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From First Principles – The Need for a Fighter-Capable Air Force

The Proliferation, Diversity and Utility of Ground-based Robotic Technologies

The Second Métis War of 1885: A Case Study of Non-Commissioned Member Training and the Intermediate Leadership Program

NOTE TO READERS

As a bilingual journal, readers should take note that where citations are translated from their original language, the abbreviation [TOQ] at the end of the note, which stands for "translation of original quote", indicates to the readers that the original citation can be found in the published version of the Journal in the other official language.

EDITOR'S CORNER

Welcome to the 56th issue of the *Canadian Military Journal*. Time certainly flies, and to think some said we would not 'live long and prosper' when we inaugurated back in 1999. At any rate, more on 'space, the final frontier' later under this cover.

And speaking of the cover, we now continue with our frequent commemoration of Canada's participation in the two global conflicts of the 20th Century. This time out, and since it is the turn for an 'air themed cover' in our truly democratic cycle, we are pleased to showcase Stephen P. Quick's interpretation of the great Canadian First World War ace William Avery 'Billy' Bishop's dawn raid on a temporary German airfield near Esnes, France during the early morning of 2 June 1917. Readers should note that Stephen based his painting upon the content of Bishop's combat and reconnaissance reports of the event. More on 'Billy' Bishop later in this issue.

With respect to our major articles for Autumn, a mixed team of senior Army officers and Canadian Forces College academics 'take the point' with an interesting study of the functions of the operational level of command in the Canadian Army. In the words of Lieutenant-General Stuart Beare, until recently, the Commander of the Canadian Joint Operations Command, the operational level of command "… is not well known, understood, or taught to leaders within and across the CAF." Many questions pertain here, and General Beare believes, "…that the authors …have done a superb job in describing the operational level of command, and in providing the answers to these questions."

Moving along, Whole of Government has become a concept of great interest in Canada of late, and in deference to this interest, we offer herein two articles. In the first, Major Patrick Perron, a signals officer and a member of the military academic staff at the Royal Military College of Canada, takes a fresh look at space weather awareness, and how it "…aims at monitoring and predicting adverse conditions on the Sun and in the near-Earth space environment that can degrade and disrupt the performance of technological systems." He is followed by Lieutenant Brendan Alexander, an artillery officer and a Rhodes Scholar, who sheds light upon the reasons why Canada's Whole of Government efforts in Afghanistan were somewhat disappointing in the early years of the campaign, but then articulates proposed solutions, and focuses upon "…an identification and explanation of the failures which inspired those solutions."

Next, Defence, National Security and Strategic Analysts Richard Shimooka and Don Macnamara opine that Canada's defence needs need to be addressed from first principles, and "… from a Government's first responsibility to secure the country." They make a compelling case that our nation's security is being challenged by the emerging security environment. Specifically, they contend, contrary to recent naysayers: "When it comes to fighter aircraft, the speed, flexibility, accountability, and lethality of a fighter-capable air force is very much in Canada's national security interest."

We truly now live in an 'age of machines.' In our next major article, Australian Gary Martinic briefly describes recent technological advances in ground-based unmanned weapons and surveillance platforms and systems, as well as outlining their broad capabilities and military applications. Gary also specifically addresses their potential utility for Canada's armed forces, in particular, "…as this applies to currently available 'off the shelf' acquisitions."

In our historical section, it has often been argued that one's perception of historical events is frequently dependent upon one's historical vantage point. That is certainly the case in the next article. The author, Robert-Falcon Ouellette, PhD, a Cree Indian, holder of degrees in music, education, and anthropology, a program director for university Aboriginal focus programs, and a veteran of 15 years of service in Canada's armed forces, believes this to be the case with respect to Canada's Second Métis War of 1885, often referred to as the Northwest Rebellion of 1885. Specifically, he challenges the conclusions reached through exercises taught by the Canadian Armed Forces Intermediate Leadership Program course, which "…required participants to explain how the Canadian and British soldiers used the ten principles of war to defeat the Métis and Indians in 1885." A very thought-provoking perspective on an old campaign offered herein.

We round out the issue with our usual *potpourri* of opinion pieces, this time dealing with Special Operations Forces and Professional Military Education, as well as a number of reviews of recently-published books. Finally, our own Martin Shadwick tackles equipment and procurement issues, since, in Martin's own words, they "…continue to dominate much of the public face of defence in Canada."

Finally, as promised in our last issue to keep our readership apprised of recent defence learning initiatives, Lieutenant-Colonel Debbie Miller, manager of the Performance Innovations section at the Canadian Defence Academy, offers the following invitation to members of the Canadian Armed Forces and the Department of National Defence: "This is an invitation to you, *all who presently have a'@forces.gc.ca*' address, to join us in the CAF Learning Portal (beta site). The Learning Portal is an innovative, collaborative, progressive step forward for CAF Training and Education, accessible on both the *internet* and the *intranet*. It has discussion boards, wikis, groups, conference feeds, and much more. To create an account, go to: <http:s3ongarde.net/portal/>, and click on the register link found under the login button.

That's all for Autumn. Until the next time.

David L. Bashow
Editor-in-Chief
Canadian Military Journal

LETTER TO THE EDITOR

Dear Sir;

I wish to address statements regarding amphibious warfare made in the article "Breaking the Stalemate: Amphibious Operations during the War of 1812," published in the *Canadian Military Journal*, Vol. 14, No. 1 Winter 2013.

The suggestion that land operations during the War of 1812 resembled the First World War more than the Napoleonic Wars is nonsensical, unless one believes that the allied victory over Bonaparte in Europe came as the result of a handful of major land battles, fought over the course of the French Revolution and the Napoleonic Wars. One would then have to ignore the more than 2000 other battles, skirmishes, raids, and sieges that took place between 1792 and 1815. It was not Salamanca, Borodino, Leipzig, the actions in France during 1814, and Waterloo in Belgium that won the war for the allies. Rather, the steady application of military, naval, economic, and diplomatic power defeated Napoleonic France through attrition. In North America, the wilderness and space of the northern theatre and the coastline offered operational challenges. However, the effects of battle, whether victory, defeat, or stalemate, did not always bring tactical or operational advantages.

Cover of Vol. 14, No. 1

The War of 1812 was a limited conflict, conducted at a time when Europe was locked in a global war. In July 1813, Britain had 73 warships on the North American coast and at Newfoundland, out of a total of 624 vessels in commission, and the majority of the latter were in European waters or in the Mediterranean. Similarly, of the 235,172 personnel serving in the British Army, just over 13,000 were stationed in North America. While the number of soldiers increased to 43,900 after the conclusion of the European war, the British had also began demobilizing and had reduced their army to 170,000 personnel. By this time, the Royal Navy was also down to 485 commissioned ships.

On land, the policy of limiting the resources committed to North America meant that between the opening of the war in June 1812, and the end of the 1814 campaign season, when the last reinforcements set foot in British North America, the US Army, which was never larger than 35,000 men, outnumbered the British regulars. Fencible, embodied, incorporated militia, as well as native allies, provided additional manpower to both sides, yet neither side was able to gain a decisive advantage in manpower. On the lakes, the Royal Navy was incapable of establishing sizeable squadrons on Lakes Erie and Champlain, choosing instead to focus its attention on Lake Ontario. British dominance of the Upper Lakes was owed more to audacity and strong leadership than to naval might.

