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The Future of Canadian Participation in Missile Defense

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Introduction

Missile Defense in Canada is a controversial issue, due to Canadians' commitment to the elusive concept of strategic stability, which Missile Defense is believed to undermine. In addition, Canadian domestic opinion regarding Canadian-American relations is often challenged by the fear that Canadian foreign and defense policy would become so aligned with the U.S. that Canada would lose its independence. Canadians' sensitivity to procurement costs challenges the acquisition of any new defence capability, which often becomes a matter of national debate. However, future uncertainties concerning the security and defense of North America in light of the resurgence of great power competition, rogue state nuclear actors, and the rise of destabilizing technologies entangling the nuclear and conventional domains, require a revisit to the question of Canada's participation in Missile Defense in the years to come.

Canada is an active military player in the world; its geography and middle power status requires that it partners with strong nations through bi- and multilateral alliances and defence partnerships in order to secure its safety, and in turn contribute to these alliances to reinforce trust and reciprocity. This is observed in NATO, NORAD, and the Five Eyes. As part of its contribution to North American defence, the time is long overdue for Canada to contribute substantively to US missile defence. The current threat context is distinguished from previous ones defined during the Cold War, post-Cold War, and post-9/11 security environments. The threats are variable, from multiple domains, deployed by new and old actors.

This paper explores how Canada's defense policy, strategy, and capabilities will adapt with the evolution of the Canada-US bilateral North American defence relationship. This adaptation will likely see Canada's future participation in Missile Defense in a variety of ways in response to emerging threats in the international security environment, modernization of Canada's capabilities in multiple domains, and increasing integration of North American defence architecture with the USA. Canada's preference for a passive, defence-dominant role in the binational relationship in NORAD and other bilateral agreements, may shift to incremental support to, and involvement in, missile defence from non-kinetic passive defence activities to offensive roles in new domains such as cyber.

This paper investigates 1) how Canada might adapt to emerging developments in missile technologies by joining missile defence; and 2) what options it might consider in terms of political palatability, cost-benefits, modernization of current capabilities, and development of new ones. Building upon the works of well-established experts, this work considers the changing

concept of missile defence with advances in delivery technology, such as advanced cruise missiles, hypersonic vehicles, stealth aircraft, and new maritime platforms – designed to evade missile defense systems. This work begins with an exploration of the missile defence issue within the Canadian politico-strategic context, particularly domestic issues regarding an independent Canadian foreign and defense policy, and Canada's commitment to arms control, non-proliferation and disarmament. This discussion is followed by Canada's evolving role in the changing North American strategic landscape, which addresses the inconsistency of Canada's support for Aegis sea and land ballistic missile defense in Europe relative to its unwillingness to participate in North American missile defence. An evaluation of international developments in missile delivery technologies that challenge current early-warning and missile defense systems address new concepts for passive and active defenses addressing new technologies; and finally, options for Canada within the evolving integration of multi-domain systems to enhance early warning and response. The options will be assessed within the politico-strategic context concerning domestic public opinion on the effect of missile defense on strategic stability, costs of participation, and a uniquely Canadian contribution that satisfies North American defense requirements without compromising its partnership or national values.

The Canadian Domestic Political Context: Nuclear Weapons and Missile Defence

Since the beginning of the Cold War Canada chose not to possess its own nuclear arsenal, and through successive governments, it hosted and rejected stationing US nuclear weapons in Canadian territory, and struggled with the decision whether to join US missile defence programs. This section presents a brief consideration of domestic issues within the Canadian politico-strategic context that pose challenges to Canada's participation in missile defence from the Cold War to the present. Domestic issues range from concerns about an independent Canadian foreign and defense policy, a two-track contradictory policy on nuclear weapons, and Canada's commitment to strategic stability through promoting arms control, non-proliferation and disarmament (NACD).

Canada has an ambivalent relationship with nuclear weapons and missile defence. Since the Cold War, Canada has maintained a commitment to strategic stability through arms control, nuclear non-proliferation, and disarmament. This includes anti-ballistic missile defence (ABM) systems, which undermine the logic of mutually assured destruction by threatening the other state's ability to retaliate with a nuclear strike. The mutual vulnerability created by the mutual threat of annihilation, or otherwise unacceptable damage against cities, disincentivizes the use of nuclear weapons, and thus creates an equilibrium of strategic stability. The instability caused by strategic defences is through incentivizing states to create capabilities to evade missile defence through some asymmetric capability, a preemptive or preventive first strike. The ABM Treaty of 1972 (revised 1974) imposed limitations on missile defence sites to allow for mutual vulnerability, while also ensuring the survival of leadership depending on whether the state chose to protect a capital city or a missile site.[1]

[1] The 1972 ABM Treaty permitted MD to protect two targets – one missile silo and one city. The 1974 Protocol imposed further limitations on systems so that only one site could be defended – a city or a silo. NTI, "Treaty on the Limitation of Anti-Ballistic Missile Systems (ABM Treaty)," Overview – Nuclear Threat Initiative, 26 October 2011, https://www.nti.org/learn/treaties-and-regimes/treaty-limitation-anti-ballistic-missile-systems-abm-treaty/.

Canada's Policy Incoherence

From the Cold War to the present, Canada followed divergent policies on the role of nuclear weapons in national security, continental, and European defence. During the Cold War, the Department of National Defence and External Affairs were at odds on the value of nuclear weapons. Philippe Lagassé identifies the dissonance of Canada's two-track policy of promoting strategic stability through NACD in contrast to its alliance obligations, which divided the Departments of National Defence and Foreign Affairs. On the one hand Canada "tacitly endorsed and facilitated the United States' offensively oriented nuclear strategies," while (to support strategic stability and arms control) discouraging "offensive nuclear doctrines and the arms races they have tended to fuel." Lagassé argues that this contradictory two-track policy served Canadian national interests. The defence of North America required "maintaining a credible nuclear weapons posture," in spite of the emphasis on the "futility of nuclear war and arms races."[2] Notably, Lagassé affirms that the technological development of BMD threatens to "expose the contradiction and force Ottawa to give precedence to strategic defence over strategic stability, or vice-versa."[3] He states that

> The belief that BMD was destabilizing meant that Canadian participation in the system was inimical with Ottawa's declared support of strategic stability. Yet declining a role in BMD called into question Canada's commitment to the strategic defence and the logic of transmitting tactical warning and attack assessment data to NORAD. Simply put, BMD was forcing an intersection, and possible collision, of Ottawa's two-track approach to nuclear politics.[4]

Complimentary to Lagassé's two-track model, is Erika Simpson's[5] argument that Canadian policymakers held two divergent views on nuclear weapons during the Cold War: 1) Defenders who focussed on the Soviet threat and believed that Canada's security guaranteed by the U.S. and NATO's nuclear deterrence was suitable and reliable; and 2) Critics who argued that the Soviet threat was exaggerated, that Canada was trapped into war by its allies, and doubted NATO's deterrence doctrine.[6] Like Lagassé and Simpson, Duane Bratt identifies a "schizophrenic" nuclear policy of Canada, in which Canada deployed nuclear weapons in Canada[7] and supported the US deployment of nuclear weapons in European NATO states,[8] while

[2] Philippe Lagassé, "Canada, Strategic Defence, and Strategic Stability: A Retrospect and Look Ahead," *International Journal*, Vol. 63, No. 4 (Autumn 2008), 918-ff.
[3] Lagasse, "Strategic Defence," 918.
[4] Lagasse notes that Washington was largely indifferent to Canada's participation in BMD, an aloofness which allowed Canada to decline a role in missile defence without affecting NORAD's air and tactical warning mission. Lagasse, "Strategic Defence," 923.
[5] Erika Simpson, *NATO and the Bomb: Canadian Defenders Confront Critics*, McGill-Queens, 2001, 224-225.
[6] Simpson, *NATO and the Bomb*, 224-225.
[7] "Canada deployed four nuclear weapons systems—the Bomarc surface-to-air missile, the CF-104 Starfighter nuclear bomber, the Honest John short-range battlefield rocket, and the Genie air-to-air unguided rocket." Duane Bratt, "Canada's Nuclear Schizophrenia," *Bulletin of the Atomic Scientists*, 58.2 (March/April 2002): 47.
[8] During the 1950s and 1960s West Germany, Italy, Turkey, Netherlands, Greece, Belgium, and Greenland (Denmark) hosted U.S. nuclear weapons; and Britain and France stored U.S. nuclear warheads. Bratt, "Schizophrenia," 48. This relates directly to the contradiction of the articles of the multilateral 1968 Nuclear Non-Proliferation Treaty which prohibits proliferation of nuclear weapons beyond the established nuclear weapons states

actively promoting nuclear non-proliferation internationally: "Canada will continue its long tradition of nuclear cooperation with the United States – even as it strides the international stage as a leading proponent of nuclear disarmament." Bratt affirms Canada's security is dependent on its relationship with the US and nuclear weapons are critical in American defence doctrine, and reminds us that Canada "remains firmly under the protection of the American nuclear umbrella." Bratt also suggests that Canada will "in the end" support U.S. missile defence, which will either be financial or allow the U.S. to use Canadian territorial airspace.[9]

