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The Future of the RCAF: Adaptable, Balanced, and Flexible

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THE FUTURE OF THE RCAF: ADAPTABLE, BALANCED, AND FLEXIBLE

Air power is indivisible. If you split it up into compartments, you merely pull it to pieces and destroy its greatest asset – its flexibility.

— Field Marshal Bernard Montgomery

AIM

1. The future of the Royal Canadian Air Force (RCAF), like other smaller air forces, remains a topic of discussion regarding capabilities needed to effectively respond to the challenges of the 21st century. Through the assessment of RCAF roles and responsibilities, technological trends, and the evolving operating environment, this service paper aims to determine which capabilities are required for the RCAF to remain relevant and effective, domestically and internationally.

INTRODUCTION

2. Air forces are valued force enablers and force multipliers for their land and naval counterparts, while remaining responsible for fulfilling roles across the spectrum of air power functions. Since WWII, the RCAF has significantly expanded its role to provide support to other government departments (OGDs), allies, and international partners.¹ As modern conflict has become a Whole-of-Government (WoG) effort, the RCAF, similar to the Canadian Armed Forces (CAF) writ large, must be increasingly accessible to answer the call.

3. The priorities of the Canadian strategic defence policy, *Strong, Secure and Engaged* (SSE), are Canadian security, security of North America, and contributions to peace and security, internationally.² In alignment with SSE, the Future Concepts Directive Part 2: Future Air Operating Concept (FAOC) outlines the core air power functions as control of the air, attack, surveillance and reconnaissance (SR), air mobility, and support to joint operations and civil authorities.³

4. The RCAF is, seemingly, at a greater disadvantage than the Canadian Army (CA) or the Royal Canadian Navy (RCN), as the air force provides the government with a rapidly deployable capability to effect influence around the globe.⁴ However, as a smaller air force, defined as having “balanced capabilities, but limited depth (size and

¹ RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept*, (Trenton: Canadian Forces Aerospace Warfare Centre, 15 August 2016), 5.

² Canada, Department of National Defence, *Strong, Secure, Engaged: Defence Policy*, (Ottawa: DND, 2017), 14.

³ RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept*, (Trenton: Canadian Forces Aerospace Warfare Centre, 15 August 2016), 7-9.

⁴ Sanu Kainikara, *The Future Relevance of Smaller Air Forces*, (Australia: Royal Australian Air Force Air Power Development Centre, 2009), 5.

capacity),”⁵ the RCAF is close to being overstretched. Force overstretch is defined as the gradual, and likely unnoticed, decline in overall operational capability and effectiveness.⁶

5. Air forces around the globe struggle to maintain “the baseline level of airpower capability” due to the significant costs associated with procuring and maintaining equipment.⁷ The RCAF is no stranger to this dilemma. Evolving technological trends and their impacts on the operating environment have compounded the risk of overstretch. The RCAF faces irrelevancy, if it does not prioritize investment into future capabilities. With security threats ranging from militant groups and non-state actors operating with minimal technology, to adversarial states, Russia and China, leveraging technological advancement, the RCAF must be responsive to each of these threats and every permutation of them in between.

DISCUSSION

National security

6. Domestically, the RCAF is responsible to an increasing number of duties in support of OGDs. The RCAF supports the Department of Fisheries and Oceans with surveillance for illegal fishing activity in Canadian waters, and Search and Rescue (SAR) operations, conducted in partnership with the Canadian Coast Guard.⁸ The RCAF also regularly responds to RCMP, Parks Canada, as well as provincial and territorial requests for assistance involving ground SAR operations.⁹ With the opening of Canadian Arctic waterways, increases in commercial and private traffic will result in a growing number of SAR call-outs and surveillance missions. Additionally, Canada is at the forefront of a territorial debate regarding the Arctic. Not only do competitors challenge Canada, Arctic allies are concerned with GoC, and by extension, the CAF ability to enforce the sovereignty of the North.¹⁰

7. Continentally, in the defence of North America through the North American Aerospace Defence Command (NORAD) partnership with the United States (US), the apportioned RCAF resources respond directly to the Commander of NORAD. Similarly, the opening of the Arctic waterways brings concerns from US spokespersons as to whether the Government of Canada (GoC) has the ability to exercise sovereignty in the

⁵ Sanu Kainikara, *The Future Relevance of Smaller Air Forces*, (Australia: Royal Australian Air Force Air Power Development Centre, 2009), 1.