As the aggressor, it was up to the United States to develop a strategy to defeat the British, and they proved incapable of doing so. Objectives such as York, Fort George, and others may have yielded *tactical* successes. However, the *strategic* results were negligible. The most sensitive challenge the British faced was with respect to logistics, and had the Americans struck decisively at the Upper St. Lawrence River and cut communications between Lower and Upper Canada, the British undoubtedly would have traded space for time and abandoned the upper province, or would have sought a negotiated end to the conflict. This never happened.

Waterways were indeed the easiest means of communication, and each side attempted to exploit control of the Great Lakes or the rivers for their purposes. While Lake Ontario and Lake Erie formed, in the words of Lieutenant-General Sir George Prevost, the commander of British North America, a shield protecting Upper Canada, the lakes did not share the same importance. Lake Ontario had to be held at all costs, a belief Commodore Sir James Yeo shared, and the majority of the inland naval resources were committed to that one lake. It was during the course of inland naval operations that the British discovered the difficulties of extending the reach of their naval power past Montréal.

One means of overcoming the size of the theatre, the limited road network, and the lack of horses and wagons in the north rested in amphibious operations, which often provided the shortest route to the enemy. Several amphibious attacks are described in the article. By 1812, the British had conducted some 60 such operations around the globe, and, to the credit of the United States, which had none to that point, in 1813, their commanders managed to pull off two excellent amphibious attacks, one against York (now Toronto), and the other, the north-eastern end of the Niagara Peninsula.

Washington Burning, 1814.

Neither of these operations, nor those the British conducted, involved lengthy support of land forces once ashore. Indeed, the senior American and British naval commanders grew to detest supporting the army. Most if not all of these amphibious attacks were raids, designed, unless weather or currents refused to cooperate, to take no longer than a day. A similar situation prevailed on the Atlantic and Gulf coasts, where, in the Chesapeake area alone during 1813 and 1814, British conducted 87 amphibious raids. The two notable exceptions to the raiding policy were the British occupation of Washington and the New Orleans campaign, both of which were classic amphibious operations.

The literature related to amphibious warfare in the War of 1812 is far greater than suggested in the article. The late Robert Malcomson considered 'amphibiosity' in his *Lords of the Lake: The Naval War on Lake Ontario, 1812–1814,* and *Capital in Flames: The American Attack on York, 1813*. Robin Reilly examines both Washington and New Orleans in *The British at the Gates: The New Orleans Campaign in the War of 1812*. There are also a host of general and specific campaign studies and articles by historians such as Ernest Cruikshank, Frederick Drake, Ralph E. Eshelman, Donald E. Graves, Donald R. Hickey, J. Mackay Hitsman, Walter Lord, Alfred Mahan, C.P. Stacey, and Scott Sheads, just to name a few. Finally, the impressive multi-volume *The Naval War of 1812: A Documentary History* addresses amphibious warfare and raids in detail, as do at least two graduate level theses.

One final note. Of the senior British commanders who served in Canada during the War of 1812, the greatest opponent of amphibious attacks against the Americans came, not from the army, but in the person of the Commander in Chief of His Majesty's Ships and Vessels on the Lakes of Canada, Commodore Sir James Lucas Yeo.

Yours sincerely,
John R. Grodzinski

Major John Grodzinski, CD, PhD, *an armoured officer, is currently an Assistant Professor of History at the Royal Military College of Canada. An acknowledged expert on the War of 1812, he has been published extensively on that war, and he is the editor of the on-line* War of 1812 Magazine. *His published works include* Defender of Canada – Sir George Prevost and the War of 1812, The 104th (New Brunswick) Regiment of Foot in the War of 1812, *and editorship of* The War of 1812, An Annotated Bibliography. *John has also been a commentator on the War of 1812 for the Discovery Channel, CBC Radio, and a PBS documentary*.

DND photo AR2011-0025-120 by Corporal Tina Gillies

A Canadian Approach to Command at the Operational Level

by Paul Johnston, Chris Madsen, Paul Mitchell, and Steven Moritsugu

Lieutenant-Colonel Paul Johnston *is a staff officer (A2) at 1 Canadian Air Division Headquarters in Winnipeg.*

Chris Madsen, PhD, *is a Professor in the Department of Defence Studies at the Canadian Forces College in Toronto.*

Paul Mitchell, PhD, *is a Professor in the Department of Defence Studies at the Canadian Forces College, and the Deputy Director of the Department of Military Plans and Operations.*

Colonel Steven Moritsugu, *formerly a staff officer at Canadian Joint Operations Command Headquarters, is currently the Commander of Canadian Forces Information Operations Group.*

Preface

Lieutenant-General Stuart Beare, CMM, MSC, MSM, CD, *a highly experienced combat arms officer who has commanded at all levels, was, until recently, Commander of the Canadian Joint Operations Command (CJOC).*

"We defend Canada, we defend North America, we deliver peace and security abroad" – if we were to choose words to go on a bumper sticker (beside our yellow ribbons) that describes who we are and what we do as a modern CAF – it would likely be these.

Our services, joint forces, and joint capability providers across the CAF develop and generate the tactical excellence and operational readiness that puts truth to these words. The Chief of the Defence Staff (CDS), supported by his senior Commanders, and enabled by the strategic military and defence staffs, formulates the strategic direction, in accordance with the Government of Canada's intent, as to where, with whom, with what force structure, and when we deliver on these words, preserving the CDS's unique responsibility to the Government of Canada for CAF operations. It is the responsibility of operational level Commanders to translate strategic direction into operational purpose, enabled and sustained through joint, interagency, and combined action – the how. The operational level Commands that exist in the Canadian context include North American Aerospace Defence Command (NORAD), and Canadian Special Operations Forces Command (CANSOFCOM), as well as our recently-formed Canadian Joint Operations Command (CJOC).

CJOC's mission is to anticipate, prepare for, and conduct operations to defend Canada, to assist in the Defence of North America, and, when directed, to promote peace and security abroad. As a standing joint operational command with Component Commands, Regional Joint Task Forces (RJTFs), Joint Operational Support, Search and Rescue Regions, and assigned Task Forces – CJOC, with federal, provincial, host nation, international organization, and international military partners, performs that mission daily, and will continue to perform it in the future, in a world that is increasingly volatile, unstable, and unpredictable. We *do* and *will perform* that mission in all domains – maritime, land, air, space, and cyber. While missions of the day dominate common understanding of CJOC activities, conditions for mission success are designed and delivered in the Phase Zero – well in advance of operations. Phase Zero means effective monitoring *in* and *of* all domains, planning, practicing, and exercising generic and specified contingencies, and setting the command and control, Joint Intelligence, Surveillance, and Reconnaissance (JISR) networks, force protection, and operational sustainment conditions to support current operations and enable crisis and contingency response. An effective Phase Zero requires strong and familiar partnerships – federal, provincial, multi-national, and international. In addition to delivering success in current operations, this '*mission preparedness*' is a key element of our sustained excellence in operations. But this 'operational level' of activity is not well known, understood, or taught to leaders within and across the CAF.

"What then are the functions of the operational level of command in the Canadian context?"

What then are the functions of the operational level of command in the Canadian context? How do we effectively partner, anticipate, prepare for, and conduct our ultimate mission? Where is this described, and how is it codified? Where are all these things taught, and how are they practiced? And why, in a period of seeming reduction in operational tempo, are our Operational Commands, and the operational level, so engaged and so busy?

