NORAD in Perpetuity?
Challenges and Opportunities for Canada
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Introduction

This discussion report is based upon research undertaken by the authors since Fall 2013 on the place of NORAD in the Canada-U.S. defence relationship, with an emphasis on Canada. It is supported by a grant from the Defence Engagement Program, Assistant-Deputy Minister for Policy (ADMPOL), Department of National Defence. The project's origins pre-date the launch of the NORAD Next study within NORAD. In contrast to that ongoing study, which looks out over several decades into the future, this project is designed to examine the current state of NORAD, and its immediate future, and identify and evaluate current issues, or areas of concern relevant to NORAD and its place within Canada-U.S. North American defence cooperation.

We would like to thank everyone who met with us; we appreciate the time and resource pressures you are all under and it must have been frustrating at times to bring us up to speed. Your input, however, has been invaluable. We must also draw particular attention to the incredible support given us by Sarah Kavanagh, Major Julie Roberge and Gloria Kelly – without their assistance, the interviews, this report and this workshop would simply not take place. On behalf of the entire research team, we commend you all on your incredible organization skills and patience (academics not being known for either.)

The findings presented below are the first, rather than last word, on the issues involved. As became clear to the authors early on in the research phase, the Canada-U.S North American defence relationship and NORAD's place within it, and existing issues, challenges and opportunities are extremely complicated. As such, this report is designed to present our current observations to officials, directly engaged in the relationship, as well as other members of the research team, as a means to ensure their accuracy and relevance, and to identify issues that may need further evaluation. It is also designed to facilitate an open dialogue, discussion and exchange of views between officials and the research team.

Overview

In 2006, the North American Aerospace Defence Command (NORAD) Agreement was renewed for an indefinite period. The normally five-year renewal was replaced with a review process to be held every four years, or anytime at the request of either party. In so doing, uncertainty regarding the future of NORAD, and attendant political irritations

that had accompanied many previous renewals is a thing of the past. Indicative of the new process, the first review passed in complete public and political silence.

The review process is left in the hands of members of the Permanent Joint Board on Defence (PJBD) and the Military Cooperation Committee (MCC), and the Agreement's Terms of Reference (TOR), "including the addition of other aspects of the missions…" are placed in the hands of the Canadian Chief of the Defence Staff (CDS) and the American Chairman of the Joint Chiefs of Staff (CJCS), "with the approval of higher national authorities as appropriate…"[1] Importantly, nothing in the Agreement prohibits either nation from engaging in a public debate on NORAD at any time, or on the occasion of a review. But, in the absence of some major event or development that would place the NORAD arrangement onto the national political agenda, the review process and possible TOR additions reside largely in the area of day-to-day management or caretaking, far removed from the political limelight, and vested in the hands of defence officials on both sides of the border.

Of course, NORAD living in the political and public shadows is not new. The only real difference is the absence of a renewal process which brought it into the political limelight, if only briefly. They were largely occasions for political debate, especially in Canada, on the Canada-US defence relationship. More importantly, no such occasion presents itself today, unless of course, some major event or dramatic proposal were to emerge placing NORAD back onto the national political agenda. NORAD, once again, as throughout most of its history, fades into the background.

The 2006 Agreement added a new maritime warning mission to NORAD to go along with its longstanding aerospace warning (air and space threats) and aerospace control (air defence) missions. In expanding the scope of bi-national defence and security cooperation, the new mission can be seen as a harbinger for continued expansion towards the establishment of an all-encompassing bi-national approach to the defence and security of North America. As the three existing bi-national missions can be seen as a product of a functional efficiency and effectiveness logic relative to the nature of the threats, which brought them into being, new nascent and/or emerging threats to the defence and security of North America will drive both Canada and the United States towards functional, bi-national solutions. No longer will NORAD be just a bi-national island in national and bilateral seas.

Of course, the actual relationship between the bi-national and national/bilateral management of North American defence and security is much more complicated, especially with regard to the new maritime warning mission. Moreover, even with the new mission, the last two decades of Canada-United States defence cooperation can also be interpreted as the stalling, if not retreat, of bi-nationalism following the

[1] *Agreement Between the Government of the United States of America and the Government of Canada on the North American Aerospace Defence Command.* Article II, Para l. 28 April, 2006.

emergence of new threats occasioned by 9/11, which on the surface at least, should have driven bi-national cooperation forward.

Indicative, the new maritime warning mission is carefully defined within national "surveillance and control", [which] "shall continue to be exercised by national commands and, as appropriate, coordinated bilaterally".[2] In this regard, the mission is similar to the longstanding aerospace warning one, except that it is embedded, or a component "within the overall maritime information-sharing network."[3] NORAD, thus, provides bi-national maritime awareness in addition to the national ones. It is, in effect, a second or third voice within the maritime warning process.

National caveats have emerged within the bi-national environment in the wake of these new threats. The relationship between NORAD and national command authorities became rather opaque with the creation of US Northern Command (NORTHCOM) and first Canada Command (CANCOM), and now its successor Canada Joint Operations Command (CJOC). These, and others, potentially suggest that the Canadian and American response to nascent or emerging threats and challenges to the defence of North America, such as in the areas of outer space, the Arctic, and cyber security, will be national in foundation, and coordinated bilaterally.

In effect, the relevance of a bi-national approach to Canada-US North American defence cooperation and management, and thus NORAD itself, appears to be at issue, both from within the existing structure and processes, and relative to the management of nascent and emerging threats and challenges. This is not to suggest necessarily that NORAD is becoming irrelevant, such that its future is in doubt, not least of all because its symbolic value to both parties will remain. But, it does raise significant questions about the future of NORAD.

Tangibles and Intangibles of NORAD

The roots of Canada-U.S. defence cooperation, and thus NORAD, are a function of three basic considerations. First, it is simply the product of geography relative to evolving military technologies that have undermined the historical level of security provided by three oceans separating North America from the Euro-Asian continents. Second, it is the result of common historical roots and language, and fundamental shared values and interests held by both nations, and epitomized by the ideas of democracy, freedom, and the rule of law. Finally, it stems from the integrated, interdependent nature of the Canadian and American economies, in which a threat to one nation's economy is a threat to the other's, as clearly demonstrated in the wake of the 9/11 attacks.

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[2] *Terms of Reference North American Aerospace Defence Command (NORAD).* Para 13. 26, May, 2011.
[3] *Ibid*. Para 14.

Since its establishment in 1957,[4] NORAD has been the institutional, as well as symbolic, centerpiece of Canada-U.S. defence cooperation. In its basic form, NORAD was the logical, functional outcome of over a decade of air defence cooperation in response to the common threat posed by the Soviet Union's long-range, nuclear capable, bomber force. It established a unity of command in North America, promoted the relatively efficient and effective use of national air defence resources, reduced duplication, and generated a North American perspective or mindset, albeit limited to the air environment.

For Canada, air defence cooperation and subsequently NORAD had other significant benefits. It provided access to the greater military resources of the U.S. through which the U.S. provided, for example, majority funding for relevant NORAD infrastructure in Canada. This infrastructure, in turn, enhanced Canadian sovereignty not just in terms of control over its expansive air space in the Canadian North, but also through the presence of ground installations across the North. It gave Canada access to U.S. air defence plans, thereby ensuring unique Canadian air defence requirements would be taken into account. It was also Canada's entry point into the strategic world. NORAD's missions required access to vital intelligence on Soviet capabilities, which Canada could not acquire on its own. With the addition of a ballistic missile early warning mission, NORAD also became Canada's conduit into military outer space which, for a variety of reasons, was simply unaffordable for Canada on a national basis.

Of course, NORAD was and is not simply a one-way street. For the U.S., air defence cooperation and NORAD enhanced its defence position by providing more time to identify an attack, and more intercept opportunities. It gained access to valuable Canadian air defence resources and capabilities. It also provided the U.S. with access to Canadian defence thinking and planning, and, in so doing, obtained a second perspective on the air defence, and subsequently the aerospace world.

Moreover, for both nations, NORAD released national military resources for other political and military requirements. This was most pronounced in the case of Canada where the costs of a national approach to the control of its airspace would have significantly undermined the nation's ability to contribute to NATO and the United Nations. Even so, every asset that Canada contributed to North American aerospace defence cooperation, in theory, released an American asset for employment elsewhere.

North American air defence cooperation and NORAD is often highlighted as evidence of cooperation between the Canadian Armed Forces and the American Armed Forces and cooperation with the US is consistent with Canadian foreign and defence policy. However, the cooperation is mostly between the RCAF and USAF and far less so for the other environments. Nevertheless, because of the cooperation, NORAD is symbolic of, at least for Canada, its support to an important ally. (We are not confident,

[4] Often 1958 is quoted, but 1957 is the correct date.

however, that the US sees NORAD as more important, than, for example, deployment of Canadian troops overseas in support US-led missions). Some point to the over fifty treaty level agreements, hundreds of MOUs and other arrangements that currently govern cooperation across the defence, as well as security spectrum, as evidence of the success of the NORAD experience. Others will suggest that NORAD continues to exist because it is just too complicated to undo – NORAD does no harm and so better to leave it than to dismantle it even if the value added isn't that great (especially on the US side). However, were the US to indicate they no longer see the point of NORAD, this would send a very negative signal to Canada and to other allies of the US. (It is doubtful, however, that this negative message would spill over into other areas, for example trade). If Canada, however, were to say no to NORAD, this would be seen as a loss for Canada in terms of the privileged relationship NORAD affords to the US, training and symbolism. NORAD's binational arrangement does contribute to trust and confidence shared on both sides of the border - especially given that some Canadians are dual hatted NORAD/NORTHCOM. That Canadians fill NORTHCOM positions responsible for the security of North American would be a surprise to many Americans. Indeed, one wonders why the 9/11 Commission did not make more of the fact that a Canadian was "in charge" at NORAD on that fateful day.

The military exchanges, education and training opportunities are of particular significance to Canada as a function of the much greater size of the USAF, and the U.S. Armed Forces as a whole. These opportunities remain important in promoting interoperability, trust and confidence. However, these exchanges, especially from the US perspective, are service and capabilities specific. NORAD arguably helps with USAF/CAF interoperability, but for Army and Navy interoperability, other binational exchanges/exercise/protocols are more important. American military multilateralism has many close partners. For example, consider the UK, Japan, Israel, South Korea, Germany and Australia. The US has extensive interoperability, intelligence sharing and mutual training and professional military education arrangements with all of these countries and many more. NORAD is relatively small in the overall American strategic posture (indeed NORAD is rarely referenced in key DoD documents) and the binational character of NORAD is often misunderstood as an American organization with some Canadian involvement. But as much as the US may value NORAD in its current form, it would take just one major reformulation of the US unified command plan, for example the merging of USNORTHCOM with USSOUTHCOM or USSRATCOM, prompted by US interest, to diminish NORAD's standing.

It is also the case that for the United States armed forces, the direct military defence of the homeland is secondary to forward power projection as a means to defend the American people, territory and economy. At home, security takes precedent over defence and that is the responsibility of the civilian security agencies, especially the Department of Homeland Security. Not surprisingly, since 9/11, Canadian-American security co-operation is largely conducted by the civilian security agencies of both countries which have dramatically increased functionally and institutionally along

bureaucratic lines. In contrast, there have been no new, significant bilateral defence arrangements.

What we can say is that the binational cooperation that relates to the direct defence of the American homeland, of which NORAD is the most salient component, affords Canada a somewhat higher level of collaboration and trust than might otherwise be the case given Canada's relatively small importance to the overall American global strategic posture.

However, NORAD has to be considered beyond strictly functional, military terms. It has significant, if not unequal, political value. Canadians and Americans on exchanges are afforded better insights into the culture, history and myths of each state although overseas missions are probably more important in terms of creating a "fraternity of the uniform". Nevertheless, NORAD was, and remains, the one constant and concrete example of Canada-US cooperation, immune from the ebb and flow of Canada-U.S. relations, and the cycles of anti-Americanism and anti-Canadianism stemming from specific events, such as the Vietnam and Iraq wars.

NORAD, as a binational command, represents a unique arrangement. Neither nation has lost its sovereignty, or more accurately, its independence as a function of the binational arrangement or other elements of defence cooperation. More importantly, for either party to contemplate publically the possible end of NORAD is to promote a process leading to the re-nationalization of North American defence, and all its unforeseen implications.

In sum, there may be reasons why NORAD's spill-over, intangible effects have gone unrecognized; they have not been that great and Canada-US defence co-operation in North America and abroad can be accounted for by other factors. Even if one could attribute some of the evolution of extensive defence ties to NORAD, it is doubtful that intangible benefits would save NORAD from the marginalization that some fear in the future. After all, the extensive network of non-NORAD collaboration would still continue.

Of course, the continued existence of an air-breathing threat to North America ensures the continued functional relevance of the institution. But, if NORAD is strictly seen in military functional terms relative to the threat per se, rather than wider terms as suggested above, the issue of its future relevance may be at stake. In effect, NORAD may be marginalized in the relationship and one could suggest that this is already occurring. This perception of marginalization appears to underlay in part the NORAD NEXT study, and the premise that unless NORAD expands, it will become less relevant to the defence relationship.

However, this perception is largely misplaced. First, it is a product of too great an emphasis on the tangible, functional benefits of NORAD relative to the new diverse

threat environment. Simply, NORAD worked in response to the air-breathing threat, and thus should be applied to the other threat environments. But, failure to move forward quickly is not a sign of either marginalization or creeping irrelevance. No one expected that air defence cooperation when it began following World War II would lead to a binational command. Indeed, both nations would likely have balked at the idea on national political grounds in the late 1940s. Similarly today, the groundwork for expanding the binational command into other environments is fraught with national political challenges, which may, if the NORAD experience is any indication, be overcome as the benefits of deeper cooperation become clearer to all the actors (military, civil and political) over time. Of course, no one can predict whether the maritime, Arctic or cyber dimensions will evolve along the NORAD pattern.

One of the significant drivers here is the constrained resource and budgetary situation faced by defence and security establishments in both countries. As noted above, one of the key, and largely intangible benefits of NORAD, has been avoiding duplication, and promoting the efficient and effective use of resources for the common defence. Neither nation can afford national solutions. Canada in particular, can no longer rely upon the U.S. to fund defence infrastructure, which is of significance as a replacement/refit of the North Warning System (NWS) is debated. More importantly, NWS modernization should not be seen in isolation from other requirements across the threat environment. In effect, the NORAD experience relative to the multi-dimensional threat environment suggests that the old resource 'stovepipes' need to be replaced by a holistic North American perspective in which the two nations trade off investments in one environment for investments in others.

Second, it is a problem of communication with regard to the far-reaching intangible benefits of the NORAD experience. In this regard, ironically, NORAD is a victim of its own success in the aerospace domain relative to its missions. NORAD's operations, and thus its role, are taken for granted as a function of being well understood and as well as smooth and efficient in its operations over the past decades. Little attention is paid to NORAD, especially relative to the demands emanating from the new areas of Canada-U.S. defence and security cooperation. As such, there is little advertisement, and thus recognition of the important intangible benefits derived from the binational arrangement. This is extended through the lack of public, as well as political, knowledge. In effect, NORAD is out of sight and out of mind, and this significantly contributes to a sense of marginalization.

A priority is thus the development and implementation of an effective communication strategy to expose all actors to the tangible and intangible benefits of the NORAD relationship. If this communication, however, is strictly NORAD in origin, then there is the danger that it will be discounted as simply a reflection of organizational interests. As such, any NORAD communication strategy must be complemented at the national levels as well.