⁶ *Ibid.*, 3.

⁷ *Ibid.*

⁸ RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept*, (Trenton: Canadian Forces Aerospace Warfare Centre, 15 August 2016), 8; Government of Canada, “Canadian sovereignty operations,” accessed 22 Jan 2022, <https://www.canada.ca/en/department-nationaldefence/services/operations/military-operations/types/canadian-sovereignty.html>.

⁹ Canada, Public Safety Canada, “National Search and Rescue Program,” accessed 22 Jan 2022, <https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/rspndng-mrgnc-vnts/nss/prgrm-en.aspx>.

¹⁰ Christian LeMiere and Jeffrey Mazo, *Arctic opening: Insecurity and opportunity*, (New York, USA: Routledge, 2013), 27.

North.¹¹ The easy, and most likely, option for the GoC to increase its presence in the North is to increase the frequency of RCAF patrols and exercises. Regardless of whether the CA or RCN are tasked with leading presence patrols, the RCAF would need to support or remain responsive to facilitate movement of personnel, supplies, and equipment.

8. Internationally, when required, Canada will likely continue to deploy as part of a coalition force, employing the Air Task Force (ATF) model to optimize resources and equipment allocated for specific operations. This has been a strength of the RCAF, whereby it has maintained its ability to execute across the spectrum of air power functions in support of partners while leveraging interoperability with them to ensure sustained operations in theatre. ATFs are scalable, providing the necessary flexibility to the RCAF to reduce or increase capacity at a desired location based on the use of force in other theatres.

9. To meet the demands of national security, domestically and continentally, the responsibilities of the RCAF will increase while its force structure will remain the same,¹² leading to increased strain on personnel, aging platforms, and other equipment. Internationally, air power is likely to continue to be “the option of first choice” as a mechanism for rapid and precise effects.¹³ Maintaining an air force that is capable of carrying out all air power functions is critical for Canada to remain relevant as a contributing partner to NORAD, the Five-Eyes (FVEY) community, and North Atlantic Treaty Organization (NATO). As such, it is equally important to stress interoperability, and to keep pace with their technological advancements.

10. The relevance of the RCAF to national security is dependent on its ability to evolve in synchronization with its allies, and the growing list of national security imperatives.¹⁴ However, the reality of procuring and maintaining capabilities is resource intensive, and it is easy for governments to cut spending there first.¹⁵ Without financial investment, the RCAF will likely be overstretched in the near future. Therefore, the RCAF must engage at the strategic level, and leverage its’ success as a national instrument to solicit prioritization of resource allocation.¹⁶ In the meantime, the organization will need to continue to balance the level of professional competence of its personnel while adapting its force structure to employ capabilities in a “resource-

¹¹ Joe Varner, “Canada’s Arctic Problem,” accessed 22 Jan 2022, <https://mwi.usma.edu/canadas-arcticproblem/>.

¹² RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept*, (Trenton: Canadian Forces Aerospace Warfare Centre, 15 August 2016), 3.

¹³ Sanu Kainikara, *The Future Relevance of Smaller Air Forces*, (Australia: Royal Australian Air Force Air Power Development Centre, 2009), 3.

¹⁴ *Ibid.*, 3.

¹⁵ *Ibid.*

¹⁶ Richard Goette, *Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations*. (Canada: Royal Canadian Air Force Warfare Centre, 2020), 84-85.

constrained environment.”¹⁷ Beyond this, the future challenge is determining an affordable capability mix.¹⁸

Technology

11. Air power is synonymous with technological innovation. With increasing advances in technology, there is a “greater impact on the fundamentals of air power application when compared to land and sea power.”¹⁹ The success of the RCAF to project air power is a result of the organization’s ability to adapt to the changing operational environment, and to optimize resources for specific operations. However, if not seen already, the RCAF will gradually see a decline in operational effectiveness due to lack of technological investment.

