Journal of Military and Strategic Studies

VOLUME 23, ISSUE 1

Considerations for the Future of Canadian Military Air Power

Brad Gladman

Looking at an always uncertain future must be done with care. The simple fact is that the future is unknown, and unknowable. Whatever techniques one may use to look beyond the current time, the truth is that the future cannot be foreseen. As Nobel Laureate Neils Bohr is reputed to have said, "Prediction is difficult, especially about the future."[1] The problem, first and foremost, is always epistemic – how do we know what we think we know? The answer is that we cannot know what lies ahead; we can only guess.[2] Despite this, thinking about the future is something that cannot be eschewed. The challenge becomes finding methods that do not attempt to get that future exactly right, just not so catastrophically wrong that national security is compromised. This paper will identify the main considerations for determining the future Royal Canadian Air Force (RCAF)[3] that Canada needs and will argue that it should be balanced for the defence of Canada, and by extension that of North America. It will use the capacity achieved through that balance to be able to make a meaningful contribution to preserving

[1] This quote is also attributed to baseball player Yogi Berra, so the source is uncertain, but the sentiment holds true.

[2] Gregory Smolynec, Don Neill, Brad Gladman, Peter Archambault, Michael Roi, and Charles Morrisey, "Defence Scientists' Reflections on CDS's Future Security Environment 2007-2030, Part One dated November 2007," DRDC CORA TN 2008-01, February 2008, p.4.

[3] The term 'future RCAF' is part of the accepted three-force model. The *force of today* is the force in being and those capabilities at initial operational capability (IOC); the *force of tomorrow* relates to capabilities under development; the future force is a conceptual force being designed to respond to future missions and tasks. See Record of Decision Air Force Terminology Panel, 19-20 March 2019.

ISSN : 1488-559X

international peace and security to give the Government of Canada (GC) the options needed to meet the range of challenges ahead.

Consideration 1: The Context

Answering the question of what kind of future RCAF Canada needs requires *confronting* the three exigencies of Canadian defence, which are the defence of Canada, being a strong and reliable partner in the defence of North America, and contributing to international peace and security through overseas operations.[4] These priorities were reiterated in the 2017 defence policy *Strong, Secure, Engaged* (SSE), and likely will remain central pillars to future defence policies. Within those exigencies, the Royal Canadian Air Force (RCAF), along with the Canadian Army (CA) and the Royal Canadian Navy (RCN), must develop and generate forces for employment in response to the Force Posture and Readiness (FP&R) directive from the Chief of the Defence Staff (CDS).[5] However, from an air force perspective, those concerns are mostly the force of today, and there is still some flexibility for the RCAF to define a future for itself within the broader vision for the Canadian Armed Forces (CAF) to meet the challenges ahead.

This paper is predicated on the axiom that the security environment will continue to be dynamic and uncertain. With that said, it is possible to identify a range of possible military operations in support of a whole of government effort to protect Canadians and

[4] Douglas Bland has argued that there are two imperatives and a choice in *Canada's National Defence, Volume 1: Defence Policy* (Kingston: School of Policy Studies, Queen's University, 1997), pp. 3-4, but these are enduring priorities even if the emphasis can shift for political reasons. For examples see, Department of National Defence, *White Paper on Defence* (Ottawa: Queen's Printer, 1964), pp.13-15; Department of National Defence, *Defence in the 70s: White Paper on Defence*, (Ottawa: Information Canada, 1971 pp. 17, 25, 32, 39; Department of National Defence, *1994 White Paper on Defence*, https://publications.gc.ca/collections/collection_2012/dn-nd/D3-6-1994-eng.pdf (accessed 4 July 2023), chapters pp,4-6; Department of National Defence, *Canada's International Policy Statement: A Role of Pride and Influence in the World: Defence*, https://publications.gc.ca/collections/Collection/D2-168-2005E.pdf (accessed 12 July 2023), pp. 16, 21, 24; Department of National Defence, *Canada First Defence Strategy*, (Ottawa: 2008),pp. 7-9.

[5] This directive is the first step in fielding ready forces. See https://www.canada.ca/en/department-national-defence/corporate/reports-publications/departmental-plans/departmental-plan-2021-22/planned-results/ready-forces.html (accessed 3 July 2023).

advance national interests. Each end of this spectrum will demand unique capabilities that may not transfer well to the other end. On the one hand, the threat posed by radical Islamist insurgencies as experienced in the recent campaign in Afghanistan and Islamist militants like Daesh[6] recently fought in Iraq and Syria, will continue to be a challenge in various parts of the world in which Canada has a keen interest. On the other hand, one cannot forget the threats from states with advanced militaries like Russia and China whose recent actions are cause for concern and potentially a threat to the defence of Canada and the strategic entity of North America. Indeed, recent developments show that the Arctic could again become a key area of Great Power rivalry. It is here that the RCAF should place its force development (FD) emphasis, on developing capabilities suitable for the defence of Canada and North America.

Consideration 2: The Resurgence of Great Power Interest in and Through the Arctic

There is no doubt that the Arctic holds a special place in Canada's national identity, both now and in the past. Some have written that the *North* to Canadians "is more of an idea than a place."[7] That idea and the Canadian attachment to the North is spawned by the notion that it is synonymous with the country itself.[8] Mounting an effective defence against Russian and Chinese encroachment on the Canadian Arctic is something that likely would resonate more strongly with the Canadian public and, in particular, political leadership. The military developments and increased activity in and through the Arctic from the Chinese and Russian militaries could take the form of an anti-access/area denial challenge to the free flow of air and naval traffic over and through

[6] The acronym 'Daesh' is used by Arabic speakers for ISIS Arabic name 'Al-Dawla al-Islamiya fi al-Iraq wa al-Sham.' See Terry Terriff, John Ferris, and James Keeley, "*Hic Sunt Dracones!" Journal of Military and Strategic Studies*, Volume 15 Issue 4 (2014), p.1.

[7] Kenneth Eyre, P. Whitney Lackenbauer, ed., *Custos Borealis: The Military in the Canadian North, 1898-1975,* (Peterborough Ontario: North American and Arctic Defence and Security Network, 2020), p. 5.

[8] Brad W. Gladman and Peter M. Archambault, "The Canada-US Strategic Defence Relationship: Methodology and Case-Study Synopses," DRDC CORA TM 2009-063, December 2009, p. 53.

the Arctic, negatively impacting the trade that may flow through this region as climate change opens it up over time.

Russian Anti-Access/ Area Denial in the Arctic

The term anti-access (A2) refers to action "intended to slow deployment of friendly forces into a theater or cause forces to operate from distances farther from the locus of conflict than they would otherwise prefer. A2 affects *movement* to a theater."[9] Area-denial (AD) refers to action "to impede friendly operations within areas where an adversary cannot or will not prevent access. AD affects *maneuver* within a theater."[10] Neither of these ideas is new. The attempt by an adversary to prevent reinforcement and limit manoeuvre is as old as warfare, but as always technological advances change the character of those environments.