Finally, brief consideration should be given to developing defence cooperation with Mexico, relative to the NORAD experience. It is premature for a variety of historical, political and cultural reasons to expect the addition of Mexico into NORAD in the immediate future (noting of course that Mexico is part of NORTHCOM's AOR). As a function of NAFTA in particular, an integrated, interdependent North America, which includes Mexico is gradually emerging, as are a sense of a common threat and shared values and interests. To date, none have reached the level, as found in the Canada-U.S. case, to create the functional requirements for tri-lateral defence cooperation and integration. Nonetheless, Canada defence relations with Mexico have grown substantially over the last several decades, and these will slowly over time generate tangible and intangible benefits that will expand and deepen cooperation. In other words, some evidence exists of the NORAD evolutionary process being replicated with Mexico, albeit at different bilateral rates between the Mexico-U.S. and Mexico-Canada defence relationships, for understandable reasons. Of, course a tri-lateral NORAD is not inevitable, nor is an overarching North American Defence Command. But, both are important propositions.

Threats and Challenges

Today, North America confronts a range of diverse or multi-dimensional threats in contrast to the single, dimensional threat posed by the Soviet Union and its long-range strategic nuclear capabilities during the Cold War. These threats can be divided into two categories – traditional, and non-traditional. Traditional threats concern nation-states and their military capabilities, and are largely, but not exclusively symmetrical in nature. Non-traditional threats are generally associated with non-state actors (terrorism), but may also entail the covert support or covert use of capabilities by nation-states. They are generally asymmetrical in nature, ranging from the 9/11 example of hijacked aircraft as flying cruise missiles to covert cyber-attacks on critical infrastructure. Combined, they serve to generate a series of new challenges for North American defence and security cooperation, and the current and future roles and missions of NORAD.

Traditional Threats

None of the major strategic nuclear powers pose a direct, political threat to North America proper, although they may be a threat to Canadian and/or American interests outside of the continent. Russia's actions in the Ukraine are extremely worrying and may signify a "game changer" in how Canada and the US deal with Putin. This is not a new Cold War, however. Absent Putin, for example, would there be such concern? Is the threat to Ukraine a global security threat? Is this a new ideology? (Or nationalism in an extreme form?) US and Canada should be concerned, but there is no indication there is an imminent threat to North American proper. The People's Republic of China is not a

political adversary per se either even though significant, political differences exist between it and Canada and the United States.

Russia and China, however, do possess the capabilities to strike and destroy major North American targets, and are in the process of strategic modernization. For example, Russia recently deployed a new generation, multiple warhead, inter-continental ballistic missile (ICBM) – the SS-27 Topol - and is developing the multiple warhead Sarmat ICBM and Bulova submarine launched ballistic missile (SLBM). Russia has also resumed long-range bomber training flights over the Arctic Ocean, capable of launching long-range nuclear tipped cruise missiles. China has deployed the multiple warhead, DongFeng 5A ICBM, and is expected to deploy shortly its first generation SLBM – the Jualang 2 – on the new Jin Class nuclear powered submarine (SSBN). China does not possess, nor appears to be developing a long-range bomber capability. Finally, both possess surface and subsurface launched cruise missile capabilities.

In contrast, North Korea and Iran are perceived as political threats, but currently lack significant strategic capabilities to threaten North America. North Korea does possess nuclear weapons, has tested with limited success a long-range ballistic missile, the Taepo Dong, is reported to have developed a road mobile ICBM (Hwasong-13), capable of reaching Alaska, and launched a satellite into orbit. Whether North Korea is capable of marrying a nuclear warhead to the missile, and the missile is capable of reaching continental North American targets beyond Alaska is open to speculation. Eventually, unless significant changes occur in North Korea, especially regime change, the capability to reach North American targets will emerge in the near future.

Iran does not currently possess a nuclear weapons capability. Fears of an Iranian nuclear weapons development program have been somewhat allayed by the recent agreement between the United Nations Security Council Permanent members (P-5) plus one (Germany) and Iran. If successfully implemented and followed up by a more extensive agreement, this may put an end to concerns about Iranian nuclear ambitions. Nonetheless, it is unclear the extent to which Iranian nuclear enrichment may have created a sufficient stockpile of weapons-grade material, which could lead to the acquisition of nuclear weapons in the future regardless of the implementation of the agreement. Moreover, Iran certainly possesses the technological knowledge and capacity to develop nuclear weapons.

Iran also possesses an evolving ballistic missile development program, which currently consists of an intermediate range (IRBM) capability, and has also launched a satellite into orbit, portending a future ICBM capability. The Iranian ballistic missile development trajectory, along with the uncertainty associated with its nuclear program, suggests a high potential for a future strategic threat to North America, unless significant political changes occur, beyond the recent Iranian ‘charm offensive’.

Overall, the single dimensional strategic threat to North America in capabilities terms continues to exist, and may well grow in the future and once again be linked to political adversarial relations where the probability of war rises to levels not seen since the Cold War. It will likely be dominated by nuclear capable, strategic ballistic missile capabilities. The long-range air bomber threat capability married to nuclear and/or conventional warhead cruise missiles is likely to remain relatively static in capability terms, and limited to Russia. Submarine-launched cruise missile capabilities may also grow in significance as a threat to North America.

Alongside this single dimensional strategic threat, both the United States and Canada recognize emerging threats in the outer space domain, with major implications for North America. These are primarily a function of the significance of dedicated military, as well as civilian/commercial satellite systems for terrestrial military operations, including military capabilities devoted to the defence of North America, and the vital importance of satellite systems, such as the Global Positioning System (GPS), to the health and well-being of the North American economy.

The number of potentially hostile nations with space launch capabilities has grown significantly over the past decade, and such capabilities provide the means to target satellites on-orbit. While the deployment of offensive on-orbit satellite weapon systems possessing weapons of mass destruction (WMD) are prohibited by the 1967 Outer Space Treaty, there is no prohibition against conventionally armed satellites. In addition, there is a range of non-kinetic and non-nuclear threats to satellite systems, including cyber-attacks, as well as the threat posed by growing amounts of debris on-orbit. In effect, the outer space dimension contains both traditional symmetrical and non-traditional asymmetrical threats.

Non-traditional Threats

Non-traditional, asymmetric threats are generally associated with terrorists, or armed non-state actors (ANSA). However, such threats may also emanate from state actors, either through their support of terrorist organizations in providing sanctuary, money, capabilities, and training, or by employing capabilities in a covert manner. The capabilities associated with non-traditional, asymmetric threats range from the potential employment of traditional military to non-military capabilities. The former are potentially employed from non-military platforms, and by non-uniformed actors. The latter can be used by both terrorists and states, with the ability to track the origins of an attack extremely difficult.

Prominent among traditional military capabilities is the growing cruise missile threat. Cruise missile technology and capabilities has diffused greatly, and can be readily and covertly transferred from state actors to terrorists. With this, the possibility of states employing covert means or non-state terrorist organizations acquiring cruise missiles and threatening North America is growing. Alongside cruise missiles, there is also the

potential use of rudimentary short-range missiles or rockets. For example, both Hezbollah in Lebanon and Hamas in Gaza have developed and employed a variety of short-range rockets, including 'home-made', against Israel. While the likelihood of such capabilities being married to nuclear warheads is low, not least of all because of the complexity of acquiring the material and constructing a weapon, especially covertly and for terrorist organizations, this should not be discounted. The same may be said about biological weapons. Chemical weapons are of greater concern, not least of all because a rudimentary capability can be developed from readily available, commercial off-the-shelf chemicals. Such a weapon would not likely have the lethality of an advanced chemical weapon, as demonstrated last year in Syria. Nonetheless, such a capability still poses a significant threat.

Regardless of warhead, the cruise missile/rocket threat stems from the possibility of states or terrorist organizations employing different or non-military means to strike at North America. Merchant vessels, especially given the volume of traffic heading towards North American shores or ports, are potential launching pads for short-range cruise and other missiles or rockets. In this case, the threat begins as a naval-based one, but then transitions into an air one.

Alongside this capability threat, there is also the possibility of maritime-based capability threats transitioning into land based ones. Weapons of mass destruction (WMD), as well as conventional warheads, can be transported by air or sea into North America, and then transported across North America within the integrated North American transportation system to pre-determined targets, targets of opportunity (i.e. pre-planned detonation based upon time only), or for use by terrorists, which have either infiltrated into North America or are homegrown.

As demonstrated by 9/11, there remains the threat of hijacked aircraft being employed as a weapon, although measures taken since 9/11 have significantly limited this likelihood. But, it also extends to hostile groups acting from within North America, including homegrown terrorists, purchasing their own small aircraft for terrorist purposes. Added into this threat capability equation is the emergence and diffusion of unmanned aerial vehicles (UAVs) or drones into the civil sector. Whether as flying bombs or containing weapons, this is another part of the diverse, multi-dimensional threats facing North America.
Moreover, internal terrorist threats, even if undertaken by amateurs as witnessed at the Boston Marathon, can inflict significant physical damage and/or have a major symbolic, political impact. Basic bomb-building knowledge is readily available on the internet, and evidence indicates that well-educated individuals, especially with a scientific expertise, for example in chemistry, can turn to terrorism.

Perhaps the most threatening among non-traditional threats resides in the cyber world. The integrated North American economy and society is dependent upon the cyber world. In one sense, the cyber threat is simply the extension of traditional information

operations from the military sector to the civil sector as a function of the development and application of computer technology for economic and social purposes. Its diffusion into the civil sector, however, provides a new set of targets, especially in the area of critical infrastructure, such as power grids, which link Canada and the United States together.

Threats in the cyber world may emanate from computers hackers with no political intent to states themselves. The ability to identify whether cyber-attacks are motivated by political purposes, as well as their origin, is extremely difficult given the rapid diffusion of computing power and speed, and the global connections of internet systems. They can range from viruses and malware for spying purposes to ones designed to hamper and/or destroy the operational capability of a computer system immediately or to be activated at some point in the future. The destruction of such systems can be devastating. For example, an attack on the computer system operating a large city's traffic systems could bring chaos. An attack on a nuclear plant could produce a meltdown and major release of radiation. Such viruses can also mask their damage, dangerously delaying remedial responses. Individuals monitoring a system come to trust a system's indicators and gauges without question, as evident, for example, in the case of the Stuxnet virus embedded into Iranian centrifuges.

Whether cyber, kinetic or WMD, non-traditional threats to North America remain largely directed against large urban centres, where the destructive, political, and symbolic impact will be greatest. This includes threats to critical infrastructure, which is largely co-located with major urban centres. However, there are an important range of critical infrastructure targets outside of major urban centres, such as hydro-electric dams and power lines, oil and gas fields, pipelines, and water supplies. There are also similar potential targets offshore, such as oil and gas platforms, which are likely to increase in number, and thus vulnerability, in the future.

No one truly expected terrorists to turn hijacked commercial aircraft into flying bombs. The threat lesson is to expect the unexpected, no matter how unimaginable today. Moreover, capability threats, married to political intent, have transitioned from the simple, clean division between external military threats and criminal ones. Today, threats may begin as criminal in nature, requiring a response from regulatory and police/security agencies, and quickly translate into a military one, in which only military forces possess the necessary means to defeat it.

Above all else, existing and potential adversaries are likely to view North America as a single target area. Many on both sides of the border may like to think that North America is really two separate national target areas. But adversaries are more likely to recognize that the United States and Canada are a single, integrated whole in terms of their economies, transportation systems, critical infrastructure, and common policies towards the outside world. To threaten and attack one is to threaten and attack the other.

Finally, to this list of non-traditional threats there also has emerged threats posed by natural disasters, man-made or otherwise, in which national armed forces are the only governmental organization that possess the manpower and capabilities to respond quickly. While climate change is largely associated with the Arctic, there are no shortage of scientists warning that it will result in much larger scale weather-related disasters, and even recent hurricane, tornado, flooding (e.g. Eastern Seaboard), and wild fires events have been directly associated with climate change. Alongside climate change, there is also the threat of major pollution events that exceed the ability to civil authorities to manage and respond quickly, and a major earthquake on the West Coast of North American.

Overall, North America will continue to face the threats posed by the strategic capabilities of the major nuclear powers, which cannot be ignored relative to the uncertainty of future political relationships. At the same time, new diverse, multi-dimensional threats have emerged. All exist within the reality of North America as an integrated, interdependent entity, despite the existence of two sovereign states.

Challenges

The ability of Canada and the United States collectively to respond efficiently and effectively to traditional and non-traditional threats faces a series of significant challenges. Some of the challenges are old and well known, and others are relatively new, and largely a function of the challenge posed by non-traditional threats in blurring the division of responsibilities between the defence (military) and security (police, civil) sectors. Arguably, the first major challenge is simply the recognition of the significance of the multi-dimensional threat environment.

Despite the volatility of the world, North America resides in a politically stable and peaceful environment. The net result is a general sense of security. Threats primarily originate far from North America. Even homegrown terrorism is driven by events outside of North America.

9/11 is increasingly a distant memory. Osama Bin Laden has been killed, and Al Qaeda's sanctuaries and network eliminated or seriously disrupted and downgraded. Since 9/11, there have been no major terrorist attacks on North American soil. Occasional government announcements of successful actions to pre-empt terrorist attacks lacking in detail and specifics for obvious security reasons impede the ability of governments to communicate the reality and magnitude of threats, and have generated a sense of complacency. North American defences are sufficient and defence and security agencies and processes are adequate to the task at hand. Home grown terrorists, such as the Toronto 18 and Boston Marathon bombers, are in varying degrees viewed as amateurs, lack the capacity to inflict major damage, and are simply a police problem. Moreover,

there is an increasing sense that homegrown terrorists are not threats in North America, but are leaving North America to take up their cause overseas.

Overall, the ability of governments and their respective defence and security agencies is communicate the significance of threats to North America, and obtain the level of public support for investments is difficult, although it does vary between Canada and the United States. To this must be added the current economic climate, and public demands to invest in the economy and jobs. While the idea that a dollar spent on defence and security means that a dollar cannot be spent on jobs is simplistic and misleading, it does have political meaning and relevance, especially when the threat environment is distant, somewhat intangible, and contested.

Closely related, the fact that these threats largely originate overseas presents four additional challenges. First, it assigns priority to meeting these threats in their place of origin, prior to their manifestation in North America. In effect, North American defence and security is the final line, rather than the first line of defence. The logic of meeting threats in their place of origin cannot be ignored. However, there are a host of political, operational and capability limitations that impede the ability of the United States and Canada in being able to do so. Moreover, globalization, and the shrinking of the world through evolving transportation and communication networks means a threat in a distant part of the world can be quickly manifested in North America. Threats, in this sense, know no political boundaries.

Second, if priority is assigned to meeting threats overseas, then investments will follow in terms of defence capabilities. Ideally, such capabilities can be applied both overseas and at home, and in some circumstances this is the case, especially relative to traditional threats, and the multi-functional technologies of advanced defence systems. But, there still remain distinct capability requirements between home and away within an environment of constrained resources. Of course, there is no easy solution here, although one of the impacts of 9/11 has been to raise the priority of homeland or North American defence relative to overseas. Even so, the challenge of recognizing that North American defence is at least an equal to overseas defence cannot be ignored.