12. The pace of technological change has led to major shifts in everyday life.²⁰ Air forces around the world are similarly affected as speed and complexity have merged into the conduct of warfare.²¹ This fact is not lost on enemy forces, who are able to leverage technological advancements for their own means. Security events take place in a matter of hours, days, and weeks, whereas they occurred over months and years in the past. The speed in which a military force can respond or influence is critical, underlining once again, the importance of the RCAF to the GoC as land and naval forces are inherently less responsive.²¹

13. Remotely piloted aircraft systems (RPAS). The continuous innovation of these systems is transforming the traditional air power model.²² RPAS will likely transition to an increasingly autonomous capability, supporting and conducting air power functions.²³ For smaller air forces, RPAS and future autonomous flying aircraft present an opportunity to reduce risk and costs associated with training personnel. While the FAOC has identified the requirement to “develop a balanced mix of air and space capabilities... [to include] unmanned/remotely operated systems and systems with varying levels of autonomy,”²⁴ serious investment is required to actualize this capability. Conversely, there is a requirement to develop and employ counter-unmanned aircraft systems (C-UAS) doctrine and systems to match the “advancements as well as the inventiveness of our opponents.”²⁵

¹⁷ Kainikara, *The Future Relevance of Smaller Air Forces...*, 4.

¹⁸ RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept...*, 3.

¹⁹ Kainikara, *The Future Relevance of Smaller Air Forces...*, 3.

²⁰ David A. Deptula, “Twenty-First Century Air Power: Future Challenges and Opportunities,” *Royal Air Force Air Power Review* 21, no. 3 (Autumn/Winter 2018), 161. ²¹ *Ibid.*, 161.

²¹ *Ibid.*

²² Claire Muir, review of *Drone and Terrorism: Asymmetric Warfare and the Threat to Global Security*, by Nicholas Grossman, and *Armed Drones and Globalization in the Asymmetric War on Terror*, by Fred Aja Agwu, *Royal Air Force Air Power Review* 21, no. 3 (Autumn/Winter 2018): 205.

²³ David A. Deptula, “Twenty-First Century Air Power: Future Challenges and Opportunities,” *Royal Air Force Air Power Review* 21, no. 3 (Autumn/Winter 2018), 164.

²⁴ RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept...*, 8.

²⁵ David Reynolds, “Future Warfare: Shaping Capability for the 21st Century Battlespace,” *Jane’s Defence*

14. Networking. “Advancements in computing and network capabilities are empowering information’s ascent as a dominant factor in warfare.”²⁶ Wireless communications and cloud-based technology are reshaping the future of warfare. Integrated networks are transforming the manner in which data is processed and stored. Dynamic interaction and integration is key to networking system as when “it is taken as a whole, it is more than the sum of its parts.”²⁷ Moving forward, current and future aerial platforms and their operators must be trained and employed beyond their single- or multirole capabilities to effect information collection and processing.²⁹ In so doing, the RCAF needs to review and adapt to how forces are distributed, trained, and equipped.

15. Artificial intelligence (AI). The RCAF Intelligence, Surveillance, and Reconnaissance (ISR) doctrine outlines the series of sensors available to Canada to collect information.²⁸ However, like the United States Air Force (USAF), there is a significant lack in capability to effectively process this information. Lieutenant-General David A. Deptula, USAF (Retired), while serving as the Chief of US Air Force Intelligence, Surveillance, and Reconnaissance, stated that, “we are swimming in [aerospace] sensors, so we need to avoid drowning in data.”²⁹ The USAF processes, roughly, two percent of the data collected.³² AI can be programmed and configured to siphon through massive amounts of data for desired information to effectively arm and enable commanders, “reducing time within the observe, orient, decide, act (OODA) loop.”³³ Further, AI will be critical to the employment of RPAS swarms for increased autonomy and coordination.

