

ATTRITABLE, SUSTAINABLE, AND SOVEREIGN

The case for a new approach to warfare in Canada's Arctic.

Initial Discussion



About the Author

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About the National Center of Excellence and Innovation

Founded in 2024, the National Center of Excellence and Innovation is a multi-disciplinary focal point for communities coming together to address complex maritime security challenges. While young, it brings together academics, practitioners, and others who have experience ranging from law enforcement to the impacts of severe weather and changing ocean conditions. You can visit the website at <https://marseccoe.com>.



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Purpose

This document presents an alternative approach to projecting force in the Arctic. This approach may be useful in other environments.

Background

The Canadian Armed Forces (CAF) consists of approximately 63,000 active personnel and 30,000 reserve personnel for a total of roughly 93,000 personnel (all ranks).¹ This includes approximately 28,979 in the Canadian Army, 15,553 in the Air Force, and 8,575 in the Royal Canadian Navy (RCN). Approximately 5,000 Canadian Rangers bolster this. The Rangers are distributed across approximately 200 remote and coastal communities, mainly in the north.

When we think about the idea of sovereign control, we are talking about a situation where the state rules its territory, enacts its own laws, and manages its affairs without unfair external interference. In the past, we have been able to count on the “rule of law” to assist in this. In today’s geopolitical climate, however, we need to be able to back up the argument that we control space with the tools necessary to both demonstrate that level of control and also the ability to resolve attempts to interfere with that control.

Consider the Arctic as three types of territory. First, there is the part that belongs to mainland Canada. From a sovereignty point of view, this area is clearly under Canadian control. The second type includes the islands north of the mainland. The dispute between Canada and Denmark over Hans Island (resolved in June 2022) falls into this category. We see a similar situation with the Lomonosov Ridge involving Canada, Denmark, the USA, and Russia. Lastly, there are issues related to the waterways. The most contested waterway is the Northwest Passage (NWP), which Canada claims as internal waters while the USA views it as an international strait. This dispute mainly concerns freedom of navigation through these waters.

In this context, consider how force is projected. The presence of submarines might require allies to declare their activities (to prevent “blue-on-blue” incidents) and make adversaries more cautious when operating in Canadian waters. Vessels like the Arctic Offshore Patrol Vessel (AOPV) serve to establish presence, maintain surveillance, and project force when necessary.

The challenge here does not lie in the usual operations, but when another power chooses to assert its position despite threatening both Canada’s sovereignty and the rules-based order.

¹ <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/proactive-disclosure/nddn-supplementary-estimates-b-2023-2024/background-notes/personnel.html>



Figure 1 - General topography of the region.

Part 1 – The End State

Describing the End State

Our end state ensures that Canada maintains the following:

- An ability to anticipate threats or undesired conditions in the North.
- An ability to protect against incursion.
- An ability to reassert sovereign control in areas that become contested.
- An ability to learn from previous engagements and realign as necessary.

To accomplish this, the North is divided into operational zones under their own chain of command, ensuring that each chain of command follows a structure in which national aims are clearly understood and decision-making authorities are distributed to maximize operational effectiveness.

This includes having senior officers able to exercise authorities delegated from multiple departments. For example, the Commanding Officer may be delegated to act as a Customs Official, Immigration Official, Quarantine Officer, and so on. It may also include limited delegations (such as directing a ship to an anchorage) for a period of time under other national-security-related acts, such as the Marine Transportation Security Act.



These operational zones are organized so that if the command-and-control of one zone is disrupted, it can be “picked up” by the surrounding zones. For example, if the command capability in the Mould Bay area is disrupted, the Command function could be assumed by Tuktoyaktuk. This ensures that no particular zone’s capability can be decapitated.

Each zone maintains three streams of activity.

- First, it maintains a combination of “manual” and “autonomous” capabilities that can be used to maintain situational awareness within its one and overlapping with the other neighbouring zones. Each zone’s situational awareness is fed both upwards and to that national picture, laterally to neighbouring zones, and downwards to sub elements operating within the zone.
- Second, it maintains an ability to project authority and control over its region. This includes the ability to use legal mechanisms (such as through the cross-delegations), displays of presence (overflights, etc.), displays of force, and ultimately application of force (if necessary). There should be no doubt in the mind of an entity attempting to defy the authority in the space that it enters into a capable escalation of force that can ultimately result in its destruction.
- Third, the logistics network leverages the distributed nature of the operational zones and a mesh topography to sustain both the ability to fight and the ability to sustain forces. This includes having multiple connections to capable supply chains in the southern industrial bases.