The authors of this concept paper have done a superb job in describing the operational level of command, and in providing answers to these questions. Their contribution here is a key element of expanding this knowledge and understanding across the CAF and the defence team at large, and is a superb lead into the CAF doctrine and its introduction to training and education to follow. It is my hope that their efforts will fuel the professional discussions required of those in the military profession to grow and evolve our understanding of the operational level of command. Well done to them.

Please read on.

Introduction

Within the Canadian Armed Forces (CAF), the functions of command at the operational level are neither universally understood nor necessarily agreed upon. Different organizational models and levels of experience have led to sometimes significantly different views with respect to what operational level activities are necessary to ensure the delivery of tactical military effects that achieve strategic objectives – in short – excellence in operations. If consensus does not exist among senior leaders, then strong personalities rather than shared understanding and experience could drive future 'transformational' changes to CAF processes and organizational structures, roles, and responsibilities. The resulting differences, as opposed to unity of thought and

DND photo

SOF forces on the move.

DND photo AT2011-T035-06 by Master Corporal Chris Ward

Lieutenant-General Stuart Beare, then-Commander of Canadian Expeditionary Force Command, speaks to Canadian soldiers stationed at Camp Alamo, Kabul, Afghanistan, 3 December 2011.

purpose, can lead to organizational inefficiencies and potentially less operational effect. With recent organizational changes and institutional experiences in mind, two basic questions need to be answered: What constitutes command at the operational level, and what does it mean in the Canadian context?

The intent of this article is to offer that a specific Canadian approach to command at the operational level is emerging, with key and enduring functions that are far more expansive than merely commanding individually-named operations. Strategic level functions will not be specifically addressed here, although they do certainly impact on the *conduct of* and *preparations for* operations, as well as the dynamic behaviors of military organizations at the interface between strategic and operational. To be truly effective, the strategic and operational levels should work together in tandem, often with shifting boundaries and integrated and overlapping functions that are complementary. For Canada, the operational layer resides in Canadian Joint Operations Command (CJOC), Canadian Special Operations Forces Command (CANSOFCOM) and North American Aerospace Defence Command (NORAD). Conceptual understanding of command at the operational level is a necessary precursor

DND photo

to the development of joint doctrine that can lead to enhanced professional understanding of the nature of the operational level of operations in the Canadian context, and advance unity of purpose and action by CAF organizations engaged in the operations agenda.

The government's *Canada First Defence Strategy* identifies three central roles for the CAF: defending Canada by delivering excellence at home, defending North America as a strong and reliable partner, and contributing to international peace and security by projecting leadership abroad. Within these areas of ambition are six core missions: 1) conduct daily domestic and continental operations with special emphasis on the Arctic and NORAD; 2) support a major international event in Canada on the scale of the Olympics or G8 summit; 3) respond to the threat or actual occurrence of major terrorist attack ; 4) assist civilian authorities in Canada during natural disasters and other crises; 5) contribute to or lead designated parts of major international operations and military campaigns alongside multi-national partners; and 6) deploy task-appropriate forces globally in response to crisis when needed for shorter durations of time.[1] Implicit in these tasks are the pre-mission execution conditions set within operational commands to succeed in these tasks – as well as the efforts of force generators and capability providers to ensure, as a whole, the CAF and operational partners are poised for mission preparedness, while forces are postured for operational readiness. This article focuses principally upon mission preparedness and the joint operational responsibilities that ensure forces assigned are ultimately enabled and successful when committed to specified operations.

Where does the Operational Level Begin and End?

In military usage, the term 'operational' has existed for centuries, but only in the sense of the conduct of operations, as distinct from training or administration.[2] In the sense of a level – either of command or of the phenomenon of conflict itself – English use of the term is relatively new. Classically, military thought recognized two, not three, distinct levels – the strategic and the tactical.[3] The idea has been intimately bound up with the related concept of 'operational art.'[4] Certainly, that focus preoccupies almost all theory and doctrine published on the operational level.[5] However, operational art in the sense of planning theatre-level campaigns is not what primarily concerns Canadian commanders working at the operational level.

Historians generally trace the operational level's roots back to Soviet thinking on deep operations in the 1920s, or farther with German military thought of the later 19th Century, right at the time that industrialization was first creating huge armies.[6] Regardless, the contemporary English language concept comes largely from the 1980s manoeuvre warfare revolution, which shifted from a supposed attritional and positional approach, to one based upon deft manoeuvre and operational art.[7] Manoeuvrist precepts stressed the importance of thinking at the operational level.[8] Recently, something of a counter-movement seems to be developing, as exemplified by the critical analysis of Justin Kelly and Mike Brennan, who argue that artificial separation of the operational level from the strategic led in conflicts like Afghanistan and Iraq to independent military activity that is

US Marine Corps photo 140719-M-IN448-138 by Corporal Matthew Callahan

A Canadian infantryman with US Marines during Rim of the Pacific (RIMPAC) Exercise 2014 in the Pohakuloa Training Area, Hawaii, 19 July 2014.

not usefully connected with strategic ends.[9] Indeed, the very nature of an operational level – distinct from the strategic and tactical – is intellectually contested and conceptually unclear.[10] William Owen has taken an even more extreme position, flatly asserting that there is "no such thing as the operational level."[11] No doubt, in the contemporary security environment, distinct levels often blur and merge.[12]

In the Canadian context, the idea of an operational level, and the corresponding operational art through which it is practiced, are even more difficult to articulate. Whereas some military writers might lament its absence or immaturity as a concept, others question the applicability of operational art to Canada.[13] As a nation, Canada typically contributes forces to campaigns led by others. Lieutenant-General Jonathan Vance termed this choice "contribution warfare."[14] The CAF is neither *required* nor *able to generate* military forces larger than army brigade groups or naval and air force equivalents, with the possibility of one deployable joint task force headquarters which could control combined forces up to the same level. Therefore, there is little-or-no national imperative for operational level campaigning and command in the field. If theatre-level campaigning is rarely applicable, and if the very concept of a distinct operational level is somewhat problematic as an organizing principle, then how exactly does operational-level command concern the CAF?

The conceptual theme to what constitutes the operational level, certainly in contemporary Canadian practice, is integration – integration of the myriad activities necessary in order to accomplish the things asked of militaries as they monitor the defence and security environment, partner with civil authorities and military forces, plan and prepare for contingency and crisis response, and lead and enable their own armed forces in the conduct of operations.

The decisions surrounding prospective deployment and participation of military forces on operations are made at the political level, customarily by Government. CAF operations or CAF contributions to civil authority activities at home or coalition and international partners abroad has to be worthwhile and appropriate in light of the nation's strategic imperatives, overriding policy, departmental priorities, and other strategic factors. The Chief of the Defence Staff (CDS) is uniquely responsible for the provision of military advice to Government on these issues, and manages the interaction at political/military interface.[15] That responsibility is enabled by the full range of strategic functions, as well as the support of service chiefs, functional experts, and operational level leaders who support and enable the CDS in fulfillment of this responsibility.

According to military doctrine, preparation and planning for operations begins once the military has received strategic direction and initiation from the government. However, strategic uncertainty and gaps or lack of unity in the international order do often result in decisions taken at the last moment, and degrees of strategic ambiguity in the real strategic objectives being pursued where operations are directed. Sometimes, just 'being there,' and 'doing something' is adequate strategic effect. At other times – being

DND photo IS2012-2007-001 by Master Corporal Marc André Gaudreault

Chief of the Defence Staff (CDS), General Tom Lawson, addresses the troops during a dinner at Camp Phoenix, Kabul, Afghanistan, 8 December 2012.