16. Technological advancements are equally available to adversary forces as they are less hindered, if at all, in their procurement and exploitation of them to achieve their objectives. Non-state actors have used low-cost RPAS to shutdown international airports,³⁰ and, to attack deployed land forces.³¹ “The proliferation of technology, information flow...presents one of the most daunting challenges that [modern] militaries have ever faced.”³² Low-tech, unconventional militant groups operate in regions where

Weekly, accessed 18 Jan 2022, https://customer-janescom.cfc.idm.oclc.org/DefenceWeekly/DisplayFile/FG_3780559?edition=2020.

²⁶ Deptula, “Twenty-First Century Air Power: Future Challenges and Opportunities,” ..., 167.

²⁷ Peter Layton, “Fifth Generation Air Warfare,” *Australian Defence Force Journal* 204 (2018): 24.

²⁹ Richard Goette, *Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations*. (Canada: Royal Canadian Air Force Warfare Centre, 2020), 94.

²⁸ RCAF, *Intelligence, Surveillance, and Reconnaissance*. (Canada: Royal Canadian Air Force Warfare Centre, 2017), 38-39.

²⁹ Deptula, “Twenty-First Century Air Power: Future Challenges and Opportunities,” ..., 164. ³² *Ibid.*, 164. ³³ *Ibid.*

³⁰ Benjamin Mueller and Amie Tsang, “Gatwick Airport Shut Down by ‘Deliberate’ Drone Incursions,” *The New York Times*, last modified 20 Dec 2018, <https://www.nytimes.com/2018/12/20/world/europe/gatwick-airport-drones.html>.

³¹ Claire Muir, review of *Drone and Terrorism: Asymmetric Warfare and the Threat to Global Security*, by Nicholas Grossman, and *Armed Drones and Globalization in the Asymmetric War on Terror*, by Fred Aja Agwu, *Royal Air Force Air Power Review* 21, no. 3 (Autumn/Winter 2018): 205.

³² Deptula, “Twenty-First Century Air Power: Future Challenges and Opportunities,” ..., 163.

they may have access to advanced and integrated air defence systems³³ They also understand how to leverage low-tech capabilities to target the civilian populations, and to disrupt high-tech military systems of Western nations. Similarly challenging are conventional state threats, such as Russia and China, who employ anti-access area denial (A2/AD) strategies in potential regions of operations that prove difficult for the RCAF to sustain and carry out operations.³⁴

17. As Western nations look to fifth and sixth generation platforms as multi-role operators, costs prohibit smaller air forces, like the RCAF, from purchasing enough to meet the demand. Balance remains pivotal as the RCAF looks to fulfilling its' roles in Canada, and contributing capabilities "as part of a coalition against a [US] near-peer adversary... [While] proving cost-effective enough to deploy and risk in lower-intensity conflicts."³⁵

Operating environment

18. Akin to technological advancements, the operating environment, whether domestic, continental, or expeditionary, has become increasingly complex. As previously covered, the Future Security Environment 2013–2040 highlights threats to the RCAF, ranging from "unconventional militant groups with limited technological capability to adversarial states possessing advanced capabilities and integrated A2/AD technology."³⁶

19. The multi-domain battlespace is defined as "the joint operating environment, integrated across domains, and applied in concert with other instruments of national power to converge on the enemy for the desired effect."³⁷ Information is the critical component to the modern battlespace as weapon systems have evolved to be highly integrated. Within networked militaries, success is based on the ability to process data, and coordinate actions of air power to a point of convergence on the enemy.³⁸ The RCAF, as a traditional domain, will further support emergent domains of cyber, information, and space, as current and future platforms that will serve as network enablers.³⁹ ISR, counter-unmanned aerial systems (counter-UAS), and force projection capabilities are enablers when integrated modern C2 systems.⁴⁴

³³ RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept...*, 3.

³⁴ *Ibid.*, 4; David Reynolds, "Future Warfare: Shaping Capability for the 21st Century Battlespace," *Jane's Defence Weekly*, accessed 18 Jan 2022, https://customer-janescom.cfc.idm.oclc.org/DefenceWeekly/DisplayFile/FG_3780559?edition=2020.

