th Pugwash Conference on Society and World Security, 1 November 2013, available at www.state.gov/t/avc/rls/2013/216242.htm.

Dollars and Sense: Decision Time for Defence

Dave Perry

After a lengthy spring and summer of consulting with Canadians on a range of key files, the Liberal government returned to work this September and was met by immediate controversy. In addition to a spending scandal, a number of the controversies are substantive. The government's carbon dioxide (CO2) reduction targets will be significantly less than suggested at the Paris Accord. A controversial liquified natural gas (LNG) terminal in BC was approved. The Health Minister announced the health care transfers to the provinces will remain unchanged from the plan enacted by the Harper government. And, the federal government will impose a carbon tax across Canada.

Assessing this criticism of the Trudeau government, *Toronto Star* columnist Paul Wells concluded that "[p]romising was easy, consulting not much harder. Now comes deciding."[1] These decisions are going to become increasingly tough for a government that promised to do so many things for so many different people, and is facing increasingly difficult economic and fiscal circumstances. The country's economic numbers for the second quarter of 2016 show a contraction, and the government's revenue projections are lower than expected. Elected on a forecast of sunny ways, the government's fiscal situation is cloudy at best. It is within these unfortunate economic circumstances that the Defence Policy Review has now reached crunch time.

In the Minister of National Defence's mandate letter alone, the Liberals promised to: invest in strengthening the navy; renew Canada's commitment to UN peacekeeping; focus on the surveillance and control of Canadian territory; improve the care of serving members and overhaul the delivery of veteran services; and maintain Canadian NORAD and NATO commitments.

Individually, each of these pledges imply additional activities for defence. Collectively they suggest a cumulative increase in what the government asks of the armed forces. Outside of that direction, the government has yet to suggest any areas where it will ask less of the military. In fact, when questioned about two possible routes to lessen the demands on the military, the Minister of National Defence (MND) closed off those options. The consultation paper for the Defence Review had asked about whether airborne search and rescue could be performed by anyone other than the RCAF, but the MND quickly nixed such an option. Similarly, early on in the review process, the Minister precluded any reduction to the size of the military, instead suggesting that he might be looking at an expansion.

Credit: Internet

Will Canada contribute to the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA)?

The public consultation process undoubtedly did little to provide much clarity. Months of public hearings and an open submission portal generated nearly 25,000 submissions from Canadians of all walks of life. At the 'expert' roundtables alone the diversity of views and scope of discussion was so broad that it is unlikely that much clear useful direction could be discerned. The Defence Department was therefore no doubt told what it already well understood: the world is more dynamic and unpredictable than ever; potential threats abound; Canada must invest in sexy (and expensive) new technology or fall behind; the potential for Canada to be 'back' in the world is limitless; and re-engaging with UN peace support operations is a good thing, but so too are NATO and NORAD.

This ultimately leaves the government with some fundamental defence decisions, without a clear direction about how to proceed. The aggressive timelines attached to the Defence Review were designed to align the policy process with the pre-budget discussions underway as this issue goes to print. If the big policy decisions with cost implications are not made this fall, they will be delayed

until the following year's budget cycle. It now appears that the release of a formal document will happen some time in 2017, rather than by the end of 2016, but this doesn't change the need to make decisions soon to have them incorporated into Budget 2017.

This leaves defence in roughly the same position as it was when the Liberals assumed office a year ago – with too many demands on too few resources. The Liberals took over the defence file with a capital investment portfolio oversubscribed by as much as $2 billion a year, short several thousand positions, and with mounting bills on significantly more infrastructure than the department actually needs. None of those key structural deficits have been addressed and MND Harjit Sajjan's mandate would add significantly to the resource pressures the department already faces. So DND didn't have enough to start with and Prime Minister Trudeau is telling it to do more.