DND photo AR2007-Z041-10 by Corporal Simon Duchesne

Former CDS General Rick Hillier speaking with combat engineers at a forward operating base in Afghanistan, 24 October 2007.

there immediately is the strategic imperative, and eventually driving strategic objectives and operational outcomes – alone or with partners – follows. Operations are mounted with varying degrees of strategic precision regarding aims and intended effects – that can then be translated into operational and then tactical objectives. This phenomenon is not particularly Canadian, but rather, it reflects the contemporary strategic environment where the goals of employing military force frequently have less to do with traditional strategic issues. Rasmussen and Coker, for instance, observed that "strategy is no longer a question of defeating concrete threats in order to achieve perfect security; it has instead become a way of managing risks."[16]

"Strategy provides a bridge between policy and action by applying natural resources to achieve policy objectives."

The pressure to 'do something' often leaves many questions with respect to what should be done, to whom, and how it should be done unanswered.[17] The CAF, at certain times, has even been told what the number and nature of deployed forces on specific operations shall be, as opposed to being provided explicit strategic security or national objectives that inform the military ways and means that ultimately are committed.[18] Indeed, these problems were clearly evident in General Rick Hillier's direction to Canadian Expeditionary Force Command (CEFCOM) at commencement of operations in Kandahar in 2005.[19] Command at the operational level seeks to inform and influence these deliberations by providing the CDS with relevant and useful information about the nature of the operational environment, understanding of operational challenges and adversaries, as well as understanding of the aims, forces structures, operational designs, and intentions of partners at the operational levels – ultimately contributing to the formulation of military advice that the CDS may provide to strategic decision makers. These inputs, among others, support Government as it makes calculated choices with respect to available options and the effects that might result from military operations conducted by, with, and through operational partners and partnerships. The CDS does not prescribe political or strategic decision; instead, enabled by a clear picture of the strategic factors in play, and a clear understanding of the operational level environment, the CDS provides sufficient and timely information, understanding, and advice that allows the national authority to make the most informed decisions possible, mindful and understanding of CAF views and opportunities, capabilities, objectives, and risks.

Functions of Operational Command

It is important to distinguish that in a Canadian context, the operational level is not limited to the classical level between the strategic and tactical in the conduct of a single operation or campaign. Instead, it involves command across multiple, simultaneous operations, rather than in any single operation or

DND photo AS2014-0045-007 by Sergeant Bern LeBlanc

Paratroopers from 3rd Battalion, Princess Patricia's Canadian Light Infantry (PPCLI), exit a CC-130J *Hercules* during an airborne insertion into the Oleszno Training Area of Poland as part of NATO reassurance exercises, 4 July 2014.

theatre of operations, as well as the continuous monitoring of the defence and security environment in all domains, and the partnering, planning, and preparation for operations as required in defence policy, and from strategic military direction. Thus, the Canadian operational level involves more than just operational art and campaigning in a singular mission. In practical terms, the interpretation of strategic intent, the understanding of the operational environment, and orchestration of military action and effort takes place on a much wider scale – across operations, across domains, across theatres, across partnerships, and over time horizons – *in anticipation of, preparation for,* and ultimately *in conduct of* operations – many and concurrently – themselves.

Strategy provides a bridge between policy and action by applying national resources to achieve policy objectives. Tactical level forces execute operations to achieve military effects. The overarching responsibilities of the operational level commander can be categorized into two broad areas that close the gap between strategy and tactics: the conduct of operations and the preparation for (setting the conditions for success in) operations. The operational level of command integrates service and joint operational capabilities to enable concurrency, balancing of effort, and coordination of effects – in planning, in coordination, in mission preparation, and in application.

The design and control of operational level effects should always be command-driven, versus staff-led. Transformational principles of an operations-focused, command-led, and a mission command approach to command at the operational level remain dominant in effective leadership of the operational level in the CAF context. Command-driven, as opposed to staff led, sustains clarity in the singular points of responsibility and accountability for the CAF in the operations agenda. This focus ensures clarity and organizational unity in understanding in terms of who issues what orders and how operational activities and risks are managed. *Authority* can be delegated, but *responsibility* cannot be delegated.

Conduct

For success in operations at the operational level, Canadian operational commanders perform four key functions:

1. **Translate strategic intent to operational direction, allocate resources to assigned forces, and influence conditions to enable mission success.** Conducting operations is the *raison d'être* of the CAF. The basic concept is well understood, codified in doctrine, and regularly practised. The operational commander sets the parameters for favourable outcomes. Through five phases (warning, preparation, deployment, employment, and redeployment), tactical level task force commanders execute operations to achieve military effects. In many ways, this activity seems straightforward – militaries know how to be in charge of military operations and CAF professional development stresses leadership in operations. Where the CAF is the provider of forces to missions led by other operational partners – this effort requires the careful balancing of force provider (national) intent, restraints

and constraints, as well as that of the mission partnership (coalition/alliance for example) and their broader intent objectives and desired effects.

2. **Provide, integrate, and enable effective and relevant military forces.** The environmental services, joint commands, and other parts of the CAF generate maritime, land, air, cyber, special operations, and joint forces for employment. The operational commander must integrate assigned forces into a militarily-effective whole and enable their success. National command and control communications and information systems (C3I), intelligence, surveillance, and reconnaissance (ISR) networks, provisions for force protection and operational support and sustainment are nationally-provided joint enablers and therefore core responsibilities of the Canadian operational commander. The operational level commander seeks, to the greatest degree possible, to establish these networks and operational frameworks in advance of operations and contingencies; and ensures their integration with, contribution to, and leveraging among inter-agency and international operational partners.

3. **Inform, shape, monitor, assess, and report on campaign plans and their execution.** As the CAF contributes to either the inter-agency mission or coalition/alliance campaigns, the Canadian operational commander seeks to inform and influence the development of the partnered mission and campaign plan. The Canadian operational commander plays a key role in informing, influencing, and expressing the Canadian national viewpoint to the leadership of the campaign at the operational level, complementing that being conducted at the strategic level. Responsibility for monitoring its progress and evolution is another requirement. In simple terms, the operational commander needs to report to the national authority clear understanding of the operational level campaign, how the coalition/alliance or inter-agency team is conducting it – and measures of performance and measures of effect. Put in other words, "how is it going?" This understanding, provided by the CDS, is further key input to formulation and updating of military advice to Government, in particular as it relates to adapting strategic partnerships and interactions, as well as potential adjustments to the CAF mission, contribution to, and participation within a campaign.

4. **Engage and inform mission partners and stakeholders.** Support for Canadian participation in a military campaign depends upon an informed public, knowledgeable 'opinion shapers,' and well-informed strategic decision makers. Success in combined operations depends upon close coordination with mission partners, not just of tactical manoeuvre but also of operational direction, resourcing, and condition setting. Building trust and familiarity at the operational level takes concerted effort. The operational commander must ensure support for and coordination of Canada's participation in the campaign and its major operations. Shared understanding among stakeholders of the mission, operational actions, risks being managed, and results being achieved by the CAF contribution within the operation and campaign are necessary, as well as adequate understanding of the overall mission partner or coalition campaign design, coalition actions, risks being managed, and results being achieved across the mission at large. Understanding of "how are we doing?" and "is it working?" within the CAF mission element besides across the operational team at large are key to enabling CAF operational agility and adaptability, as well as CAF and Canadian resilience in the face of significant risks and costs.