The resurgence of Russia under Vladimir Putin has seen a re-emphasis of military modernization as a tool with which to re-establish control over its near abroad not seen since the end of the Cold War.[11] The current conflict between Ukraine and Russia, from its annexation of parts of Ukraine in 2014 to its ongoing invasion beginning in 2022, has forced the US and its allies to once again think about containing or confronting Russia.[12] Some evolution in thinking about how best to do so is needed, even though the same Russian motivations are at play.

A significant amount of that military modernization has been devoted to the Russian navy, and in particular its submarine fleet. It recently added a new Borei-class Ship, Submersible, Ballistic, Nuclear (SSBN) submarine to its fleet.[13] These vessels are

[9] "Air-Sea Battle: Service Collaboration to Address Anti-Access & Area Denial Challenges" (Washington D.C.: Air-Sea Battle Office, May 2013), p. 2. Emphasis in the original.
[10] *Ibid.* Emphasis in the original.
[11] The following section is drawn largely from Brad Gladman and Andrew Billyard, "Royal Canadian Air Force (RCAF) Future Air Operating Concept (FAOC) Functional Concepts: Advice and Example," DRDC-RDDC-2017-L346, October 2017, pp. 10-14.
[12] Justin A. Evison, "MIGS and Monks in Crimea: Russia Flexes Cultural and Military Muscles, Revealing Dire Need for Balance of Uti Possidetis and Internationally Recognized Self-Determination," *Military Law Review* 220 (June 2014), 91; *The National Military Strategy of the United States of America 2015* (Washington DC: Joint Chiefs of Staff, 2015), pp. 1, 2, and 4.
[13] Franz-Stefan Gady, "Putin's 'Red October': Russia's Deadliest New Submarine," *The Diplomat*, 4 March 2015.

capable of nuclear and conventional launch capabilities and are a key part of the potential Russian threat to North America.[14] Along with these boats are the Russian navy's newest nuclear-powered attack submarine, the Yasen-class Kazan, armed with long-range Kalibr cruise missiles and advanced torpedoes.[15] In total, Russia's Northern Fleet, which is the principal naval force in the Arctic, has roughly 25 submarines and approximately twenty surface vessels, including cruisers, destroyers, frigates, an aircraft carrier, and amphibious ships.[16] At the same time, the Arctic is rising in priority for Russia, from ranking third in its 2016 Foreign Policy Concept to second in 2023, after its European near abroad.[17] It remains to be seen whether the strength of the Northern Fleet will be diminished due to needs elsewhere, but the advanced vessels could be used in an anti-access role to prevent the insertion of follow-on forces from North America or to prevent freedom of manoeuvre in Arctic waters, or those associated with any future conflict area.

In the air and space domains, a recent development reflects an evolution in Russian military thinking. In August 2015 Russian Defence Minister Sergey Shoigu announced the unification of Russia's air and space forces into an "Aerospace Forces Command.[18] This change from the Cold War structure, where Soviet air and space forces were under the command of different branches of the Soviet armed forces, was prompted by what Shoigu referred to as a "shift in the combat 'center of gravity' toward the aerospace theater."[19] These arrangements continue the 2011 merger between Russia's space and air defence forces into the Aerospace Defence Forces, whose purpose was to defend Russian airspace from air and space attacks. Moreover, the Aerospace Forces Command has significantly streamlined the command and control of Russian Long-Range Aviation

[14] *Ibid.*
[15] Loulla-Mae Eleftherious-Smith, "Russia launches most powerful nuclear attack submarine yet," *The Independent*, 5 April 2017, http://www.independent.co.uk/news/world/europe/russia-nuclear-attack-submarine-yasen-class-tass-kalibr-cruise-missiles-east-europe-severodvinsk-a7667511.html (accessed 5 October 2017). Some of the Yasen-class boats are expected to carry the Tsirkon hypersonic cruise missile.
[16] Igor Delanoe, "The Russian Navy and the Arctic: A New Reality, Old Challenges, *Network for Strategic Analysis*, 23 August 2023 https://ras-nsa.ca/the-russian-navy-and-the-arctic-a-new-reality-old-challenges/#:~:text=The%20principal%20naval%20force%20in,(within%20the%20Murmansk%20region) (accessed 28 October 2023.
[17] *Ibid.*
[18] Matthew Bodner, "Russian Military Merges Air Force and Space Command," *The Moscow Times*,p. 3 August 2015, https://themoscowtimes.com/articles/russian-military-merges-air-force-and-space-command-48710 (accessed 5 October 2017).
[19] *Ibid.*

(LRA), tactical aviation, air and space ISR assets, and potentially anti-satellite weaponry possibly targeting US and coalition space-based ISR and communications.[20] This potential avenue of attack would be enhanced through a Russian cyber-attack against the uplink and downlink of space-based systems. The US Time-Phased Force and Deployment Data (TPFDD) system depends upon an array of data links bringing together information from a range of sources and would constitute a prime target at the outset of a conflict.[21] These efforts to streamline the command and control of the Russian Federation Aerospace Forces (RFAF) enhance its ability to support Russia's A2/AD strategy.

Along with the command and control changes, recent efforts to modernize its Soviet-era TU-95 Bear H, TU-160 Blackjack, and Tu-22M Backfire bombers have added new lethality to these Cold War aircraft, although recent sanctions and other priorities have seen the modernisation programs progress "at a snail's pace."[22] Upgrades to avionics to improve precision and survivability, as well as enhancing command, control and communications functions add to their overall effect. So too do developments with precision strike weapons with their reduced radar cross-sections and improved range and accuracy will enhance the efficacy of Russian LRA once reliability and serviceability matters are resolved.[23] As well, in September 2010 Vladimir Putin announced the development of the next-generation Russian strategic bomber, known as the Prospective Aviation Complex for Long-Range Aviation (PAK-DA).[24] The broad specifications for this aircraft are for it to be a 'flying wing' low-observable design cruising at subsonic speeds, capable of carrying a range of precision-guided munitions including long-range hypersonic air-to-

[20] *Ibid.*
[21] Andrew F. Krepinevich, *Why AirSea Battle? p.* 16.
[22] Matthew Bodner and Aaron Mehta, "Heightened Ops Tempo Reveals Russian Air Force Vulnerabilities," *Defense News* (13 July 2015).
[23] Defense Intelligence Agency, "Russia Military Power: Building a Military to Support Great Power Aspirations," DIA 11-1704-161, http://www.dia.mil (accessed 5 October 2017); Sebastien Roblin, "Russia's TU-95 Bear Bomber: Everything You Need to Know." *The National Interest*, 4 May 2017, http://nationalinterest.org/blog/the-buzz/russias-tu-95-bear-bomber-everything-you-need-know-20484?page=2 (accessed 11 October 2017).
[24] Franz-Stefan Gady, "Russia Moves Ahead With Future Strategic Stealth Bomber Project," *The Diplomat*, 2 March 2017, https://thediplomat.com/2017/03/russia-moves-ahead-with-future-strategic-stealth-bomber-project/ (accessed 5 October 2017; Franz-Stefan Gady, "Russia's New Stealth Bomber to Make Maiden Flight Outside Moscow in 2025-26, https://thediplomat.com/2019/08/russias-new-stealth-bomber-to-make-maiden-flight-outside-moscow-in-2025-26/ (accessed 30 August 2023).

surface missiles with both conventional and nuclear payloads.[25] Currently under development, this aircraft is expected to fly in 2025 but will not be in active service for some time, but it represents Russia's desire to once again be seen by the world as a Great Power.