Third, organizations respond to beliefs about priorities. At one level, especially in relation to non-traditional threats, this is manifest in the notion that overseas is about defence (the military) and home is about security (police/civil), and evident in their different mandates, jurisdictions, and legal responsibilities. While this issue is discussed further below, the challenge here is to recognize the diverse nature of the threat environment, which does not respect these organizational boundaries.

At another level, highly contentious, is the impact of priorities within military organizations themselves. Both the United States and Canadian military experience over the last century has been located overseas. In part, it is simply a function that both nations have fought overseas, and thus their organization culture implicitly serves to

prioritize the overseas mission. When Colin Powell stated that the purpose of the American armed forces is to fight and win the nation's wars, he implicitly gave priority to the overseas, whether intended or not as a function of historical experience. This culture, in turn, has direct challenges for the organizations, although it will vary among the military services in each country. Regardless, it is important to recognize the challenge posed by military culture and socialization as a function of the past.

Finally, as noted above, globalization, like the threat environment, has in reality blurred the tidy division between overseas and home. While the US command structure, for example, places formal boundaries between command areas of responsibilities, as did Canada during the brief life of Canada Command (CANCOM), the defence of North America is increasingly global in nature. Where North American defence really begins is an open question. For example, part of NORAD's aerospace early warning mission begins with data from the US Space Surveillance Network (SSN) and includes the tracking of all objects of minimum size on orbit. By adding *Sapphire's* capability to the US surveillance network, Canada has been able to gain access to more space-based intelligence. Of course, the global element of defence is assigned to US Strategic Command (STRACOM), but there is no equivalent in Canada. Consider also the naval equation. A merchant ship on the high seas far from North American waters carrying illegal immigrants, and possibly terrorists, poses a threat to North American security. Thus the challenge is to recognize this new reality, and respond accordingly.

These challenges co-exist with, and are informed by, the longstanding challenge posed by the existence of two sovereign states sharing a common threat environment, and the image that close defence and security cooperation is ostensibly, a threat to their sovereignty, defined as political independence. Historically, this has largely been focused upon Canada and the issue of Canadian identity as a function of the United States being a superpower, or the dominant power in the relationship. Even so, the United States is not immune to nationalist impulses that affect defence and security cooperation.

For example, in the wake of 9/11, the concept of a North American security perimeter fell afoul of nationalist impulses on both sides of the border. In Canada, the logic of a North American security perimeter was perceived through the concept of policy and legal harmonization across a range of jurisdictions, and harmonization was seen as the adoption of American laws and policies. Even the creation of U.S. Northern Command (NORTHCOM) with North America, including Mexico and the Bahamas, as its area of responsibility (AOR) was perceived by the left as a threat to Canadian independence.

In the United States, especially on the right, Canada was perceived as a threat, or perhaps more accurately as a security liability, not least of all when senior political officials inaccurately identified the 9/11 terrorists having come from Canada. The American political response was not just to 'close' the border initially, but also to 'arm' and thicken the border. Although many of the post-9/11 barriers to the movement of

people and goods between Canada and the United States have been removed, adapted or managed through negotiation, and the *Beyond the Border* Agreement has placed the concept of a security perimeter quietly back onto the political agenda, one still has to be concerned about a potential American nationalist backlash. Importantly, no longer is the Canada-US border an unarmed one on both sides.

Of course, the politics of sovereignty and nationalism cannot be wished away, or ignored, which is why it represents a challenge for both parties in terms of limiting or managing its impact on ensuring an efficient and effective response to the common threat environment. This challenge manifests itself in many different ways.

The first concerns the manner in which the threat equation is processed. From a sovereignty perspective, the equation is processed along national lines. It is packaged in national terms, with cooperation as the secondary consideration. It generates the likelihood of distinct national assessments of the various threats, with potential significant differences between the two states' policy-makers, and assigns priority first to a national response, and then to a possible cooperative solution when gaps or limitations exist. In effect, there exists no North American perspective, even though the threat environment suggests the need for such a perspective. If there is any North American perspective, it is only found through NORAD as a function of its bi-national nature and roles and missions.

Second, sovereign packaging generates an environment, or process in which a North American, or a holistic approach is implicitly ignored. Simply, North American or bi-national solutions may never see the light of day. They are considered political non-starters, and thus potentially not entertained realistically, if at all, in the decision-making process.

These inter-related challenges do not mean that a North American or bi-national solution is always the ideal and preferred one. Rather, it is the challenge to ensure that a North American perspective is considered alongside a national one, and a bi-national solution is presented and evaluated. Their importance stems from recognizing the integrated nature of North America, and the common threat environment. It is also important relative to the constrained resource environment that both nations face. Finally, the challenges here are directly related to command and control structures, as discussed below.

Third, the political sovereignty challenge also drives the creation of national caveats within the NORAD mission suite itself, and a preference for bilateral approaches and solutions, which are essentially national caveats as well. Again, the point is not that national caveats in either above case should be eliminated. It is whether such caveats enhance or detract from the ability of both nations to deal effectively and efficiently with threats.

Finally, this challenge extends into all the bureaucratic actors now involved in the defence and security arena. One of the significant changes that have occurred in the wake of 9/11 and in response to non-traditional threat environment has been engagement of security organizations in the defence sector and vice-versa. In addition, many bureaucratic actors, which did not perceive their role in either defence or security terms, are now also engaged. This has created major challenges in coordinating national and North American efforts to manage and respond to threats. The simplicity of the old single dimension, external state-based threat requiring the response of a single actor no longer exists.

Not only does each bureaucratic organization possess different belief systems, which impact their individual threat assessments and responses, each also possesses different responsibilities, mandates, and jurisdictions especially relative to the non-traditional threat environment. Many of these threats are generally seen in policing or constabulary terms, where national armed forces participate as aids or assistance to the civil power, and second responders in the case of a major event. National armed forces lack the legal mandate to act. Yet, at the same time, armed forces are the only actor in many circumstances that possess the capabilities to act, but not the officers' powers to do so. The net result is the inefficient use of limited resources. For example, the navy does not have the legal authority to arrest illegal immigrants, that may include terrorists, but their capability is vital to transport police and immigration officials, and provide for their protection during the interception and boarding process. Moreover, this problem is even greater when one considers the Arctic, and expected increased transportation and resource development activity relative to the costs of operations and infrastructure in that environment.

It is not just the issue of mandates and jurisdictions at play from a management, coordination, and efficiency perspective. It is also ensuring the free and open flow of information among all the actors nationally, and between the two nations. In some case, many organizations, including the military, have closer links with the counter-parts across the border, than with other bureaucratic actors within their borders. Information is power and bureaucratic interests many times, informs and drives decisions and actions. Ensuring unity of command within this environment of diverse threats that cut across bureaucratic boundaries is a major challenge in itself.

These challenges, along with threats, are important issues that inform North America defence and security cooperation and considerations of the current and future role of NORAD. They provide the basis for examining NORAD's mission suite, current command and control structures and processes for the defence and security of North America.

NORAD Missions

Under the current Agreement, NORAD's three missions are divided into two categories. The first category encapsulates both the Aerospace Warning (NAW), which includes air and space, and maritime warning missions (NMW). The second is NORAD's only mission in which it controls operationally interceptors – Aerospace Control or air defence, which is responsible for responding to imminent threats to North America of an air-breathing nature. The Aerospace Warning and Control missions that are the most well-tuned and understood by the respective national commands, not least of all because of over 50 years of maturity. Both of the warning missions are best understood as the collation and assessment of early indications and warning to determine whether North America is threatened with or under attack, and the nature of the attack.

In these two missions, NORAD is a primarily a *supported* command, although by feeding its assessment to the responsible national command authorities (and NORAD itself for air defence), NORAD is also a *supporting* command. NORAD is a *supported* command because it does not own the array of aerospace and maritime warning sensors providing early warning data. These are national sensors, even though the United States provided funding and equipment for the establishment of the North Warning System (NWS) radars across northern Canada. Neither does NORAD technically operate these sensors, with the exception of NORAD personnel historically working in components of the U.S. Ballistic Missile Early Warning (BMEWs) ground-based radars as part of NORAD's Space Track responsibility, entailing, for example, Canadian NORAD personnel posted into American sites. The presence and role of Canadian personnel in American sensor facilities, and vice-versa are, or will be, primarily based under current arrangements upon bilateral agreements outside of NORAD's purview.

To clarify these warning arrangements, Canada's newly deployed space-based optical satellite (Sapphire) in low earth orbit (LEO) contributes directly to the U.S. Space Surveillance Network (SSN), is nationally owned and operated, feeds data into the U.S. Joint Space Operations Centre (JSPOC), where Canadian personnel serve on the basis of a bilateral Memorandum of Understanding (MOU). It is in this sense that NORAD is a *supported* and *dependent* command.

The NMW mission and overall Maritime Domain Awareness are much more complicated, and difficult to map. It entails a much greater array of land, sea, air and space sensors, including intelligence sources, at the national levels, including not only military, but also civilian collection agencies. In all, it is estimated that there are over 80 agencies involved. It is assumed that bilateral arrangements exist for the exchange of national personnel for some, but not necessarily all, sensor capabilities. The process through which data from individual environment national military sensors are collated into a national common operating picture and then single combined operating picture for North America is apparently well-defined. Inputs from non-military agencies are largely event driven. NORAD has the authority to request specific data from all agencies

within the maritime domain awareness suite subject to planning and availability. Importantly, the initiative is NORAD's.

Beyond the request for additional data, it appears that NWS is based upon the reception of a maritime operating picture from several sources, including the Canadian common or recognized maritime picture (RMP) and the American equivalent. NORAD thus merges these pictures into a North American maritime domain awareness picture, which is assessed, and the assessment communicated back to the national level. In the US, this is the Maritime Operational Threat Response (MOTR), and in Canada the Maritime Emergency Response Protocol (MERP).

NORAD's assessment is only one of many upon which national authorities will make response decisions. One can infer, then, that NORAD is only one of several assessment *eyes* and *minds*, and arguably is an important, yet potentially redundant early warning capability, if receiving and using the same picture as national centres. NORAD's value added is in ensuring that there is not a single, national *point of assessment failure*. It is also, arguably, the only truly North American perspective.

However, it also generates two possible problems. First, the relevant national agencies may conclude that there is no need for NORAD in the maritime early warning role, because it duplicates the work of others. If so, their organizational interests will dominate, NORAD will be marginalized, and the likelihood that the process can be standardized where needed, and streamlined low. Second, there is the possibility of conflicting assessments, which can be assumed will be decided by the relevant national authorities, and in situations where national jurisdiction is unclear, by some form of bilateral arrangement.

In contrast, NORAD is the dominant, but not necessarily single *point of assessment* in the aerospace domain. While NORAD is responsible for the assessment of an aerospace attack against North America, reporting directly to the national command authorities (NCA), the national supporting elements likely undertake their own assessments to avoid a *single point of assessment failure*. In this case, these are the redundant capabilities, and would include, for example, NORAD's regional commands, which, in the case of Canada, is directly linked with the national Joint Force Air Component (JFAC). Similar to the NWS in terms of non-military inputs, this process is supported by data from the Federal Aviation Administration (FAA) and NAVCANADA following 9/11.

Of course, the major difference between the aerospace and maritime domains, notwithstanding the relative simplicity of the NAW process when compared to the NMW, is that the air warning and air response are directly linked. NORAD is responsible for the air control mission; the only bi-national North American defence mission. In so doing, the assessment process is seamlessly linked to the operational response process, including national air defence assets dedicated by each nation to NORAD, and under direct NORAD command, and their employment based upon existing national caveats,

for example, in the area of intercepting hijacked aircraft. Defence against a ballistic missile attack and/or a space-based threat (e.g. an uncontrolled de-orbiting satellite), and a maritime-based attack under whatever form or guise are national responsibilities, although in the latter case one would expect a level of coordination between the two nations depending upon geographic location. Only the United States possesses the capabilities to respond to a ballistic missile or space threat, either through its current ballistic missile defence systems, deployed in Alaska, California and with its commands outside of North America, or the possibility of strategic retaliation.

In considering the future of NORAD relative to this mission analysis, four overarching options emerge – the status quo, a reversion to the past, the environmental expansion of warning, and the marrying of early warning with operational responsibility within environments. The case for the status quo is based on two considerations. The aerospace warning and air control missions are well understood and operate smoothly and efficiently. Second, the current maritime early warning issues and problems will be sorted out over time. It is still a relatively new mission within a complicated environment, and given the number of actors involved, time is needed for all the actors to adapt, identify cost-effective solutions, and overcome longstanding practices. The primary objective, then, of the ongoing NORAD Next study, should be directed to this new mission, with a particular initial focus on mapping the current process, and an education process to inform the multiple organizations and agencies of NORAD's value-added contribution.

Reversion to the past entails the shedding of the maritime early warning mission, as a function of the very nature of the maritime threat environment, and the number of organizations and agencies engaged, military and civil. The current process, grounded upon national agencies, and bilateral arrangements are assumed to sufficient and effective. Moreover, predilections for maintaining a nation approach, supported by bilateral arrangements, will be difficult to overcome reinforced by national organizational and agency interests. NORAD's role represents a duplication of efforts, which cannot be afforded in a resource-constrained environment. In effect, there is no need for a North American perspective.

This, however, runs contrary to the value assigned to generating all-domain awareness relative to the diverse nature of the threats facing North America; an objective present in the broader defence environment to support net-centric warfare. It is also useful to recall that NORAD emerged after over a decade of bilateral cooperation between both nations, and their respective air forces in response to the new post-World War II threat environment, which necessitated the creation of a common external aerospace operating picture, and adding the internal North American picture, through links with the FAA and NAVCAN, was easily achieved. Of course, NORAD's maritime early warning function is much more difficult, because of the maritime environment. But, the driver here, as it was for the creation of NORAD itself, is the threat environment, and the need for a common North American operating picture in support of national commands and

responses. Today, and in the future, the requirement for all-domain awareness is especially relevant for the Arctic, as discussed below.

In effect, NORAD's current early warning and attack assessment mission would be expanded to encapsulate all environments – air, space, maritime, land, and cyber for all of North America (and so would include the entire NORAD area of responsibility). One might even suggest the creation of a new North American Early Warning Command (NOREWC) as the central organization for the reception of all early warning sensor data from national assets, including a formalized link to forward deployed assets outside the North America on the premise that the early identification of threats approaching the continent provides greater decision-making time, and enhances the ability to intercept or defeat the threat before it reaches North America. NOREWC, in effect, would be responsible for an integrated common North American operating picture, or all-domain awareness, which along with its assessment role, would be fed to national authorities and operational commands.

However, the creation of such an organization is problematic on several grounds. It would require a significant investment of new resources, which neither nation can afford. Second, its logical place would be to co-locate with the existing integrated US Northern Command (NORTHCOM)-NORAD (N^2) Headquarters, especially given their operational mandates. Of course, consideration must also be given, regardless of whether all-domain early warning is centralized in NORAD, to the vulnerability of the transmission of information to all the actors to disruption from electronic warfare and a cyber-threat.

This is not to suggest that NORAD should or would be the single point of early warning and assessment. But, it should become the dominant centre by virtue of being the only one with a holistic, North American perspective. One should not expect either nation to forgo national assessments, not least of all because some of the threats will be strictly national the further they are removed from the common borders. Nor is it to suggest that NORAD should expand its presence into sensor operation or ownership. Rather, it is based upon existing and future multi-environment military-based sensor capabilities of significant value to national non-military organizations, and the need to integrate valuable data acquired by non-military sensors and intelligence.