That means it's time for some tough decisions on defence. The first and fundamental one is: will this government devote any more money to defence than what's already in the fiscal framework? Achieving this result would likely require, at a minimum, making a compelling argument in the new defence policy that aligns very expensive budget asks with the government's agenda in a way that cultivates allies around the Cabinet table. With so many demands on the federal coffers, a Minister of Defence, no matter how politically powerful, needs to make an exceptionally strong case and have it fall on receptive ears to gain more budget share.

In fact, DND may well have to do exactly that just to keep the budget increase the Liberals promised to honour in next year's budget. From DND's perspective, the change is relatively modest – an additional $184 million more to its operating funds – but across the rest of the government, that's real money, especially when money is tight. It's significantly larger than the combined annual spending at the Immigration and Refugee Board, the Canadian Environmental Assessment Agency and the Security Intelligence Review Committee to name three federal organizations that may well be asking for more money given the government's agenda.

If no more money is on offer, and defence can only keep what it was previously allocated, then all the other decisions will be more difficult. If DND is empowered to reduce some of its non-operational activities and shed some excess infrastructure, this would be easier. More likely, the department will face strong pressure to resurrect and deliver on efforts to improve its own efficiencies. Despite solid efforts in some quarters, especially the Materiel Group and the navy, overall the 'defence renewal' effort has been underwhelming. In a fiscally constrained environment, there will likely be significant pressure for DND to take this seriously. The new Vice-Chief of the Defence Staff Vice-Admiral Mark Norman has strongly stated that he intends to do so, but he faces a department that seems to have tuned out. That will need to change.

Credit: www.hilltimes.com

Defence Minister Sajjan announces a Defence Review. What will be the financial implications of the review?

Absent full funding, the other necessary decision is to identify how the various defence activities will be prioritized. The government is clearly an enthusiastic backer of UN operations, having committed cash and up to 600 troops. But that's the same magnitude of commitment it has made to operations in the Middle East and NATO in Eastern Europe. Which of these is most important, and how do these commitments balance against looming demands to beef up North American defences?

Beyond this, will this government decide to privilege certain regions over others? Many, navalists especially, have called for increased activity in the Indo-Asia-Pacific region. The previous government had developed a Latin America strategy while largely ignoring Africa. Given the Liberals' apparent partiality for Africa, that seems likely to change – meaning that Canada's defence policy will be globally focused. With the existing funding arrangements, a lack of geographic focus is unwise. Other countries that spend more than double what we do, such as France, do a much better job of prioritizing defence engagement in way Canada does not.

One way or another, the government needs to make some tough calls.

Notes

1. Paul Wells, "Best Remedy for Liberals is Progress on Carbon and Indigenous Groups' Files," *The (Toronto) Star*, 21 September 2016.

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A View from the West:

Australian Shipbuilding: Addressing Indo-Pacific Concerns?

Diana Edwards

Australia has recently embarked on its most ambitious naval expansion since the end of the Second World War. The need for an expanded Royal Australian Navy (RAN) was first recognized in the 2009 Defence White Paper (DWP) and highlighted again in the 2013 and 2016 White Papers. The 2016 DWP identified a confluence of traditional and non-traditional factors to justify the proposed naval build-up including: the changing geopolitical situation in the Indo-Pacific region; the potential influx of migrants and refugees; and the increase in organized crime on the seas.

Observers say this defence plan was in direct response to the growing threat of China and the relative size of the navies neighbouring China. Australia shares multiple maritime borders with countries with far fewer available resources than it. This limits the strength of Australia's neighbours in suppressing threats, which means these threats can not only affect Australia, but they may grow. How, then, can Australia address these potential threats to maritime security in the region? Will the shipbuilding plan be sufficient to address the growing concerns and instability in the region, and what can countries like Canada learn from Australia's experience?