All of these capabilities are being deployed in and around Russia's near abroad, but also in the Arctic. This is a concern of all Arctic nations, including Canada, and may be something that will increase in importance with the possibility of the Arctic opening to year-round maritime traffic and the already increasing air traffic. The free movement of goods safely by ship through this region will be a priority if the Arctic waters are able to be navigated for some or all of the year. Recent Russian investments in military capabilities in the Arctic could threaten freedom of navigation. These include the development of new bases and airfields in the Arctic, unifying command of these forces under a Northern Joint Strategic Command, and plans to deploy new radar sites and SAM systems possibly of the types described earlier further complicates this situation.[26] In the end, the defence of Canada from threats from and through the Arctic, including hypersonic weapons, is one of time and distance and compressed timescales related to the defence of the strategic entity of North America. Thus, an RCAF FD emphasis on the defence of Canada and North America is all the more sensible.

Chinese Activity in the Arctic

While publicly downplaying its ambitions to become a polar Great Power, it seems that is what China is seeking to become. Some scholars, like Frédéric Lasserre, argue that the Chinese interest in the Arctic is motivated mainly by economic opportunities and that the threat is overblown.[27] However, military planners cannot afford to be hopeful, and Chinese leadership describes the Arctic in their own publications as a new strategic

[25] "Russia Moves Ahead With Future Strategic Stealth Bomber Project."
[26] David Barno and Nora Bensahel, "The Anti-Access Challenge You're Not Thinking About," *War on the Rocks*, 5 May 2015, https://warontherocks.com/2015/05/the-anti-access-challenge-youre-not-thinking-about/ (accessed 13 October 2017).
[27] Frédéric Lasserre, "China and the Arctic – Threat or Cooperation?" presentation to the RCAF Air Power Symposium, 21 April 2017.

frontier and an area of future military competition.[28] Former Chinese Ambassador to Norway Tang Guoqiang commented that the Arctic region has important strategic military value and that if one "dominate[s] the Arctic region [one] can occupy the 'commanding heights' of the world's military."[29] Moreover, its scientific efforts give it greater experience in operating in and accessing, the Arctic, and many of its infrastructure investments appear dual-use.[30]

As well, China has just launched its first nuclear-powered guided missile submarines (SSGN) that give it the ability to attack from both land and sea in a way that was formerly the sole province of the US and Russia. A Pentagon report to Congress noted a series of concerning developments with China's military, including that it will have over 1,000 nuclear warheads operational by 2030. It has also launched "two SHANG III (TYPE 093B)-class guided-missile nuclear attack submarines (SSGN) between May 2022 and January 2023." [31] It is expected to have three hulls of this class operational by 2025.[32]

These developments have been accompanied by a recent trend of Chinese warships sailing into the approaches to North America, and even into the US exclusive economic zone around Alaska. In September 2022, for example, a US Coast Guard vessel on a routine patrol in the Bering Sea came across a Chinese guided-missile cruiser that

[28] Rush Doshi, Alexis Dale-Huang, and Gaoqi Zhang," Northern Expedition: China's Arctic Activities and Ambitions, *Foreign Policy, Brookings Institution,* April 2021,

[29] *Ibid., p.* 12.

[30] Anne-Marie Brady, *China as a Polar Great Power* (Cambridge: Cambridge University Press, 2017), p. 70; Anne-Marie Brady, "Facing Up to China's Military Interests in the Arctic," *The Jamestown Foundation*, 19:21 (December 10, 2019), pp. 21-23.

[31] US Department of Defense, "Military and Security Developments Involving the People's Republic of China, 2023," pp. 55-56 https://media.defense.gov/2023/Oct/19/2003323409/-1/-1/1/2023-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF (accessed 26 October 2023).

[32] *Ibid, p. 56.*

sailed roughly 86 miles north of Alaska's Kiska Island.[33] The vessel was escorted by two other Chinese and four Russian ships. This was just the latest in a series of encounters with Chinese naval vessels in the Bering Sea and off the Aleutian Islands, but the latest incident came just after the warning from NATO Secretary General Jens Stoltenberg about Chinese interest in the Arctic and Russian military buildup there. This has been viewed as a pledge by Russia and China to intensify operations in the Arctic, and forms "part of the deepening strategic partnership that challenges our values and our interests."[34]

Consideration 3: Other Enduring Challenges

SSE demands a great deal from the RCAF at a challenging time. It outlines a spectrum of expectations from the GC for the CAF.[35] But given the range of domestic and international contingencies, and the spectrum of conflict from 'small wars' to those of national survival, the question remains how can the RCAF develop the range of capabilities needed for all eventualities? The short answer is that it is very difficult to do so, as conflict at each end of this spectrum demands capabilities that may not transfer well to the other end. On the one hand, the threat posed by radical Islamist insurgencies as experienced in the recent campaign in Afghanistan, Iraq and Syria will continue to be a challenge in various parts of the world in which Canada has a keen interest. On the other hand, militaries are needed primarily for wars that one cannot afford to lose.

In any *small war* operation, the costs of employing advanced air power will have to be considered. In attempting to balance operational abilities with fiscal realities, it is clear that certain platforms are more expensive to operate and sustain in operations, and some have capabilities that are simply not needed for low-end or irregular warfare. The

[33] The Associated Press, "Coast Guard spots Chinese guided missile cruiser off Alaskan Island," https://www.nbcnews.com/news/us-news/coast-guard-russia-chinese-guided-missile-cruiser-alaska-rcna49548 (accessed 12 July 2023).

[34] Jens Stoltenberg," NATO chief warns Canada that Russia, China have designs on the Arctic," https://www.cbc.ca/news/politics/nato-stoltenberg-trudeau-russia-china-1.6563825 (accessed 12 July 2023).

[35] Department of National Defence, Strong, Secure, Engaged: Canada's Defence Policy (Ottawa: 2017).

cost per flying hour of an F-35, according to a 2022 Government Accountability Office (GAO) report, the total costs per flying hour was US $41,986.[36] This figure does not differ significantly from the costs per flying hour of a CF-188. Operating advanced fighters is, quite simply, an expensive proposition.[37] Other similarly advanced aircraft would be equally expensive. While the effects delivered by these aircraft are indispensable in certain circumstances, the cost of maintenance, fuel, and increased airframe wear for irregular warfare operations make their use for such operations questionable. This has caused the US Air Force (USAF) to look to develop or modify a light turboprop training aircraft for such operations that would see the costs per hour drop to roughly "$1000-$2,000 per flight hour with a more flexible aircraft able to fly from more airfields and provide more coverage in benign environments."[38] Canadian defence spending would prohibit this option, and the specific character of each conflict would have to determine whether the costs of deploying advanced aircraft are worth the risk.