Fergusson argues that Canada pursued a doctrine of separation in order to keep missile defence off the public agenda, due to the link to US strategic nuclear forces and its implicit link to space weaponization. Keeping BMD "at a distance" was Canada's preference "even if it has meant that the defence of Canadian territory and population centres would be left to the discretion of Canada's southern ally."[10] The doctrine of separation involved treating nuclear weapons, missile defence, and military space as separate "policy baskets', but all are linked in Canadian policy through NORAD. This approach is intended to keep strategic missile defence separate from Canadian progress on bilateral cooperation on the military uses of space. Fergusson argues that this separation will unlikely continue if Canada moves forward to consider reversing its policy on missile defence, placing the issue on the public agenda.[11] Fergusson argues that in Canada's pragmatism there is no need to change its approach, but the issue of military space vis-à-vis its relationship to US STRATCOM will likely be part of the public debate when missile defence resurfaces on the agenda.[12]

The role of public opinion was particularly influential in decisions of the previous Diefenbaker, Pearson, and Trudeau governments to either station or remove US nuclear weapons in Canada. Varying degrees of public opinion had an impact on the Canadian governments' decision not to participate in missile defence since the ABM debates in the 1960s. Collins states that variables involved in these decisions include anti-Americanism, the influence of Quebec politics, and fears of space weaponization.[13] Canada declined an ABM role in 1967, Mulroney turned down formal government support to SDI in 1985, Paul Martin dithered and declined in 2004/05, Harper-Baird considered BMD and rejected participation in 2012,[14] a 2014 Senate recommendation considering a role for Canada was ignored,[15] in 2015 Trudeau indicated that BMD was off the table for Canada, and in 2017 Trudeau reiterated that the Liberal long-standing opposition to

(NPT Treaty – articles I, II, and III). However, these weapons remain under US control, so whether they actually violate the NPT can be debated.

[9] Bratt, "Schizophrenia," 45, 48, 50.

[10] James Fergusson, "Off the Radar: Strategic Defence and Military Space," in *After Afghanistan: An International Security Agenda for Canadians*, eds James Fergusson and Francis Furtado (UBC Press, 2016): 230.

[11] Fergusson, "Off the Radar," 230-231.

[12] Fergusson, "Off the Radar," 238-239.

[13] Jeffrey F. Collins, *Should Canada Participate in Ballistic Missile Defence: A Survey of the Experts*, Macdonald-Laurier Institute (July 2018), 9.

[14] The policy inconsistency is not lost on the fact that the Harper government approved European NATO BMD at the Lisbon Summit in 2010. Collins, *Should Canada Participate*, 10.

[15] A bi-partisan Senate report. Parliament of Canada, "Canada and Ballistic Missile Defence: Responding to the Evolving Threat," Standing Senate Committee on National Security and Defence (June 2014).

missile defence would not change "any time soon."[16] However, Trudeau's responses appear to merely push the issue down the road rather than closing the door on the matter.[17]

The manipulation of public opinion on the dangers of Canadian participation in missile defence includes playing on Canadian fears about giving up sovereignty to the US, prohibitive costs, the effectiveness of interception technology, diplomatic consequences, and whether Canada faces a threat. Debate among scholars on these issues is gradually narrowing, as evident in the 2018 Macdonald-Laurier Institute (MLI) report on a survey of experts about whether Canada should participate in Ballistic Missile Defence (BMD).[18] The report indicates that the majority of Canadian defence and security scholars, and missile defence experts argue Canadian involvement in BMD would not worsen Canada's diplomatic relations, with some arguing that it would better align Canadian foreign and defence policies with the NATO BMD program. Technical and operational limitations should not dissuade Canadian involvement, but rather limited BMD gives Canada access to a system under a "great power guarantor."[19] One might also argue that a limited system would enhance strategic stability through preserving some vulnerability. Financial cost is certainly a concern, given that the US has not provided a figure for Canada to consider its participation, and Canada is reluctant to consider participation without first seeing the price tag. For instance, McDonough argues that cost rather than logically inconsistent criticisms about the effectiveness of BMD is the "only element of uncertainty" about Canadian participation. Cost would also be affected by how Canada participates, whether through hosting radars or interceptors, or some other support. This is what McDonough describes as a "known unknown," namely "what the United States may require from Canada to secure both participation in missile defence and involvement in the interception process in North America.[20] Canadians are already sensitive to the costs of procuring new defence equipment and capabilities that they think is unnecessary; and uninformed and politicized opinions often have an impact when procurement becomes an item of national debate.

Criticisms about the effectiveness of GMD' GBIs, in addition to the other systems – Patriot, Aegis, THAAD – were refuted by responses in the MLI report that recent testing demonstrates increasing success of interception. Collins states that arguments that the system is "technologically infeasible and ineffective" are unfounded given the GMD system's proven capability to "deploy sophisticated countermeasures, decoys, and other advanced technologies," such as MIRVs, hypersonic speeds, and maneuverable glider technology.[21]

The MLI survey results demonstrate that the Canadian epistemic community is becoming more receptive to a Canadian role in missile defence, suggesting the time is ripe for an open and

[16] Bruce Campion-Smith, "Trudeau Weighs Calls to Join Ballistic Missile Defence," Toronto Star, 19 September 2017, https://www.thestar.com/news/canada/2017/09/19/trudeau-weighs-calls-to-join-ballistic-missile-defence.html.
[17] Lee Berthiaume, "Liberals Have Not Ruled out Joining U.S. on Ballistic Missile Defence: Sajjan," *Globe and Mail*, 4 October 2017, https://www.theglobeandmail.com/news/politics/liberals-have-not-ruled-out-joining-us-on-ballistic-missile-defence-sajjan/article36488585/.
[18] Collins, *Should Canada Participate*.
[19] Collins, *Should Canada Participate,* 19.
[20] David S. McDonough, "Canada, NORAD, and Missile Defence: Prospects for Canadian Participation in BMD," CDA Institute Vimy Paper (April 2016), 17.
[21] Collins, *Should Canada Participate,* 13-14.

informed public debate addressing the realities of the emerging North American threat and Canadian position, geographically and geopolitically. Benefits to Canada involve either further integration into the defence architecture of North America providing it with access to information on strategic planning and space; or achieving limited decisionmaking authority.[22]

Canadian domestic opinion regarding Canadian-American relations is often challenged by the fear that Canadian foreign and defense policy would become so aligned with the U.S. that Canada would lose its independence. A debate among scholars regarding this decision concerns "defence against help" with respect to Canadian sovereignty and security concerns that the United States would take action to protect its national security interests by "helping" Canada defend North America. This concern otherwise motivated Canada as a smaller power relative to its great power neighbour to establish credible measures in the form of military capabilities in cooperation with the US to defend against external threats emanating from Canadian territory bordering on the Arctic[23] – the avenue of Soviet aerial threats to the continent. The concept of "defence against help" has often been used to justify Canadian defence decisions to participate or not participate in nuclear sharing or strategic defence (missile defence), fearing "United States continental defence priorities as a threat to Canadian sovereignty … owing to potential territorial encroachment to protect the American heartland." Although "defence against help" provided a useful descriptive framework to understand Canada's approach to managing "continental security-sovereignty dilemmas" from the 1930s to the end of the Cold War, P. Whitney Lackenbauer correctly affirms that the "defence against help" concept is unhelpful as a decisionmaking strategy for Canada in the 21st century continental defence context. Rather, a rational analysis of the benefits to Canada in its bilateral and binational defence partnership should guide defence policy and investment in essential capabilities in response to evolving threats to the shared homeland.[24]

Lackenbauer's argument that Canada should calculate the benefits in its security and defence partnership with the US finds support in the shift of the Canadian government's[25] activist approach to nuclear arms control and disarmament from the late 1990s to quieter, almost silent, approach to NACD in the past decade. This shift, or retreat, in NACD activism correlates with the increasing uncertain international security context characterized by returning to great power competition, with threats emerging from new domains, and increasingly dangerous weapons

[22] Collins, *Should Canada Participate,* 19.

[23] Nils Orvik identifies the trilateral equation of external threat, smaller state, and larger neighbouring power as part of the defence against help decision calculation, assuming that the smaller power's national interest is to be a sovereign state. Nils Orvik, "Defence Against Help – A Strategy for Small States?" *Survival: Global Politics and Strategy*, 15.5 (1973), 228-231.

[24] P. Whitney Lackenbauer, "'Defence Against Help': Revisiting a Primary Justification for Canadian Participation in Continental Defence with the United States" (Waterloo: Defence & Security Foresight Group briefing paper, May 2020), 2, 10, 14. Charron and Fergusson argue that "defence against help" is an inappropriate concept for understanding Canada-US relations, as Canada has never rejected an instance of US help,[24] suggesting no evidence to the contrary. In agreement with Charron and Fergusson, Lackenbauer affirms that "the U.S. will not do anything within Canadian territory without Canadian government permission." See also Philippe Lagasse, "Nils Orvik's 'Defence against Help': The Descriptive Appeal of a Prescriptive Strategy," *International Journal*, 65.2 (2010), 463-474.