The 2016 Defence White Paper notes that while there is no foreseeable direct threat to Australia, the Australian strategic focus extends beyond defending borders, and aims to maintain overall maritime security in the Indo-Pacific region well away from Australian shores.[1] Given their ability to operate far from Australia, the RAN and the Royal Australian Air Force (RAAF) are the primary focus of the DWPs. The 2016 DWP states that while the United States is Australia's most important strategic partner, US primacy in the Pacific is no longer guaranteed, and therefore the maritime security of the Indo-Pacific region is not as certain as it once was. This is so because the United States has multiple areas of consideration across the globe, and has to journey 8,000 kilometres before beginning operations in the Pacific region.[2] As well, political and economic instability in neighbouring countries in the region adds another layer to the maritime security considerations for Canberra. Australia's extensive shipbuilding and procurement plan can be seen as a response to the changing geopolitical situation, and a willingness to become more self-sufficient in operations in the region.

It is important to note how high a priority this defence expansion has become for the government. Defence acquisitions take time and will almost always outlast the government that ordered them; consequently, a consistent government view on defence policy linked to national interests is critical. Although defence enjoys bipartisan support, Australia has experienced a number of government changes since 2007, so the current plans have been set up to withstand these changes. The 2016 DWP calls for USD $21 billion in defence spending by 2025, or an increase of 81%, and aims for a defence spending target of 2% of Australia's Gross Domestic Product (GDP) by 2021.[3] Since the spending is tied to GDP predictions, the budgeted defence spending is likely to remain stable. Further cementing the defence expansion as a priority, Australia had previously acquired its ships from other sources, but the 2009 and 2016 DWPs set out a 'home-build' plan – 3,600 jobs are expected to be created in Australia – thereby increasing public buy-in and making the plan politically difficult to abandon.

Credit: DCNS

*The **Shortfin Barracuda Block 1A** submarine DCNS will build for the Australian navy.*

Credit: Wikimedia Commons

*A completed HMAS **Hobart** air warfare destroyer alongside at the Submarine Corps, Australia, 26 June 2016.*

The cornerstone of the DWPs since 2009 has been the proposed shipbuilding plan. The plan involves building new submarines, a new class of frigates and offshore patrol vessels, and is accompanied by procurement/contingent strategies and, as of 2016, a full costing strategy. A majority of the plan was laid out in the 2009 DWP, but the 2013 and 2016 DWPs added to the initial plan considerably.

The largest part of the shipbuilding plan is the submarine construction, which will double the RAN's six-submarine fleet by constructing 12 new submarines. Notably, many of the countries in the region are acquiring submarines, and the 2016 DWP predicts that half the world's submarines will be operating in the Indo-Pacific region within 20 years.[4] China has 71 submarines (varying in size from 14 large submarines to 57 smaller submarines), Japan has 17 (planned to expand to 22), India has 14 (planned to expand to 21), South Korea has 13, and Vietnam has five (planned to expand to six). The 12-submarine fleet will therefore help the RAN to keep pace with other submarine fleets in the region. Australia will continue to work with the US Navy, and the new submarines will be designed to work interoperably with US submarines, thereby expanding the submarine's capacity for joint operations.[5] The submarines are budgeted to cost USD $36 billion in total, the largest Australian defence contract ever. The first submarines are expected to enter service in 2030, with construction continuing into 2040-2050.

In addition to the submarines, the 2016 DWP calls for the significant recapitalization of the RAN surface fleet. Thus, 12 new offshore patrol vessels are to be delivered by 2030, three *Hobart*-class air warfare destroyers are to be delivered by 2017-2018, and a new class of anti-submarine frigates with nine vessels are to be delivered by 2030. The modernized offshore patrol vessels will expand Australia's ability to patrol its littoral waters and police migration flows, and the new frigates will help address submarine concerns. If the entire plan is implemented, the RAN will have upgraded almost every part of the fleet, and achieved the objectives outlined in the 2016 DWP.

