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A New Way to Fly: Major challenges facing Air Force planners over the next 20 years

by George Macdonald
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POLICY PAPER

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► **Executive Summary**

RCAF planners face formidable challenges as they think ahead to what air force capabilities will be needed in the future. By actively expanding their thinking to identify capabilities, the major elements of which are people and equipment, they will gain the flexibility necessary to respond to unexpected, and potentially catastrophic, events. This paper discusses some of the challenges faced by the RCAF and how they might be meaningfully addressed in planning for future capabilities.

Unpredictable technological breakthroughs are one challenge planners face. It is critical to employ new technologies where they will matter most in maintaining operational relevance, effective self-protection and essential interoperability. Other challenges involve the development of resilience and innovativeness of air force personnel to empower them to make the decisions necessary in fluid circumstances, the need for appropriate interoperability with allied forces, and the ability to conduct and support 'para-military' missions associated with humanitarian assistance and respond to natural disasters such as earthquakes and floods.

In addressing future challenges, balance will be key – balance in the provision of multi-purpose, sustainable, and flexible capabilities – all the while living within the available Defence budget.





When one reflects on the last two decades, it is clear we lived during a time of dramatic change. The end of the relatively stable Cold War period has brought a series of unexpected events that have had a significant and continuing impact on global security. Who would have predicted the terrorist acts of 9/11, the “Arab Spring” uprisings, the global economic crisis, the intervention in Libya, or the recent crisis in Ukraine or Iraq? Each of these events threatens our security, directly or indirectly, and each presents new potential challenges to air force planners trying to choose the most appropriate capabilities for the future.

There is no shortage of analyses to assess future risks and threat scenarios. One in-depth effort is the DND document, the *Future Security Environment 2009-2030 Part 1*, which examines future complexities and concludes that “emerging geopolitical, economic and social, environmental and resource, science and technology, and military and security trends all have profound implications for Canada, DND, and the CF.” Further “greater external pressure and increased demands for defence capabilities coupled with future personnel and resource constraints, will require creative leadership and adaptive responses for addressing future challenges.”¹

The draft of Part 2 of the document in 2010 addressed future shocks. These were defined as “any disruptive situation where the resulting consequences require a fundamental, enduring and irreversible shift in National policy and strategy.”² The premise is that it’s not sufficient to simply identify trends and be prepared to react to them. Rather, one must think outside the box, to expect the unexpected, and prepare for irregular, catastrophic and disruptive challenges that could force dramatic, fundamental, shifts in national policy. Without this more expansive approach, our ability to react will be constrained, and potentially ineffective. This requires planners to consider their work as “revolutionary”, not just “evolutionary”. “Revolutionary change accepts all the advantages evolutionary change has to offer but appreciates the value of using discontinuities, non-linearity, and the emergent characteristics and consequences of compounded change.”³

RCAF planners face formidable challenges as they think ahead to what air force capabilities will be needed over the next two decades. They must actively expand their thinking to identify capabilities, the major elements of which are people and equipment, and incorporate flexibility in order to respond to unexpected developments. Planners are also challenged by the long lead time typical for the acquisition of enduring military capability, and the requirement to provide solutions that are consistent with approved defence policy and affordable.

The RCAF provides unique capabilities that are employed in support of, or coordinated with, the navy and the army. But, Canada is unable to afford the full spectrum of air capability resulting in tough choices to balance cost, effectiveness and relevance of capability in anticipated future

¹ Department of National Defence, Chief of Force Development, *Future Security Environment 2008-2030 Part 1*, July 2009, p 88.

² Department of National Defence, Chief of Force Development, *Future Security Environment 2008-2030 Part 2*, draft for discussion purposes only, 2010, p 6.

³ Westphal, Deborah; Szafranski, Richard; and Parnell, Gregory, *Strategic Planning for the Air Force*, in *Airpower Journal*, Winter 1998, p 33.



roles. The challenges faced by the RCAF are discussed below, with recommendations on how to meaningfully address planning for future capabilities.