[25] Primarily key actors in Department of Foreign Affairs/Global Affairs Canada in partnership with Canadian disarmament advocacy groups.

systems. A likely explanation is that Canada is increasingly aligning its national security interests with those of the United States, its powerful ally and partner in NORAD, NATO, and the Five Eyes, among other bilateral defence cooperative agreements under uncertain and unpredictable global and continental security environment. As the Western liberal order is increasingly under threat by revisionist states, Canada is becoming more pragmatic in its appreciation of the growing threat and the benefits of its relationship with the United States through greater investment in continental defence. This alignment may also reflect increasing consistency in Canada's Global Affairs and Department of National Defence on nuclear issues, potentially impacting future decisions on missile defence participation. The evolution of North American defence opens the door for increasing participation in strategic defence via emerging integrated domains.

Revisiting Canada's Role in North American Strategic Defence in a Changing Landscape

The global strategic landscape has progressively changed since 9/11 demonstrated that North America was not immune to threats and actors originating abroad. The US withdrew from the ABM Treaty in 2002 in response to the growing threat of rogue nations or terrorists using weapons of mass destruction (WMD) against the US and its allies. This step included the US modernization of the nuclear triad, including expanding national missile defence with active and passive defences, responsive infrastructure, C2 and intelligence planning, and the entanglement of nuclear and non-nuclear strike capabilities among the sea (SLBMs), air (bombers), land delivery platforms (ICBMs). The New Triad "offers a portfolio of capabilities and the flexibility required to address a spectrum of contingencies."[26] Russia and China responded to the US withdrawal from the ABM Treaty with nuclear modernizations of their own. Rogue states such as North Korea and Iran pursued nuclear weapons technology and ballistic missile delivery technology. North Korea became a nuclear weapon state in 2006,[27] while Iran continues to develop its nuclear and ballistic missile program.

The Ground-Based Midcourse Defence (GMD) program developed out of the 1999 National Missile Defense Act policy to "deploy as soon as is technologically possible an effective National Missile Defense system capable of defending the territory of the United States against limited ballistic missile attack (whether accidental, unauthorized, or deliberate)."[28] In the post-9/11 and post-ABM context, and within the guidelines of the 2002 BMDR and 2002 NSPD-23, the Bush II Administration proceeded with developing this system of interceptors and radars[29] to

[26] Hans M. Kristensen, Robert S. Norris, and Ivan Oelrich, "From Counterforce to Minimal Deterrence: A New Nuclear Policy on the Path Toward Eliminating Nuclear Weapons," Federation of American Scientists (April 2009), 15. https://fas.org/nuke/norris/nuc_10042901a.pdf.

[27] The DPRK withdrew from the Nuclear Non-Proliferation Treaty (NPT) in January 2003 and began conducted nuclear tests since 2006. In July 2017 North Korea successfully tested an ICBM (Hwasong-14 and Hwasong-15). NTI, North Korea, Nuclear Threat Initiative (August 2019), https://www.nti.org/learn/countries/north-korea/.

[28] Thomas Karako and Ian Williams, "Missile Defense 2020: Next Steps for Defending the Homeland," Center for Strategic and International Studies - Missile Threat (April 2017), xiv-xv. http://missilethreat.csis.org/wp-content/uploads/2017/04/170406_Karako_MissileDefense2020_Web.pdf.

[29] The current GMD architecture includes: 2 interceptor sites, 7 types of sensors – land, sea, space, multiple distributed fire control systems, (2016) 36 GBI – in silos – in Alaska and California (to counter North Korea and Iran), (2017) additional 8 interceptors – 44 GBIs. New / integrated systems: sea-based X-band radar (SBX),

protect the US homeland from WMD terrorism and rogue states with nuclear ambitions. The architecture and concepts continued to evolve from the Bush to the Obama Administration, and following.[30]

In 2010 US/NATO began the first of a series of phases to deploy ballistic missile defence in Europe,[31] through the European Phased Adaptive Approach (EPAA) centred on Aegis sea- and land-based missile defence system deploying SM-3 midcourse interceptors. The Active Layered Theatre BMD system capability is intended to protect NATO deployed forces from short-, medium-, and intermediate range ballistic missiles launched from Iran. The system evolving with upgrades to the SM-3 and integration with land- and sea-based sensors.[32] The US also cooperates with allies in the Pacific theatre to deploy Aegis systems with Japan, South Korea, and Australia.[33] Since the 2010 Lisbon Summit Canada committed its support to ballistic missile defence in Europe and the Pacific theatre, but not in the continental US.[34] Canadian critics fear that Canada's participation will undermine arms control, encourage destabilizing nuclear arms

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upgraded early warning radars, SPY-1 radar on Aegis ships, forward-based TPY-2 radars. Karako and Williams, "Missile Defense 2020," xiv-xv.

[30] In December 2016 Congress passed a national defense authorization act to update policy in response to recent threats and the requirement for a more robust and layered system, expanded to defend allies and deployed forces, and provide a hedge against unpredictable regimes. CSIS, Missile Threat, 2017, xviii.

[31] At the Lisbon Summit in 2010, the NATO-Russia Council discussed cooperating on territorial BMD and a joint ballistic missile threat assessment to prepare a future cooperative framework. NATO Review, "Missile Defence," (updated 2015), https://www.nato.int/docu/review/Topics/EN/Missile-defence.htm.

[32] Details of the phases and upgrades to SM-3 interceptors available at Kingston Reif, "The European Phased Adaptive Approach at a Glance," Arms Control Association (January 2019), https://www.armscontrol.org/factsheets/Phasedadaptiveapproach.

Participating countries:

- Turkey: host a BMD radar at Kürecik
- Germany: Command Centre at Rammstein Air Base
- US: deploy Aegis BMD ships
- Romania: Aegis Ashore with SM-3 interceptors at Deveselu Air Base
- Poland: base SM-3 interceptors at Redzikowo military base
- Netherlands: upgrade four air-defence frigates with extended long-range BMD early-warning radars
- Spain: base four Aegis BMD ships in Rota.

[33] CRS for Congress, "Navy Aegis Ballistic Missile Defence (BMD) Program: Background and Issues for Congress," Congressional Research Service, RL33745, 21 June 2019, 7-8.

[34] Senate testimony of Frank Harvey highlights the inconsistency in Canada's policy on ballistic missile defence. At the NATO Lisbon Summit in November 2010 all NATO members committed to "develop the capability to defend our populations and territories against ballistic missile attack as a core element of our collective defence … we've agreed to develop missile defense capability that is strong enough to cover all NATO European territory and populations, as well as the United States." This commitment was reinforced at the 2012 Chicago Summit. Harvey correctly states that:

> As a NATO member, there is no question any longer that Canada officially endorses the logic, strategic utility, and security imperatives underpinning BMD. In essence, the Government of Canada (GoC) now fully embraces the merits of multinational cooperation on missile defence as part of Canada's treaty obligations and alliance commitments … Why would any Canadian government support BMD to protect European, American and Asian allies, territories and populations yet continue to shy away from embracing the utility of bilateral negotiations with the US to protect Canada? This serious (and potentially dangerous) inconsistency demands some logical explanation … Ottawa should engage in high-level consultations with Washington on BMD architecture, ***precisely because the government has already embraced the strategic imperatives tied to BMD***. Drawing imaginary distinctions between American, European and Asia security on the one hand, and Canadian security on the other, makes no sense.

Canadian Global Affairs Institute, "Canada and Ballistic Missile Defence," Policy Update (March 2014), https://www.cgai.ca/canada_ballistic_missile_defence.

races by provoking Russia into developing offensive delivery systems. Canada has avoided bilateral engagement with the US on BMD, preserving the status quo; all the while Russia and China proceed to develop longer-range conventional and nuclear offensive strike systems, and North Korea is advancing ICBM technology to strike targets on the West Coast of North America.

The North American strategic context is evolving in unpredictable ways as the international security environment becomes more uncertain. In addition to the evolving threat of terrorism and rogue states that emerged in the post-9/11 context, the US and its allies are now seeing a return to great power competition by Russia and China. The trajectory of destabilizing events began with Russia's annexation of Crimea in 2014, support to separatists in Eastern Ukraine, and in 2015 assistance to the Syrian Assad Regime against anti-Assad rebels in the region. The increasing deterioration of relations between the West and Russia corresponds to NATO's support to allies in Eastern Europe with its enhanced forward presence to counter Russian aggression.