Within this activity, the focus is on “having one soldier able to project the capacity of fifty.” The focus shifts from small sections of lightly armed infantry to establishing the capability for a 12-person detachment to protect a significant force against the adversary. For example, the primary defence may involve small, specialized units capable of operating shore-based anti-ship missiles and positioning an adequate number of these missiles at a given location. Instead of operating a single drone to support lightly armed infantry sections, mobile patrols may be equipped to launch drone swarms of various sizes.

There is an adage that “if you’ve entered a fair fight, you failed to plan well.” With a smaller force, the concept of operations may need to be uncomfortably brutal. This may involve targeting the infrastructure required for any adversary to move and sustain operations in a challenging environment. It may include removing the adversary’s ability to shelter, move, or sustain its forces at the end of a long and difficult supply chain. It may also involve the use of weapons that have known catastrophic impacts against certain kinds of infrastructure. This is not to say that Canada would adopt a “kill them all” or “let them all die” approach, but that the nation would adopt a clinically brutal approach to removing the adversary’s ability to fight or counter Canada’s own position of sovereign control.



This approach has three key elements: (1) the decision-making infrastructure, (2) resilience anchors, and (3) attritable assets. The decision-making infrastructure may follow the edict of a central authority's intent, but it is distributed (as discussed below) to ensure that appropriate decision-making can be assured even in contested environments.

The concept of the resilience anchor, however, involves those strategic infrastructures (bases, support hubs, etc.) that are critical to projecting sovereign control. A loss of one of these has an immediate impact and is difficult to recover from. As a result, it is protected not only in its own design but also by rings of attritable assets that improve its ability to sense, shield, and fight. These attritable essentially increase our ability to project outwards and, in the case of contested environments, our ability to absorb the attack's impacts without disrupting the critical services delivered by the resilience anchors.



Part 2 – Behind this Structure

The Goal

Under this approach, the goals of preserving national sovereignty are tied to mission-driven, outcome-focused objectives that ensure Canada's ability to exercise independent authority in the Arctic. This encompasses all aspects of authority, including guiding the population, managing infrastructure, and the decision-making processes used to determine and direct activities in the region.

This goal includes the ability to anticipate, prevent, withstand, and recover from external interference impacting sovereign control. These include the ability to counter military, diplomatic, economic, and other forces that erode Canada's ultimate authority over how its territory is accessed, used, or managed.

Ultimately, the goal is to enable Canada to assert, maintain, and visibly demonstrate autonomous, effective, and continuous final authority over the Arctic, including its territory and waters, in relation to geopolitical (including military), environmental, and operational considerations.

The Key Objectives Considered

Given the definition of "sovereign control", we can establish several objectives that must be demonstrated when claiming that the Arctic falls within Canada's sovereign control. These include the following:

1. **Continuous situational awareness** in terms of Canada's activities, the activities of others within the space, and of what is present within the space. This would include persistent, reliable monitoring across air, maritime, land, and cyber domains.
2. **A sustained operational presence** that not only demonstrates concern for the region but also maintains the capability to deploy, support, and sustain operations in support of Canada's claim of sovereign control.
3. **A secure and resilient ability to communicate** in the Arctic. This involves a robust and resilient Canadian communications capability that enables Canada to reach its population and others in its geographic area. This is about making Canada's expectations known to those in the area.
4. **The ability to respond rapidly and enforce Canada's sovereign control.** This involves being able to determine the threshold at which sovereignty is being challenged then executing timely decisions that project Canada's authority. This projection of authority goes beyond simple law enforcement and may also involve taking steps to compel others to accept Canada's sovereign control over the area (up to and potentially including conflict).