In some sense, it would be to replicate the existing status of Canada's three Maritime Operations Centres in Halifax, Esquimalt and the Great Lakes/St. Lawrence Seaway, with the ones on each coast dominated by the Royal Canadian Navy with a major presence and role for Transport Canada, the Coast Guard and the RCMP, among others relative to their mandates and capabilities (of note, there is apparently no NORAD presence or liaison at these and other relevant centres. Whether such a need exists is an important question). Thus, one would expect an expanded presence of non-military organizations in the Command, such as officials from Canada's Department of Public Safety and Emergency Preparedness and U.S. Homeland Security, and conversely, a NORAD liaison

presence at the lower national levels, as found in the case of BMEWS. Finally, it would necessitate formal arrangements, as noted above, with forward commands, such as US Pacific (PACOM) and US European Command (EUCOM), which, it should be noted, is also a requirement for improving NORAD's current maritime early warning mission. In this case, it should be noted that NORAD's terms of reference (2011) allow for direct liaison with PACOM, but not EUCOM.

This Command would thus become fully combined and joint (inter-agency) in nature. Whereas NORAD in the past was strictly air force, and NORAD today remains dominated by air force personnel, NORAD as the agent for the North American common operating picture or all-domain awareness would become a relatively balanced combined, joint headquarters, with an expanded non-military presence.

Such a Command would also potentially serve to reduce, and ideally eliminate the stove piping of information that currently exists, which, for example, limits the information provided to NORAD currently for its maritime early warning mission. It is premised on the assumption of open access to all relevant national sensor data, including intelligence sources. Of course, this data would still be filtered relative to national interests. But, importantly, within the Command itself, full open access would be required, thereby eliminating the longstanding dependence on personal relationships to determine when and what information would be open each party. By agreement, 'No Foreign Eyes' would be replaced by 'Canada-US Eyes Only'.

The final option, which is arguably the most distant for national political reasons alone, is to integrate all-domain early warning with all-domain operational response. In effect, it is the transformation of NORAD from an aerospace command to a North American command. Its fundamental logic is a streamlined, seamless unity of command, which would support the effective and efficient use of national resources. Moreover, the nature of current and possible future threats cannot be neatly parceled into a threat to the United States or Canada alone. They are too diverse, and a defence failure will affect both parties. Moreover, the implications of a defence failure, if it was traced back disunity and/or duplication, would be significant, and to some extent reflective of the failures at Pearl Harbor and 9/11. As repeatedly noted by participants in the defence relationship on both sides of the border, the current air control arrangement is highly successful, efficient and effective, as a function of years of experience. There would, naturally, be growing pains, but the lessons of binational air defence would facilitate the process of change. Assets would remain national, and generated from national commands, as they are today in the air defence sector. Moreover, it would not necessarily entail the end of national caveats or rules of engagement, as these already exist in the current air control mission. Finally, this option may be the end result, regardless of a conscious decision on the part of both parties today. As cooperation deepens functionally in response to the evolving threat environment, the process that led to the creation of NORAD itself may be duplicated.

Of course, the logic that would lead to the creation of a North American Defence Command is fraught with political (sovereignty), command structure, organizational, jurisdictional, and legal obstacles. Bi-national air defence is relatively easy, as it involves only one service in one environment. Maritime and land are much more complicated as they involve in varying degrees multiple services and non-defence organizations with different perspectives, operating procedures and legal mandates. Moreover, many of the threats are outside military jurisdiction and responsibility, and many actors perceive the military as an inappropriate means of response. The military may possess significant and vital early warning capabilities, but in terms of response, in many circumstances they operate after the fact as second responders. Better coordination and cooperation between non-military organizations between the two countries in responding to certain threats may be in order, but this does not mean that the military should be given command responsibility. Finally, in order to do so, there would have to be legal harmonization between the two countries, which would be a daunting task for political reasons alone, and call for significant departmental organizational re-structuring as well.

The arguments for and against any of these options are not exhaustive. Importantly, they do represent existing arguments, concerns and issues at play in all the major issues facing North American defence and security cooperation and the future roles and missions of NORAD. It would be naïve to suggest that an expanded NORAD or the creation of a NOREWC is likely in the immediate future, notwithstanding some unpredictable major event that might be a catalyst. Moreover, one can conceptualize a range of variant structures and processes relative to these futures. Regardless, these options are implicitly at play, and specific decisions concerning the future of NORAD will be coloured by considerations of their long-term implications for the Canada-US defence relationship.

Command Structures

Probably the most difficult task for outside observers of the Canada-US defence and security relationship, and NORAD is to come to grips with the complicated command structures that currently exist. Historically, this structure was relatively straightforward and easily understood. The primary threat to North America was aerospace and required aerospace cooperation. There was no land threat, and the maritime threat was exclusively seen in submarine terms; threats to the sea (Atlantic) lines of communication and thus the ability of North America to supply and reinforce NATO Europe in the case of war. These were managed and coordinated through bilateral arrangements between the Royal Canadian Navy (RCN) and the U.S. Navy (USN) and NATO's Supreme Allied Command Atlantic (SACLANT). The submarine ballistic missile nuclear (SSBN) was logically part of this, albeit primarily USN, even though NORAD's aerospace early warning and attack assessment included data derived from BMEWs sites in the continental U.S. concerned with potential submarine missile launches. In this regard, one would expect that NORAD also received at least some naval intelligence on the type

and location of Soviet SSBNs, but its provision was, and is at the discretion of the USN. Today, NORAD receives the maritime picture from the USN Global C^2 system via NORTHCOM.

The subsequent triple-hatting of the NORAD Commander as Commander of U.S. Space Command (USSPACECOM) and US Air Force Space Command (AFSPACECOM) in the 1980s did little to complicate NORAD's command structure, given its responsibility for aerospace early warning being supported by U.S. space assets. U.S. Strategic Air Command and its successor U.S. Strategic Command (USSTRATCOM) kept U.S. strategic nuclear retaliatory forces at arm's length from NORAD, and thus Canada, which continues to this day. The air control mission continues to entail a central command, formerly located in the Cheyenne Mountain Operations Centre (CMOC), which remains as a backup centre to the Peterson Air Force Base Centre, both in Colorado Springs. There are three regional sub-commands: Continental US Region (CONR), located at Tyndall Air Force Base in Florida, with two regional subordinate commands located in Washington State (West) and New York (East); Canada-NORAD Region (CANR) located in Winnipeg, and Alaska Region (ANR) located at Elmendorf Air Force Base.

The relative simplicity of the NORAD command structure and location within each nation's respective national commands was complicated by the creation of NORTHCOM in 2002 in response to the attacks on 9/11, and the dual-hatting of the Commander of NORTHCOM and NORAD. USSPACECOM was eliminated, and its responsibilities folded into USSTRATCOM, and NORAD was separated from AFSPACECOM with its space and cyber responsibilities. Subsequently, Canada established Canada Command (CANCOM), the functional equivalent of NORTHCOM, which was then replaced by the Combined Joint Operations Command (CJOC), ostensibly the re-creation of the old Canadian Deputy Chief of the Defence Staff (DCDS) structure, with responsibility for both domestic and overseas operations.

The NORTHCOM – NORAD - CANCOM/CJOC structure generated the tri-command issue to clarify responsibilities and lines of communication of the 3 commands following re-organization. Even so, nothing significantly changed with the NORAD command operating independently from CANCOM/CJOC. However, what did change was the location, at least perceptually, of NORAD relative to the U.S. command structure with the establishment of NORTHCOM. As NORTHCOM's area of operational responsibility (AOR) covered all of North America, Mexico and the Bahamas, including maritime approaches, and thus land, sea and air, NORAD was perceived as the air arm of NORTHCOM. (Of note here, NORAD's AOR excludes Mexico, and includes Puerto Rico and the U.S. Virgin Islands.)

In effect, NORAD slid beneath NORTHCOM, and thus generated the image of NORAD being subordinate to NORTHCOM, rather independent per se. This was not replicated in Canada, as NORAD remained firmly outside of CANCOM/CJOC.

On the surface, this can be understood only as a perception, partially reflective of misleading Canadian op-ed pieces at the time, which warned that NORTHCOM would lead to the complete subordination of the Canadian Armed Forces (CAF) to US command and control in North America. At the senior level, separation was ensured with the existence of a U.S. Deputy Commander for NORTHCOM, co-existing with the Canadian Deputy-Commander for NORAD, who is technically equivalent to the Canadian Deputy Commander for Continental Operations in the CJOC. Of note, the Commander of NORTHCOM's equivalent is the Chief of the Defence Staff, both of whom report directly to civilian authorities. The Deputy Commander is also dual-hatted as the Vice-Commander, U.S. NORAD element. In contrast, the CJOC Deputy Commander for Continental Operations is not dual-hatted as the Vice-Commander, Canada NORAD element. Implicitly, this is the position of the Commander of CANR, who is also the Commander of the 1st Canadian Air Division, and the Canadian Joint Forces Air Component Commander (CJFACC), thus being simultaneously a force generator and force employer.

Implicitly, the tri-command structure can also be understood as a quad-command, consisting of NORAD-NORTHCOM-CJOC-CANR/1 Canadian Air Division, with the NORAD component linked to other domestic air responsibilities through the Combined Air Operations Centre (CAOC) and Joint Force Air Component (JFAC) in Winnipeg. Canadian air assets can be assigned to NORAD or strictly national missions as required through the CAOC, and reflected in the U.S. Deputy Commander CANR dual-hatted as the JFAC Deputy Commander in Winnipeg. Ostensibly, the strictly national missions, which are also a function of national legal caveats, which reflect differences in Canadian and American law regarding the use of force, are linked above to the CJOC's Deputy Commander for Continental Operations, and below to Canada's six Joint Regional Task Forces – North, Pacific, West, Central, East and Atlantic. Of these, only North is under Royal Canadian Air Force Command (BGen. RCAF). The Pacific and Atlantic are RCN, and the West, Central and East are Army.

The Regional Task Force structure is a longstanding one, indicating a seamless command relationship based upon well-established standard operating procedures, as well as existing operations in which air assets are employed. It reflects the common observation that the air side of Canadian operations, whether NORAD or national, is efficient and effective. Thus, for example, the NORAD air control mission, which currently entails the dispatch of fighters to escort Russian bombers on training missions approaching the Canadian Arctic, can be seamlessly transitioned into a national sovereignty mission if circumstances warrant. Whether U.S. NORAD fighters can also transition and vice-versa is unclear relative to each other's national airspace and requirements. One would expect the same transition with the other Task Forces, in which NORAD remains theoretically at least 'in-the-loop' through the CAOC.

The relationship, however, between NORAD-CANR to the CJOC appears, at least on the surface to be less fully developed. In part, this is simply a function of NORAD's success

and the integration of NORAD and national air requirements through the dual-hatting arrangements in Winnipeg, and the distance between Winnipeg and Ottawa. Specifically, the air control piece is done, and works efficiently, and thus the CJOC's attention is directed elsewhere, not least of all because it is a relatively new command organization, with natural growing pains.

The result, however, is a sense within the NORAD piece that NORAD is not really connected to the CJOC, whereas on the U.S. side, NORAD is well connected to NORTHCOM. There is no formal, dedicated NORAD presence in the CJOC, either in terms of U.S. NORAD or CANR, even though the 2011 NORAD Terms of Reference (TOR) agreement authorizes direct liaison with then CANCOM, and by implication then its successor CJOC. Instead, CANR input is filtered through the RCAF in two ways: through the Combined Air Force Component Commander (CFAC), and through the presence of RCAF officers in various CJOC positions who possess significant NORAD experience and knowledge. As such, the monitoring of NORAD issues, concerns, and requirements in the CJOC are arguably secondary, if not tertiary to other duties. NORAD input is thus one, if not two steps removed and dependent upon individuals with different primary responsibilities.

This is reinforced by perceptions of a cultural gap between NORAD and the CJOC. There is an overall lack of RCAF personnel in the CJOC, which is dominated by Army personnel. Army personnel, in turn, tend to be focused on overseas operations, as a function of their experiences, and tendency to relate national duty in garrison terms.
This also appears to be another element of a sense of NORAD marginalization in Canada.

Besides the CANR link to the CJOC, there is also the question of the U.S. NORAD link. One of the principals of the NORAD command structure is the appointment of a Canadian as deputy-commander in U.S. NORAD regional commands, and vice-versa. In the case of the CJOC, this is not to imply the need for a U.S. deputy-commander in the CJOC. CJOC is the functional equivalent of NORTHCOM, notwithstanding its overseas responsibilities. Its deputy-commander, as noted above, is U.S. In Canada, the CJOC equivalent is the Deputy-Commander for Continental Operations. However, the U.S. NORTHCOM Deputy-Commander is also the Vice-Commander of U.S. NORAD element, whereas in Canada, the equivalent is the Commander, CANR. One might then suggest that the CJOC Deputy Commander for Continental Operations should be dual-hatted as Vice-Commander Canada NORAD element to create a degree of command symmetry, and as a mechanism to enhance the NORAD connection in the CJOC, as well as the relationship between the CJOC and NORTHCOM.

There remains, however, the issue of whether a U.S. NORAD presence in the CJOC would be useful, or whether the U.S. Deputy Commander CANR is sufficient. The only current U.S. conduit into the CJOC is the U.S. NORTHCOM liaison officer. One would expect that NORAD would be part of his responsibilities, although as in the case of CANR-RCAF-CJOC links, it would be only one part and influenced by his/her experience,

knowledge and workload. In effect, a single liaison officer may be insufficient, and it should be noted represents a potential single point of failure.

In contrast to the CJOC, the NORAD-NORTHCOM (N^2) command centre at Peterson is fully integrated, with the exception of the J-3 operations position. J-3 operations are divided into two positions: one NORAD and the other U.S. only NORTHCOM largely as a function of the 2005 Canadian decision not to participate in the U.S. ground-based continental ballistic missile defence program. It can be assumed, but this is unclear, that the U.S. only J-3 also entails domestic U.S. land and maritime operations. Otherwise, all of the other positions within the Command Centre consist of combined N^2 personnel. In other words, Canadian NORAD personnel sit in NORTHCOM positions, and act as NORTHCOM relative to its area of responsibilities.

In comparing the NORAD-NORTHCOM and NORAD-CJOC relationships, one can see a greater bi-national flavour in the case of the former, which extends beyond the air dimension. In contrast, Canada, however, remains firmly national in its approach, notwithstanding existing bilateral agreements and cooperation outside of the bi-national air control arrangement. However, the idea of replicating the N^2 structure in the CJOC is not straightforward, and potentially counterproductive given the location of CANR and CJFACC in Winnipeg, regardless of political imagery. The creation of CJOC by folding CANCOM, Canada Expeditionary Command and Canada Support Command into a single command centre was driven primarily by budgetary pressures. Separate Deputy Commanders were created for Continental, Expeditionary and Support missions, with independent J-3 (operations) and J-5 (strategic policy and plans) as separate components for each, with the remaining positions within the CJOC common for all three. (In addition, it should be noted that the U.S. J-8 is responsible for requirements, analysis and resources, whereas the Canadian equivalent is responsible for finance).