The rise of revisionist states includes China's expansion in the South China Sea and increasingly aggressive behaviour against Western allies in the Asia Pacific, and its anti-access/area-denial strategy to push US assets out of the region. Russia is also deploying denial assets in Eastern Europe, the Eastern Mediterranean, and its Arctic territory. Russia and China's strategic behaviour is both regional and global. Of particular concern for Canada and the US is the development of long-range strike capabilities against North America. Russia poses the greatest threat – its hybrid methods of aggression below the threshold of conflict (including disinformation), offensive cyber operations, and advances in nuclear weapon delivery technology. From Arctic bases, Russia's land, sea, and air platforms are being modernized with hypersonic vehicles and advanced cruise missile technology that can threaten North America from a standoff position. China maintains a minimum deterrence posture with a No First Strike policy, but as its warhead numbers grow, in conjunction with modernization of its capabilities, including the conventional and nuclear entanglement of C2, this posture could change from defensive to offensive. Strategic cooperation between Russia and China intended to "reinforce strategic stability" may include Russia's assistance with China's modernization of its nuclear and conventional forces.[35]

[35] Russian analysts describes the following factors in cooperation with China to strengthening strategic stability: "Strategic partnership between Russia and China, a high level of trust and the absence of a zero-sum game between them, as well as a low probability that their bilateral relations may degrade to rivalry in the foreseeable future. A possible increase in China's nuclear capabilities will not pose a military threat to Russia." Sergei Karaganov and Dmitry Suslov, "The New Ways of Understanding and Ways to Strengthen Multilateral Strategic Stability," Russia's National Research University's Higher School of Economics, Moscow (September 2019), 5. http://svop.ru/wp-content/uploads/2019/09/REPORT_Eng_1.pdf. This report explicitly cites support of the Russian Foreign Ministry, State Duma, and Council on Foreign and Defence Policy.
Among the additional factors increasing strategic stability from the Russian perspective are two that stand out in the context of this discussion: "The newest Russian weapons guarantee its ability to inflict unacceptable damage upon the U.S." and "strengthening of asymmetrical deterrence amid waning transparency— ability of weak countries to deter militarily stronger states using the factor of uncertainty." (5)

Rogue nations are increasingly posing a threat to North America. As North Korea appears to achieve increasingly long-range ICBM capability to strike North America, the issue becomes a real concern for Canada. Its West Coast could become a soft target for North Korea to demonstrate its resolve and capabilities to the US, to coerce it from interference in the Korean peninsula. Iran poses a challenge to North America's East Coast since the US withdrew from the JCPOA. This development loosens constraints on Iran's nuclear weapon and ballistic missile delivery program, which involves achieving short-, medium-, intermediate, and long-range missile capabilities. If Iran develops the capability to strike the East Coast of the US with a nuclear weapon, Canada will also be at risk. The ending of bilateral arms control agreements like the INF Treaty, possibly New START, and multi-lateral treaties such as Open Skies and the JCPOA contributes to an atmosphere of nuclear competition between the US/NATO and its adversaries, as observed in capabilities designed to defeat missile defence systems. What is global is now regional – North America is facing unprecedented evolving threats against the continent.

Evolving North American Security and Defence

NORAD expert Andrea Charron describes this unprecedented transformation comprising a shifting geostrategic and geopolitical landscape in conjunction with the emergence of new weapons systems in her evaluation of the evolution of North American defence.[36] The former NORAD and USNORTHCOM Commander, General Terrence O'Shaughnessy, states that "We face a more competitive and dangerous international security environment today then we have in generations. And like yesterday, our security environment is marked by the re-emergence of Great Power competition with an evolving balance of power." O'Shaughnessy identifies threats to North America as Russian aircraft and surface ship incursions into the Arctic, Russia's development of hypersonic missiles tipped with both conventional and nuclear warheads, and subsurface nuclear torpedoes. He identifies the most geographically vulnerable area as the Canadian Arctic where Russian forces are active. Vulnerable targets include the North American economy, in which communications networks, dams, pipelines, power grids, and roads can be attacked. The General states that NORAD is evaluating new ways to counter North American threats.[37] More recently, the General affirms that Canada and the US have lost their military advantage over Russia in the Arctic, as Russia has been expanding its capabilities in the region, including air, maritime, and land platforms for delivering strategic weapons, such as advanced cruise missiles. He states that "in order to reclaim our strategic advantage in the high North, it is critical that we improve our ability to detect and track surface vessels and aircraft in our Arctic approaches and establish more reliable secure communications … in the higher latitudes" through a network of space-based and underwater sensors linked with traditional radar systems.[38]

[36] Andrea Charron, "From NORAD to NOR[A]D: The Future Evolution of North American Defence Co-operation," CGAI Policy Paper (May 2018), https://www.cgai.ca/from_norad_to_nor_a_d_the_future_evolution_of_north_american_defence_co_operation.
[37] Statements by NORAD commander General Terrence J. O'Shaughnessy at the Ottawa Conference on Security and Defence in 2019. James Careless, "NORAD Commander: North America is in Most Danger Since 'Height of Cold War'," *Canadian Defence Review*, 2 December 2019, http://www.canadiandefencereview.com/news?news/2624.
[38] Statements to the US Senate Committee on the Armed Forces. Lee Berthiaume, "NORAD Commander Says Canada, U.S. Have Lost Military Edge Over Russia in the Arctic," *Globe and Mail*, 13 February 2020,

In order to improve the ability to monitor activities in the North, the General promotes the Joint All Domain C2 (JADC2) concept through NORAD and USNORTHCOM – a joint capability necessary for homeland defence to provide domain awareness in real time to sense incoming ballistic missiles and new hypersonic glide vehicles and cruise missiles. This program intends to link sensors with shooters; and use predictive analysis to advise decisionmakers facing complex decisions on the consequences or outcomes "at the speed of relevance."[39]

General O'Shaughnessy's recommended responses to the growing threat is part of Canadian and American efforts to close the gap in capabilities to detect, deter, and defend against new threats to North America. Charron and Fergusson address the challenges of the modernization and evolution of North American defence,[40] which has implications for Canada's future participation in missile defence. Explored within the framework of the evolution of North American defence (EvoNAD) the binational Canada-US command NORAD evaluates the long-term implications of strategic developments.[41] Charron states that "At EvoNAD's core is the examination of immediate and future threats to North America and the utility of current defence structures and capabilities to meet them."[42] This process requires a re-evaluation of requirements to counter threats emerging in multiple domains in conjunction with revisions to Canada-US defence cooperation. The defence of the US involves the defence and security of Canada due to its geographical location at the top of the North American continent, bordering the Arctic from which aerial, ballistic, and maritime threats may arrive via the Arctic, Pacific, and Atlantic Oceans. Charron predicts greater Canada-US cooperation in the current and evolving context and suggests "the functional demands of this new threat environment could lead to NORAD's ultimate transformation into an integrated, multi-domain and dimensional North American Defense Command solution."[43] Canada's defence policy outlined in the 2017 White Paper *Strong, Secure, Engaged* does not discuss missile defence, but it does address new threats and challenges in the North American and Arctic context, the importance of the binational command NORAD and its need to evolve with the threat, in addition to upgrading the North Warning

https://www.theglobeandmail.com/canada/article-norad-commander-says-canada-us-have-lost-military-edge-over-russia/.

[39] Aerospace Nation: A Conversation with Gen O'Shaughnessy, Mitchell Institute, 4 May 2020, https://www.mitchellaerospacepower.org/aerospace-nation. See also General Terrence O'Shaughnessy and Brigadier General Peter Fesler, "Hardening the Shield: A Credible Deterrent & Capable Defense for North America," Canada Institute, Wilson Center, September 2020, https://www.wilsoncenter.org/sites/default/files/media/uploads/documents/Hardening%20the%20Shield_A%20Credible%20Deterrent%20%26%20Capable%20Defense%20for%20North%20America_EN.pdf.

[40] Importantly, Charron and Fergusson argue that the evolutionary changes to NORAD resulting from the new threat environment goes beyond upgrading and modernizing aged infrastructure and equipment. Andrea Charron and James Fergusson. "The Evolution of North American Defence." MacDonald-Laurier Institute. (24 May 2017). https://www.macdonaldlaurier.ca/norad-and-the-evolution-of-north-american-defence-andrea-charron-and-james-fergusson-for-inside-policy/. Charron, Andrea, and James Fergusson. "Beyond Modernization." In *North American Strategic Defence in the 21st Century: Security and Sovereignty in an Uncertain World*, eds Christian Leuprecht, Joel J. Sokolsky, and Thomas Hughes. (Cham, Switzerland: Springer, 2018). pp 141-148.

[41] Referencing the "Evolution of North American Defence" (EVONAD) binational study of requirements in six domains – maritime, air, aerospace, land, outer space, cyber. Charron, "From NORAD to NOR[A]D."

[42] Charron, "From NORAD to NOR[A]D."

[43] Although Charron acknowledges that this outcome is not certain and encounters barriers. Charron, "From NORAD to NOR[A]D."