Consideration 4: Allied Perspectives on Canadian Defence

The sensitivity displayed routinely by the US in avoiding any perception of violating Canadian sovereignty stands in sharp contrast to a prevailing theme in much of the scholarship on Canada-US relations, that of *Coping with the American Colossus*.[39] Many of these scholars would have agreed with former Prime Minister John Diefenbaker's later take on close cooperation with the US in continental defence – that it endangered Canadian sovereignty. The question of how to preserve sovereignty under such

[36] Government Accountability Office, "Weapon System Sustainment," GAO-23-106217 https://www.gao.gov/assets/820/813896.pdf (accessed 28 October 2023), p. 210.
[37] *Ibid.*
[38] Thomas P. Ehrhard, *An Air Force Strategy for the Long Haul*,p. 82; also see Bruce Rolfsen, "USAF Eyes Propellor Planes for Irregular Wars," *Defense News* Vol. 23, Issue 47 (12 August 2008), and Marcus Weisgerber, "ACC Officials Want Air Force Irregular Warfare Fleet of Aircraft" *Inside the Air Force ,p.* 7 November 2008.
[39] There are many examples of this kind of scholarship, see David Carment, Fen Osler Hampson, and Norman Hillmer, eds., *Canada Among Nations 2003: Coping with the American Colossus* (Ottawa: Oxford University Press), 2003; Gerard S. Vano, *Canada: The Strategic and Military Pawn* (New York: Praeger, 1988); Lewis Hertzman, John Warnock, and Thomas Hockin, *Alliances & Illusions: Canada and the NATO-NORAD Question* (Edmonton: M. G. Hurtig Ltd., 1969).

circumstances has been addressed in scholarship often called 'defence against help'. This argument, first posed by Nils Ørvik in 1973 as a security strategy for small states, holds that large and powerful countries pose a threat to the sovereignty of their smaller neighbours unless the latter can provide credible defences.[40] In the absence of such capability and the willingness to employ it, the more powerful country may be forced to violate the smaller state's sovereignty. Some have argued that the geographic position of Canada between the US and the Soviet Union put Canada "in a classic defence against help situation" during the Cold War.[41]

Yet, this does not appear to be the case regarding Canada. As James Fergusson and Andrea Charron have written, the defence against help theory is the wrong one for Canada. Indeed, while they hold that Canada's free-riding on defence may change the American approach, they argue that "there has yet to be a scenario in which the United States has provided help which the Canadian government has rejected.[42]

That having been said, it is also true, although by no means is this a new development, that Canada's key allies are becoming ever more vocal about their perception that Canada does not spend enough on defence.[43] Against this has to be set

[40] Richard Evan Goette, "Canada, the United States and the Command and Control of Air Forces for Continental Air Defence from Ogdensburg to NORAD, 1940-1957" (PhD thesis from Queen's University, 2009), 11; also see Whitney Lackenbauer, "From 'Defence Against Help' to 'A Piece of the Action': The Canadian Sovereignty and Security Paradox Revisited," University of Calgary Centre for Military and Strategic Studies Occasional Paper No. 1 Small States?," *Survival*, Volume 15 Issue 5 (September-October 1973); Nils Ørvik, "The Basic Issue in Canadian National Security: Defence Against Help/Defence to Help Others," *Canadian Defence Quarterly* 11:1 (Summer 1981).

[41] Goette, "Canada, the United States and the Command and Control of Air Forces for Continental Air Defence from Ogdensburg to NORAD, 1940-1957", p. 11.

[42] Andrea Charron and James Fergusson, "Canada and Defence Against Help: The Wrong Theory for the Wrong Country at the Wrong Time," in Thomas Juneau, Philippe Legasse, and Srdjan Vucetic, eds., *Canadian Defence Policy in Theory and Practice* (Palgrave Macmillan, 2019), p. 100.

[43] For a few examples of this see Lee Berthiaume, "Canada faces fresh pressure on military spending as NATO chief eyes hard target," https://nationalpost.com/pmn/news-pmn/canada-news-pmn/canada-faces-fresh-pressure-on-military-spending-as-nato-chief-eyes-hard-target (accessed 24 October 2023); Murray Brewster, "Dozens of political and military luminaries call on Ottawa to stop backsliding on national defence," https://www.cbc.ca/news/politics/national-defence-trudeau-nato-1.6811632 (accessed 24

the significant contribution of the Canadian Armed Forces (CAF) to the Afghanistan conflict, the contribution of valuable capabilities in CAF operation IMPACT (coalition *Operation Inherent Resolve*), and the other ways by which the CAF commits to the defence of Canada, North America, and contributes to international peace and security. Despite this, the refrain from key allies about backsliding on defence continues. When interviewing senior RCAF officers for the RCAF Strategy, this was a common refrain. In their view, it was becoming more intense to the point where it would be very difficult to ignore.[44] Perhaps just as important, it has been joined by voices from inside the country calling on Canada to stop backsliding on national defence.[45] The point simply is that our key allies are being consistently more vocal about Canada's defence spending. The opportunity is at hand for the RCAF to reinforce Canadian sovereignty and change these views by doing something of particular value to the defence of Canada and North America when the US is focusing on its so-called pacing threat of China in the Pacific.

Consideration 5: Balance or Niche? The Characteristics of the Future RCAF

Both the establishment of Russia's Arctic command, along with the opening of new and former Soviet Arctic military airfields and deep-water ports, and the growing Chinese interest and capability of operating in the Arctic underscores the relevance of the RCAF Strategy's determination to focus its force development efforts on the defence of Canada and the strategic entity that North America has become.[46] This is similar to the Canadian Army's emphasis, given the geostrategic reality of Canada's position in the world, that it would emphasize expeditionary operations instead of domestic and

October 2023); Murray Brewster, "PM's former adviser says there's no indication Canada was invited to join AUKUS defence pact," https://www.cbc.ca/news/politics/aukus-u-s-australia-u-k-nuclear-subs-canada-defence-spending-1.6837792 (accessed 24 October 2024).

[44] As required by the Human Resource Ethics Committee (HREC) 2021-032, the interview recordings were destroyed following analysis.

[45] Berthiaume, "Canada faces fresh pressure on military spending as NATO chief eyes hard target;" Murray Brewster, "Dozens of political and military luminaries call on Ottawa to stop backsliding on national defence;" Murray Brewster, "PM's former adviser says there's no indication Canada was invited to join AUKUS defence pact,"

[46] Gladman and Archambault, "The Canada-US Strategic Defence Relationship, " pp. 21, 23, 27, 58, 64.

continental.[47] This allowed the army to argue for tanks and artillery instead of sandbagging and snow removal equipment.