Naturally, the elimination of duplication within the CJOC was the key cost saving measure underlying its creation. At the same time, the CAF simply lack the capabilities to warrant separate commands, as exists within the U.S. Unified Command Plan (UCP). As a result, an N^2 arrangement for the CJOC would likely at best be limited to the J-3 and J-5 continental positions, simply because the remaining J positions sit astride both national and overseas areas of responsibility. To suggest an N^2 model across all CJOC positions would be bring a U.S. presence directly into overseas considerations as well. Such a step is likely a political non-starter in Canada. In addition, as noted above relative to the location of CANR, and CJFACC in Winnipeg, it would suggest that the Navy and Army move its command to Ottawa, which at a minimum would be very costly.

Moreover, as air defence operations exist within a separate command structure, independent of the CJOC, the case for integration along the N^2 model, would be a greater NORTHCOM, rather than NORAD presence; ostensibly the logic behind the NORTHCOM liaison position. Of course, such a development would have direct implications for NORAD's status. Arguably, the integration of NORTHCOM personnel

into the CJOC would suggest that CJOC personnel, not NORAD per se, should be placed within the NORTHCOM structure.

This is the path towards an integrated, bi-national North American Defence Command, which neither party is likely prepared for, or willing to accept, at least for the foreseeable future. If NORAD is the model, for example, it implies that Canadian continental defence would always be under a U.S. commander, with a Canadian Deputy-Commander. Putting aside other structural implications, several key points stand out.

First, there currently exists in reality a North American bi-command structure: N^2 and CJOC, as a function of the integrated N^2 relationship. Second, NORAD in the case of Canada is largely separate from the CJOC in terms of its air defence relationship. Air command is Winnipeg per se. Third, the absence of a formal NORAD presence in the CJOC reinforces NORAD's separateness, and potentially limits the ability of NORAD to ensure its issues, concerns and requirements are present in CJOC deliberations. Instead, NORAD's conduit is a function of officers with NORAD experience in the CJOC, the NORTHCOM liaison officer, or through RCAF links. Importantly, the current arrangements speak to a sense of NORAD's marginalization within Canada's command structure and process.

The simple objective of symmetry does not alone make a case for CJOC re-structuring, even though Canada reciprocating the U.S. approach does have perceptual and symbolic messaging value. In this regard, Canada has always feared unilateralism in the U.S. approach to the defence of North America, which is offset by Canada's commitment to North American defence cooperation. Developments in this area to formalize and deepen the N^2 relationship within the CJOC would support this commitment and perceptually offsets U.S. unilateral impulses. More importantly, symmetry should promote greater coordination, efficacy and effectiveness relative to the current and future diverse threat environment.

As noted above, NORAD's command structure was originally premised upon the independent external nature of the air breathing threat to North America. This changed with 9/11 and the emergence of an internal air breathing threat as a function hijacked civilian aircraft being employed a 'cruise missiles'. This led to the acquisition of internal warning tracking data from the U.S. Federal Aviation Administration (FAA) and NAVCANADA, along with a liaison presence at NORTHCOM/NORAD Headquarters. In addition, the U.S. and Canada took different approaches concerning rules of engagement against this type of internal threat. What essentially are national caveats, intercept authority within the U.S. is given to the N^2 command, whereas in Canada such a decision is the responsibility of the national command authority. In either case, NORAD functionally remains the operational air intercept command.

Of course, NORAD has no other operational mission beyond air defence, and thus remains outside of the maritime and land command structures in Canada, and the

bilateral command arrangements, which are primarily environmental between like national organizations and agencies. Yet, there is a command logic for NORAD, especially due to the diverse threat environment, in which a maritime threat can transition quickly into an air-breathing one. During the Cold War, for example, operational control of surface-to-air batteries passed to NORAD and one can assume this remains in place at least in the case of US assets as a function of the N2 linkage. Canada has few SAM assets, and it is unclear whether they are currently deployed or assigned to a national defence role.[5]It is also apparently the case that NORAD is enabled under certain circumstances to take command of naval vessels in its air defence function. Logically, however, one would expect that actual command in the case of a maritime or land threat transitioning into an air would be the relevant regional task force command.

Whether the current level of command cooperation and coordination between Canada and the U.S. is efficient and effective is an open question, and beyond the immediate purview of NORAD as a function of its mission suite. But, the issues that surround NORAD's maritime early warning mission relative to Canada-U.S. defence cooperation are not unique relative to the operational side of the equation. Their resolution will potentially have an impact upon the operational side of Canada-U.S. maritime defence cooperation.

Finally, brief consideration should be given to the operational planning of command arrangements. Evidence suggests that Canada/CJOC lags behind NORTHCOM/NORAD in terms of existing operational defence and security plans. Indeed, the planning processes between Canada and the U.S. do not appear to be harmonized. This not to suggest necessarily that current CJOC planning does not take into account existing NORTHCOM/NORAD plans. However, the degree to which this is taking place on the surface at least may be problematic given the limited presence of NORTHCOM/NORAD in the CJOC, and thus the Canadian planning process.

Ballistic Missile Defence and Outer Space

The sense of NORAD being on the outside, looking in is replicated on both the ballistic missile defence and outer space file. Of course, by virtue of Prime Minister Martin's 2005 decision, Canada, and thus NORAD cannot be engaged in ballistic missile defence, although it appears that the current government may be re-considering its policy position with the Senate Standing Committee on National Security and National Defence having begun a study on the issue.

[5] Most SAMs were and are currently a responsibility of the U.S. Army, but from 1959 to 1972, the BOMARCs were operated by the Air Force.

Many observers will suggest that a reversal of Canadian policy is just a matter of time, especially given that Canada is the only ally not engaged in ballistic missile defence. But, will a policy reversal really matter in the case of NORAD? Certainly, it would potentially resolve the current N^2 anomaly of two separate J-3 positions. But beyond the possibility of a Canadian NORAD officer having operational responsibility as J-3, it would still be a command link into a NORTHCOM mission.

Reversing Canadian policy does not automatically mean that NORAD will be assigned the mission. This is an issue for negotiation, and during the last (and only) negotiations on Canadian participation that began in the summer of 2003 and concluded unsuccessfully in early 2004 (a year before the Martin policy announcement) U.S. negotiators made it clear that the mission would not be assigned to NORAD. Moreover, the U.S. would not provide a formal defence guarantee, and little, if any Canadian or NORAD input into operational planning. In other words, it is questionable whether the outcome will change through future negotiations.

There are significant changes since 2004 that must be considered. There is a different Administration in office in Washington, which may be more amenable to assigning missile defence to NORAD. Importantly, it was during the last Democratic Administration that in 1996 the Joint Requirements Oversight Council, U.S. Joint Chiefs of Staff, signaled a willingness to assign the future missile defence mission to NORAD, if Canada agreed. This led to the development of a NORAD Concept of Operations document on missile defence.

The U.S. has also begun environmental assessments of a possible third continental site. There are four candidate locations: Maine, New York, Ohio and Michigan. At issue for Canada, if the U.S proceeds to deployment, is the location of a forward deployed tracking and cueing radar. In the case of the Fort Greely site, it is supported by a forward deployed, sea-based X-band radar off Japan, and the south coast of Alaska, and a land-based Cobra Dane radar on Shemya Island in the Aleutians for tracking, cueing and target discrimination. One may assume that a third site will require similar forward-deployed radars, whose logical location would be in Canada in order to deal with ballistic missile warheads launched from the Middle East, as well as an additional layer for warheads launched from Asia that escaped interception and are tracking to eastern continental targets.

Of course, the deployment of a third site and its sensor components is neither assured nor likely in the near term future. Nonetheless, this possibility alters the negotiating environment, and Canada, if it responds positively, also faces a lengthy process of environmental assessment through to deployment. It means Canada making a significant contribution and investment, which did not occur in the earlier negotiations. If the issues surrounding the modernization of the North Warning System are any indication, especially in light of U.S. defence cuts, Canada cannot expect that the simple provision of territory will suffice.

It is this development, which may well have motivated the current Canadian government to re-evaluate current policy. It is also the means through which NORAD could obtain the missile defence mission. It would also resolve certain current issues affecting NORAD's aerospace integrated tactical warning and attack assessment (ITWAA), which is provided to the NORTHCOM missile defence mission through the August, 2004 agreement.

Apparently, the forward-deployed radars for the Fort Greely site are not linked into the NORAD aerospace ITWAA mission. NORAD relies upon the longstanding space-based Defense Support Program (DSP), which is being modernized with a new generation of infra-red sensors and satellites in polar orbit, and the BMEWS for its data and attack assessment. How forward-deployed radar data are fed into the NORTHCOM missile defence mission, however, is unclear. It would appear that it is fed directly into the Fort Greely site, or the data is limited to the U.S. NORTHCOM only J-3 screen. Regardless, there are apparently circumstances in which NORTHCOM could assess, release and shoot before NORAD picks up the data. In this sense, NORAD's assessment serves to validate NORTHCOM's. However, it also appears that NORAD possesses the capability to assess whether the target has been intercepted.

In 2004, the U.S. sought to ensure that NORAD's aerospace ITWAA would be linked to its missile defence system, which was subsequently achieved. It was a requirement essential for the stand-up of an initial operating capability. Today, with the forward deployed radars, this link is no longer as significant, and arguably redundant, raising the question about NORAD's future in this regard. Moreover, it is not just the missile defence side of the equation of relevance here. These forward-deployed radars also have a space track capability, which is a NORAD aerospace requirement. There are also future Space Tracking and Surveillance (STSS) system of satellites in LEO that are important to NORAD.

In effect, significant elements of the U.S. sensor data suite of importance to the NORAD mission appear to be withheld. While NORAD submits its mission requirements and priorities to USSTRATCOM for action, the decision on the provision of data is USSTRATCOM. NORAD is not authorized to establish a direct liaison with USSTRATCOM, and has no direct presence in the JSPOC at Vandenberg, California. This, of course, is consistent with NORAD being a supported command.

There are several potential explanations for the limitations on the provision of data to NORAD. New sensors provide a more accurate picture of space objects, and for intelligence and security purposes, USTRATCOM is unwilling to share this information with NORAD, and thus Canada. Closely related, this data is linked to USTRATCOM's global engagement requirements, which is beyond NORAD's AOR. The current data is deemed sufficient by USTRATCOM to meet NORAD's mission requirements. Canada is not involved in ballistic missile, and this data relates directly to the operational missile

defence mission, whose overall responsibility is USSTRATCOM. This data, and future sensor capabilities, are also directly relevant to the U.S. objective of space control, which is problematic in Canadian policy, relative to the non-weaponization of space. As such, this falls into the same category of U.S. strategic nuclear forces, in which Canada was kept at arm's length under tacit mutual agreement.

Until last year, NORAD relied strictly upon data from U.S. assets, as provided by USSTRACOM. With the launch of Sapphire and its successful operational deployment, Canada now contributes to the U.S. Space Surveillance Network (SSN), which supports NORAD. Located in LEO, this optical satellite is designed to monitor the geo-orbital belt. The Canadian Space Surveillance Operations Cell, located at Canadian Forces Base North Bay (22 Wing), a CANR sector operations centre, is responsible for tasking and observation data. Tasking requests include the U.S. JSPOC, and data is fed into the JSPOC, rather than directly to NORAD. NORAD is able to request a tasking or specific data. However, given Sapphire's mission and capability, it is unlikely that its data is overly relevant to its aerospace warning mission.

Canada also contributes to Maritime Warning through RADARSAT II, in polar orbit. This capability provides wide-area surveillance of the maritime approaches to North America, including the Arctic. It also includes an Automatic Identification System (AIS) receiver for maritime traffic identification. Its value will be increased with the addition of three more radar satellites, also with AIS, in polar orbit. The Radar Constellation Mission (RCM), with initial launch expected in 2018, will provide significantly improved re-visit times and near real time imagery. Importantly, RADARSAT II and RCM are Canadian Space Agency projects. National Defence funded a ground-moving target indicator (GMTI) experimental capability for RADARSAT II, but there is no indication of the success of the experiment, or that RCM will possess a GMTI capability. There have also been suggestions that future capabilities may include an air-moving target indicator, which would be of direct value for NORAD's air control mission.

National Defence through Project Polar Epsilon downloads RADARSAT imagery for analysis at two ground stations located in Nova Scotia and British Columbia. Consideration is also being given to a third ground station either on the Prairies or further North. The data is then fed into the Canadian RMP for subsequent distribution through the maritime warning network, and thus to NORAD.

National Defence has also stood up a Canadian Space Operations Cell (CANSpOC) to provide CJOC with daily space briefs, including missile warning. In addition, Director-General Space (DGSPACE), located under the Chief of Force Development, has an MOU with the U.S. to placing Canadian officers in the JSPOC, Historically of note, Canada's military presence in U.S. space was through NORAD and its Space Centre, at the discretion of U.S. commanders. Finally, DGSPACE has also established a direct relationship with USSTRATCOM as a function of its relatively new space contributions to U.S. capabilities.

Notwithstanding several other Canadian military or military-related space projects, including investment into the U.S. secure military satellite communications system, the wideband global satellite communications system (Mercury Global), search and rescue, and weather, three observations emerge relative to NORAD as a supported command of note. First, Canada has replicated the U.S. approach to space relative to NORAD. Second, Canada's deepening linkages and access to U.S. space, USTRATCOM, and the JPOC are a product of Canadian space investments and contributions: a lesson in considering Canada's future possible participation in ballistic missile defence.

Finally, NORAD's relatively unique aerospace warning capability is being duplicated in Canada, as it already is in the U.S. Historically, Canada's access to the missile warning, and space as whole, was only through NORAD. With the creation of CANSpOC, Canada is acquiring its own capability, assumingly supported through its links to U.S. Space, and possibly by a NORAD feed as well.

Overall, this reflects the sense that NORAD is increasingly on the outside, looking in on the space file, and the space file is directly linked to the missile defence issue. Under current fiscal conditions facing both the U.S. and Canadian armed forces, if both parties possess a national capacity for missile warning, then NORAD's role may be at issue. This is not to suggest that this applies to the air side. Arguably, the outcome on the missile defence file will be significant for NORAD.

This also raises, however, an even more contentious issue. Assuming the future holds the possibility of NORAD acquiring the missile defence mission for North America, this raises the question of space itself. U.S. missile defence ground-based, mid-course phase and naval-based interceptors possess the capability to strike at satellite targets. While current Canadian policy opposes the weaponization of space, it is somewhat vague. It certainly includes the deployment of weapons in orbit, even though it doesn't clearly define what such a weapon would be (one will know it when one sees it). But, it is unclear whether it includes ground, sea or air-based counter-space capabilities. Of note, in the late 1990s, Foreign Affairs in seeking an expanded Outer Space Treaty regime to include a prohibition on weaponization did exclude these counter-space capabilities. Regardless, the current Canadian government has remained silent on the issue, but one can expect it to re-emerge if, or when, Canada reverses policy on missile defence. Moreover, it is evident that Canadian involvement is to be limited to the surveillance of space, and non-kinetic defensive measures, notwithstanding the missile defence issue.

It is also clearly recognized that space capabilities, military and civil, are vital enablers and multipliers for terrestrial military operations, essential to the North American economy, and vulnerable. Chinese military officials, for example, have made it clear that these capabilities are logical and legitimate targets in the case of military conflict, and have demonstrated the capacity to strike at them. This reality, thus, has significant implications for Canada-U.S defence cooperation, and the future role of NORAD. It is, of

course, in the distant future. But, it is an issue that needs close consideration today relative to existing Canadian policy and U.S. space control and USTSRATCOM's global engagement mission.