TECHNOLOGICAL ADVANCEMENT

The most important factor impacting air force planning is technological advancements, due mostly to the unpredictability of breakthroughs fundamental to military capabilities. For example, the use of GPS technology over the past fifteen years has revolutionized navigation, weapons accuracy, and effective command and control, not to mention its applications for public, everyday, use. Also, internet access for military purposes is expanding in areas never before imagined. Communications linkages and capacity for data exchange have evolved to levels that enable the timely transfer of huge amounts of information.

On a more air force specific front, the use of stealth technology has matured over the past few decades. Increased fidelity in situational awareness has been enabled by modern sensors and data link capability. New weapons, with varying degrees of lethality, are more adaptable to a changing tactical situation and can be employed with limited collateral damage. Increasing miniaturization has presented new opportunities for applying these technologies more broadly, more covertly, and more cost-effectively.

The use of unmanned aerial vehicles (UAVs) has revolutionized surveillance and combat operations to the point where the need for manned platforms has been significantly reduced. They have also enabled the conduct of operations remotely, even on the other side of the world, and have raised the issue of how the 'man in the loop' is best employed. This phenomenon has created a disruptive effect on air operations with dramatically increased endurance and surveillance persistence, along with high fidelity images provided in real or near-real time to decision makers on the ground. It has also precipitated many questions about the eventual need for manned aircraft. This calls for a break from traditional thinking and challenges planners to explore new ways of performing air force missions. Otherwise, newly-acquired manned aircraft may become obsolete or marginally effective in performing their mission well before their useful life is expended.

"As technological applications become increasingly autonomous, not just in equipment but also in areas of its command, control and execution, the concepts of human agency and technology will evolve. Pervasive and overarching semi-autonomous systems will become increasingly interconnected and multi-tiered. Furthermore, highly intelligent semi-autonomous systems will all be controlled by key individuals, who are paired to the appropriate decision-making authority. This level of semi-autonomy will be achieved through effective knowledge management and data fusion that has a reachback capability into joint command and support systems."

Godefroy, Dr. Andrew B., *Projecting Power: Canada's Air Force 2035*, 2009, p 65.

The ubiquitous nature of satellite capabilities and the future threat of having to deal with the potential of space-based weapons cannot be ignored. The increasing resolution and responsiveness of space-based surveillance assets is a real game-changer in understanding what is happening and evaluating the best options to deal with the situation. This is especially relevant to operations in remote areas, such as Canada's North. Access to near real-time information provided through a global communications network represents a huge



advancement in the ability to respond appropriately and there is no reason to suspect that this capability will not grow and improve in the future.

The air force cannot allow itself to fall behind in technology advancements if it is to remain effective. This does not necessarily mandate the complete replacement of major equipment fleets, but at least the ability to change and evolve incrementally. This most naturally applies to software where the flying characteristics and onboard systems can be updated to maintain their operational relevance and effectiveness, but it also relates to enterprise and command and control systems that are used to generate, support and manage military forces. Planners are challenged to ensure that assets acquired have the inherent flexibility to remain current to exploit future technological advances. In many cases, such as when lives are at stake, tried and proven capabilities will be needed, but in others the employment of ground breaking advances may be the better choice.

The strategic challenge here is to employ new technologies where they will matter most in maintaining operational relevance, effective self-protection and essential interoperability. The Canadian Forces Aerospace Warfare Centre⁴ is a key resource in identifying technological trends and applications. Participation in multilateral initiatives to develop new capabilities, even if only to be exposed to new information, is also very worthwhile. Canada's partnership in the Joint Strike Fighter program is a great example of gaining exposure and maintaining awareness of new fighter technologies well in advance of a procurement decision.