For the RCAF to emphasize the defence of Canada and North America is both a wise and politically astute move, as it will enable the Air Force leadership to argue strongly for capabilities the RCAF currently does not possess. It is particularly so since the Royal Canadian Navy (RCN) has recently "shifted the weight of [its] presence to the Pacific" and the Canadian Army's focus remains expeditionary operations.[48] Since the defence of Canada is a CAF responsibility, one cannot argue that the others will be able to provide the missing capabilities. Moreover, that emphasis likely will resonate more strongly with the Canadian public and political leadership than for capabilities that are intended mainly for operations outside of North America.

It is important to note that emphasis does not meet exclusively the defence of Canada and North America. It turns out that the capabilities needed for this emphasis are exactly those needed for expeditionary operations, with the possible exception of specific munitions. Moreover, in developing a balanced RCAF that can free up the US to operate against China if required, the RCAF must continue its seamless operation with the US through NORAD. In short, if one gets NORAD right then one can operate with the US needed, from NATO to coalitions operating around the globe. The emphasis simply means that in a conflict with Great Powers – whether Russia or China – the RCAF should focus on the defence of Canada and North America. In anything less than a full conflict between peer adversaries, the extra capacity from a balanced RCAF that is not needed for the defence of Canada can be used to integrate seamlessly with the US or its allies in other operations around the globe. Essentially, those instances would be *niche* contributions from an RCAF balanced for the defence of Canada and North America.

What is a Balanced Air Force?

[47] Department of National Defence, *Designing Canada's Army of Tomorrow: a Land Operations 2021 Publication* (Kingston: Directorate of Land Concepts and Designs, 2011), pp. 42–43.

[48] John wherever Grady, "Head of Royal Canadian Navy Outlines Ottawa's Pacific Strategy," *USNI News* 7 November 2023, https://news.usni.org/2023/11/07/chief-of-royal-canadian-navy-outlines-ottawas-pacific-strategy (accessed 15 November 2023).

There has long been a debate about whether air forces should be balanced or consist only of specific niche capabilities. In the past, those debates have normally been fuelled by armies and navies that wanted specific types of air power for their own purposes, and by air forces that wanted a wider spectrum of capabilities and a lead rather than a supporting role. It is now more commonly accepted that a balanced air force is an essential contribution to national security, and it is difficult to argue that point. But what does a balanced air force really mean? The RAAF defines balance as the ability to carry out the four fundamental roles of control of the air, strike, air mobility, and ISR.[49] That is fine as far as it goes, but the context surrounding that balance is important. In other words, balanced for what operating environment?

The first point that needs to be made is that a balanced air force does not necessarily have to be a large air force. An air force that does not have the full range of air power capabilities and could only conduct a few functions can be referred to as a 'niche air force'. A balanced air force, by contrast, must "be the repository of all airpower capabilities in order to carry out its mandated function."[50] Balance does not necessarily connote size. Smaller air forces can maintain a balance appropriate to their own threat perception and appreciation of their country's regional and global ambitions. It is also important to note that single services do not win campaigns on their own and that while the national goal might be balanced armed forces, "it will always be necessary to have a balanced air force as an integral element within it. A balanced air force is critical to national security."[51]

All of the RCAF strategic guidance documents, from GC policy to the RCAF's recent strategy, combined with the threat environment described earlier, lead to the conclusion that an RCAF balanced for the defence of Canada and North America is the

[49] Air Power Development Centre, "Pathfinder Collection – Volume 5," https://airpower.airforce.gov.au/sites/default/files/2021-03/PFV05-Pathfinder-Collection-Volume-5.pdf (accessed 5 October 2023), pp. 67-69.

[50] "Facets of Air Power: A Balanced Air Force," *Pathfinder: Air Power Development Centre Bulletin*, Issue 167 (November 2011), 1.

[51] *Ibid.*, 2.

air force Canada needs.[52] Moreover, that balanced future RCAF would allow the types of capabilities essential to a meaningful niche contribution to NATO or other coalition operations of relevant capabilities from the capacity developed for the defence of Canada and North America. Balance for a smaller air force is less about the number of platforms, although numbers still do matter and more about the effects created through the synergistic and synchronous application of the right quantity and type of capabilities to exploit the inherent flexibility and impact of air power across its core missions.

Strengthening Deterrence by Denial

While most of those who led the US and Canadian air forces after World War Two likely believed that air power was best used offensively, the value of what has become known as 'deterrence by denial' was understood during the Cold War.[53] In all forms of deterrence, the credibility of one's deterrent lies in the mind of the adversary's leadership. It comes by demonstrating clearly that an attacker will not achieve their desired goals, and that the response will be too costly to be worthwhile. In recent years, the concept of *deterrence by denial* has re-emerged and has been redefined in response to technical developments by potential adversaries seeking to attack North America. During the Cold War, the emphasis was on deterring a nuclear attack, while the new focus of NORAD and the RCAF was on deterrence of a conventional attack. Yet, some similarities still exist. Similar to certain times in the Cold War, potential adversaries feel they have eroded a once-held military advantage to the point where an effective defence is not certain. Thus, as was done in the Cold War, those adversaries may seek to challenge Canada and the US at home, holding their population, critical infrastructure, and power projection capabilities at risk.[54] Re-establishing the initiative will require making it clear to those

[52] RCAF Strategy, 3, 9, and 18. Moreover, this emphasis is expected to be central to the forthcoming update to SSE.

[53] Brad Gladman, Continental Air Defence: Threat Perception and Response (Ottawa: DRDC CORA TM 2012-257, 2012), p. 13.

[54] "Canada, U.S. must do more to check Russia's military moves in the Arctic, says NORAD chief," CBC News, 12 February 2019, https://www.cbc.ca/news/politics/russia-arctic-norad-missiles-1.5016654; USAF Academy Special Collections, Papers of Nathan Twining (MS 22), Box 15, "Suggested Remarks for General

adversaries that they will not succeed, and that the risks of attack far outweigh the potential benefits.

There have always been three fundamental conditions necessary for successful deterrence.[55] The first is determining the enemy's level of incentive. Russia, for example, has demonstrated a pattern of behaviour that suggests that it might be willing, in times of conflict in Europe, to threaten or attack strategic targets in North America to lock down forces and thereby prevent reinforcement in Europe.[56] The second condition lies in making it clear what enemy action is being deterred, as well as the consequences of defiance. This is more difficult when talking about deterrence by denial, which does not solely rest upon punitive action. However, those statements of what action is being deterred must be equally clear. Unqualified and unfocused statements that do not define the actions being deterred have proven to make conflict more likely by inciting, rather than deterring, enemy action.[57] While those statements must be clear, they must also be unprovocative, and the forthcoming Canadian defence policy update likely focusing on the defence of Canada and North America is an important signal of intent. Finally, a demonstration of the strength necessary to carry out the promised actions – in the case of deterrence by denial it is through a demonstration that the attack will not succeed – must be demonstrated to the aggressor that those deterring its actions have the capability and will to do what they say. Effective deterrence has always been a complex and nuanced enterprise, but where these three criteria have been met deterrence efforts have generally

Trwinning, Civilian Orientation Conference of Mayors, 13 November 1951, Pentagon," 13 November 1951; LAC, RG 2 volume 2749 File part VIII, Cabinet Defence Committee Documents, The one hundred and seventh meeting of the Cabinet Defence Committee, 8 November 1955, p. 5; Dwight D. Eisenhower Presidential Library (DDE), White House Office, Security Council Papers, 1948-61, Disaster File, Box 23, File Continental Defense 1954 (8), Memorandum for the Secretary of Defense, Continental Defense – Guidelines Under NSC 162/2, 19 July 1954, p. 7.