System.[44] However *SSE* is silent on allocating funds to some of these initiatives. Fergusson notes that the Canadian public is "largely uninformed and disinterested" on NORAD modernization and the North Warning System, while the Trudeau government remains silent on the issue.[45]

The North Warning System (NWS) comprises a network of long- and short-range radars in the High North to detect and provide early warning of air and missile incursions into North America. This system is integral to Canada-US defence cooperation on North American security as it is directly related to the evolution of North American defence in light of emerging technological advances by adversaries.[46] Built in the 1980s the NWS was a response to the air-launched cruise missiles (ALCMs) that emerged in the 1970s.[47] The NWS is incapable of managing the modern threats posed by ALCMs today. Charron highlights gaps in which the NWS cannot identify and track Russian long-range bombers before reaching North American airspace, when they arrive at their ALCM launch points over the Arctic Ocean or further distances, and the radars cannot track ALCMs in flight due to their low radar profile signature and terrain flight paths.[48] A limited number of US AWACS platforms to detect ALCMs and SLCMs from a distance from North America coasts are available, but Canada still has no ground-based air defence to intercept missiles.[49] Fergusson adds ground-launched cruise missiles (GLCMs) to the problem mix, suggesting that the long-range GLCM threat against North America may be possible if Russia deploys them in the Arctic.[50] Thus, Charron asserts that the next generation NWS will need to identify and track air-breathing threats and maritime threats. It requires ground-, sea-, and space-based sensors; and needs to move further North and down the North American east and west coastlines. A "new NWS will entail integrated land, air, sea and space systems into a single system-of-systems construct."[51] Charron suggests that with new capabilities being developed by Russia, namely next-generation long-range air-launched cruise missiles (ALCMs) and sea-launched cruise missiles (SLCMs), in addition to hypersonic delivery vehicles, the conditions are set for the "merger of air and missile defence, and the air and outer space domains."[52]

New Capabilities and New Deterrence Concepts

Missile Delivery Technological Challenges to Current Early Warning and Missile Defense Systems

The *2019 Missile Defence Review* (MDR) outlines the new direction for America's missile defence strategy in response to innovations in offensive weapons systems, including new

[44] Department of National Defence / Canadian Armed Forces, *Strong Secure Engaged: Canada's Defence Policy,* (2017), 79-80.
[45] James Fergusson, "Missed Opportunities: Why Canada's North Warning System is Overdue for an Overhaul," MacDonald-Laurier Institute (January 2020): https://macdonaldlaurier.ca/files/pdf/20191219_NORAD_Fergusson_COMMENTARY_FWeb.pdf.
[46] Fergusson, "Missed Opportunities."
[47] Fergusson, "Missed Opportunities."
[48] Charron, From "NORAD to NOR[A]D."
[49] Charron, "From NORAD to NOR[A]D."
[50] Fergusson, "Missed Opportunities."
[51] Charron, "From NORAD to NOR[A]D."
[52] Charron, "From NORAD to NOR[A]D."

domains, that threaten the US homeland.[53] In describing the new challenges that leave gaps in the missile defence capabilities to track, target, and destroy missiles, the MDR also outlines improvements in missile defence systems of adversaries. One might consider whether a missile defence gap is emerging within the strategic competition, particularly in light of the increasing denial capabilities being pursued by Russia and China.

The 2019 MDR is consistent with policy, strategy, capabilities outlined in the 2017 National Security Strategy, 2018 Nuclear Posture Review, and 2018 National Defense Strategy. These documents outline emerging strategic challenges, requirements for new concepts and capabilities, including expanding nuclear arsenal and missile defences to respond. Both General O'Shaughnessy and the MDR describe the need for a system to manage all missile threats, not just ballistic missiles, but a layered integrated system to deal with HGVs, advanced CMs, ISR gaps, and other challenges.[54] In a statement at the CSIS in 2019 O'Shaughnessy indicated that existing and planned BMD is capable of meeting the threat from North Korea, but they were never designed for the Russia and China's large stockpile of missiles capable of flying at various ranges.[55] The evolution and expansion of MD reflects the shift in nuclear posture from the former administration. However, as early as 2015, the US National Security Strategy describes increasing concern for a catastrophic attack on the US homeland or critical infrastructure. The 2018 NPR is distinguished from the previous Nuclear Posture Review, as a "return to pragmatism" in an "uncertain future security environment." This approach provides justification for expanding and diversifying the nuclear arsenal, shifting from a mission limited to defending against ballistic missiles (BMD), to new missile threats posed by hypersonic vehicles and advanced cruise missiles, and possibly detecting and intercepting unmanned underwater vehicles, invites broader missile defence concepts.

In considering new deterrence concepts, O'Shaughnessy argues that the question of deterrence has changed in dealing with Moscow and Beijing. When the adversary has hypersonic, cruise missiles and cyber capability, he asks whether there are new definitions of "cost imposition" on them to deter attack. He suggested that the US response does not have to be kinetic but could be cyber to deter an aggressor.[56] One might suggest the original purpose of BMD, namely to reduce or eliminate the coercive and deterrent value of weapons[57] – i.e. deterrence by denial – remains the central concept. The methods through which to achieve this purpose against multiple weapons in multiple domains is the challenge, through various means – conventional, unconventional, kinetic, and non-kinetic; with the requisite ISR capabilities in all domains.

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[53] US Department of Defense, *2019 Missile Defence Review*, https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR_Executive%20Summary.pdf.
[54] See O'Shaughnessy and Fesler, "Hardening the Shield."
[55] John Grady, "NORTHCOM Says U.S., Canada Must Maintain 'Clear-Eyed' View of Arctic Threats," *USNI News*, 23 July 2019, https://news.usni.org/2019/07/23/northcom-says-u-s-canada-must-maintain-clear-eyed-view-of-arctic-threats. CSIS, "Homeland Defense and the Role of NORAD and USNORTHCOM: A Conversation with General Terrence O'Shaughnessy" [video], CSIS Headquarters, 22 July 2019, https://www.csis.org/events/homeland-defense-and-role-norad-and-usnorthcom-conversation-general-terrence-j-oshaughnessy.
[56] Grady, "NORTHCOM." CSIS, "Homeland Defense."
[57] McDonough, "Canada, NORAD, and Missile Defence," 15.

New Offensive Weapons Systems

The conditions under which the US withdrew from bi- and multilateral arms control (ABM, JCPOA, INF, Open Skies) provides a strong indicator of future cooperation in the future, including potentially allowing New START to expire in February 2021 without renewal. The current environment can be described as a volatile transition phase – post-INF and pre-New START expiration. In this new era of the US and Russia losing confidence in arms control, we are seeing the removal of constraints to destabilizing technologies, in conjunction with the emergence of new systems not addressed by arms control. Under these conditions, Russia in particular is developing capabilities intended to bypass early warning and missile defence. Russia's cooperation with China on new systems also has implications for North American security. In developing offset technologies to American conventional and nuclear advantages, Russia and China attempt to restore parity by having capabilities that can defeat missile defence. Notably, CSIS reports that "Foreign missile threats have continued to evolve in number, range, sophistication, and survivability." They are longer-range, more accurate, and diverse. The multifaceted threats that could overcome current defence systems of the US and its allies include "advanced cyber intrusions, electronic warfare, and hypersonic boost glide vehicles."[58]

The Threat from Russia

Efforts to contain Russia have failed … nobody wanted to listen to us. Listen now.[59]

The most pressing missile threat to North America is Russia. At the May 1, 2018 State of the Union Speech in Moscow, Russian President Vladimir Putin unveiled new high-tech nuclear weapons in response to Western anti-missile systems that could erode Russia's nuclear deterrent: underwater drones, intercontinental missiles, and hypersonic weapons designed to evade missile defences. Putin argues that Russia's growing military might will ensure strategic stability in the world.[60] Pointing to the US withdrawal from the ABM treaty, Putin blames the West for creating conditions that require Russia to develop advanced strategic weapons, particularly those who "seek unilateral advantage against Russia." Putin's statements provide a glimpse into Russian intentions to secure its ability to threaten the West asymmetrically with new weapons systems, which could be used as coercive tools so that Russia could continue to expand its sphere of influence. In defending Russia's position, Putin identifies the US nuclear strategy as threatening to lower the nuclear threshold, that any use of nuclear weapons against Russia would result in an "immediate response." Russian advances in nuclear delivery systems pose the greatest threat to North America,[61] as do North Korean ballistic missile and nuclear programs. Russia-China

[58] Karako and Williams, "Missile Defense 2020," xvi, xix.
[59] March 1, 2018, President Vladimir Putin's State of the Union speech was held at Manezh Central Exhibition Hall in Moscow. President of Russia – Kremlin, "Presidential Address to the Federal Assembly," Moscow, 1 March 2018, http://en.kremlin.ru/events/president/news/56957.
[60] Olga Tanas and Andrey Biryukov, "'Nobody Listened to Us. Listen Now': Putin Warns the U.S. with Nuclear Weapons Display, *Globe and Mail*, 1 March 2018, https://nationalpost.com/news/world/nobody-listened-to-us-listen-now-putin-warns-the-u-s-with-nuclear-weapons-display.
[61] Russia has recently pressed the US to renegotiate New START before it expires, but it is clear that any agreement to extend or renew will require limitations on missile defence. Such constraints are now difficult to envision with its

cooperation[62] – "Our comprehensive strategic partnership with the People's Republic of China" – may involve Russian assistance to Chinese advances in their nuclear forces, reinforcing the threat of this new strategic peer competitor.