5. The ability to sustain sovereign operations through the **presence of infrastructure, logistical support, and effective supply chains**. These may include bases, ports, and agreements with local communities. What matters here is Canada's ability to project its sovereign control in the area continuously

The capability to project sovereign control needs to be looked at in terms of the general definition of capability provided by the Canadian Armed Forces (CAF) or the “ability to contribute to the achievement of a desired effect in a given environment within a specified time and the sustainment of that effect for a designated period.”² Within this definition of “capability”, the CAF have established the domains of “command, sense, act, shield, sustain, and generate.”³ In this context, we are most concerned with what are terms the five operational functions of “command, sense, act, shield, and sustain.”

Key Performance Indicators

How would we know if we are meeting these objectives? Key Performance Indicators can be tied to each of these objectives to indicate how well we are doing. Consider the following:

1. Continuous situational awareness can be looked at in terms of two factors. The first is the coverage over the Arctic using a three-dimensional view of air, land, and maritime domains. The second factor involves the ratio of time covered to “continuous time.” For example, 99% coverage of the Arctic over 364 days of 365 days can be compared to 80% coverage of Arctic achieved 100% of the time.
2. The concept of operational presence can be looked at in terms of the number of days that assets can be present in the Arctic to respond to events that are detected as part of the situational awareness. This can also include the number of assets and formations that are permanently resident in the Arctic.
3. The concept of communications can involve two factors. The first consists of the ability to reach all areas of the Arctic using standard technologies (not just major communities). The second aspect can examine the “up time” of this capability under all conditions, including more challenging natural events such as geomagnetic storms.
4. This can be measured in terms of the ability of an effective responding force to reach any point in the territory covered within a timeframe that ensures an adequate response.

² <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/canadian-armed-forces-operational-sustainment-modernization-strategy.html>

³ <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/canadian-armed-forces-operational-sustainment-modernization-strategy.html>



5. This can involve either the amount of effort that is required from outside the Arctic to respond to events or the percentage of critical infrastructure points that remain operational and that can sustain their operations without significant support.

The Architecture

By treating this exercise as an organizational system, we can determine that the solution's "architecture" would exhibit certain features. These features are key attributes that should be present in any solution for it to be considered appropriately adequate and trustworthy. These include the following:

1. The awareness capability does not exhibit any single points of failure. It has multiple sensing networks that provide a highly credible picture of what is in and what is happening within the space.
2. Decisions regarding sovereignty come from a unified command but can be executed through multiple entities. Ultimately, there must be acceptance as to which entity is the final authority. Similarly, all entities under that authority focus (as able and appropriate) on maintaining that unity of purpose.
3. The infrastructure is present to cover the region, but is supported by a modular and scalable logistics structure that supports operations in both routine and contested situations. This would include infrastructure concepts that can be used for civilian or military purposes, that can be rapidly expanded or contracted as needed, and so on.
4. The communications network is robust enough to withstand foreseeable conditions but is also resilient enough to counter and/or adapt to events within contested environments. What is sought is assured connectivity for critical datasets under all conditions, and the ability to sense, adjust, and adapt to situations that threaten any one or more means of communication.
5. The enforcement capability must stem from a shared understanding of the situation. This understanding enables the choice of different courses of action, including rapid deployment, coordination of activities across jurisdictions, and the establishment of clear rules of engagement for field decisions. The goal is to ensure a seamless transition through each phase of the OODA loop (observe, orient, decide, and act).
6. The overall system supporting the activity can evolve, considering operational, environmental, economic, socio-cultural, and geopolitical factors. What is sought here is the ability to identify when to adapt, as well as to maintain the overall system, so that the addition, modification, or removal of capabilities offered by the system is done seamlessly and gracefully.



7. Finally, governance of all the above must be embedded within the system design and operations. Those embedded elements should clearly support national priorities, adherence with international laws, support for indigenous co-governance (or involvement), and the sovereignty claims themselves. They should clearly encompass the major operational, geopolitical, environmental, economic, and socio-cultural factors within a single system that focuses on achieving sovereign control and explicitly builds legitimacy into the system, rather than simply assuming it.