[55] Michael J. Mazarr, "Understanding Deterrence," RAND Corporation Perspective, https://www.rand.org/pubs/perspectives/PE295.html (accessed 18 January 2021), p. 8.

[56] Brad Gladman and Andrew Billyard, "Royal Canadian Air Force (RCAF) Future Air Operating Concept (FAOC) Functional Concepts: Advice and Example," DRDC-RDDC-2017-L346 (October 2017), p. 11.

[57] Mazarr," Understanding Deterrence," p. 9.

been successful.[58] In this case, deterrence by denial represents the application of capabilities along with a clear intent to defend Canada and North America. It is this effect that the RCAF, in partnership with the USAF through NORAD, must attain through precise investments in capabilities combined as always with the clear, continual, and robust signalling of intent.[59]

Planned RCAF Capability Investment from SSE

SSE provided a foundation for the modernisation of the CAF. From an RCAF perspective, the capabilities being acquired to meet policy goals will assist with deterrence by denial strategy through NORAD and will enable the RCAF to be a more capable and credible contributor to NATO collective defence and international peace and security. In the context of the RCAF's top priorities of being Strong at Home and Secure in North America, it will be important to ensure the sensors and systems on all aerospace capabilities acquired through SSE are tailored for domestic defence, as well as being fully interoperable with NORAD.

Of particular importance to the Aerospace Defence of Canada and North America and 'deterrence by denial' are the 88 advanced F-35 fighter aircraft that will be equipped with the sensors, communication systems, advanced datalinks, and weapons to reinforce a deterrence by denial approach to the defence of Canada and North America.

Supporting this are other capabilities, such as the acquisition of those in space, which are meant to assist with the identification and tracking of threats and improve communications, especially throughout the Arctic region. The considerations for the defence of Canada and North America will be central to plans to replace the current RADARSAT system through the completion of the Defence Enhanced Surveillance from Space Project (DESSP), which will provide enhanced Earth observation capabilities and represents a commitment to developing and deploying the next generation of digital,

[58] *Ibid.*, p. 11.

[59] Brad Gladman, "Considerations for a Royal Canadian Air Force Vision for Continental Defence and North American Aerospace Defence Command Modernization (U), DRDC-RDDC-2021-L079, March 2021.

high-resolution space-based radar.[60] The RCAF is expected to continue its engagement with this project to confirm the development, delivery, and assurance of capabilities and effects appropriate for domestic and continental defence, as well as the success of deployed operations. It should also begin the analysis required to identify space-based capabilities required for the future RCAF.

Revealed in recent RCAF-led table-top discussions and other war games, some enabling capabilities are applicable across all anticipated operating environments making them ideal 'niche' contributions to deployed operations. For example, the Strategic Air-to-Air Tanker-Transport would be as vital for NORAD missions over Canada and the US as it would be in expeditionary operations. Meeting the worst-case demands for the defence of Canada and the continent allows for that excess capacity to be used in expeditionary operations in anything other than a full-scale war.

The replacement of the CP-140 Aurora maritime patrol aircraft will be a multi-mission platform that will be equipped with the sensors and systems for anti-submarine operations (in peace and war) and those for an overland Intelligence, Surveillance, and Reconnaissance (ISR) role. This aircraft will provide an essential capability for detecting and defending against submarine incursions into Canadian waters before they can launch their missiles against North American targets, contributing to a deterrence-by-denial strategy. It also will enhance the surveillance and reconnaissance of the approaches to Canada and North America if appropriately configured with sensors tailored to those environments.[61]

All of these capabilities, and those developed for the future RCAF, should be designed with an emphasis on Strong at Home and Secure in North America, meeting NORAD requirements in both effects delivered and capacities available to bolster the deterrence by denial approach to Canadian and Continental Defence. The spare capacity available could, in anything other than a full-scale war where Canada was targeted, be

[60] Department of National Defence, "Defence Enhanced Surveillance from Space – Project (DESSP)," http://dgpaapp.forces.gc.ca/en/defence-capabilities-blueprint/project-details.asp?id=1791 (accessed 13 July 2023).

[61] Department of *National Defence, Strong, Secure, Engaged*: Canada's Defence Policy, p. 39.

used to provide a valuable contribution to operations in support of international peace and security.

Additional RCAF Requirements Beyond SSE

While SSE was a solid foundation and its implementation remains a top priority, in a dynamic security environment it is difficult to have accounted for everything. For example, the threat context described earlier has made the need to defend Canada and North America more urgent than in the post-Cold War, or even the post 9-11, period. The Commander of NORAD and USNORTHCOM, strongly echoed by his Canadian Deputy Commander (ND), has recently identified three main areas requiring attention. Those priorities are 'All Domain Awareness', an 'Adaptive Architecture for Joint All Domain Command and Control', and 'Defeat Mechanisms' to defend critical strategic targets throughout North America that may come from or through the Arctic.[62] Similarly, SSE identified what was called at the time a 'new approach to defence,' consisting of 'Anticipate, Adapt, and Act'. The fusion of these two sets of priorities is a good way to describe the general characteristics of the future RCAF, understanding that each element will require investment in the 'connective tissue' of physical and digital infrastructure. Underpinning each is the real need to develop leaders who are well-educated and true masters of their profession, and as such can keep pace with situations that extend beyond that for which their training has prepared them.

Anticipate

The future domestic and continental operating environments require the ability to detect, identify, track, and respond to the various means by which adversaries will threaten Canada across all domains, including space and cyberspace. From a defence of Canada's perspective, those challenges are most acute in the Arctic.[63] The compressed

[62] North American Aerospace Defense Command, "(U) NORAD Capability Requirements and Proposed Investments Summary, Cycle 2, 30 June 2020,"p. i.

[63] David Barno and Nora Bensahel, "The Anti-Access Challenge You're Not Thinking About," War on the Rocks, 5 May 2015, https://warontherocks.com/2015/05/the-anti-access-challenge-youre-not-thinking-about/ (accessed 13 July 2023).

timescales brought about by advanced long-range cruise and hypersonic missiles, as well as cyber-attack capabilities, make the need for a layered approach to all domain awareness even more important. Ideally, the first layer should come from intelligence queuing of space-based and other sensors to observe areas identified as of particular importance.[64] The second layer is those space-based and forward-deployed sensors like those that make up (and will replace) the obsolescent North Warning System (NWS), to be supplemented with airborne sensors. The final layer is something brought about by the speed through which adversary effects can be delivered. Those are the dedicated, sensors that likely will be tied to ground-based defences around critical assets throughout North America.[65] Throughout these layers is a need to adequately anticipate and defend against attacks from cyberspace. There are plans in place to deal with some of these requirements in SSE, but not all have been fully accounted for.