Planners must also consider measures implemented to counter or defeat new technologies, including increasingly sophisticated cyber interdiction, GPS jamming and counter-jamming measures, advances in negating a ballistic missile defence system, anti-satellite capabilities, UAV hijacking, etc. The RCAF needs to stay abreast of these developments and collaborate with allied nations to ensure that capabilities are sustained and not unexpectedly overtaken by new technology. Importantly, thought should be given to contingencies where access to a capability could be disrupted or denied. In such an event, a 'plan B' for such things as alternate communications, back-up navigation, and redundant services needs to be considered.

PERSONNEL

With sufficient preparation and experience, RCAF personnel can adapt effectively to changing circumstances, from strategic to tactical. Even when unexpected events occur, the resilience and innovativeness of individuals can enable a positive outcome. This ability begins with comprehensive support to maintain a high standard of educational development. With this foundation, the training environment must encourage flexibility of thought and approach to expose individuals to challenging scenarios and empower airmen and women to make the decisions necessary in fluid circumstances. The RCAF already does this well,⁵ but the ongoing

⁴ From the CFAWC mission, at <http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/index.page>, "The CFAWC will provide the Air Force with knowledge to acquire the right capabilities and develop appropriate doctrine to successfully conduct aerospace operations as we move to the future."

⁵ For example, Canada is recognized for an excellent aircrew training system, dating back to the British Air Commonwealth Training Plan. Combat ready training is well-developed on RCAF squadrons and supported by modern training devices. Exercises, such as the Maple Flag series conducted annually at Cold Lake, offer exposure to large scale, multinational and dynamic training in a realistic air combat



challenge will be to ensure that personnel continue to be exposed to demanding situations so they are as prepared as possible for whatever might happen. This is not at all exclusive to aircrew, but to the many personnel in varying trades and occupations involved in executing and supporting missions.

Comprehensive investment in providing education, training and experience to air force personnel can go a long way to mitigating the consequences of an uncertain world. In the words of the RAF “although technology has proved to be a significant force multiplier, the complexity and diversity of the modern battlespace requires just as much from high calibre and well trained personnel to manage and operate a modern air force.”⁶

The Canadian work force is aging and experiencing a diminished recruiting pool; the same holds true for the RCAF. Younger people are not often committed to a full or contiguous career when they join, and yet they presumably want to pursue a career path that is relevant, challenging and exciting. Maintaining an awareness of their perspective and the best incentives to attract talent is critical to successfully competing with civilian employers. The most promising individuals need to be recognized early and offered opportunities that will help them develop into effective managers and leaders. And they need to be engaged as valuable, contributing members of the larger RCAF team. A culture of inclusiveness will not only help individuals develop, it will ensure that they have an intimate understanding of air force capabilities – their weaknesses and strengths – and how best to employ the resources available. Overall, the air force has much to offer and needs to nurture and retain the most talented airmen and women. The challenge is to find and maintain a cadre of people with the intellectual flexibility and analytical skills to deliver the appropriate response to any situation, anticipated or not. This may in turn challenge the traditional culture of a more disciplined, regimented approach that may tend to inhibit freer thinking and the new ideas that it can generate.

INTEROPERABILITY

While Canada’s air force may operate independently at home, it is almost certain that forces will be integrated into a coalition of allies when deployed abroad. Planners must ensure that air force capabilities can continue to integrate with like forces of other coalition partners. Like most nations, Canada will almost always be in a position to only provide niche elements of air force capability to a coalition and the effectiveness of any contribution will almost certainly be dependent on the ability of the air force to operate seamlessly within the coalition. This implies physical interoperability – communications systems, weapons types, support structure, etc – but also commonality of tactical employment of air power. The RCAF is already capable of this with the US and several other allies, and needs to respond to changes in technology and operational doctrine to ensure continuance of close interoperability. Otherwise, Canada might be limited in contributing effectively to a coalition or prevented from taking full advantage of the capability provided. This would be inconsistent with Canada’s tradition of being more than a marginal participant. Canada has always taken pride in providing a meaningful contribution, thus shouldering its share of the responsibility and risk involved.

environment. This encourages innovation and leadership development, even at relatively junior rank levels, for all personnel involved, from planning and support to execution.