Lessons Learned

The 2009, 2013 and 2016 DWPs were written following extensive public consultation, which not only helped illustrate the needs and gaps in the capabilities of the Australian Defence Force but, more importantly, created public buy-in which limited criticism of the plan. Given the long time span and large defence spending increase, this public support will be critical to the plan's success. However, despite the public buy-in, the shipbuilding program has not escaped criticism – largely about costs and timelines – therefore illustrating the divide between the plan and the harsh realities of implementation. One lesson learned deals with the home-build program because, despite the excellent political optics, the vessels cost 30-45% more than foreign-built ships and take much longer to build than if purchased offshore.[6] There were concerns of perpetuating a boom-and-bust shipbuilding cycle – a concern Canada shares – and as a result, a "continuous build strategy"[7] was inserted into the 2016 DWP. Australia's experience over the next 30 years will undoubtedly provide important lessons for other countries – such as Canada – embarking on shipbuilding programs.

Australia is looking to remain at the forefront of naval power in the Indo-Pacific region. It aims to do this through a robust shipbuilding and procurement plan which will take place over the next 30 years. This naval expansion will affect the geopolitical nature and maritime security of the region, with the aim of maintaining the global rules-based order. If effective, Australia will have set a standard of naval expansion that other countries will be sure to note.

Notes

1. Commonwealth of Australia, Department of Defence, 2016 Defence White Paper, p. 15.
2. Deborah Snow, "Defence White Paper Wrong, Says US Officer," *The Sydney Morning Herald*, 31 May 2011.
3. Euan Graham, "Australia's 2016 Defense White Paper: Forward Funded Defense," PacNet Paper #23, Centre for Strategic and International Studies, 1 March 2016, paragraph 2. See also Franz-Stephan Gady, "Australia's Defense Budget to Jump 81% Over Next Decade, Diplomat," *The Diplomat*, 26 February 2016, paragraph 1.
4. Australia, Department of Defence, 2016 Defence White Paper, p. 50.
5. *Ibid*., p. 19.
6. John Birkler, et al., *Australia's Naval Shipbuilding Enterprise: Preparing for the 21st Century*, Santa Monica, CA: RAND Corporation, 2015, pp. xxxv-xxxvi.
7. *Ibid*., p. xxx.

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Warship Developments: Trends

Doug Thomas

Personnel

Modern ships, many with easily-replaced gas-turbine engines and modular sensors and weapons systems and components which permit quick 'repair by replacement,' are capable of more time underway than their predecessors of past generations. The limiting factor may well be crew fatigue. In order to achieve increased sea-days and longer deployments, a number of innovative manning ideas are being implemented. For example, the new, large (7,000 tonnes), highly-automated German F125-class frigates will have small core complements (crews) of 110, but there will be two such crews per ship in order to maximize availability. Indeed, the operating concept for the ships could mean deployments of up to two years with impressive redundancy in machinery, electrical generation, weapons and sensors so that they may continue their missions in spite of having a few unserviceable systems.

Credit: NavalToday.com

FGS ***Baden-Württemberg*** *is the first of four German Navy* ***F125****-class frigates, shown July 2016 .*

Although the core crew is small, there will be accommodation for a total of 190 people, permitting embarkation of specialist teams, such as boarding parties or Special Forces. In addition to the traditional tasks of national and alliance defence, the F125-class frigates are designed for conflict prevention, crisis management and intervention/stabilization operations in the international arena. These ships also represent the first realization of the intensive use concept, i.e., significantly increased availability in the deployment region. This capability is supported by the two-crew strategy which permits a complete change of crew during deployment every four months.

It is interesting that these four F125s will replace the eight *Bremen* or F122-class anti-submarine frigates, which have been a key component of the German Navy for the past three decades. Before planners decide that this is a terrific way to halve their fleets, they should understand that these new frigates are rather unique and appear to be designed for peace support operations in tropical regions. The F125s will be equipped with two NH90 helicopters and up to four 11-metre Rigid-Hull Inflatable Boats (RIBs), which will be very useful for providing transport for Special Forces missions. They have no fitted anti-submarine sonar systems but they will be able to detect divers and swimmers that could pose a threat. They will have an all-around infra-red detection system to counter such concerns as small boats carrying an explosive device, and they will be equipped with non-lethal weapons such as water cannons and searchlights for non-provocative deterrence and defence. The concept of these vessels is rather like the colonial sloops deployed by France and the UK during the 19th and early 20th centuries in order to police colonies and their offshore resources. This modern iteration is expected to contribute to international deployments in littoral environments and naval support to UN operations.