"The requirement to supervise or monitor CAF contributions to the conduct of operations will always exist, even if those operations are purely tactical in nature."

The requirement to supervise or monitor CAF contributions to the conduct of operations will always exist, even if those operations are purely tactical in nature. In the contemporary environment, local actions can have strategic consequences and therefore timely and accurate provision of information about CAF operational activity – even if modest – is frequently required by strategic leaders.

DND photo AS2014-0041-003 by Sergeant Bern LeBlanc

Paratroopers from Canada and Poland jump from a CC-130J *Hercules* aircraft in Poland, 29 June 2014.

DND photo IS2014-1015-06 by Sergeant Matthew McGregor

Troops from 3rd Battalion, Princess Patricia's Canadian Light Infantry Recce Platoon, 3 Section, 3rd Reconnaissance Battalion, 'A' Company, Third Platoon, United States Marines, and troops from the Japanese Western Area Infantry Regiment, use combat rubber reconnaissance crafts for training during Exercise RIMPAC in Kaneohe Bay off Hawaii, 29 June 2014.

Prepare

"War," Clausewitz wrote, "is a serious business."[20] Military failure, at the very least, results in significant casualties and the loss of hard-to-replace capital equipment; at the very worst, strategic disaster can have consequences for the state that can resonate for years or even lead to its dissolution. Consequently, preparing for operations represents a significant effort of the operational level of command. While the higher strategic level will anticipate the requirement for military action and determine strategic intent, and tactical level task force commanders will execute military operations as directed – and with forces generated and readied by environmental services and specialist joint forces, the operational commander must ensure that all domain awareness, partnerships, plans, and the preparedness to execute operations pre-exist the call for action and the need to employ – to the maximum degree possible and within policy and strategic constraints.

Regardless of the number of operations in train, the operational level commander remains responsible for adaptations to those operations (branches and sequels), as well as for the preparedness for other crisis or contingency. Furthermore, the operational level commander *contributes to* and *participates in* monitoring, with partners, the current and emerging defence and security environment in all domains – ensuring understanding of any likely indicators or warnings that could result in the call for major changes to current operations or for contingency or crisis response. This type of anticipatory military effort is 'Phase Zero' activity – continuous and on-going, not anticipatory to any one operation, but that provides the assurance of preparedness for any and all of the CAF missions and assigned tasks – before a specific military operation is directed. It becomes not just a basis for any specified operations that may be undertaken, but as the purpose and method of engagement with inter-agency and international operational level partners in their own right – across the whole range of operational possibilities. Effective understanding of the operational environment and preparedness for operations entails common effort by many players. Phase Zero work comprises several key functions:

1. **Attain all domain understanding.** Building situational awareness is the first step toward comprehensive understanding of the operational situation and framing suitable responses, by which to add to strategic understanding and to inform the basis for mission preparedness. The operational commander must constantly monitor the situation and engage with potential operational partners – in Canada, in North America, and around the world. Appreciating military threats, potential adversaries, broader force protection and public security threats, natural and man-made disasters, political instability, and the gamut of other factors that could precipitate the consideration of Canadian military action is one part of understanding the operational situation. Equally important is to understand how potential operational partners view and assess the situation themselves, their interests and intent, their potential courses of action, and their force posture. Comprehensive understanding of the operational situation, along with some indication of the strategic environment, enables the operational commander to inform strategic decision-making and, most importantly, to drive other operational level preparedness functions. Furthermore, it ensures that Canadian equities in the global commons – maritime, air, space, and cyber – and the networks on which the CAF depends, including C3I, ISR, and sustainment – are protected and available to inform decision-making, as well as enabling contingency or crisis response.

2. **Plan for contingencies.** Contingency planning is a fundamental activity. Plans and procedures for the specified task related to defence, safety, and security of the homeland, as well as for the generic tasks related to peace and security abroad – are the operational description of 'how' the CAF translates the defence mission into Phase Zero and Phases 1 to 5 (warning up to deployment) tasks across the joint force. Contingency planning is collaborative – pursued and produced with inter-agency partners at home, and international partners abroad. Contingency planning also helps to identify capability limitations and gaps, informing requirements for current force operational readiness and future force development.

3. **Establish and maintain networks.** To be prepared to conduct potential operations rapidly and successfully, the operational commander must create relationships with specified as well as potential mission partners – prior to contingency or crisis response, or time of need. This technology enabled human networking builds on the contacts necessary to understand the perspectives of operational partners and facilitates planning, establishes pre-mission frameworks for command and control, ISR, force protection, and operational support, and then accelerates the integration of forces and coordination of effects in mission execution. Establishing physical networks of operational support hubs and integrated lines of communication in advance of a specific military operation is a key operational level preparedness activity, as is working out the human and technical details of command and control and ISR networks.

4. **Practice joint operations.** The Canadian operational commander is ideally-placed to conduct large-scale joint exercises and training that demonstrate the readiness and capability of the CAF to deliver on its assigned missions, while forcing the integration of environmental service elements and developing joint capabilities. Practicing standing operations and contingency plans, exercising the C3I, ISR, force protection, and operational support systems and networks, in addition to integrating the effectiveness of environmental service and joint force generated forces – in effect, playing out contingencies – with operational partners – before they are called are all key elements of mission preparedness.

5. **Drive joint capability improvement and influence joint force development.** As the employer of the end product of force generation activities of other parts of the CAF, the operational commander has an implicit interest in improvement of current capabilities and development of the future force, in particular, those capabilities germane to C3I, ISR, force protection, and operational support, as well as the space capabilities and cyber networks upon which all of these depend. This effort belongs to the joint operational level of interest and influence. The joint operational commander must take an active role in designing near term solutions and marshalling others to deliver them, as well as signaling the requirements for future force development.

DND photo PA2014-0144-11 by Corporal Mark Schombs

Major Edward Jun from the 3rd Battalion, the Royal Canadian Regiment, with American and Polish commanders at the start of a multi-national firepower demonstration with the Polish 6th Airborne Brigade and the American 173rd Airborne Brigade during Operation *Reassurance* in Eastern Europe, 17 July 2014.

Operational-Level Gap: Who is the Champion for Joint Forces?

If the role of the operational level force employer remains significant, a distinct lack of agreement within the CAF on the authorities, responsibilities, and accountabilities for joint capability development, joint force generation, and joint force management persists. There is no single champion or dedicated organization responsible for developing, stewarding, delivering, and sustaining the capabilities that enable the joint operational commander to integrate into an effective whole the contributions of the Royal Canadian Navy, Canadian Army, Royal Canadian Air Force, and Special Operations Forces, while assuring effective integration and enabling with mission partners founded upon a backbone of national joint capabilities. For some capabilities, the operational commander has taken on the tasks of identifying and prioritizing joint enabler shortfalls, and marshalling others to deliver solutions. While a single champion may or may not be the right solution for the CAF, this decision should be made consciously; it appears that the current situation has developed organically as people and organizations do what is necessary to ensure success in operations, and the development and generation of joint capabilities and forces that function persistently in Phase Zero and therefore crucial to ultimate success in the steps leading up to and in the conduct of operations.