Features of Design

The design features of this network are evident at every level of the organization. These include the following:

1. Our organization that is delivering the capability is designed clearly around operational effects and not the administration of the CAF. The focus here is on the capability outcome. A key aspect of this is that the organization can create, adjust, and remove tasks without actually losing its purpose, a key element in adaptability.
2. With the organization understanding its role in terms of the outcome, it distributes its authorities to act throughout the network. This is particularly important in contested environments (conflict), where an adversary's disruption of communications or a single chain of command should not result in the loss of capability. Ideally, other elements would step in to maintain the decision-making processes in support of the disrupted element.
3. The system leverages distributed networks for its critical functions. Again, this refers to the need for a resilient capability across the critical functions (see those functions that directly support the goals of anticipation, prevention, withstanding, and adapting). Ideally, the individual soldier, sailor, and aircrew member is clear on what capability they are supporting and has the authority to act quickly and decisively in support of that capability's goals, particularly in contested environments.
4. Intentional segmentation is achieved through the creation of defensive zones that can operate reasonably independently under defined conditions or for set periods of time. This independent operating capability is guided by the first three features of design. Across the north, this may be tied to the presence of existing communities or population centers. These zones operate in harmony with the overall intent or capability. They are controlled by being limited to operating in a manner that clearly supports the overall outcome.
5. While the overall system-of-systems (across all operational zones) has the ability to detect and transfer authority, there are clear pathways to reconstitute command and control functions or reestablish the capabilities, even if in other locations using other personnel. This speaks to primary, secondary, and tertiary operating points or even the distribution of



remotely operated infrastructure can result in Canada's ability to initiate activities from across "just about anywhere" in the eyes of the adversary. This structure is closely aligned with the assumption that any infrastructure can be operating in a degraded or even partially compromised state at any time.

6. Finally, this is not about establishing a single "standing operating procedure" but instead of building a force that can not only act thoughtfully but that can also critically analyze its actions in relation to outcomes and learn (evolve) its approaches.

Balancing Capital Assets and Attritable Assets

The current concept of force projection involves establishing bases and deploying capital assets, such as the Arctic Offshore Patrol Vessel (AOPV). While this has merit, the conflict in Ukraine has exposed that overreliance on this approach can quickly leave Canada without key capabilities in contested environments.

Thus, a different approach to defence in depth may be invoked. While capital assets operate in the space, they are bolstered by larger communities of Attritable assets. The role of the Attritable asset is not to replace the capital asset, but to bolster the asset's capability and resilience by having the Attritable asset operate at the core.

For example, an AOPS vessel may operate with a system that can "patch into" drone swarms launched from a distant control point (such as an AOPS operating near Arctic Bay, capturing the feed of a drone swarm over an area around Mould Bay). Similarly, attritable assets may be used to support the creation of highly resilient communications networks when forces need to be deployed or operate jointly. The role of the attritable asset would be to extend and bolster the network against disruption, but not define the overall network.

The attritable asset may also operate as a screen that preserves higher value assets. Attritable drones carrying packages that replicate submarines, ships, aircraft, or even logistic points can be deployed to challenge the adversary's ability to clearly and concisely identify targets. This serves to protect the target itself. It can be further bolstered by providing a physical screen around the capital asset, much in the same way that helicopters were used during the Falklands to protect ships against heat-seeking missiles.

The final application may involve the leveraging of "swarm" or "saturation" attacks against an adversary's capital assets. This may involve swarms of attritable assets attacking an adversary's ship's detection equipment, close-in defensive capabilities, communications. It may involve actions that degrade an adversary land force's ability to shelter, move, or sustain its operating capability in the environment (destruction of key supplies like food and fuel).

Ultimately, the balancing point is based on a calculation that looks at the ability of the capital asset to meet the sovereign control goals with the ability to sustain that capability in a contested environment. Repairing or even replacing the resilience anchors may be significantly time consuming and costly. As a result, Canada's ability to sustain its sovereign control could be



impacted severely. The use of attritable assets, however, reduces the risks associated with successful attacks against those anchors by improving situational awareness, projecting force difficult to counter, shielding resilience anchors, and assisting in bolstering critical services.

The core of attritable assets, however, lies in a shift in thinking. The attritable asset is primarily defined in terms of lower cost and more rapid rates of production (to when it arrives in the field). A capital asset may take months or even years to establish. The attritable asset should only require weeks.