The Royal Canadian Navy (RCN) has experience flying a ship's company drawn from another ship of the same class halfway around the world to do a crew swap. This was done during the period following the first Persian Gulf War (1990/91) and it was repeated with HMCS *Toronto* when she was deployed to the Arabian Sea from January 2013 to February 2014 and a successful crew swap took place in July 2013. The alternative – replacement by another ship and crew and a long transit home – is obviously expensive and time-consuming, and it makes sense in certain cases to replace the people rather than the ship.

Short of a crew swap, there are other ways to alleviate the effects of lengthy deployments. One solution is to fly technical support teams from one of the RCN's fleet maintenance facilities to the ship for alongside work periods or to provide specialist assistance for major tasks such as replacing an engine. In addition, subsidized flights – home for crew members or to have spouses join them for leave periods abroad – have proven to be important morale boosters. These and other measures ease personnel issues during lengthy deployments, short of replacing the entire ship's company as planned with the F125 two-crew concept.

The fourth French Navy FREMM frigate, FNS ***Auvergne****, began sea trials 26 September 2016.*

Offshore Design

Another trend in medium-sized navies is to adapt a ship design from another country – i.e., an offshore design – which meets most national requirements and modify it rather than go through the expensive and time-consuming process of developing their own unique design. Canada has prior experience with this: the design of the British Type 12 frigate was adapted in the post-World War II period to produce the highly-successful *St. Laurent*-, *Restigouche*-, *Mackenzie*- and *Annapolis*-class destroyer-escorts (DDEs) and helicopter-destroyers (DDHs). The Canadian government has recently decided to seek an offshore design for the Canadian Surface Combatant (CSC).

The CSC concept requires that all 15 units have a common hull and machinery, which will provide many benefits in building and maintaining the vessels, and training the ship's companies. It is intended that there will be two variants. The first will be for the near term to satisfy the requirement for a command and control vessel with an area-air defence capability – similar to that of the *Iroquois*-class destroyers now being paid-off for disposal. The second variant will arrive in subsequent years and specialize in anti-submarine warfare to replace the *Halifax*-class frigates. To that end, there will be considerable differences between the two variants regarding weapons, sensors, communications and the layout of related spaces.

If the concept of a common hull for both variants is agreed, then the design will require a hull size suitable for the two variants. This will likely produce a CSC larger than the RCN's existing frigates and remaining destroyer: in the 6,000 to 7,000 tonne range and a length of 450-480 feet (135-145 metres) in order to accommodate a vertical launch missile system, similar to the Mark 41 system used in the *Tribal*-class destroyers and by many of Canada's allies. Suitable foreign designs at the moment would include the French/Italian FREMM (European multi-purpose frigate) and the British Type 26 Global Combat Ship, a warship that will replace the Type 23 frigate as the workhorse of the Royal Navy, tasked for the RN's three core roles – warfighting, maritime security and international engagement on the world stage. Another possible design is that of the Spanish F100 *Alvaro de Bazan*-class, which was modified to build Australia's three air warfare destroyers (AWDs). HMAS *Hobart*, the first AWD, is expected to be commissioned in June 2017.

Conclusions

The program to build and maintain the 15 Canadian Surface Combatants will be expensive, and there will be sticker shock. To some extent this will be due to the way such programs are costed now, with every through-life cost down to translation services, training, shore support facilities and future fuel expenditures thrown in. There is no question that the Canadian public expects to get value for money, and I personally believe that they get it from the RCN with the extended service lives demanded from fleet units and the high esteem in which the RCN and its personnel are held on the world stage. Nevertheless, there are lessons to be learned from others about building and operating the Canadian fleet, including innovative manning concepts, and we should take advantage of opportunities to do so.