Canada the Arctic and NORAD

The Arctic is the nexus for the four, overarching challenges facing NORAD. Specifically, concerns about: 1) command policies; 2) mission challenges; 3) emerging threats; and 4) other government agency partnerships all converge in the Arctic. On the one hand, the Arctic is no different from other areas of NORAD operations; the mandate is still to defend North America via aerospace warning and air warning and control and now maritime warning. On the other hand, the austere conditions, great distances, remoteness and lack of infrastructure make the Arctic the most challenging environment NORAD must reconnoitre. This section surveys NORAD's activities in the Arctic by asking the following questions: What are the challenges facing the Arctic? What are the shared, operational assumptions? What is the state of Canada's side of NORAD's readiness in the Arctic? And is the binational agreement, but tri-command arrangement of NORAD the right one for the Arctic? While the focus is on the Canadian-side of operations, US realities, especially fiscal ones, must be considered.

The Cold War history of NORAD is well known. The clear danger posed by the Soviet threat (air-breathing and possibly sea-based incursions) were thought best countered directly by the creation of the Distant Early Warning (DEW) radar line, which was later upgraded to the North Warning System, by regular air patrols and by Ranger reports.[6] Additional surveillance equipment to warn of an imminent attack was tested, such as sonobuoys or "jezebel" buoys and large vertical line arrays. The majority of this new equipment was donated by the US and was destroyed inevitably by the harsh Arctic conditions.

Despite background political tension between US and Canadian governments on account of transits of the Canadian North West Passage (NWP) by the *Manhattan* and *USCG Polar Sea*, NORAD continued to monitor the Arctic and US and Canadian personnel continued to operate jointly and cooperatively.

By the end of the Cold War and as the threat of Soviet incursions receded, research and development investment and attention to surveillance equipment and hardware for the Arctic decreased dramatically. NORAD continued to provide aerospace warning and control, but incidents were few and tension was low. Today, however, there is a

[6] The Canadian Rangers are a subcomponent of the Canadian Armed Forces Army Reserves. They are the eyes and ears in isolated locations across Canada, including in the Canadian Arctic. For an excellent history of the Rangers, see Whitney Lackenbauer, *The Canadian Rangers: A Living History* (Vancouver: University of British Colombia Press, 2013).

perceived new urgency for Arctic domain awareness. The Arctic is no longer viewed as an ice-infested buffer to the outside world. For Canadians, the common perception is that the defence of the Arctic is divided along national boundaries and that cooperation with the US (via NORAD or any military arrangement) ends at the tree line. In other words, Canadians do not seem to notice or mind the US/Canada cooperation in the Great Lakes, at border crossings or across the North American continent via NORAD monitoring, but they are decidedly certain that US cooperation in the Arctic is an infringement of Canadian sovereignty. This perception belies the myriad of joint exercises and arrangements between the two militaries specific to the Arctic found in Annex 1.

Furthermore, the pressures facing NORAD, both financially and in terms of the expansion of duties, means that the widely held assumption that the US is not playing a role in Canada's Arctic is discordant with the actual cooperation, which is essential if the pressures are to be overcome given the size of the US and Canadian Arctic. The communications' challenge for Canada's military is managing media and political rhetoric that suggests the US has no role to play in the Canadian Arctic.

On the US side, NORAD's role is rarely mentioned in government and other documents. For example, Canada's First Defence Strategy makes reference to NORAD and the Arctic while the US National Strategy for the Arctic Region (May 2013) makes no reference to NORAD in any way vis-à-vis the Arctic. The exception is the US Navy's *Arctic Roadmap: 2014 – 2030*[7] which makes one, brief mention of NORAD. In other documents, the aerospace mission is mentioned but not the maritime warning mission. NORTHCOM is the "face" of the US Arctic. Being out of sight of the media spotlight is not necessarily problematic so long as important, domain awareness information is not purposely or accidentally blocked to NORAD by other agencies because they too overlook/do not know about NORAD's role in the Arctic. (For example, maritime warning-like intelligence). On the other hand, if NORAD is concerned with remaining "relevant" – highlighting its Arctic role may be useful for a variety of reasons including as a deterrent to adversaries as well as education for domestic audiences.[8]

Sequestration means that Canada cannot depend on the US to pay the lion's share of new, additional NORAD operations and capital expenses. Therefore, the North Warning System, which will reach its end of operational life relatively soon, will likely need to be financed by Canada, in large part, whether for replacement/repairs etc. Ideally, the whole system needs to be able to detect incursions farther North which may mean relocating the system and should also be all singing and dancing to provide full domain

[7] See http://greenfleet.dodlive.mil/files/2014/02/USN-Arctic-Roadmap-2014.pdf especially p. 6.
[8] The annual Santa tracking events are the kind of public relations exercise that keeps NORAD in the minds of the public. Movies are another venue. Mention of NORAD is helpful, but even better if reflective of its actual mandate.

awareness for land, sea, air, space and cyber. However, successive Canadian governments show little appetite to shoulder such an enormous financial burden unless they are space-based assets (like RCM, Polar Epsilon and the Northern Watch TDP).

Furthermore, any new system likely needs to have multiple detection capabilities to serve a myriad of government agencies because duplication of infrastructure is too expensive. For example, if new radar or other detection systems are adopted, ideally they would be able to recognize and track air breathing threats in addition to ship-sourced pollution, climate changes, storm detection changes etc. This then has cybersecurity implications for NORAD especially if classified and unclassified sources of information are collected and need to be shared with or pushed to/from different agencies on both sides of the border. On the communications side, a lack of priority communication protocol for the Arctic means that "blackouts" are a considerable weakness especially as there are few centralized communication centres. There is often too much reliance on internet-based communication sources which are fragile.

Even before one considers new systems for NORAD, the basic definition of the Arctic is different for Canada and the US. For Canada, the Arctic begins at 60^0 North[9] which includes parts of Northern Quebec and the very tip of Newfoundland in addition to the three territories. For the US, the Arctic Circle marks the beginning of the Arctic which is 6.5^0 farther North.[10] That the definitions are different is not necessarily an issue but it is symptomatic of the national caveats that challenge the binational NORAD.

There are some assumptions about the Arctic which are shared jointly by the US and Canada:

1) There will be increased human activity and resource development in the Arctic;
2) The types and level of international activity will not result in armed conflict;
3) Relationships among Arctic nations will remain stable;[11]
4) Environmental change is definite and will result in consequences for the Arctic (including worsening storms);
5) Financial constraints will limit the ability of US and Canada to finance large scale projects; and
6) The tricommands will work together within the respective Arctic strategies (which are nationally-determined) within a whole of government framework

[9] Note, however, the CJOC Plan for the North makes reference to exercises north of 55^oN which cuts across the middle of most of the provinces.
[10] See Framework for Arctic Cooperation among North American Aerospace Defense Command, United States Northern Command and Canadian Joint Operations Command (11 December 2012): 5/15.
[11] This may change with respect to Russia given events in the Ukraine. To date, Arctic Council meetings involving Russia have continued as per normal. And to date, Northern Chiefs of Defence meetings involving the 8 Arctic states have continued.

NORAD has 3 geographic regions:

1) Continental NORAD region;
2) Alaskan NORAD region (ANR). Anchorage Alaska is one of the largest cities in the Arctic (260,000)* next to Murmansk, Russia (340,000)*); and
3) Canadian NORAD region (CANR). Canada has 121,000-135,000 people living in its Arctic (depending on one's definition of the Arctic.)(There are 19,000 in Whitehorse*).[12]

CANR and ANR conduct operations in the Arctic area. USNORTHCOM administers command over Joint Task Force Alaska (JTF-AK), as CJOC does over Joint Task Force North (JTFN).[13]

JTF-AK and JTFN have similar, national roles. While JTF-AK provides defence and civil support, JTFN emphasizes the maintenance of a visible presence in support of Arctic sovereignty in addition to support to other government departments. Canada's domain awareness is expanded via human intelligence and presence in the form of Rangers. JTF-AK has no equivalent, but is leveraging outreach activities with local communities. USCG District 17, with an HQ in Juneau, AK, is a persistent partner in the North.

While the Alaskan and Canadian NORAD regions are confined to domestic borders for control purposes, NORAD routinely operates across them to ensure continental domain awareness via its warning mandates. For air-breathing threats it is likely the 50+ years of NORAD experience are sufficient to ensure information is exchanged. The maritime warning side, however, is new (since 2006) and all of the information and contact linkages (above-and-beyond those that are personality/personal contact-oriented) may still be a work in progress. Both the Alaskan and Canadian NORAD regions feed information to NORAD (and to NORTHCOM and CJOC respectively). How much information is exchanged directly between JTF-AK and JTFN is not certain – the assumption is that most of the information is connected to joint exercises/training. In terms of Canadian operating locations and bases in the Arctic, they are few. NORAD forward operating locations on Canadian soil (from West to East) for the Arctic are:[14]

1) Inuvik (the most active)
2) Yellowknife
3) Rankin Inlet
4) Iqaluit

Only Inuvik is north of the Arctic Circle. Eureka Station (Environment Canada base)/Fort Eureka (DND seasonal facility), CFS Alert, Skull Point and 6 High Arctic Data

[12] * Note, migration in and out of Arctic towns fluctuates often subject to job prospects.

[13] JTFN is the only RJTF whose AOR in entirely in the North. The other RJTF (Pacific, West, Central, East and Atlantic) have activities in the North. The creation of Northern Operations Hubs (hub and spoke lines of communication to facilitate operations in the North and to enable rapid force projection) is in the works. Yellowknife, Inuvik, Resolute and Iqaluit have been identified as primary hubs. Alternatives will also be identified (likely at Rankin Inlet, Whitehorse etc.)

[14] Refer to Annex 2: RCAF map.

Communication (HADC) stations[15] should be considered as potential NORAD points of interest/vulnerabilities.

Yellowknife and Goose Bay are the most northern RCAF bases located in the Northwest Territories and Labrador respectively. (As well, there are 5, air force support bases for the Arctic.[16]) While additional bases may not be needed currently, managing public expectations will be important. Often, the message (especially in Canadian media) is that Canada needs 24/7 full capabilities (e.g. a fuelled CF-18 or next generation replacement permanently stationed in the deep Arctic ready to deploy at a moment's notice) –something Canada cannot afford and does not need given current threat analyses.

OP NORTHERN DENIAL is the NORAD operation for the air defence of North America – specifically for the Arctic, against foreign incursions into Canadian airspace.[17]

Yellowknife is the Joint Task Force regional headquarters for Northern Canada and Whitehorse is a land forces operating location. Note there is no land forces station or operating location either north of the Arctic Circle or in the Eastern Arctic (Nunavut, Nunavik or Labrador). A CF Arctic Training Centre is in the works co-located with the Continental Polar Shelf office in Resolute Bay, Nunavut.

There are no naval bases in the Canadian Arctic. The only functioning, deep water port (and civilian) is in Churchill, MB which is on the edge of Hudson's Bay and below the Arctic Circle. The "deep water" port at Nanisivik is not likely to be operational for several years and will serve as a fuelling and berthing depot for relevant Canadian government agencies not as a functioning port for commercial cargo. The Mary River Mine project is constructing a port off Baffin Island – MOUs will likely exist with the DND to use the port when required (as a force multiplier). Thule Greenland is still the refueling station for military vessels in the Arctic.

The government of Canada may consider a future base in the Arctic but it would likely need to house several government agencies as a cost/infrastructure saving method. The RCAF is in the process of reviewing future resupply plans/routes for Alert and other bases.

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[15] OP NEVUS is the annual maintenance effort to support these assets. Scope of OP NEVUS also includes operation of Fort Eureka, maintenance of road to Skull Point, and fuel cache resupply.

[16] Cold Lake, Baggotville, Trenton, Winnipeg and Comox.

[17] Op NUNALIVUT, Op NUNAKPUT, Op NANOOK, OP BOXTOP (biannual), OP QIMMIQ, OP NEVUS, and OP NORTHERN DENIAL are the major (annual), Canadian Arctic operations. The Canadian Army has Northern Exercises (NOREXs) and Sovereignty Exercises. Also note Canada, the US and Russia conduct Op Vigilante Eagle. Canada has stopped its partnership with Russia in this regard due to events in Crimea. Exercise NORTHERN EAGLE is a biennial, combined Russian-U.S.-Norwegian naval exercise series that began in 2004. It was last held in August 2012 in the Barents Sea.

In the short term, there is no indication that a larger, military-only presence in the Arctic is required although world events are causing some to reconsider the threat posed by Russia to the Arctic. Whether Canada has adequate capabilities/equipment is a CJOC/Canadian government concern and whether or not the US has adequate capabilities is a NORTHCOM/Congress concern.

The Maritime Domain and NORAD

In considering the maritime domain, there are two major factors to consider. The first is why NORAD obtained a maritime warning mission. The second is to examine maritime command and mission issues as it relates to NORAD's role.

There is no single explanation for the decision on the part of both actors to assign maritime warning to NORAD. On the surface, relative to existing maritime warning mechanisms on both sides of the border, and some current views which see NORAD's function as redundant and of little, if any value added (and by default a waste of time and resources), the decision appears as one driven by concerns about the future of NORAD, in that the maritime warning mission could help boost its relevance. In the immediate wake of 9/11, Canada and the U.S. established the binational planning cell, which was transformed into the binational planning group (BPG). The BPG's mandate was to examine the post-9/11 threat environment and identify options for coordinating Canada-U.S. defence and security responses. Its range of recommendations included engaging NORAD in the maritime domain. But, overall, its report was arguably too bold and premature to be adopted in total.

Having invested time, resources and political capital into the process, decision-makers could not simply ignore the report in its entirety. The most viable among its options relative to what could be borne by the political environment was maritime warning. It fit well with NORAD experience and expertise. NORAD would not become the primary actor, but a supporting secondary one, thereby not directly threatening the interests of the other actors in the maritime warning domain. If NORAD's mission suite remained static in light of the new post-9/11 threat environment, it might also be interpreted as the beginning of the end of binational cooperation. In effect, with political, and thus resource attention directed to these new threats, if NORAD did not become engaged, some might begin to wonder if continued investments in NORAD was worth it. If bilateralism was the preferred means to manage new threats, would not bilateralism be sufficient to also deal with old threats. Moreover, the political environment at the time, especially as perceived within Canada, was of growing U.S. unilateralism, indicated, for example, by U.S. steps taken with regard to its open border with Canada, and Canada's failure to sign on to the U.S. missile defence program. Thus, by expanding its mission suite, it would signal to all concerned that NORAD, and by default binational

cooperation, remained an important contributor to the defence and security of North America.

In effect, NORAD acquired a maritime warning mission because it had to get something new for political reasons. This explanation may be seen at the root of NORAD's growing problems with the mission itself and its relationship with the other actors in the maritime domain. Why NORAD is perceived as an 'interloper', with little value added to contribute is because this explanation dominates. In effect, decision-makers did not fully explain why the decision to assign maritime warning to NORAD was made, and in conjunction with a lack of knowledge and understanding of NORAD, it is easy to conclude that the decision was only for political reasons.