It is no secret that the NWS needs to be replaced, ideally with a layered system of systems for the surveillance of Canadian territory and its air and maritime approaches. The development of this system should be explored as a top priority by Defence Research and Development Canada (DRDC), which has experience with the topic through projects like Northern Watch, All Domain Situational Awareness (ADSA), and the follow-on Continental Defence project.[66] That and other projects should focus on thinking about the next generation of systems to stay ahead of adversaries rather than reacting to their latest developments. In the meantime, the plans to install over-the-horizon radar sites in Canada, including the Arctic and Polar Regions, are being advanced as a priority by the RCAF and the Chief of Force Development (CFD).[67] Anticipating the immediate threats to Canada and North America should be met by prioritizing these systems and

[64] Canadian Defence Associations Institute, "NORAD Modernization Forum: Second Report," 26 August 2020, p. 6.

[65] *Ibid.*

[66] Department of National Defence, "Continental Defence Science and Technology Investment," https://www.canada.ca/content/dam/drdc-rddc/documents/en/cdst-investment.pdf (accessed 13 November 2023).

[67] Brad GLADMAN and Andrew BILLYARD, Reconciling RCAF Interests through an alignment method: CFD and NORAD initiatives and the FAOC, DRDC-RDDC-2021-L085, March 2021, p. 6.

retrofitting the NWS with existing technologies, but getting ahead of adversaries is a worthwhile goal that should be a priority for the RCAF Aerospace Warfare Centre (RCAF AWC) in conjunction with DRDC.[68]

Another element key to 'anticipating' effectively from an RCAF perspective is both crewed and remotely-piloted airborne assets, which are an important and uniquely flexible element to monitor the approaches to Canada and North America. While not identified specifically in SSE, a requirement to meet the defence of Canada and NORAD commitments, as well as those of the most challenging expeditionary operations, is a next-generation Airborne Early Warning and Control (AEW&C) capability for the RCAF. This capability would be of great value to the defence of Canada, to NORAD and Continental Defence, as well as to the most challenging of expeditionary operations. It should be noted that the investment in this capability by the Royal Australian Air Force (RAAF), which is an air force similar in size to the RCAF, and the Royal Air Force (RAF) with the USAF likely to follow suit, shows its importance and arguably would make a valuable contribution to the defence of Canada and North America.

There is, however, no plan for the RCAF to develop such a capability, but the AEW&C capability has proven to be vital to the Royal Australian Air Force's (RAAF) surveillance and control across Australia's north,[69] a requirement Canada shares over its remote northern regions in the Canadian Arctic. The effects this capability would deliver would reinforce the deterrence-by-denial approach to the defence of Canada and North America, and it is worth serious evaluation for the RCAF of the future. Together with the other sensors described, the resulting system of systems will allow a flexible and resilient ability to investigate and prosecute threats, as well as offer capabilities valuable to coalition operations in international peace and security missions when not needed for the defence of Canada and North America.

Adapt

[68] CDA Institute, "NORAD Modernization Forum First Report: Awareness & Sensors, undated, p. 7.

[69] Carlo Kopp, "Wedgetail: Australia's eagle-eyed sentinel," Australian Strategic Policy Institute, (2006), p. 11.

Both 'anticipating' and 'adapting' require systems that can enable leadership to make the right decisions in a timely manner. This is best reflected in the NORAD Commander's priority of an 'Adaptive Architecture for Joint All Domain Command and Control. The goals of command and control systems have remained largely the same over time. Their purpose is to deliver, through secure communications, the intelligence needed by decision-makers to enable appropriate action. What has changed recently is the compressed timescales brought about by adversarial investment in long-range cruise and hypersonic missiles that can be launched from aircraft or submarines against Canadian and North American targets, and the possibility of attack through cyberspace will minimal warning. In response, an evolution in the character of command and control has resulted in what the US calls Joint All Domain Command and Control (JADC2), or what the CAF refers to as 'Pan Domain' Command and Control. Attempting to break through the silos of service-specific systems, this new concept is the foundation of the next step in the evolution of joint operations – multi-domain operations. The development of JADC2 in partnership with the US, in time exploiting artificial intelligence (e.g., machine learning) to analyze data from the layered sensor network is also being advanced as a priority by the RCAF and the Chief of Force Development (CFD).[70] When deployed, these technologies should help to give decision-makers a superior understanding of the fast-moving situations that adversary threat systems have created and will allow the needed time for an appropriate response.

From an air power perspective, the RCAF leadership should ensure appropriate engagement with the development of JADC2 to ensure that the enduring principles governing the effective employment of air power are understood and incorporated in order to preserve the inherent flexibility of air power—perhaps its greatest advantage in modern warfare. It should also invest resources into professional military education, to foster a leadership that can thrive in uncertainty and deal with situations for which their training has not necessarily prepared them.

Act

[70] Gladman and Billyard, "Reconciling RCAF Interests through an alignment method," p. 6.

An enduring reality of warfare is that even the best intelligence can be rendered useless if it cannot be acted upon. Even the best system of sensors and effective JADC2 is of little value unless it can enable a defence of critical assets that is sufficiently strong to convince a belligerent that the objectives will not be achieved. Moreover, that defence must span the spectrum from the air, land and sea domains, but also space and cyberspace. The defender is at a disadvantage in that it is difficult to identify the targets an adversary will select before an attack takes place, as well as countering them effectively afterward.

In the context of possible attacks from air or sea-launched missile systems that offer little warning, to those through cyberspace that offer none, it must be determined whether the best defence is through a strong offence, or if robust defences will suffice.[71] In many ways, it may be better to target and destroy the aircraft and submarines before they launch their weapons, than to attempt to defeat multiple fast-moving and hard-to-detect and track missiles once they have been launched.[72] The systems needed to defeat the latter are somewhat different than those for the former.

The likely solution might be a combination of systems necessary to defeat the launch platforms, with others needed to prevent those missiles that leak through from striking critical infrastructure. It has long been known that providing a one hundred percent effective defence is unrealistic. Indeed, this has been a long-standing conundrum of the Air Defence of North America. For example, in the early 1950s air defence exercises revealed that a significant portion of the attacking aircraft were not intercepted, and those exercises that were run after improvements were made to the continental air defence system suggested a 95-99% kill probability.[73] Thus, a comprehensive approach to deterrence by denial must rest on a layered approach to defence that includes air defences

[71] CDA Institute, "NORAD Modernization Forum Second Report: Defeat Capabilities," 26 August 2020, p. 2.