Book Reviews

Where Youth and Laughter Go: With 'The Cutting Edge' in Afghanistan, by Lieutenant-Colonel Seth W.B. Folsom, USMC, Annapolis, MD: Naval Institute Press, 2015, 368 pages, index, photos, ISBN 978-1-61251-871-8

Reviewed by Rachel Andrews

In *Where Youth and Laughter Go*, Lieutenant-Colonel Seth Folsom, USMC, provides a vivid account of his command of the 3rd Battalion, 7th Marine Regiment (3/7, 'The Cutting Edge') during its deployment to Afghanistan's Sangin District in 2011/2012. Folsom offers a firsthand perspective that brings forth the blunt realities of engagement in counterinsurgency operations. With the responsibility to patrol a region plagued by decades of violence and instability, Folsom and his Marines faced the challenges and successes of building peace amongst a population of Taliban enemy forces and Afghan villagers. The events described by Folsom prior to, during, and following deployment exemplify the naked truths of the various challenges each Marine must overcome. With the weight of Sangin's stability on their shoulders, Folsom and his Marines juggle the personal and operational obstacles that arise while patrolling endless minefields.

Where Youth and Laughter Go is an account of command and combat that captures your attention immediately. With each page the realities set in that counterinsurgency is not all pride, glory and status. Rather, what is depicted by Folsom are the horrific and trying day-to-day activities that the 3/7 faced. Folsom does not spare any details of the mental and physical strains faced by the Marines, and this parallels the often watered-down details that are typically publicized. In addition to the circumstances to which the Marines are exposed, Folsom touches on the challenges and contributions of the families and volunteers at home. In doing so, he reveals aspects of war not often made transparent: the endless hours dedicated to seeing off and welcoming home troops; supporting the injured in their rehabilitation; explaining complex ideas of war to children; and so much more.

This book emphasizes the significance of the patrols executed by the 3/7. At first read, Folsom's account after account of the Marines' interactions with improvised explosive devices makes the book a somewhat repetitive read. However, taken as a whole the interactions provide a boots-on-the-ground, gruesome depiction of the daily routine of the Marines risking their lives with every step they take. The strong imagery Folsom's writing creates is enhanced by photographs placed throughout the book that bring to life the realities he describes. From off-duty to patrolling, to meetings, to combat, no detail is spared as Folsom relives his deployment through the book's pages.

It is clear that the purpose of *Where Youth and Laughter Go* is not to provide an in-depth analysis of the American counterinsurgency operations in Afghanistan. Rather, the purpose is to offer the reader an honest, straightforward view into the operations of the Marines. Additionally, the narrative appeals to more than just the reader interested in politics or war. Folsom manages to provide a well-written narrative that is clear of any ideological biases, which allows the book to appeal to a greater spectrum of readers. His unbiased approach is also crucial for allowing the book to focus purely on the personal and operational undertakings of the Marines, which aids in reinforcing the harsh realities of counterinsurgency he describes.

Furthermore, *Where Youth and Laughter Go* is a descriptive and exceptional work that provides a depiction of the USMC counterinsurgency operations in Sangin. Folsom successfully illustrates the experiences of pre-, during and post-deployment tasks in the fight against the Taliban. It is through such vivid examination that Folsom is able to provide the reader with a brutal look into the infinite challenges of counterinsurgency at all Marine rank levels.

Anti-Access Warfare: Countering A2/AD Strategies, by Sam J. Tangredi, Annapolis, MD: Naval Institute Press, 2013, 306 pages, $42.90 (hardcover), ISBN 978-1-61251-186-3

Reviewed by Colonel P.J. Williams

Perhaps it was done for shock value. Certainly, at a distance it makes the potential reader think that this is a new book about Midway, picturing as it does a US aircraft carrier, clearly in distress from multiple explosions. A closer look however reveals that the vessel in question is not of Second World War vintage, but rather a much more modern class. Indeed, the cover painting is of a supposed new Chinese ballistic missile being developed, which could attack, and presumably kill, warships such as US aircraft carriers.