³⁵ RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept...*, 4.

³⁶ *Ibid.*, 4.

³⁷ Canada, Department of National Defence, *Pan-Domain Force Employment Concept: Prevailing in an Uncertain World*, (Ottawa: CJOC, 2020), 3.

³⁸ David Reynolds, "Future Warfare: Shaping Capability for the 21st Century Battlespace," *Jane's Defence Weekly*, https://customer-janescom.cfc.idm.oclc.org/DefenceWeekly/DisplayFile/FG_3780559?edition=2020, (accessed Jan 18, 2022).

³⁹ *Ibid.*; Deptula, "Twenty-First Century Air Power: Future Challenges and Opportunities," ..., 163. ⁴⁴ Canada. Department of National Defence. *Pan-Domain Force Employment Concept: Prevailing in an Uncertain World*, (Ottawa: CJOC, 2020), 26.

20. Any future Canadian expeditionary deployments will likely be as part of a multination or coalition force.⁴⁰ As a smaller air force, it is expected that Canada will not lead future coalitions but rather serve as a regular contributing partner. Consequently, the RCAF must focus its efforts on interoperability with the US, for continental and expeditionary purposes, as well as other NATO partners.⁴¹ The challenge will then be for the RCAF to balance remaining capable of providing air power functions while identifying specific capabilities that should be developed for future value-added contribution to coalitions.

CONCLUSION

21. “Air power has the primary mission to obtain and maintain control of the air over all domains.”⁴² As a smaller air force, the RCAF is challenged to fulfill its primary role over Canada, in addition to meeting growing responsibilities as the preferred strategic response to national security dilemmas.⁴³ Thus far, the outstanding professionalism and dedication of RCAF personnel to adapt and innovate has enabled the organization to effectively project air power to meet demands. However, technological trends and their influence on the operating environment are compounding the strain placed on the RCAF.

22. It is imperative that the RCAF maintain its ability to deliver across core air power functions while keeping pace with technological trends to remain interoperable with international partners, and an instrument of national power for strategic influence. Where possible, the RCAF must invest in niche capabilities to bolster its depth and increase value to partnerships when deployed with a coalition force.

RECOMMENDATIONS

23. The following recommendations outline a way forward for the RCAF to meet the challenges of the future operating environment while identifying key capabilities that the organization can reasonably develop over the next 20 years.

24. Retain the ability to perform core air power capabilities to remain relevant as a smaller air force, and to participate at the international level. A balanced air force is one that is “[adaptable], flexible, effective, and, therefore, valuable as an instrument of national power.”⁴⁴

25. Assess the multi-domain battlespace with L1s and international partner forces to optimize roles for current platforms and systems with procurement of new platforms and systems to meet future multi-role operations.

⁴⁰ Richard Goette, *Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations*. (Canada: Royal Canadian Air Force Warfare Centre, 2020), 26.

⁴¹ *Ibid.*, 8.

⁴² Kainikara, *The Future Relevance of Smaller Air Forces...*, 7.

⁴³ *Ibid.*, 7.

⁴⁴ RCAF, *Future Concepts Directive Part 2: Future Air Operating Concept...*, 4.

26. Leverage past success as force enabler, and instrument of national power to prioritize GoC funding for procurement and upgrades of aging platforms and equipment as required.

27. Prioritize interoperability across platforms, personnel, and systems. To remain effective in the multi-domain battlespace, the RCAF must be able to “plug-and-play” seamlessly with other components and OGDs, and, international partners. Lead participation in NORAD, FVEY, and NATO working groups.

28. To meet future challenges, the RCAF should become a capability or niche leader in RPAS, to include C-UAS technology and doctrine, and C4ISR through significant investment in AI and network management.

29. Assess RCAF-specific MOSID requirements to determine whether traditional trades could be divested to support growth and expertise in future capabilities.

30. Though not mentioned in this service paper, the RCAF should continue to allocate resources to electronic warfare (EW) and Space capabilities given the inherent benefits to supporting the future of multi-domain operations.

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