Russia is the only nuclear peer competitor to the United States, although China is quickly becoming a competitor by rapidly modernizing its comparatively smaller arsenal. Russia's modernization of its large and diverse arsenal includes a number of technological offsets for which current US missile defence and early warning are not equipped, namely the Avangard hypersonic glide vehicle, a new heavy ICBM (Sarmat) with MIRVs, the new Bulava SLBMs with MIRVs deployed on Borei-class SSBNs, the Kinzhal high precision air-launched ballistic missiles (deployed on Tu-22M3M, MiG-31k interceptors, and planned for the next generation Sukhi-57 stealth fighter), the Kh-101/Kh-102 Raduga conventional and nuclear-capable long-range standoff ALCM (deployed on Tu-160, Tu-95MS16, Tu-22M3/5, and Su-27IB (Su-32) strategic bombers),[63] Kalibr land-attack cruise missiles, Poseidon autonomous underwater vehicle,[64] and the (failed) Burevestnik hypersonic cruise missile. Hypersonic capabilities are particularly problematic for missile defence. Hypersonic glide vehicles (HGVs) travel at immense speeds (above Mach 5), as do ICBM re-entry vehicles; however, HGVs are incredibly maneuverable, which make them difficult to track and intercept because they can change direction quickly without predictability. Advanced cruise missiles also pose a significant challenge to missile defence due to their low-altitude path and maneuverability – they cannot be detected by ground-based radars until they close in on their targets.[65] The Poseidon unmanned underwater torpedo can use stealth to detonate a nuclear warhead against a coastal city. Russia's advantage in longer-range standoff weapons is that it can launch these systems from outside North American air- and maritime-space - many platforms can threaten North America from Russia's Arctic territory. The INF Treaty-violating ground-launched cruise missile – the Novatar 9M729 (SSC-8) – can threaten NATO allies in Europe.[66]

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new strategic weapons platforms that directly threaten North America. Unless advanced cruise missiles, hypersonic vehicles, and other systems such as unmanned underwater vehicles are also constrained, it will be difficult to pursue this venue of enhancing strategic stability. This is a reality Canada must consider in moving forward on the evolution of North American security and defence.

[62] Karaganov and Suslov, "New Ways of Understanding."

[63] Center for Strategic and International Studies, "Kh-101/Kh-102, Missile Threat – CSIS Missile Defense Project, https://missilethreat.csis.org/missile/kh-101-kh-102/.

[64] CRS for Congress, "Russia's Nuclear Weapons: Doctrine, Forces, and Modernization," 5 August 2019.

[65] Putin claims that these new generation weapons' intense maneuvering – lateral and vertical – make them invulnerable to air or missile defence systems. Putin, 2018.

[66] This concern relates to Russia's so-called "escalate to de-escalate" doctrine in which "Russia would prevail in a conventional conflict against a superior military force (read: NATO) by detonating a tactical (low-yield) nuclear weapon in the battlefield, in order to force the US to move down the escalation ladder." This doctrine has been debated and refuted by analysts as an assumption made through a Western perspective following Russia's withdrawal from its No First Use pledge in the 1990s, and its exercises simulating using a tactical nuclear weapon on the battlefield. Non-Western analysts have argued Russia's intention to lower the nuclear threshold in a conflict is "far from convincing." Olga Oliker states that "the combination of what states write, what they say, what they exercise, and what they build should provide a good sense of their actual policy." Olga Oliker, "Russia's Nuclear Doctrine: What We Know, What We Don't, and What That Means," CSIS (May 2016), 2. https://csis-prod.s3.amazonaws.com/s3fs-public/publication/160504_Oliker_RussiasNuclearDoctrine_Web.pdf. Nancy Teeple, "Offensive Weapons and the Future of Arms Control," (May 2019). [Article submitted to Canadian Journal of European and Russian Studies].

As a revisionist state with global ambitions, China is modernizing its arsenal, which is currently a small minimum deterrent force with a "No First Use" doctrine. Like Russia, China is enhancing its SLCMs and ALCMs and hypersonic capabilities, and developing new ballistic missile systems with MIRVs, MARVs, decoys and jamming devices.[67] Its strategic forces modernization includes upgrading its road-mobile ICBM numbers with MIRVs, and shifting to solid-fuel rockets. With these developments China is attempting to asymmetrically offset US strategic advantages pursuing capabilities to assure retaliation against the US.[68] China is deploying A2/AD systems "including a "wide range of mobile air and missile defense capabilities" to deny the US capability and freedom of action to protect allies in Asia. This includes regional ballistic missile strike capabilities at medium- and intermediate-ranges, in addition to anti-satellite capabilities that can threaten US space-based assets.[69] China's qualitative and quantitative modernization indicates a shift from minimum deterrence to an offensive posture. China's regional and longer-range delivery systems are not the only threat to the US and its allies; its Arctic ambitions[70] and cooperation with Russia create new challenges for North American defence and countering China in the polar region.

North Korea is rapidly advancing its ballistic missile program, including intercontinental range capabilities in the Pacific region. In addition to explicitly threatening the US with nuclear weapon use, it has increased testing of its ballistic missiles signaling to the US and regional allies its intention to use its capability to "coercive nuclear preemptive threats, and potentially could employ nuclear weapons in the event of conflict in Asia."[71] North Korea's ICBM ambitions could threaten the US homeland, and by proxy, Canada's West Coast. Political rhetoric and missile tests put the issue on the Canadian radar and was briefly mentioned in Canadian media the question of Canada's participation in missile defence. Participation would benefit Canada protecting it from a missile that could accidentally strike Canadian territory by missing its US target, or a deliberate "soft targeting" of Canada to coerce the US in a confrontation.[72] The 2019 MDR indicates that North Korea's investment extensive missile testing has "neared the time" when it could credibly threaten the US homeland.

Iran seeks to expand its regional influence and status through its nuclear and ballistic missile program. Iran's nuclear program inspired US and NATO plans to deploy the BMD system in Europe. Its success in "improved accuracy, range, and lethality" can threaten US forces and allies in the Middle East, Eastern Europe, and South Asia;[73] and its longer-range developments

[67] MDR 2019, II, IV, VII, 6, 13, 19-21.
[68] McDonough, "Canada, NORAD, and Missile Defence," 14.
[69] MDR 2019, VI.
[70] China considers itself as a "near-Arctic state," pursuing the Polar Silk Road as part of its global Belt and Road Initiative.
[71] MDR 2019, II, V.
[72] It is suggested that Canada, without protection of BMD, "may be subjected to nuclear blackmail or 'held hostage' with a threat of a strike or even actual attack." Eric Fleming, "Time to Tango: Embracing Canada's Participation in Ballistic Missile Defence," Macdonald-Laurier Institute Commentary (May 2017), 3.
[73] MDR 2019, V.

may post a challenge to the East Coast of North America.[74] The latter development led the Obama Administration to consider whether to install a GBI site in the northeast of the US. In Canada, this included discussion among defence officials and analysts whether Canada would install an X-Band radar site in Goose Bay, Labrador, to detect an incoming missile from the Middle East.[75]

New Concepts: Active and Passive Defenses, and Attack Operations Should Deterrence Fail

As a distinct feature of missile defence, deterrence by denial is evolving with the threat and the modernization of the Triad. The denial mission of missile defence can range from partial to comprehensive defence. The former by deploying limited systems to protect a launch site, C2 site, or a major (capital) city; and the latter to defend an entire nation (or continent) from all types of missile threats. Missile defence employs advanced technology with hit-to-kill vehicles guided by advanced sensor systems and a "look-shoot-look" doctrine. The missile defence architecture is improving with warhead tracking, target discrimination (one of the most difficult BMD tasks), and computer processing to increase its effectiveness. However, as the system improves adversaries seek to develop less costly countermeasures and decoys to overcome the system.[76]

The Four Roles of Missile Defence

The 2019 MDR outlines the four roles or missions of Missile Defence: Deterrence, Active Defence, Passive Defence, and Attack Operations. These are presented below with an assessment of their offensive and defensive roles, kinetic and non-kinetic capabilities, to ensure adversaries cannot threaten the US with long-, medium-, or short-range ballistic missiles or cruise missiles.

<u>Role 1: Deterrence</u>

Deterrence is a concept based on the rational calculation of the costs versus benefits of taking an action, and disincentivizing an actor to take a certain action by imposing consequences that far outweigh the benefits of taking the action. Mutually Assured Destruction[77] embodies this concept between nuclear competitors that use their nuclear forces to mutually threaten countervalue targets – economic and population centres and C2. This is deterrence by punishment, using the threat of retaliation to prevent an action. The mid-Cold War shift to counterforce – offensive strike options to disarm the adversary's nuclear platforms to prevent their launch – defines deterrence by denial, which considered more credible options among a flexible spectrum of potential responses to nuclear threats. Missile defence provides the ultimate denial capability and thus is intended to disincentivize the adversary from attempting (or threatening) a strike because such action would be futile and would generate a counter-response.

[74] The MDR indicates that Iran's Space Launch Vehicle (SLV) program establishes the technical foundation to shorten the timeline for Iran to achieve ICBM capability. MDR 2019, 3.
[75] David Pugliese, "Canada May Host Radar Site for US Missile Defence System," *Ottawa Citizen*, 28 June 2013. David S. McDonough, "Canada, NORAD, and Missile Defence," CDA Institute Vimy Paper, No. 31 (April 2016), 10. David S. McDonough, *Back to the Future: Debating Missile Defence in Canada … Again*, CDFAI (June 2013), 2.
[76] McDonough, "Canada, NORAD, and Missile Defence," 16.
[77] Thomas Schelling, *Arms and Influence* (Yale University Press, 1966), 24 - "The Diplomacy of Violence.