Such a weapon could prove to be the ultimate demonstration of anti-access/area denial strategy (A2/AD), the subject of this book. Sam Tangredi is a defence strategist with a 30-year naval career and over 100 publications, so he comes with a strong pedigree to write this work on what he claims is not a new concept, but one which has several historical precedents, and whose lessons may prove useful

in addressing several foreign policy challenges the United States may face in future.

The author defines A2/AD as "warfighting strategies focused on preventing an opponent from operating forces near, into or within a contested region" (p. 1). Tangredi makes the point that the book is not designed to describe current A2/AD technologies such as supposed carrier-killing missiles, but rather to look at the implications of them for US policy-makers. He claims that he is aware of no other book which has so far attempted this analysis (p. 4).

The book first describes how the modern concept of A2/AD was formed, and makes no bones about the fact that, in the author's view, it has a strong maritime component. Other fundamentals include the primacy of geography, the importance of intelligence and the impact of events in other regions, outside the A2/AD area. He also goes into some depth in explaining how A2/AD might be defeated, laying out the primary importance of *deterrence* in this regard. Indeed, while reading this book, I wondered if all that was needed in terms of countering A2/AD was a return to some old-fashioned Cold War containment.

To demonstrate that A2/AD is not new, Tangredi goes back to the days of Sir Francis Drake defeating the Spanish Armada in the 16th century, the Turkish victory at Gallipoli in the First World War and the Battle of Britain in 1940 as examples of the successful employment of A2/AD strategies. Conversely, Germany's defence of so-called 'Fortress Europe' against the Allies in the Second World War, the Pacific strategy of Japan in the same conflict and Argentina in the Falkland's War in 1982 are held up as examples of unsuccessful A2/AD strategies.

The book has no illustrations or maps, which makes following some of the historical examples a little difficult for those not familiar with the examples used. The detailed Notes number some 23 pages and the Bibliography a further 19. However, given that the People's Liberation Army (PLA) figures prominently in the discussion of A2/AD, there is a lack of primary Chinese sources.

One might easily dismiss this as a dull, somewhat turgid book, suitable only for the doctrinaire about the latest in a series of supposed new developments in military theory, but I did not find this to be the case. The author writes in a clear, concise, convincing manner and poses many difficult questions. As well, he doesn't shy away from examining the implications of A2/AD for the United States in particular when dealing with China, Russia, Iran, North Korea and other potential challenges. Tangredi makes the case that countering A2/AD is not just a matter of technology, and that further, it is what we'd call in Canada, a problem requiring a whole-of-government approach.

If there was one thing that I felt was missing in the book, it was a discussion on how we could turn A2/AD on its head and employ it to our advantage, so as to 'deny access' to our homelands to such external threats as terrorism, transnational crime or cyber intrusions. Throughout the book, the assumption seems to be that A2/AD strategies are only employed by those in the position of being strategically inferior. I'm not so sure if this is always true.

Nevertheless, this timely and well-written book is strongly recommended, particularly for those in policy and strategic decision-making posts, not only in defence circles, but also within foreign policy and law enforcement. Indeed, one wonders if sales of the book are strong within certain American competitors.

Oakville's Flower: The History of HMCS Oakville, by Sean E. Livingston, Toronto: Dundurn, 2014, 141 pages, CAD $30 (Paperback), ISBN 978-1-45972-841-7

White Ensign Flying: Corvette HMCS Trentonian, by Roger Litwiller, Toronto: Dundurn, 2014, 188 pages, CAD $34 (Paperback), ISBN 978-1-45971-039-9

Reviewed by Colonel (Ret'd) Brian K. Wentzell

These books are important texts for those people interested in understanding the connection between sponsoring communities and warships of the Royal Canadian Navy (RCN) in time of war, in this case World War II. The RCN had a policy of naming its warships after towns and cities in Canada and encouraging those communities to adopt their namesake ship and crew for the duration of the conflict. The Ontario towns of Oakville and Trenton fulfilled their obligations with enthusiasm and earned the gratitude and respect of the ships' companies.