⁶ United Kingdom Ministry of Defence, Air Power in an Uncertain World, found at <http://www.raf.mod.uk/role/airpoweruncertainworld.cfm>, undated.



When choosing capabilities, planners must strike a balance to create a flexible air force that can be effective both independently in domestic operations, and with a coalition. This speaks to the traditional air force doctrine of multi-purpose combat capability. It also brings up the traditional debate that exists in force development activity – do you focus on contingency or deployed operations, assuming that domestic needs can be accomplished with the capabilities that will exist, or do you focus on domestic needs, enhanced as needed for deployed operations? The former will provide greater combat capability, with the logistic support to go with it, but will be less cost effective if the potential use for that capability is low. The latter will provide what is needed to defend and support Canada first, but may not provide the robust capability needed in a higher threat deployed operation. Whatever approach is taken, some level of interoperability is needed and there is a real risk of losing operational relevance if new advances are not adopted. The resources necessary must be assigned to maintain interoperability where it is essential to effective employment of a capability. This necessarily involves a commitment to track changes in the capabilities of other forces, engage with them in the need for new standards or procedures, and implement those that are essential.

It is also important to remember that, whether we like it or not, Canada's security is closely linked with the actions and policies adopted by the US. Our mutual success in NORAD, for example, hinges on the continued major contribution of our southern partner. Likewise, the future of NATO is dependent on American support and commitment. Consideration in gaining and maintaining interoperability, therefore, will almost always have to consider US capabilities and their evolution. Canada must, above all, be able to continue a close operational relationship with the US so that our forces can work together whenever necessary without the need for significant incremental training or modifications to be made to the equipment employed.

WHOLE OF GOVERNMENT APPROACH

While the RCAF must be able to project air power and support effectively, it must also be able to conduct and support the 'para-military' missions associated with humanitarian assistance and respond to natural disasters such as earthquakes and floods. These missions are a major consideration as they involve many non-military stakeholders, including various government departments, agencies, non-governmental organizations, and international government representatives. In order for the RCAF to connect effectively with other participants they have to understand what they do, how they operate, and what RCAF resources are fundamentally important to working effectively together. These conversations must occur regularly as the time to exchange business cards is not on arrival at the scene of a humanitarian disaster.

Military and other personnel assigned to a mission often assume a natural leadership role, providing command and control, communications assistance, logistical support, etc. With the increasing trend to a whole-of-government approach to respond to security concerns and crisis management, the RCAF must be prepared to coordinate and communicate with a myriad of stakeholders, and especially with those who are being supported with air force resources. Moreover, the RCAF or the CAF may be the only agency that can effectively bring the stakeholders together to address common concerns, establish priorities, coordinate actions to take and report outcomes. The staff training provided to air force officers offers the ability for disciplined options analysis and consideration of effective courses of action which is often not available elsewhere.



The responsiveness and flexibility of the air force can really be taxed in such situations where many lives and critical infrastructure is at risk. Innovative coordination of resources, dependable communications, and decisive command and control are all important capabilities needed here. One of the challenges for planners is to ensure that the appropriate priority is assigned to these ‘para-military’ functions. While they may be seen by some within the military to be of lesser concern, the reality is that the military response to a natural disaster often provides the most exposure that the CAF has with the majority of Canadian citizens. The receptiveness of those affected and the related media coverage is very important for the public image of the military and should not be underestimated.