The Way Forward

In the Canadian context, command at the operational level is not limited to campaigning in a single theatre of operations following receipt of comprehensive strategic direction. It encompasses the maintenance of all domain awareness – alongside operational partners. It includes the *preparation for*, and *conduct of*, the entire spectrum of military operations: inside and outside Canada – in all domains – with a full range of operational and mission partners – concurrently. Whether or not a specific military effect has been ordered, the operational level commander continuously builds situational awareness by engaging partners and stakeholders to inform strategic decision-making and drive Phase Zero preparation activities, plans for contingencies, establishes networks, practices joint operations, and drives joint capability improvement. When strategic direction is issued specific to an operation, the operational level commander interprets national direction, coordinates with operational level mission partners, establishes the national networks for C3I, ISR, force protection, and operational support, issues direction, allocates resources, and influences conditions to enable tactical success. The operational level commander informs and shapes partnered campaign planning, and monitors and reports operational results – achieved by coalition/alliance and inter-agency operations at large, and by the CAF contributing to those very operations. Success in operations, including CAF adaptability and agility in those operations, as well as institutional resilience in the face of challenges and setbacks, is ensured by securing the trust and confidence of national stakeholders. This result can only be achieved by timely and relevant engagement with partners and informed stakeholders.

DND photo by Master Corporal David McVeigh

Canadian understanding and a unified approach to command at the operational level, so far advancing incrementally, has yet to be made 'normal.' As the CAF, with its operational partners, continues to learn while doing – codification of the operational level in Canadian joint doctrine, its implementation through professional military education, and its application in the business of command at the operational level as described here should continue deliberately, with the full consciousness of commanders within and outside the operational command framework. Canada's progress in this area compares to like-sized and like-minded military partners, and instills confidence among foreign and Canadian inter-agency partners that the CAF takes the operational level seriously, both prior to and during operations. CJOC, NORAD, and CANSOFCOM will remain central to how the CAF functions at the operational level. Focus and effort in Phase Zero, assurance of all domain awareness, pre-operations maintenance of partnerships, plans, and joint training and exercises that practice them, as well as pre-contingency maintenance of the operational frameworks for C3I, ISR, force protection, and operational support need to be nurtured and sustained. In addition to the mission-critical operational readiness of environmental service and joint force provided tactical forces, mission preparedness efforts remain key to advancing and sustaining Canadian excellence in operations. Appreciation of the operational level and the key concepts behind how it is practiced in the Canadian context provide a good start.

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NOTES

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2. Bruce W. Menning, "Operational Art's Origins," in *Military Review*, Vol. 77, No. 5 (September-October 1997), pp. 32-47.
3. The etymologies of those two words reflect their antiquity, both stemming from ancient Greek words for "the art of the commander" and "to order or arrange troops," respectively. Carl von Clausewitz in his great work spoke only of the tactical and the strategic. Antoine Jomini, in his mid-19th Century analysis of Napoleon's campaigning coined the term "grand tactics" to describe 'the little corporal's adroit maneuvering of corps-sized formations.
4. Allan English, "The Operational Art: Theory, Practice, and Implications for the Future," in *The Operational Art: Canadian Perspectives, Context and Concepts*, Allan English, Daniel Gosselin, Howard Coombs & Laurence M. Hickey (eds) (Kingston: Canadian Defence Academy Press, 2005), pp. 1-74.
5. CFJP 01, *Canadian Military Doctrine*, defines the operational level solely as "concerned with producing and sequencing the campaign," (p GL-6) and CFJP 3, *Operations*, when offering its definitions of the levels, states that the operational level "is the level at which campaigns are planned, (p. 1-2) and goes on to provide a whole chapter on campaign planning (Chapter 5). Another single paragraph on p 8-4 states: "Military peacetime activities will normally be planned and conducted at the operational level … The activity itself should reflect Canadian national interests and be based upon a whole-of-government approach." US doctrine for what constitutes the operational level is equally focused upon campaign planning and Force Execution, for example, US JP 1, *Doctrine for the Armed Forces of the United States:* "The focus at this level is on the planning and execution of operations using operational art," (p I-8) and US JP 5-0, *Joint Operational Planning*, which describes operational art and operational design for theatre-level execution of campaigns.
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10. Richard M. Swain "Filling the Void: The Operational Art and the US Army", in B.J.C. McKercher & Michael A. Hennessy (eds) *The Operational Art: Developments in the Theories of War* (Westport, CT: Praeger, 1996), pp. 147-172; even Shimon Naveh, otherwise apostle of operational art, has criticized the delineation of "levels" of war: *In Pursuit of Excellence: The Evolution of Operational Theory* (Portland, OR: Frank Cass Publishers, 1997), p. 12; Martin Dunn, "Levels Of War: Just A Set Of Labels?", in *Newsletter of The Directorate of Army Research and Analysis*, Australian Army, No.10, October 1999, available online at <http://www.clausewitz.com/readings/Dunn.htm>, accessed 25 January 2014; Huba Wass de Czege, "Thinking and Acting Like an Early Explorer: Operational Art is Not a Level of War," in *Small Wars Journal*, (14 March 2011).
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Space Weather Situational Awareness and Its Effects upon a Joint, Interagency, Domestic, and Arctic Environment

by Patrick Perron

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Introduction

The recent launch of Canada's first dedicated operational military satellite, *Sapphire*, into the space environment coincides with the fact that the Sun's activity is undergoing its peak portion as part of the 11-year solar cycle. Despite the fact that the current solar cycle is modest in intensity, an increasing number of space weather events are expected to occur, such as violent explosions on the surface of the Sun that can release enormous amounts of electromagnetic radiation and energetic particles. These phenomena can be extremely harmful to satellites and other technologies essential to joint military operations.

Space weather awareness aims at monitoring and predicting adverse conditions on the Sun and in the near-Earth space environment that can degrade and disrupt the performance of technological systems. In fact, space weather can negatively affect satellites, long-distance and satellite communications, radars, navigation systems, electrical power grids, and it can endanger human life. Canada's Arctic region is the most vulnerable to space weather effects, owing to its direct connection with Sun-Earth dynamics. This vulnerability takes on great importance since exercising sovereignty in the Arctic is a core objective of the federal government, as laid out in the Canada First Defence Strategy. This susceptibility to space weather will keep growing with time along with our dependency upon technologies for both civilian and defence purposes. This is particularly true from a defence perspective since space-based systems are now considered by senior officers to be critical enablers of military operations.[1] Space weather situational awareness (SA) is critical for the purpose of protecting our national space assets from the harsh space environment, and to achieve synchronized joint space effects in support of military operations.

In this article, it is suggested that the Canadian Armed Forces (CAF) and the Department of National Defence (DND) leverage Canada's world-class expertise in space weather in order to develop

a unique Canadian space weather SA capability, which would enable successful operations in domestic, joint and inter-agency situations, and consequently, maintain Canada's sovereignty in the Arctic. To support the previous statement, space weather will be first introduced, along with its adverse impacts. Then, the space weather SA concept, as part of the overall space situational awareness (SSA), will be described, based upon Allied doctrinal frameworks. Finally, the latter concept will be discussed in the context of producing joint space effects in Canada's Arctic region.

What is space weather?