There are, of course, alternative explanations for the decision. Of these, the 9/11 failure may be the most important. 9/11 was a warning failure. All the information of the pending attacks were present in pieces and distributed among too many separate agencies, with no overarching agency responsible for putting the picture together. The response after the fact was the establishment of a single overarching agency – the Department of Homeland Security – for the purpose of ensuring that pieces of the puzzle would be brought to together for analysis. This was missing in the maritime domain; a single North American agency to bring together two national pieces, and to a lesser degree sub-national pieces, to provide a single analytical point. NORAD was the obvious choice, given its experience in piecing together aerospace warning pieces into a single, integrated picture for assessment. In other words, the 9/11 failure might be replicated in the maritime domain in the absence of an over-arching warning and assessment agency, especially relative to the complicated nature of its threat environment.

There are, of course, numerous other plausible explanations, including the fallout from the establishment of NORTHCOM, and some are embedded within the above two. Regardless, several significant conclusions can be drawn. The first, as noted above, is the importance of explaining why NORAD was given the maritime warning mission in functional terms. Such a clear explanation from senior military officials, not NORAD itself, is important to counter existing critical views of NORAD's role as being of little value added. NORAD making this case to others in the maritime domain will simply be discounted as self-serving and organizationally motivated. Second, the value of a North American maritime assessment relative to national and sub-national assessment points needs to be clearly communicated to all the actors. This, in turn, is confounded by the image and belief that the North American assessment point in NORAD is an air force one. NORAD's experience and expertise is aerospace, and the maritime domain is significantly different.

The maritime domain is much more complicated than the aerospace domain, simply as a function of the greater number of defence, security, and public (commercial and private) actors involved. 9/11 turned NORAD from actor focused exclusively on external

threats to one also engaged with internal threats largely because NORAD air assets relative to the speed of internal air-breathing threats (hijacked aircraft) are the only response available. Threats in the maritime world move at a much slower pace given the speed of vessels. What, however, speed has to do with the value of a North American assessment point is difficult to ascertain. Certainly, slow moving maritime vessels provide greater time for warning, and response. However, the ability to identify threats among the mass of vessels heading towards North America is difficult. This difficulty is compounded by the unknown vessel, which does not have an automatic identification system (AIS) transponder, small vessels that are not generally tracked, and the clutter as vessels move from blue to brown water. All speak to the difficulty of acquiring full maritime domain awareness. But, this difficulty does not negate the value of a single North American point of assessment through NORAD. Indeed, difficulty suggests value from a different set of 'eyes' on the domain.

There is also the internal maritime dimension. As noted above, NORAD focusing on North America, and obtaining access to FAA and NAVCAN radar data, was a function of the nature of the internal air breathing threat. On the maritime side, monitoring the inland waters are U.S. Coast Guard and RCMP responsibilities, and are coordinated for cross-border waters (e.g. the Great Lakes) through the Shiprider agreement, which established Integrated Cross-Border Law Enforcement Operations. In effect, these waters have been defined as policing, rather than defence operations, outside of the jurisdictions and mandates of the Canadian and U.S. Armed Forces. Given the nature of the internal waters issue, there does not seem to be a value added role for NORAD, as well as any military based warning system. Vessels may be slow (notwithstanding the use of high speed smuggling boats), but the process from intelligence collection to interception may occur too quickly for other actors to be brought into the loop. In other words, the actors responsible for this component of cross-border security are likely to perceive no role and no need for NORAD, or any military warning system.

This, of course, does not negate the value of NORAD for external North American maritime threats. But, the real point is the blurring of warning and response in the thinking of the core maritime actors. Specifically, NORTHCOM and CJOC need to be in the loop relative to their consequence management mission as second responders in aid to the civil power. This is not a NORAD mission, but a national one, alongside existing bilateral agreements, which enable each nation to aid the other one. Yet, NORAD is present by virtue of its integrated link to NORTHCOM. It generates an image, partially as a function of dual-hatting in the N^2 arrangement, that NORAD is, in fact, more than simply a maritime warning actor.

The blurring of warning and response is evident in the situation when a maritime threat necessitates an air response. On the surface, this response is a national one, in part because of political sovereignty reasons, in part because it goes through the national command structure, and in part because not all potential air assets are dedicated to NORAD. NORAD in a sense is conceived as being outside the loop, because a maritime-

based threat is not a traditional air breathing one. Land or ship-based helicopters are not NORAD assets – fighters are. Of course, NORAD is linked or inside the loop as a function of NORTHCOM's responsibilities and the JFAC integrated with NORAD at CANR in Winnipeg. Even so, neither the USN or RCN are likely, in the case of ship borne air responses, to perceive either a NORAD link, or the necessity to keep NORAD formally in the loop. It is a naval issue, not an air force one.

In effect, the NORAD maritime warning mission becomes perceived as more than just that. By the nature of the complicated maritime environment, it is also seen as encroaching upon responses beyond its mandate and expertise. This, of course, is reinforced by the image that NORAD is an air force command, dominated by air force personnel, with little, if any knowledge and understanding of the maritime domain. Of course, this image is no longer accurate. Since 9/11, NORAD has increasingly evolved into a joint command, and further steps toward jointness, especially on the part of Canada, is important to overcome images of NORAD as an air force outsider.

This is not just a NORAD problem relative to questions of its value-added role in maritime domain awareness that might be addressed by expanding the presence of naval personnel at NORAD headquarters or dropping aerospace from its name. It is a deeper problem of jointness, which operates at the senior military command levels, but where operational implementation remains embedded in a military service, environmental level. This, or course, is the problem of stovepipes and military socialization relative to career paths. It is also the problem of threats to service (and non-military organizations within the maritime domain) interests and resource allocation, especially within the current constrained resource environment. It is a zero-sum environment, where every dollar given to NORAD as it encroaches upon the maritime domain is perceived as a dollar lost to some other organization in the domain.

The complicated nature of the maritime domain (mirrored in varying degrees in other areas such as the Arctic and cyber space) works against any easy solution. In such a domain as currently structured, the ability of NORAD to communicate and demonstrate its value-added role is a challenging task. NORAD can't do it alone, because it is likely to be discounted as self-serving, organizational interests. Nor does it appear that recent exercises, which have demonstrated problems of information flows to NORAD, among other actors, will be sufficient. Rather, future exercises need to be constructed around a threat scenario which will clearly demonstrate to all the actors of value of a North American warning and assessment point – NORAD – such as a maritime threat that entails a 'dirty' bomb.

Cyber Security

Under the current arrangements governing Canada-U.S. defence cooperation and NORAD's place within it, it is difficult to see a specific role for the organization as either the warning and/or command centre for North American cyber security. This is not to suggest that NORAD has no role to play. At a minimum, it is responsible for the cyber security of its own computer systems. In addition, as NORAD systems are linked to both Canadian and American national systems and its functions are dependent upon the flow of accurate and secure data from its supporting components, as well as to other government cyber stakeholders, NORAD has a major need to ensure these linkages and their sources are also secure. This also entails ensuring that data links are not vulnerable to offensive or exploitive attacks. However, this must be accomplished with national caveats in mind; Canada, for example, does not (presently) conduct offensive cyber operations (defined by as active preemptive or retaliatory actions against adversaries). There is a need, therefore, to coordinate cyber security procedures and software among all the cyber nodes within the integrated North American defence network, and ensure that all actors are fully informed of relevant cyber events, no matter where they occur within the integrated cyber environment.

The American defense response to cyber threats was the establishment of Cyber Command in 2010 under SRATCOM. It is tasked with the management of full-spectrum cyber space for the Department of Defense (DoD), including conducting cyber space operations for select DoD networks, and supporting cyber space defensive and offensive operations of the combatant commands of the U.S. Armed Forces, including NORTHCOM. There is no Canadian equivalent, and given resource and other constraints, there is unlikely to be one in the foreseeable future. Instead, cyber space in Canada is overseen by a small detachment within the CJOC called the Joint Cyber Operations Task Force (JCOT) headed by a Lieutenant Colonel. In contrast, the nominal US equivalent is headed by a Vice-Admiral. The scope, scale and size of cyber operations with DoD accounts for the sense that Canada lags behind the U.S. in the cyber defence world. However, this does not mean that Canada does not necessarily lag nor must match, automatically, US efforts operation for operation and troop for troop. Indeed, it may not be necessary, feasible or advisable from the Canadian perspective.

There remains, however, a logical requirement for more cooperation and coordination of cyber space efforts between Cyber Command and the CJOC. Existing links are likely to expand and deepen over time, especially relative to the network between Canadian and U.S. defence systems. Arguably, such connections are most pronounced in the air defence dimension through the NORAD command and control system given the length of time it has been operational. Such links are essential to ensure the interoperability of Canadian and US forces, especially in the context of modern netcentric warfare and the common North American threat environment.

Of course, not all Canadian and American military computer systems are networked together for national security reasons. Even so, most, if not the overwhelming majority are similar or common, even if not linked. Commonality of systems and software is simply a function of the realities of the North American computer and software civilian and defence market. As such, a cyber threat or attack against a national system is a threat to the other national system. Each party has an interest and requirement to be informed about an attack against a common system or software, which exposes a software vulnerability, or a new virus, even if they are not directly linked or networked. In addition, no national network is likely to be completely isolated from other networks. Nodes exist, through which sophisticated viruses may be transmitted from a national network into a cross-border network, and then across other networks. In this regard, the cyber world defence environment is like the airport security one; the system is only as strong as its weakest link.

At the same time, the defence cyber world is not isolated from the larger civilian cyber world. NORAD, for example, receives feeds from civilian networks in support of its warning missions. Even when such feeds are filtered by a national defence networks, as in the maritime case, the possibility that the information has been tampered with, or a virus transmitted through the network into NORAD cannot be ignored. NORAD, like relevant national defence networks and commands, needs to be aware of any and all possible cyber incidents. If, or when NORAD's mission responsibilities grow, such as into the Arctic beyond aerospace warning and defence, the cyber space component will grow in significance and importance, along with the need for greater cross-border coordination and cooperation.

The challenges for Canada-U.S. defence and security cooperation, and the potential future role for NORAD or a NORAD type binational solution in the cyber world are similar to those in the maritime and arctic environments. However, there are unique challenges as a function of the nature of the cyber domain. Among these is the presence of another crucial actor – the private sector – relative to potential cyber threats to critical infrastructure. While there is no objective consensus on what constitutes critical infrastructure in North America (for example, outer space assets essential to the North American economy are generally excluded), the overwhelming majority of agreed critical infrastructure in North America is privately owned, albeit regulated by governments. At one level, there is of course the question of defining and mapping critical infrastructure and their cyber networks. For any organization, public or private, its own infrastructure is obviously critical. Thus, each organization has an interest in ensuring its cyber systems are secure. But, disabling the cyber systems of a university, for example, is not going to have a major societal-wide impact. In contrast, disabling the integrated North American energy grid, especially during winter, will have a disastrous effect on the functioning of North American society and the North American economy.

However, not all nodes within this grid or any network are necessarily critical. Redundancy exists, such that if one node fails, other nodes can replace the failure.

Where the critical, single points of failure exist within the networked grid is crucial. One of these may, of course, be the entire network itself. A virus planted in one node may spread throughout the entire network disabling it. The network, however, also largely consists of numerous private actors, or companies.

Self-interest should drive each actor responsible for a network component to ensure its own cyber security. Failure to do so would likely have a major impact on the future viability of the company. Any public investigation of a cyber event at a company would likely drive down its share values, disadvantage it against competitors, increase regulatory oversight, and could ultimately lead to nationalization on security grounds. Yet, even a 'whiff' of suspicion of a cyber security breach can have implications for a company. Importantly, the entire economy is based upon consumer and investor confidence. Undermining that confidence through a too 'heavy handed' oversight mechanism is an important concern. Militarizing this mechanism by assigning oversight to a defence organization may thus be problematic in terms of the signal it sends to companies, consumers and investors.

Currently, critical infrastructure is the responsibility of the Department of Public Safety in Canada, and Homeland Security in the United States. Their foci have been on coordinating efforts relative to the integrated economic activity of North America. Both agencies need to harmonize their approaches to critical infrastructure protection, including the crucial cyber components. Defence or military involvement stems from two factors. First, it exists where defence information nodes are connected to civil infrastructure, which may or may not be critical per se. This includes infrastructure elements whose functioning is vital for military operations, and the places in cyber space where civil systems are networked with military ones. Second, armed forces play a vital role as second responders in civil emergencies. In this case, the disabling of certain critical infrastructure, but not all, may lead to a military response.

Returning to the NORAD part of the equation, its potential role, beyond securing its own system, is partially a function of its integration with NORTHCOM, which has a significant role to play given its responsibility for an operational response to land, sea, and air threats to North America. NORTHCOM, as a function of the two factors noted above, must be engaged in the warning loop. That is, it needs to be informed of cyber-attacks. Warning as part of NORAD's mission suite would logically engage it as well. In other words, warning of a cyber-attack against critical infrastructure seems a logical fit. But, warning is problematic in the cyber world, and as noted above, private sector actors will be very cautious providing more information to government/military departments.

Warning is of a different nature in the cyber world. In the maritime and aerospace sectors, time is available in most circumstances between the identification of an approaching threat and then a response. In the cyber world, an attack takes place nearly instantaneously, or it may be undetectable (via a dormant virus, for example). The warning is indistinguishable from the attack. Of course, internal cyber defences can

identify and defeat an attack, and such occurrences need to be transmitted to a central government agency, and perhaps a central North American agency (which currently does not exist), especially if it is a coordinated attack against several nodes within a network that crosses national boundaries. Differentiating between a single attack and a coordinated one is crucial. Moreover, a single attack may be warning of potential follow-on attacks, or a test of cyber defences for future purposes.

Another important challenge is identifying the nature or purpose of the attack. Military airplanes and missiles have identifiable launch points, and can be differentiated through sensors, among other means, from non-military. Merchant ship threats are somewhat more difficult. Cyber-attacks, as a function of the global internet, are extremely difficult to trace back to their origin, and it is also difficult to differentiate between a hacker, acting for personal reasons, and a terrorist or a state.

The cyber world is arguably the most challenging one facing Canada-U.S. defence and security cooperation. Like the integrated and interdependent North American economy, and indeed as a product of this economy, there is no fully national solution. There is a clear logic in the defence sector's cyber infrastructure being kept physically separate from private assets, but this is likely to be very problematic. The NORAD model is of relevance, especially given its de-centralized command and response procedures in the air control domain. For now, NORAD's role vis-à-vis cybersecurity is constrained by its terms of reference. Its linkage into the wider defence and security cyber world is largely a function of its integrated relationship with NORTHCOM. NORTHCOM is engaged directly as a function of its operational responsibilities relative to critical infrastructure. NORAD is not.

In effect, NORAD represents a potentially important conduit for Canada into the U.S. defence and security cyber world by virtue of its NORTHCOM link (although our understanding is that NORAD can speak to CyberCom directly). At the same time, as a supported command, cyber security, by default, lies with the organizations responsible for acquiring the key information that enables NORAD to meet its mission requirements. NORAD needs to be in the loop, and given its North American perspective, can potentially provide valuable inputs in developing an effective, coordinated North American mechanism to manage cyber threats. Even so, a NORAD or NORAD-style binational solution is simply premature. In some ways, it is likely to be the product of a long evolutionary process that follows expanded binationalism, if it occurs, in relatively more mature areas, such as maritime and Arctic domains.