CONCLUSION

In addressing future challenges, balance will be key – balance in the provision of multi-purpose, sustainable, and flexible capabilities. Throughout, planners must address the natural tension between achieving this balance and living within the resources available. Even the US needs to consider this, as indicated in a recent posture statement: “This requires flexibility, versatility, and a shift to inherently agile, deployable, and networked systems from those designed for fixed purposes or limited missions.”⁷ Moreover, the elements needed to employ and sustain each capability must be balanced or it will not be effective or efficiently used. This becomes a complex undertaking due to overlapping resources that can be applied to multiple missions and there is a risk of overtasking when competing missions conflict. Assessing the correct requirements for personnel, equipment, infrastructure, training, logistics and information technology support for each mission scenario, and reconciling those needs with the defence budget, is an ongoing challenge. The ability to prioritize and reassign resources should be a persistent consideration throughout the planning process.

In the long-run the RCAF must remain open to new technological developments, maintain the intellectual flexibility to react quickly in unexpected circumstances, and be innovative in identifying potential responses. Overall the goal is to minimize, or eliminate, “shocks” that may occur, reducing them to anticipated “surprises”.⁸ “The process should continually seek to understand future risks and opportunities. Strategic planning should be viewed as a means for creative strategy”.⁹

And, of course, unique Canadian circumstances must be constantly addressed. These range from the demands of the military and the RCAF by the government in power, the specific responses expected to a crisis or development, and the financial resources that are made available to provide the capabilities needed. While the scope of potential need can be almost limitless, the air force strategic plan must be practical, achievable and affordable. This presents a challenge to planners who must find the middle ground between what personnel and equipment could be required and what can realistically be implemented. While the future prospects are exciting, they also demand in-depth analysis, careful force development, and ongoing review and adjustment if the RCAF is to be effective in meeting future needs.

⁷ Secretary of the Air Force Michael B. Donley and General Mark A. Welsh, Chief Of Staff, United States Air Force, Fiscal Year 2014 Air Force Posture Statement, 2013, p 2.

⁸ Department of National Defence, Chief of Force Development, Future Security Environment 2008-2030 Part 2, draft for discussion purposes only, 2010, p 9.

⁹ Westphal, Deborah; Szafranski, Richard; and Parnell, Gregory, p 39.

► **About the Author**

Lieutenant-General (Retired) George Macdonald joined CFN Consultants in 2005 after serving 38 years in the Canadian Forces, culminating in the position of Vice Chief of the Defence Staff from 2001 to 2004, following three years as the Deputy Commander-in-Chief of NORAD. As a Senior Partner with CFN, he focuses on clients with an interest in aerospace projects.

Initially, LGen Macdonald spent several years as an operational fighter pilot. He has commanded at the squadron, base/wing, and air division level. Throughout his career, he held many leadership positions in Ottawa, and has served with NATO forces in Germany and Norway, and with North American Aerospace Defence Command (NORAD) in both Winnipeg and Colorado Springs, Colorado. He also held the position of Director of Operations in the Foreign and Defence Policy Secretariat in the Privy Council Office.

In addition to his operational experience, LGen Macdonald has extensive executive-level expertise in military requirements and capability planning, all aspects of defence program management, corporate change management, international security issues, and Canada-U.S. relations. In his last position as Vice Chief of the Defence Staff, LGen Macdonald was the senior resource manager for DND and was responsible for strategic planning.

LGen Macdonald is a graduate of the University of Calgary and the National Defence College. He has been published on several topics, including change leadership, interoperability, knowledge management, ballistic missile defence, defence strategic planning and resource management, and CF operations in Afghanistan. In addition to being a Fellow with the Canadian Defence and Foreign Affairs Institute, he is active as a board member with the Conference of Defence Associations Institute.



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CDFAI was created to address the ongoing discrepancy between what Canadians need to know about Canadian international activities and what they do know. Historically, Canadians tend to think of foreign policy – if they think of it at all – as a matter of trade and markets. They are unaware of the importance of Canada engaging diplomatically, militarily, and with international aid in the ongoing struggle to maintain a world that is friendly to the free flow of goods, services, people and ideas across borders and the spread of human rights. They are largely unaware of the connection between a prosperous and free Canada and a world of globalization and liberal internationalism.

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