The authors of each book reside near the respective community of which they write. Both are members of the Canadian Armed Forces and serve as members of the Cadet Instructor List. Lieutenant Livingston serves with RCSCC *Oakville* while Lieutenant Litwiller serves with NLCC *Trentonian*. Their literary works tell the stories of the ships, crews and the towns that adopted them.

HMCS *Oakville* was built in Port Arthur, Ontario, christened with great municipal and naval aplomb in Oakville, Ontario, on 5 November 1941, and was commissioned quietly at Montreal, Quebec, on 18 November 1941. She was decommissioned at Sydney, Nova Scotia, on 16 July 1945. Her service was in the western Atlantic Ocean and Caribbean Sea and on 27 August 1942 she encountered,

attacked, boarded and sunk U-94 northwest of Aruba with assistance from a US Navy Catalina Flying Boat. This was the highlight of her career and a delight to her town, the RCN and the Canadian government.

HMCS *Trentonian* was constructed at Kingston, Ontario, and was commissioned there 1 December 1943. She was based at Halifax and after work-ups performed convoy escort duties in the western Atlantic Ocean and Caribbean Sea areas until late spring 1944. She was re-assigned to England and formed part of the escort force for *Operation Overlord* in June 1944. She provided escort for various convoys and special projects during and after the invasion of France.

Whilst escorting the cable ship, HMTS *Monarch* on 13 June 1944, *Trentonian* was the victim of a friendly fire incident at the hands of USS *Plunkett*, an American destroyer. *Trentonian* survived largely unscathed, but *Monarch* was badly damaged with several crew, including her captain, killed or injured. As a result, the laying of a crucial communications cable from England to France was disrupted. No one was held to account, much to the dismay of the crew of *Trentonian*.

On 22 February 1945, whilst escorting a convoy of merchant ships off Falmouth, England, *Trentonian* fell victim to a torpedo fired by U-1004. The ship was struck on the starboard quarter and sank quickly. One officer and five ratings died in this attack whilst several others suffered injuries. The Board of Inquiry found no fault with the Commanding Officer or crew of the corvette. She was in the wrong spot at the wrong time.

The people of Trenton received the sorrowful news, and reacted with compassion. The community understood that the loss of their ship was not due to any failure on the part of the officers and men of the ship's company. The outcome was a product of war and, indeed, the loss of life was relatively small when compared to the losses of other corvettes in the conflict.

The two books are important, not just to those interested in the operations of the RCN in World War II, but also to the current residents of Oakville and Trenton, the sponsoring communities. These ships form part of the history of each town, just as much as any militia regiment does. Perpetuation of the ships through the naming of a Royal Canadian Sea Cadet Corps and a Navy League Cadet Corps has provided continuity and the retention of historic memories.

Each author has achieved his purpose. It is now up to the citizens of the two modern communities to support the cadet units in perpetuating the memories. As Livingston concludes, "[t]he truth is that *Oakville* is alive and well, continuing to serve the country and community she so valiantly fought for" (p. 124). The *Trenton Star Advocate* summed up the story of Trenton's ship and crews thus, "Trenton ... and all of Canada is proud of them, for they upheld the finest traditions of the Navy" (quoted in Litwiller, p. 165).

2017 Canadian Naval Memorial Trust Essay Competition

Canadian Naval Review will be holding its annual essay competition again in 2017. There will be a prize of $1,000 for the winning 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 2017 *CNR* essay competition must be received at naval.review@dal.ca by **Monday, 12 June 2017**.
- 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.

The Dutch Navy ship HNLMS *De Zeven Provinciën* (F 802) participates in a pass and review during the North Atlantic Council at Sea Day, Atlantic Ocean, 13 July 2009. This ship design is a possible contender in the Canadian Surface Combatant competition.

Credit: U.S. Navy Mass Communication Specialist Seaman Apprentice Shonna Cunningham