However, the point of missile defence is to provide options for denial if deterrence fails, which requires some combination of the three other functions: active defence, passive defence, and attack operations.[78]

Role 2: Active Defence

Active Defence is the primary mission of missile defence capabilities – to intercept a missile in flight, at the mid-course or terminal phase. This is a right-of-launch denial role that can be perceived as offensive by the adversary (i.e. denying his ability to strike), or defensive by the state deploying the system for homeland defence or defence of allies. The capability involves kinetic interception of the missile via a hit-to-kill capability; although laser technology development is in progress to expand interception options.

Role 3: Passive Defence

Passive Defence is described in the 2019 MDR as measures "intended to mitigate the effects of a missile attack" or "mitigate the potential effects of offensive missiles." The elements involved are: hardening; dispersal; deception; redundancy; enhanced resilience and defence of bases, logistics, and other key facilities and functions.[79] This role for missile defence is defence dominant, reinforcing deterrence calculations in the mind of the enemy by providing a capability to survive a strike and retaliate with remaining capabilities. This defence dominant role might offer the most receptive option for Canadian participation in missile defence beyond providing early warning/ISR.

Role 4: Attack Operations

Attack operations are described in the 2019 MDR as operations to destroy offensive missiles prior to launch. These operations are conceptualized as "left of launch" or "left of bang." This is what Charron and Fergusson refer to as intercepting the "archers" (platforms) rather than the "arrows" (missiles) pre-emptively.[80] Given the emergence of new domains of warfare, such as space and cyber, attack operations can be carried with kinetic or non-kinetic means. Attack "left of launch" operations fall within pre-emption doctrine, and are thus deterrence by denial systems which are by nature offensive. They have the capability to disrupt, degrade, or destroy both first strike and retaliatory nuclear platforms. Among the critics of missile defence left of launch will be viewed as most problematic, potentially incentivizing adversaries to strike first before they lose their window of opportunity. Nevertheless, this capability also impacts the adversary's calculation of the costs of appearing to be preparing to launch a strike; rather than losing a missile by active defensive measure, entire platforms could be lost.

Left of Launch

Alternatives to active defence are being explored according the 2019 MDR, promoted by STRATCOM and the Missile Defense Agency. Director of Reserve Forces and Mobilization Assistant to the Commander of STRATCOM, Major-General Rick Evans advocated for

[78] MDR 2019.
[79] MDR 2019, 63-64.
[80] Charron and Fergusson, "Evolution of North American Defence."

"integrated war-fighting solutions beyond an active defense."[81] Arguing that the US does not have the "money, capability, and capacity, the General indicated the importance of refocusing on passive defence, non-kinetic, tactical operations, and C4 network architectures: "missile defense is part of the holistic continuum of offensive and defensive war-fighting integration … It requires a global network of sensors, all-source intelligence, integrated fires — both left and right of launch — lethal and nonlethal and ballistic missile [C4] and intelligence. That is what is going to address today's and tomorrow's threats." The language of "Left of Launch" (i.e. left of bang) communicates an emphasis on denial, as adversaries themselves are seeking to "deny access in contested environments." In line with the MDR concept of an integrated approach to counter missile threats, Evans suggests that "there is more value potentially from pre-launch boost phase intercept, cyber and passive capabilities." Such capabilities include: "hypersonic glide vehicles, boost-phase killers, improved sensors, better radars and kill vehicles, more capacity across the spectrum and … directed energy." Former Commander of Army Space and Missile Defense Command Lieutenant General James Dickinson stated that

> For comprehensive missile defense, we need to strengthen and integrate other elements including defeating adversary missile systems left of launch or shortly after launch; layered approaches to include cyber, electromagnetic spectrum and possibly directed energy; and we also need to consider and remember that there is no silver bullet to defeating these threats.

Dickinson also addressed the need for a space-based sensor layer as part of the "next generation space architecture to enable military operations."[82] As recently stated by O'Shaughnessy,[83] Dickenson also indicated that Low Earth Orbit satellites will facilitate and provide advantages in communications and data transfer.

These new concepts and plans for technological innovation to carry out the four roles for missile defence: deterrence, active defence, passive defence, and attack operations, provides opportunity to explore options for Canada that span non-kinetic options, passive defences, and revised approaches to deterrence.

Options for Canada's Participation in Missile Defence

This section considers options for Canada within the evolving integration of multi-domain systems to enhance early warning and response. Exploring options considers Canada's operational role or involvement in the missile defence architecture. One of the challenges is whether Canada will participate in any offensive operations within the realm of active defence or attack operations that involve right or left of launch. As North American defence evolves and adapts – NORAD and the Tri-Command framework – Canada's contribution may span the defence to offense spectrum of options depending on the domain(s) involved. Early on, support for passive defence and providing enhanced ISR might best fit in with Canada's preferences, and

[81] Statements at a symposium on Space and Missile Defence on August 6, 2019.
[82] Jen Judson, "Should the DoD Shift Focus Toward Passive Missile Defense?" *Defense News*, 6 August 2019, https://www.defensenews.com/digital-show-dailies/smd/2019/08/06/should-the-dod-shift-focus-toward-passive-missile-defense/. Note: this article seems to conflate Passive Missile Defence with the concept otherwise described in the MDR 2019 as Attack Operations – i.e. Left of Launch.
[83] Aerospace Nation, "Conversation with Gen O'Shaughnessy."

these options might be considered along an incremental shift over time towards more active and offensive means. Canada may choose partial or full participation, but it remains to be seen what this would look like. Canada may also prefer a non-kinetic role, even in offensive operations, rather than a more active kinetic mission.

Canada's Current Role in Strategic Defence

The Canada-US continental defence relationship involves a series of formal and informal arrangements, namely NORAD, bilateral defence arrangements involving MOUs, and the Permanent Joint Board on Defence. Since 2006, NORAD's mission involved aerospace warning and control of air and space, airspace control – defence against air-breathing rather than aerospace threats, and maritime warning (not control).[84] NORAD's limited role in missile defence is providing early warning and attack assessments. Although Canada is not a part of missile defence, it does cooperate in providing warning and characterization of missile threats under its aerospace warning mission.[85] Canadians can warn the US about an impending attack, but it cannot participate in responsive decisionmaking or interception, which is NORTHCOM's mission. Canada is currently outside the protection of US GMD.[86] In a 2017 statement to a parliamentary committee, Lieutenant General Pierre St-Amand, Canadian deputy commander of NORAD, warned that the US is under no obligation to defend Canada against an incoming missile: "We're being told . . . that the extant U.S. policy is not to defend Canada."[87] This situation could change in the context of evolving North American defence and security.

A number of proposals for Canadian participation suggest expanding its existing roles in early warning, assessment, and data sharing. Other proposals include a more active interception role. New domains, such as space and cyber offer unique opportunities for Canada to explore non-kinetic left of launch approaches to disabling systems electronically. New domains and advanced technological development offers Canada the option to participate in the research, development, and testing of kinetic and non-kinetic missile defence capabilities through MOUs with US defence industry.[88] The following discusses options in different domains, which Canada may choose to expand upon and pursue a combination of roles in multiple domains.

Cyber

Canada is slowly developing a cyber capability, although it remains behind its allies in this domain. Cyber could be an option for Canada to contribute to missile defence in a non-kinetic role to detect, disrupt, destroy, or deter adversaries' launch capabilities through offensive cyber-attacks. In 2018, Futter and Collins considered this option through the Bill C-59 framework that expands the Communication Security Establishment's mandate to allow for offensive cyber

[84] McDonough, "Canada, NORAD, and Missile Defence." 5.
[85] Charron and Fergusson, "Evolution of North American Defence," 146, ft. 11.
[86] McDonough, "Canada, NORAD, and Missile Defence," 17.
[87] Campion-Smith, "Trudeau Weighs Calls."
[88] Fleming, "Time to Tango," 5.

activities.[89] Although the CSE is administered under DND, it is likely this option would have to be CAF-only role, which requires Canada to step-up its Cyber Command to be capable. This role falls within MDR's attack operations, which might have implications regarding acts of war, and may encounter resistance in the domestic Canadian context.