Questions Gathered from the Research and Workshop

The following represent questions asked of the researchers organized by theme. (The questions are not always exclusive to the particular theme under which they are categorized). While some are answered in the body of this report, some have yet to be considered. Nevertheless, they are enlightening for two reasons. First, they may indicate for senior NORAD officials where there are training/communication gaps. Second, they clearly signal a need for further study, especially on the Canadian-side, which has fewer personnel resources, especially defence scientists.

NORAD Reviews/Future

- Start from scratch. Assume there is no NORAD - only CJOC and NORTHCOM. Would Canada/US invent NORAD? What elements of NORAD would be kept? What would Canada/US lose? How would Canada/US ensure the defence AND security of Canada and the US jointly?

- Are the 14 working groups that are part of the NORAD NEXT study too ambitious given personnel and other constraints right now especially on the Canadian side?

- Does NORAD have a handle on all the MOUs that apply? Are some in need of amendment/deletion/adjustment?

- Consider the space and cybersecurity realms – is the disparity so great between US/Can?
  - Is this kind of command tenable into the future?
  - Is an informal relationship even desirable in consideration of these two issues?

- How do the civilians see the future of NORAD? What should NORAD be doing?

- Re: NORAD as an institution: If NORAD was eliminated, does it necessarily call in to question Canada's participation in NATO?

- One of the major features of NORAD is that it gives certain robustness to not only the Cdn Forces but also to the US-Canada relationship. How do we measure the impact NORAD has on Canadian institutions?

The US-Canada Defence Relationship

- Are too many Canadians and American dual hatted NORTHCOM/NORAD? Does NORAD need more NORAD only personnel separate from NORTHCOM?

- What is the future of North American air defence? Astonishing that there has been no debate 13 years post-9/11. Air defence has been pushed back since 2001. Question not only for command but also for legislators and citizens.

- NORAD has totemic role in Can-US relationship. If we do away with binational command, does it damage Can-US relationship? At least it's perception?

- Do we really still need a binational joint air command?

- What about Mexico? Is greater Mexican participation in NORAD feasible given Canadian reluctance to change the nature of the binational agreement? Would Mexico add to NORAD's missions?

Command Issues

- Is the "tri-command" (CJOC, NORTHCOM and NORAD) truly 3 commands or are NORAD and NORTHCOM so interconnected (many Canadians and US personnel dual hatted NORAD/NORTHCOM) that it is better characterized as bicommand (CJOC and NORTHCOM/NORAD)?

- Related, does it matter if tri or bi or is it based on the issue? E.g. air warning and defence might be tri command but maritime warning involves many more agencies as does space and cyber (StratCom)

- NORAD reaches far beyond North America in its warning functions (on many, many occasions, reference made to missiles from North Korea and VOI – vessels of interest - in the middle of the Pacific) – this would shock many Canadians. Furthermore, NORAD is concerned with defence and security threats (i.e. attacks on critical infrastructure = security, vs. foreign invasion = defense threat) Therefore, is the North American in NORAD accurate? Likewise is the Aerospace outdated? And does "Defense" still apply? At a minimum, doesn't NORAD need to be renamed to better reflect what it purports to do?

- Are more US personnel needed at CJOC (similar to the balance at NORAD/NORTHCOM)? Or is it Canadian political reticence to have more US personnel?… from a budget perspective, more US personnel would be potentially helpful. Eg. CJOC has 3

components (expeditionary, domestic and support) whereas NORAD has multiple, hierarchical components (continental US (2 sectors – WADS and EADS), CANAR (with single sector CADS), ANR (with ADS sector)), NORAD personnel in CJOC could augment the domestic and support components? Or does the CF need to look at where US personnel in Canada are employed and likewise, Canadians in the US?

Aerospace Early Warning

- Air warning/air control works wonderfully. This has been so efficient and effective. After 60 years of maturing, why would you not want to sustain this?
- Can we afford to wait for problems to materialize?
- Is the NORAD command centre becoming irrelevant for the way the US wants to conduct missile defence?
- Should NORAD continue to do space ballistic missions?
- What does it mean if Canada reverses policy? What will it cost us? Will NORAD get command?
- Elaborate on why Canada is reluctant to participate in ballistic defence. Is it because this would make Canada a more likely target? Are we assuming that Canada is a target for a ballistic missile strike?
- Canada really has to start taking into account the necessity to defend Canadian cities. We have the erroneous assumption that the US will defend us. What do we need to contribute to achieve some form of guarantee of protection?
- If Canada matures as a continental ally on the missile front, how will we contribute? Will we just submit to US desire?
- Has NORAD undermined its case politically by being polite and circumspect with its contribution to missile defence?
- What does Canadian contribution constitute?

- Is any US commander with a limited number of interceptors really going to sign on to protect Canada as a priority?

Arctic

- Much of the information needed (especially for the Arctic) for domain awareness purposes is unclassified. However, the number of portals, firewalls, and tagging protocols on both sides of the border mean that exchanging information between agencies is difficult at the best of times – between countries is even more difficult. On the classified (high) side, classification caveats are an impediment to the exchange of information. For example, "SECRET" has a different meaning in Canada from that in the US in terms of who may see the document (e.g. 5 eyes access vs. US only). For NORAD, are these national caveats hampering its ability to meet its missions?

- Is the most pressing issue for NORAD the possibility of going "blind" should the North Warning system fail/come to the end of its serviceable life without a replacement/alternative? Or are there other means at NORAD's disposal? Might the NWS degrade or become obsolete based upon emergent, more effective and cheaper surveillance options? Is the North warning system of more benefit to Canada or to the US?

- The US can no longer finance major surveillance infrastructure and equipment in Canada – large cuts to US military budget are imminent. Canada does not have the political appetite to pay for major, new projects and promised replacement equipment for the Arctic is neither on budget nor on time. However, the "Statement on Canada's Arctic Foreign Policy" and its Northern Strategy all suggest the political appetite is to maintain its sovereignty in the North. To do so isn't free. In rough terms, Arctic operations are 10x the cost of non-Arctic areas. That being said, US promised projects are also off-pace. What impact do these realities have on NORAD?

- Related to any future replacement of the North Warning system will be issues connected to the cyber security of existing/new infrastructure. As well, are there sufficient telecommunication and other "redundancy" systems (e.g. should all electrical and telecommunications systems fail for various reasons) for NORAD?

- The maritime warning mission of NORAD in the Arctic - is it still a work in progress? Is the warning function at the same level as aerospace warning in terms of processes and machinery? What steps/links/information feeds/processes are missing/underdeveloped?

- Are there any concerns/issues with differing definitions of the Arctic and/or the CONR, ANR, CANR dynamic for NORAD? Do the US and Canada share a common security lexicon, taxonomy and nomenclature for the classification of documents, for example?

- Private shipping companies tend to use their own charts rather than depending solely on Canadian government issued hydrographic and bathymetric charts when navigating in Canadian Arctic waters. Is this a concern for NORAD vis-à-vis maritime warning? For example, violations of Canadian transport laws in the Arctic (e.g. AWPPA) would be a non-NORAD event. Putting a ship aground to cause an environmental disaster would be a NORAD maritime warning event, followed by an integrated national or multi-national response.

- For Canadians, it would come as a surprise that the US is still its greatest ally and partner in surveillance and defence of its Arctic. The shock is created, in part, by the disconnect between what NORAD does and Canadian government rhetoric. Likely, a similar shock would be experienced on the US-side as well. Are these disconnects a concern for NORAD?

- Will NORAD's role in the future be more concerned with security-related issues in the Arctic or defence-related issues? Security and defence issues continue to become more blurred. Can NORAD reach out to other government security agencies seamlessly when required? Do other government departments provide NORAD with needed information? If NORAD wants expands in the Arctic, how do they do it?

- Is NORAD exploring private/public partnerships in the Arctic? Can NORAD explore military / civil partnerships to leverage regional assets and contribute to regional development especially on the Canadian side?

- National caveats are always at play but rarely discussed openly. E.g. VOI in Canadian territorial waters dealt with very differently from VOI in US territorial waters… do these caveats hinder NORAD? (E.g. the fact that US and Canada have different geographical definitions of the Arctic…. 66 vs 60N respectively)

Interagency Cooperation

- How do Homeland Security and Public Safety feed into NORAD? If NORAD is concerned with more than defence, it probably should have more civilian agency input but will this make NORAD to big a beast?

- Do other combatant commands (eg. PACOM) think to push intelligence to NORAD? Suggestion that some do not – especially critical for NORAD's maritime warning function

Cyber

- Should cybersecurity be part of NORAD? Would there be value added or a split again between Canada and the US (akin to the BMD problem). Can Canada handle cyber injects in NORAD exercises for example?

- Is Canada splitting cyber into a civilian and a defence element? Does this make Canada more or less secure? (i.e. are there enough linkages between Public Safety Canada and DND?)

- Do Canada and US have a common understanding of what infrastructure is considered "critical"?

- Should Canada have a full-fledged cyber-command? If we do, should it come under CJOC? How would it be linked to NORAD?

- However, should cybersecurity (beyond of its own assets) be part of NORAD? Would there be value added or a split again between Canada and the US (akin to the BMD problem). Can Canada handle cyber injects in NORAD exercises for example?

- Could NORAD function as a conduit for communication and facilitating the Canadian role into the future?

- What has been the evolution of the command structure in the US in rel. to cyber security and NORAD?

- Who is trying to do what to you, and what are they trying to achieve? Are they trying to turn off sensors? These are the sorts of questions NORAD needs to ask.

Maritime Warning

- What are the measures for "good" domain awareness? Are they consistent within NORAD or are they different in the US vs. Canada

- Does NORAD make sense as a binational maritime command?

- Should a new North warning system have a maritime warning capability?

- Aerospace warning and control – mil to mil a closed loop that works well. Maritime warning – nearly 80 agencies across both borders

- Many suggested maritime warning by NORAD is not working. Others defended its value added passionately. (e.g. *Ocean Lady* case study referenced often. In 2009, 76 illegal migrants on a boat found off coast of BC). NORAD is meant to provide big picture combining maritime picture from a variety of sources. However, big picture is only as good as info provided/not provided. Concern that NORAD often only pushes back intel provided by CJOC, for example, back to CJOC. (Others say, personnel are not noting the changes that NORAD highlights).

- NORAD maritime warning allows NORAD to go directly to civilian and other agencies to command naval assets if they are in aid of an air defence situation…e g. can warn CBSA directly. CJOC cannot go to CBSA directly (this needs checking). If CJOC needs to get the attention of US Coastguard, for example, needs to go through Canadian US liaison in Washington DC. However, CJOC could go to NORAD which could go to US Coast guard directly (again, these scenarios need verification)

Canada specific considerations

- NORAD/NORTHCOM US liaison to CJOC is more NORTHCOM focused than NORAD
  Is there enough NORAD representation at CJOC? Related, is there enough Navy and Air representation at CJOC? Does the lack of blue uniforms keep NORAD out-of-sight/out-of-mind? Is this proportion in line with the # of personnel per environment CF-wide?

- CJOC still needs to finalize its continental defence plan (NORAD and NORTHCOM have just released theirs). The government's reset for the Canada First Defence Strategy delayed the completion of the plan. The US/Canada continental defence plan – what is the status? There is a US/Canada Assistance Plan and US/Canada Disaster Plan

- Does CJOC have an operation centre or is it more a fusion centre? In which case can CJOC handle the information pushed to it from NORAD? (Related to fact that CJOC has 3 domains, NORAD has 6) Or is it micromanaging for CJOC to have access to all of the data from NORAD?

Historic Air Force Relationship between Canada/US

- What don't we know about the period before 1957 when information started to be shared more efficiently?
- What does the US get out of NORAD?
- How relevant is history of NORAD?
- Is the impact of the new reluctance to record any information one of the drivers for informality within NORAD?

Not Broken

- air defence and aerospace defence were said to "work very well"
- Personalities, personal relationships, former job rotations seem crucial to NORAD function. However, are these relationships sustainable/robust enough?
- Canadians who "drink from the NORAD Kool-Aid" benefit from the experience. Is it the same on the US side?

Annex 1: CANUS Partnership Activities in the Arctic

Acknowledgments [18]

Cooperative Activity	Organizations Involved	Areas of Focus
Mil-Mil		
PJBD – 12 Feb 47	ADM(Pol) OSD(P), PS DHS	• Defence of the north half of the Western Hemisphere
Tri-Command Framework for Arctic Cooperation – 11 Dec 12 – emerged from PJBD direction • ICEX • Op NANOOK • Arctic SAREX • Employment & Support Plan for the North • Capability Gap Analysis	NORAD, USNORTHCOM and CJOC Note: Canadian Maritime Liaison Officer in NORAD	• Promoting enhanced military cooperation in the preparation for and the conduct of defense, security, and safety operations in the Arctic • Planning • Operations • Domain awareness • Information sharing • Exercises and training • Science and technology • Capability development
TTX – Arctic Zephyr (NDU Washington) 25-26 Jun 13	USNORTHCOM USEUCOM CJOC	• Advance Understanding of Arctic Nations' Capabilities and Means for Coordination. • Explore Operational Thresholds for Arctic Safety and Security Concerns. • Promote a Framework for International Cooperation in the Arctic. • Strengthen Arctic Partnerships.
Fleet Arctic Operations Game 13-16 Sep 11	USNWC CJOC, JTF(N), MARLANT N3, CCG	• Develop prioritized DOTMLPF-P maritime actions which support implementation of the Arctic Road Map. • List the DOTMLPF-P gaps in maritime forces‟ ability to conduct sustained maritime operations in the Arctic.

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Cooperative Activity	**Organizations Involved**	**Areas of Focus**
		• Develop near-term strategies to mitigate these identified gaps.
Arctic Intelligence Forum	MSOC (East) NMIC, ONI	Collaboration with a number of US commands via VTC exchanges
CANUS Space Users working group	DG Space NGA (National Geospatial Intelligence Agency)	• Unclassified Data Exchange of RadarSat II product
CANUS MDA Executive Roundtable	NMIC Info Sharing NORAD Maritime Liaison	•
Annual CANUS Maritime Stakeholders Conference		•
Arctic MDA Capability Assessment	IMSWG – CCG Maritime Security Lead US Agencies	• To identify and assess Canada's MDA capabilities in the Arctic, and engage relevant United States agencies to determine potential areas of bi-national Arctic MDA collaboration.
Master Exchange Arrangement for Advanced Research on Arctic Presence and Situational Awareness – 25 Oct 12	DARPA for DoD ADM(S&T) for DND	• Materials for resilience to Arctic conditions. • Space, surface, and subsurface communications in the Arctic. • Broad-area surface and subsurface situational awareness across the Arctic. • Intelligence, surveillance, and reconnaissance systems in the Arctic.
Northern Chiefs of Defence Staff (CHODS)	Eight Arctic States (Canada, Denmark, Finland, Norway, Iceland, Russia, Sweden, United States)	• developing a common operating picture; • mapping each country's roles, capabilities and ability to deploy in the Arctic; • identifying joint training opportunities; • exploring enhanced cooperation in supporting civilian authorities.
Tri-Party Staff Talks	MARLANT (MCC) USFFC, USCG Atlantic	• Information sharing and maritime domain awareness; • plans, exercises and schedules;

Cooperative Activity	Organizations Involved	Areas of Focus
		• public affairs; and • communications and information systems The Arctic, interoperability and operational level (or theatre-wide) anti-submarine warfare were areas in which specific objectives for collaboration were developed.

Annex 2: RCAF Map