Conclusion

Sovereignty involves more than simply fielding an effective fighting force. It can be more appropriately described as being the ability to impose and sustain Canadian values and capabilities over all others. As a result, it will take more than a simple military presence in the north. This presence should also be delegated powers that lie outside of DND that allow it to exert a wider set of options—such as being able to direct the movement of ships under Maritime Security legislation mandated to Transport Canada or requiring inspections as per the Customs Act. This will require a degree of cross training and communications.

This will require shifts in how we think about defence technology. Fortunately, we can draw upon clear lessons being learned in the Ukraine conflict where attritable assets have been used to great impact against capital or strategic assets. Building an approach that leverages the ability to design, build, and deploy this kind of asset quickly (much more quickly than the capital asset) can become a tool to protect our own resilience anchors while offering the ability to significantly degrade an adversary's ability to fight.

What this requires, however, is for defence suppliers to be producing high volume, moderately costed assets for DND. It also requires DND to simplify, stabilize, and streamline its procurement processes so that the assets can be repaired and replaced quickly in support of Canada's ultimate goal and objectives.

Annex A – The Larger Context

This strategy does not operate within a vacuum. Those implementing it will need to look at three critical areas:

1. The context of the larger alliance picture, specifically NORAD (with the USA), NATO, and potentially with the NORDEFCO (the Nordic Defence Cooperation consisting of Denmark, Finland, Iceland, Norway, and Sweden).
2. Canada's approach to defence procurement.
3. Canada's relationship with Indigenous Peoples and First Nations.

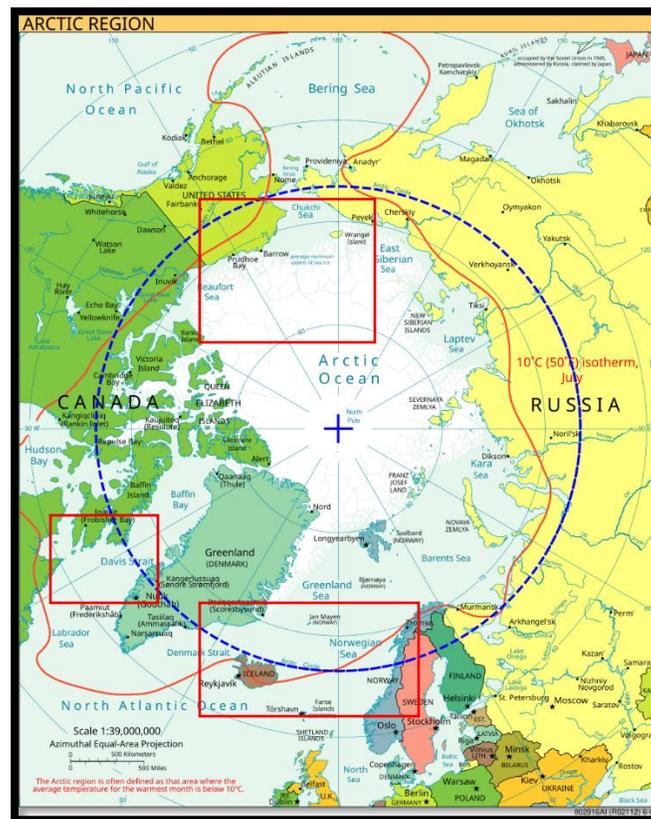


Figure 2 - CIA World Factbook Arctic Circle.⁴

Alliances

Two alliances play significant roles in the context of attritable technology. NORAD views the concept of attritable technology through both capability and economic lenses. On the capability

⁴ By CIA World Fact Book - File:Arctic.svg, from the CIA World Fact Book, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=7894803>



side, it views attritable technology as a means of addressing emerging threats (such as hypersonic missiles or hard-to-detect craft) and of adapting quickly to changes in the threat environment. The concept is that attritable technology would enhance or complement existing key anchors (e.g., ships, F-35) and evolve quickly, as development and time-to-deployment are much shorter than for capital assets.