[72] *Ibid.*

[73] Dwight D. Eisenhower Presidential Library, White House Office, Security Council Papers, 1948-61, Disaster File, Box 23, File Continental Defense 1954 (8), Memorandum for the Secretary of Defense, Continental Defense – Guidelines Under NSC 162/2, 19 July 1954, p. 7; also see Ibid., "Memorandum for NSC Planning Board Consideration, Continental Defense, 20 July 1954, pp. 3-4

equipped with appropriate defeat mechanisms to target the launch platforms and ground-based defences designed to protect critical assets that adversaries are certain to target. In a recent Canadian Defence Associations Institute NORAD Modernization forum it was stressed that the defeat mechanisms should be purpose-built for the defence of critical domestic assets, not merely adapted from systems used for deployed operations. Moreover, effective deterrence by denial "requires a limited area defence approach that it can deploy over clusters of critical infrastructure, supplied by a purpose-built, persistent system."[74]

Moreover, action at all levels, as well as anticipating and adapting, requires educated personnel to enable them to not only operate in uncertainty but thrive. This is an area requiring significant attention and really is the linchpin for success across these three themes.

Consideration 6: Professional Military Education

In *The Gathering Storm*, Winston Churchill wrote that "Air Power is the most difficult of all forms of military force to measure, or even to express in precise terms."[75] This saying is as relevant today as it was then because technology has made air power ever more complex and central to national security. However, wars have never and likely will never be won solely through the employment of capabilities at the tactical level where training tends to focus. At this level, most options available to adversaries and friendly forces are known, with slight variations. Professional military education, by contrast, provides an ability to understand and critically assess developments that the commander did not initially envisage.[76] Comprehensive education equips a commander with the ability to avoid being overwhelmed by actions the enemy takes and to ensure

[74] CDA Institute, "NORAD Modernization Forum Second Report: Defeat Capabilities,"pp. 4-5

[75] Winston S. Churchill, *The Second World War: The Gathering Storm* (London: Houghton Mifflin Company, 1948), p. 100.

[76] Sanu Kainikara, "The Criticality of Education in Modern Air Forces," *Royal Australian Air Force Air Power Development Centre Working Paper* 42, 2015, p. 3.

the enactment of their own plans. Thus, the importance of education to the long-term success of an air force is difficult to over-emphasize.[77]

If true professional mastery is the goal, beginning with the raw material of individuals with advanced technical mastery of their own occupations, then the initial steps for enhancing both qualities in the RCAF seem readily apparent. Charting a relevant course forward would involve significant changes to the RCAF professional development system to ensure the required level of air power competence through training ***and*** education, which compliments the practical air power experience gained over a career. In this process, the role of senior leadership is critical in both leading by example and providing incentives for those who embrace education as a critical part of their professional mastery. They should also work to define an enduring vision for the RCAF as an institution and adjust it to ensure its relevance to grand strategic goals, as well as provide the guidance necessary to shape the force towards those ends while enabling effective operations.

Some recent scholarship has pointed to a need for small air forces to have their personnel possess a higher level of professional mastery because "they function at the critical mass most of the time, especially when they are engaged in actual operations."[78] This requires a higher level of command ability to ensure the force is being optimally employed, prevent operational fatigue, and continue to raise, train and sustain the force while conducting operations. In short, there is a dichotomy between the development of professional mastery and the demands placed on an air force with a high operational tempo. Professional military education is one of the principal factors that ensures the competence and relevance of small air forces and yet because of the demands on their personnel, these programs are often the first casualty. Only through emphasizing professional military education and becoming true 'learning organizations' are small air forces able to shape the proper development and application of air power instead of simply being reactive to emerging challenges. Thus, it is critical to the future success of the RCAF as an institution that it continues to deliver appropriate air power effects at the

[77] *Ibid.*

[78] Sanu Kainikara, *At the Critical Juncture: The Predicament of Small Air Forces* (Canberra: Air Power Development Centre, 2011),p. 147. In Sanu Kainikara's analysis, air forces are either large or small. This term is used deliberately and in no way assumes that a small air force is incapable of strategic effect.

tactical level, but also improves its ability to articulate the central role of military air power at the strategic level and advance the institutional output. Doing so will require a professional development system that supports a comprehensive understanding of air power and its history and the critical thinking skills that should result from that study.

The focused study of air power history and theory, such as studying the literature on the long-term trends over the past century, as a central feature of a revised RCAF professional military education program, provides better guidance in preparing RCAF personnel to engage more effectively across the continuum from force development to force generation and force employment. In particular, the study of the history of air power can help one understand the evolutionary change in military affairs and differentiate that evolution from the purported revolutions that some argue happen frequently, all by providing a theoretical or mental framework for looking at change over time. In terms of understanding change, how one addresses future uncertainty can very much depend upon how one thinks about the past. It can serve to educate both military professionals and analysts on the factors associated with past victories and defeats, the enduring principles and the evolving character of air and joint warfare, all of which should inform their judgments about the best ways to meet future aerospace requirements. Such study across a career develops and shapes critical thinking skills while providing the essential contextual understanding needed to confront current air power and warfighting problems. Thus, any evolution to the RCAF professional development system should feature the study of air power history as a central feature. As British army armoured warfare theorist, Major-General JFC 'Boney' Fuller, aptly said to "understand the past and to judge the present is to foresee the future."[79] It is only through the continual study and thoughtful reflection on the history and modern application of air power that the required expertise can be developed to confront and address current and future air power problems, and in so doing improve the RCAF institutional output.

Conclusions

In closing, to sum up the arguments made in this paper it is clear that the force development emphasis on the defence of Canada is the right decision for the RCAF. It

[79] Michael Evans, *The Continental School of Strategy: The Past, Present and Future of Land Power* (Duntroon ACT: Land Warfare Studies Centre, 2004),p. 1.

will resonate more strongly with the Canadian public and political leadership, and the result will be an improvement ++

in the defence of Canada and by extension North America. That focus will also allow for a balanced future RCAF that will be able to provide valuable capabilities to coalition operations overseas. It will also be a future RCAF that will offer something more than minimally credible contributions to those operating environments and will assist in changing the views of Canada's key allies who are now looking at us more skeptically than they have in the past.

In the end, it is fairly easy to plan for the future in terms of the capabilities discussed, but that belies the very nature of conflict and the undeniable reality in war that the enemy always gets a vote. Even the best capabilities in the world can be rendered largely useless without the ability to deliver the desired kinetic and non-kinetic effects unique to each conflict, as well as to understand what those effects should be. That, in turn, demands that future RCAF leadership be true masters of their profession to exploit and develop those capabilities and the institution to challenges that cannot be foreseen, against adversaries who will use their own capabilities in ways for which it is impossible to train. That is the one aspect of thinking about the future that is typically overlooked and yet is arguably the most important. The development of a sensitivity to history should be a central feature of a revised RCAF professional military education system. In so doing, one would be wise to heed Sir Winston Churchill's words from a speech in 1944 where he said "The longer you can look back, the farther you can see forward."[80] If done correctly, it will serve RCAF very well and will tie together the past, present, and future of Canadian military air power.

[80] Richard Langworth, ed., *Churchill By Himself: The Definitive Collection of Quotations* (New York: Public Affairs, 2011), p. 25.