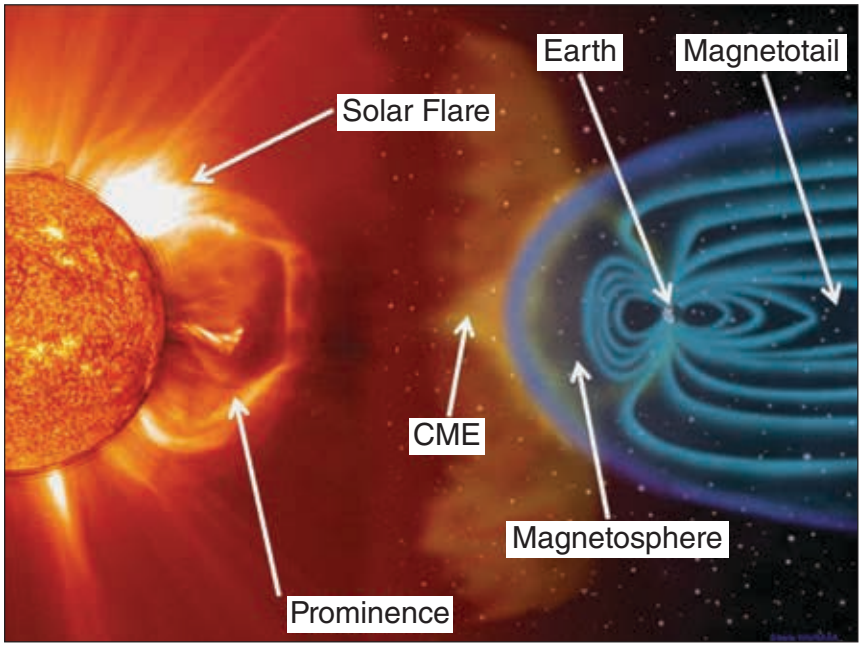
Space weather first began to affect human life in the 19th Century, altering the functioning of telegraph lines.[2] Space weather encompasses several components of the Sun-Earth system, such as the variable solar wind, sunspots, solar flares, coronal mass ejections (CME), interactions with the Earth's magnetosphere and ionosphere, and the production of the aurora. The prime source of space weather is the dynamic Sun. The Sun continuously releases streams of charged particles, named 'solar wind.' The solar wind travels in the interplanetary space at speeds of several hundred kilometres per second (km/s). Depending upon the Sun's activity, it may take 2-3 days for solar wind particles to reach Earth.

Besides the solar wind, dark regions often appear on the surface of the Sun, called sunspots, whose number is well-correlated with the approximate 11-year solar cycle. Sunspots are associated with magnetically active regions of the Sun's surface. At times, short-lived explosions can occur near these active regions, discharging radiation across the electromagnetic spectrum, as well as and high-energy particles. These bursts are called 'solar flares.' They are important because they have a direct effect upon the properties of the Earth's upper atmosphere.

In addition to solar flares, strong magnetic field loops, called prominences, often extend outside the surface of the Sun. At times, these features break apart, releasing formidable amounts of charged matter at speeds that can be much larger than the solar wind. This phenomenon is called 'Coronal Mass Ejection,' or CME. When a CME is directed toward the Earth, it can trigger a geomagnetic storm.[3]

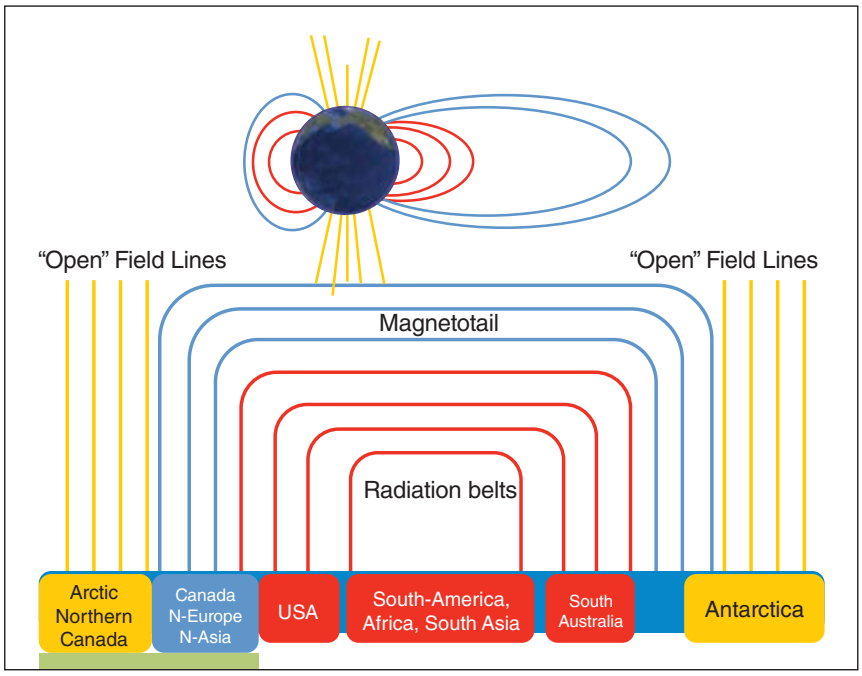
Besides the outflow of highly energetic particles, the Sun continuously emits electromagnetic radiation. Propagating at the speed of light, this radiation reaches our planet in slightly less than eight minutes. The extreme UV and X-ray parts of the spectrum are responsible for ionizing (breaking an atom or molecule into positively and negatively charged particles) the upper part of the atmosphere between approximately 60-1000 kilometres of altitude. The ionized part of the Earth's atmosphere is the ionosphere. Its free charges are capable of influencing radio propagation and GPS signals. The ionosphere's properties are highly variable with days, seasons, and solar cycles.

Fortunately, the Earth possesses a magnetic field that acts as a shield and deflects the majority of the solar wind. The region dominated by the Earth's magnetic field is called the 'magnetosphere.' On the day side, the Earth's magnetosphere is compressed, due to the solar wind's pressure, and on the night side, it is stretched into a long 'magnetotail' that resembles a windsock, as represented in Figure 1.



SOHO (ESA & NASA)

Figure 1 ~ Several components of the Sun-Earth relationship.



Dr. Pierre Langlois/CSA

Figure 2 ~ Features of the Earth's magnetic field topology and their relation to different near-Earth regions.

A large prominence and a solar flare are also depicted. Nevertheless, the Earth's magnetic field is not a perfect shield, particularly near the poles, where solar wind particles can penetrate into the atmosphere, guided by the nearly-vertical magnetic field lines.

For ideal solar wind-magnetosphere 'connection' conditions, the Earth's magnetic field typically comprises three types of lines, as illustrated in Figure 2. These magnetic field lines map into different near-space regions of the Earth. The yellow lines correspond to 'open' magnetic field lines that have 'one foot on the Earth,' and the other connected to the IMF. These yellow lines, which provide a direct path to the solar wind particles, map down to the polar cap (Arctic) region.

Magnetic field lines colored in blue are stretched into a long magnetotail. Generally speaking, the field lines colored in blue map into the auroral zone. In the auroral zone, the interaction of energetic particles with those of the upper atmosphere emits green, red, and sometimes violet light, a phenomenon commonly called 'Northern Lights.' On global scales, the aurora takes the form of ovals centered on the Earth's magnetic poles. Since the geomagnetic pole is shifted toward the Yukon from the geographical pole, "…eighty-to-ninety percent of the accessible land under the auroral oval lies in Canada."[4] The auroral oval makes Canada extremely vulnerable to space weather adverse effects. Closer to the Earth, the red lines encompass the Van Allen radiation belts, which consist of layers of energetic and charged particles around the Earth. They connect to the sub-auroral zone. The polar, auroral, and sub-auroral zones are evident in Figure 3.