NATO also sees the use of attritable assets in a complementary or supporting role. With changes in how war is waged, the speed at which innovation must progress, and the need to replace assets in the field quickly, attritable assets are being seen as a necessary augmentation to existing capabilities. The attritable assets are also looked at in terms of their ability to deliver persistent surveillance and infrastructure protection, where the asset's loss results in significantly lower impacts than successful attacks against what that asset is protecting.

These commitments are reflected in efforts such as Task Force X Baltic, which seeks to bolster NATO's ability to develop its maritime autonomous capabilities.⁵

Canada's challenge lies on two fronts. The first is being able to adjust its doctrine to integrate this technology into its mainstream operations. The second involves being able to design, build, test, and scale the technology at a pace that reaches the battlefield in time. The latter is the more significant challenge.

Industry

Canada may be well served by engaging with the NORDEFECO (Nordic Defence Cooperative), comprising Denmark, Finland, Sweden, Norway, and Iceland. Part of this cooperative effort focuses on how to help each nation's defence industrial base improve its efficiency and speed of production to keep pace with these demands.

In particular, Canada's engagement may be well served by focusing on three cooperative areas (COPAs), specifically capabilities, armaments, and HR and education. Several of the current capabilities being discussed mirror challenges that Canada faces with its highly distributed, network-reliant infrastructure. Efforts such as the Advanced Distributed Learning offer options that may prove useful as Canada attempts to build out its primary and supplementary reserves.

The key element, however, lies in the armament COPA. This COPA aims to "achieve financial, technical and/or industrial benefits for all members ... within the field of acquisition and life cycle support."⁶ This area has been a particular challenge for Canada. While the government may procure new equipment periodically, it is in the operations and maintenance of that equipment (post procurement) that has been challenging. Recent reports from Latvia with respect to spare part shortages and the resulting effect on the Canadian contingent's combat effectiveness rating is a

⁵ <https://www.act.nato.int/article/nato-tfx-maritime-dominance/>

⁶ <https://www.nordefco.org/Armaments-Cooperation-in-NORDEFECO-Cooperation-Area-Armaments2>



prime example of how procurement and ongoing support need to mature.⁷ These conditions do not lend much support to the CDS who recently claimed that Canada is “ready for war.”⁸

Indigenous

The Arctic presents a challenge for both the Government of Canada and Indigenous/First Nations. The pace at which discussions and consultations took place in the past will not address the challenges that are currently on the North’s doorstep. To be clear, the military infrastructure being discussed currently in the North was needed twenty years ago.

This past year saw two events that should serve as a “wake-up call” for those involved in this process. One was a relatively simple grounding of a Canadian sealift vessel that was able to refloat with a rising tide. The second involved the MV Thamesborg that grounded in the Franklin Strait and then required a complex salvage operation.

The MV Thamesborg, fortunately, would be considered a near miss. While ballast tanks were breached, its fuel tanks and cargo holds were not. The CCGS Sir Wilfrid Laurier was on scene about a day later but salvage operations took some weeks to begin and the ship was refloated after approximately 33 days aground.

The principle is simple: you want to be able to detect and respond to events faster than you suffer the impacts. For example, if there is a spill in the north, you want to detect and contain that spill before it reaches shore or critical waters.

The challenge here is complex. Certainly, the concerns about environmental impacts and the impacts on food sources warrant discussion. But Canada’s presence in the north is no longer operating in a relative vacuum and it is not without detractors. The USA continues to argue that the Northwest Passage (NWP) is essentially international waters.⁹ Similarly, commercial shipping using the NWP has been increasing steadily.

While the UN has placed certain restrictions (such as banning Heavy Fuel Oil) from non-ice class ships in the Arctic, laws and rules are only as good as their enforcement.

As a result, the context of what military or similar infrastructure is present in the north needs to be looked at in the context of today’s environment, where if you cannot exert control over your territory, others will do it for you or use it the way they will.

⁷ https://www.reddit.com/r/canada/comments/1n7b11t/parts_shortages_snarled_supply_chains_are/

⁸ <https://nationalpost.com/feature/general-jennie-carignan-canada-top-soldier>

⁹ <https://opencanada.org/close-the-gap-in-the-north-why-the-united-states-and-canada-must-clarify-the-northwest-passage-now/>