Of Archers and Arrows: Canada in Cruise Missile Active Defence

Charron and Fergusson recognize the need to intercept launch platforms ("archers") and not just focus on the ("arrows"). This approach implies intercepts close to Russia, which could shift NORAD's posture from defence to defence/offence, via a preemptive strategy. This shift would involve delegating new authorities to NORAD or under the Tri-Command relationship purview, which the authors argue would have C2 implications. Charron and Fergusson suggest that Canada might prefer to leave the archers to the US, and focus instead on the counter-cruise missile defence function of intercepting arrows (active defence) by air, ground, and sea-based capabilities in a binational military division of labour. Although there might be limited domestic support for Canada hosting an interceptor site, Fleming suggests Canadian interceptors would increase its relevance to the US.[90] Canadian interceptors could also provide another layer against missiles that make it through US GMD.[91] In order to fill the gap in the North, they suggest Canada could allow US fighters to deploy to northern FOLs for the archer mission. Although a politically contentious issue, they argue that this approach is covered by NATO Article V.[92] In addition, this approach would be consistent with supporting the US BMD system in Europe. Fergusson suggests in light of the delay of the replacement of the CF-18 with anti-cruise missile capabilities (which also may not be sufficient), shorter-range, ground-based anti-CM defences (like a point defence system) might be necessary to defend limited geographical areas. He notes that *SSE* prioritizes ground-based air defences for investment – for overseas, but also possibly North America. He suggests however, that Canadian homeland point defences are unlikely to be part of NWS modernization cost-sharing.[93]

The maritime threat is also relevant to defence against cruise missiles, particularly those launched from sea-based platforms. These SLCMs become air-breathing threats, which might require integrating air and maritime defence, linking the regional commands.[94] Currently maritime defence cooperation occurs between the Royal Canadian Navy and the US Navy through MOUs.[95] McDonough considers the maritime option in Canada's participation in missile

[89] Andrew Futter and Jeffrey Collins, "Deciding on a Canadian Approach to Missile Defence," MacDonald Laurier Institute, 20 August 2018, https://www.macdonaldlaurier.ca/deciding-canadian-approach-missile-defence/. Stephanie Carvin, "Zero D'Eh: Canada Takes a Bold Step Towards Offensive Cyber Operations," *Lawfare*, 27 April 2018, https://www.lawfareblog.com/zero-deh-canada-takes-bold-step-towards-offensive-cyber-operations.
[90] Fleming, "Time to Tango," 6.
[91] James Fergusson and David McDonough, "WMD Proliferation, Missile Defence and Outer Space: A Canadian Perspective," in *Canada's National Security in the Post-9/11 World: Strategy, Interests, and Threats*, ed David McDonough (University of Toronto Press, 2012), 253-268.
[92] Charron and Fergusson, "Evolution of North American Defence." The authors suggest another option: that Canada could "agree to disagree," although this would re-create the "defence against help" which would strain Canada-US relations. Charron and Fergusson, "Beyond Modernization," 141-148.
[93] Fergusson, "Missed Opportunities."
[94] Charron and Fergusson, "Evolution of North American Defence."
[95] Charron and Fergusson, "Beyond Modernization," 146.

difference through the backdoor of NATO – a multilateral, rather than bilateral option, to which Canada might be more receptive. This option involves a Canadian role in the sea-based Aegis BMD mission; and considers whether this role should involve long- or short-range missiles, and/or perhaps cruise missiles.[96]

Early Warning / ISR

Some analysts argue that Canada is already a "de facto" participant in a ballistic missile warning role through NORAD,[97] which supports missile defence, if indirectly. With the evolution of North American strategic concepts and defence, NORAD could expand its role into new areas, particularly All Domain Awareness in the Arctic,[98] an important capability being promoted by General O'Shaughnessy.[99] One challenge is that NORAD is no longer the only early warning provider. The US has deployed other systems that provide missile defence warning, such as new fixed and mobile X-band radar assets that provide tracking and cueing capabilities; and sensors that feed information to ground and sea-based systems not linked to NORAD and outside GMD.[100] However, there is a debate about whether these other systems make NORAD obsolete, or merely result in curtailing its aerospace role.[101] Charron and Fergusson maintain that NORAD is the obvious solution to demands of the new threat environment. If it provides surveillance to more domains, it provides the Commander with more information that takes "decisions further out in time and space." This role expands NORAD's missions while also distancing the Command from "the threat to bang continuum."[102]

New Radars and Sensors

Fergusson argues that participation begins with interception or a dedicated co-located radar not linked to NORAD or its early warning mission.[103] NORAD provides early warning to missile defence, which is the extent of its role in that program. Canada could deploy a radar in contribution to NORAD's early warning in formal participation in missile defence, which would provide Canada with its desired access to US continental missile defence intelligence, systems information, and operational planning.[104] At the time, Fergusson stated that early warning is not missile defence, but this could change with a decision to establish a third site in the northeast of the US to counter Iranian developments in long-range ballistic missile technology in conjunction with successfully achieving a nuclear capability. This third site would require greater

[96] McDonough, *Back to the Future*, 6.
[97] Senate Standing Committee on National Security and Defence, "Canada and Ballistic Missile Defence: Responding to the Evolving Threat," 1 June 2014, https://sencanada.ca/content/sen/committee/412/secd/rms/01jun14/Report-e.htm. Fleming, "Time to Tango," 3.
[98] McDonough, "Canada, NORAD, and Missile Defence," 6.
[99] See Sensors and JADC2 in O'Shaughnessy and Fesler, "Hardening the Shield."
[100] McDonough, "Canada, NORAD, and Missile Defence," 5.
[101] McDonough, "Canada, NORAD, and Missile Defence," 6.
[102] Charron and Fergusson, "Beyond Modernization," 147.
[103] James Fergusson, "The NORAD Conundrum: Canada, Missile Defence, and Military Space," *International Journal* 70:2 (2015), 206.
[104] Fergusson, "NORAD Conundrum," 206-207.

participation,[105] at the very least a Canadian radar site on its East Coast – an X-band radar site in Goose Bay,[106] as proposed in 2005. Fleming suggests that Canada could station radar and sensor sites in its territory "assist in the detection, discrimination, and tracking of missiles … as well as the determination of a successful interception." By virtue of its geography, Canada would provide a valued contribution in support of an interceptor site in the northeast US, in the event that Iran succeeds in advancing its ballistic missile and nuclear program to ICBM capability.[107]

Outer Space

Canada's space assets provide an opportunity for an expanded role in missile defence through enhancing space situational awareness. As part of the US Space Surveillance Network, Canada's Sapphire Satellite is part of a network that indirectly provides data to both NORAD and the GMD system through Strategic Command.[108] Although Canada-US space cooperation has been managed bilaterally outside NORAD (although NORAD tracks inbound missiles and other objects in orbit),[109] a revisit to Canada's participation in missile defence would impact NORAD's role in keeping early warning separate from missile defence.[110] In addition to Sapphire, other Canadian space assets might provide an option to be integrated into a missile defence role, such as the polar Radarsat-2 and RADARSAT Constellation, which could enhance All Domain Awareness.[111] Fergusson suggests an "asymmetric" contribution in military space would allow Canada to be involved in strategic defence with hope that it would lead to NORAD obtaining a strategic defence C2/ballistic missile mission. This option allows Canada to contribute asymmetrically, and keep strategic defence at a distance," which is less problematic for domestic politics.[112] Fergusson mentions that it is uncertain how space security will unfold over the next decade; and since the publication of this article, the space domain has emerged as significant strategic region, including the standing up of the US Space Force. Adversaries' developments of kinetic and non-kinetic ASATs threaten satellites networked to ground systems through disruption, disabling, and possible destruction. Canadian defence interest in accessing space implies possible future investments in non-kinetic defensive space capabilities, such as "satellite hardening, maneuverability, stealth, reconstitution alongside surveillance," rather than denial capabilities, which imply a role in space weaponization. Canada's interest in the peaceful uses of outer space would be maintained through this passive defence capability leaving the more problematic offensive missions to the US.[113]

Conclusion

This paper predicts that Canada's thinking on continental defence requirements will shift towards increasing support for missile defence, particularly in the post-INF context, as adversaries

[105] Fergusson, "NORAD Conundrum," 209.
[106] David S. McDonough, "Back to the Future," 5.
[107] Fleming, "Time to Tango," 5-6.
[108] David S. McDonough, "Back to the Future," 5. Fergusson, "NORAD Conundrum," 210-213.
[109] Charron and Fergusson, "Beyond Modernization," 141-148.
[110] Charron and Fergusson, "Evolution of North American Defence."
[111] McDonough, "Canada, NORAD, and Missile Defence," 11.
[112] Fergusson, "Off the Radar, 243-46. Fergusson, "NORAD Conundrum," 196-214.
[113] Fergusson, "Off the Radar," 245-246.

increase their ability to threaten North America with advanced missiles and other offensive systems. The evolution of North American defence, including its missile defence architecture with new deterrence concepts and capabilities opens the door to a re-evaluation of Canada's participation. With the increasing integration of domains and capabilities in the evolution and modernization of the binational defence command, opportunities open for new Canadian roles in the continental defence architecture. A variety of options are available, with the potential to expand contribution from early warning, assessment, and data sharing to actively deploying interceptors, or taking an offensive non-kinetic role. These options will depend on receptivity in the domestic political context, sensitivity to cost, sovereignty, and being seen as supporting the US offensive nuclear posture. Canada's receptivity and role will also be influenced by the uncertainty created by the evolution of missile threats from adversaries. These include Canada possibly becoming a target for adversary coercion to demonstrate resolve to the US, testing its extended deterrence policy, and efforts to divide allies. Canadian pragmatism in joining the US in North American missile defence provides benefits by increasing its credibility as a defence partner, strengthening the binational relationship, leverage and influence in decisionmaking processes, and being prepared for the risks, threats, and challenges posed by an increasing uncertain and unpredictable security environment.

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