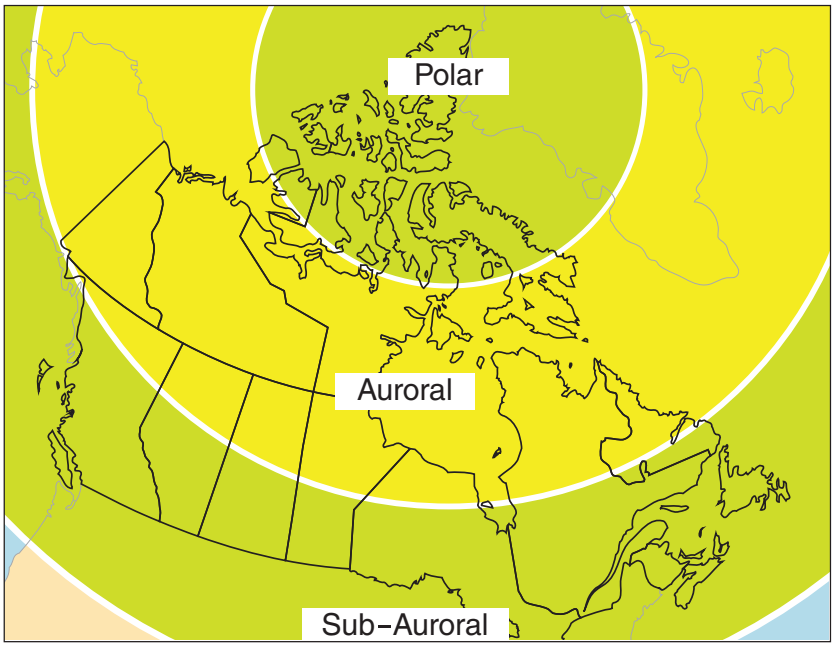


Figure 3 ~ Topside view of the polar, auroral and sub-auroral zones superimposed over Canada. Adapted from an example of geomagnetic activity conditions issued by Space Weather Canada.

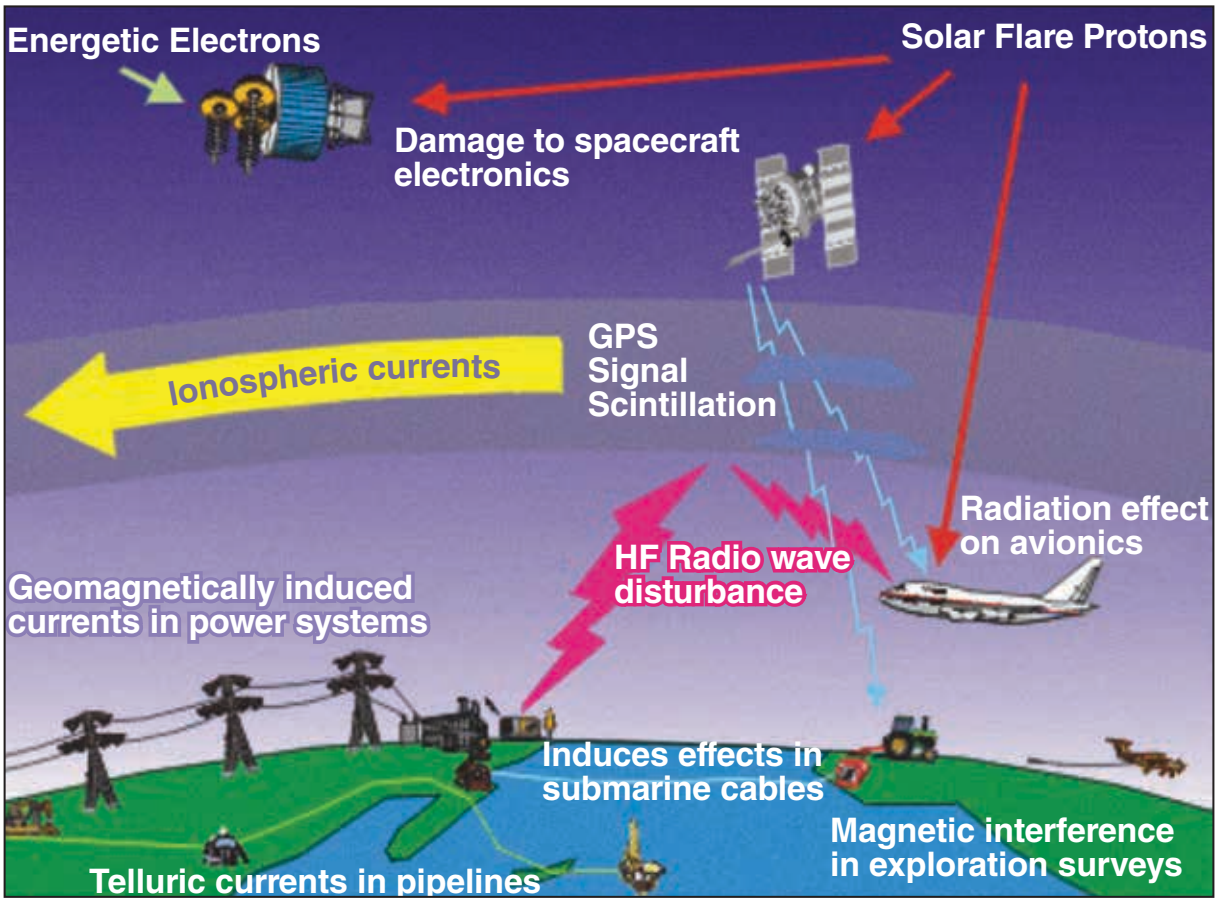


Figure 4 ~ Space weather adverse effects on technologies.

Impacts of Space Weather

Space weather events can lead to detrimental consequences for both humans and technology, as shown in Figure 4. It can impair satellite hardware and solar cells, de-orbit satellites, and put the health of space and aircrews in jeopardy. Moreover, it can disrupt radio transmission and GPS signals and it can render entire power and communication networks inoperative. Military systems not hardened from space weather can also be adversely affected.

Energetic particles can damage spacecraft electronics, especially when travelling through the Van Allen radiation belts. Energetic particles can cause temporary operational anomalies, or can even disable an entire platform. In 1994, Canadian telecommunication satellites *Anik* E1 and E2 suffered important outages due to an increase in solar activity. *Anik* E1 failed for more than eight hours and *Anik* E2 was not restored for five months, depriving Canada's population of television and data services for hours and remote northern communities of telephone services.[5] In 1997, it is believed that a CME caused the loss of AT&T's *Telstar* 401 satellite.[6]

"The health of space crews can be harmed from space weather radiation exposure. In addition to astronauts, travelers in aircraft making use of polar routes are also exposed."

In addition to deterioration caused by energetic particles, solar UV radiation can lead to material degradation. This effect is particularly important for solar panels. Furthermore, radiation from enhanced solar activity heats the Earth's upper neutral atmosphere. Consequently, it expands and causes satellites in low Earth orbit (LEO), below approximately 1000 kilometres, to experience increased drag (due to enhanced air density). Drag causes satellites to lose altitude and change orbital parameters. For example, the great geomagnetic storm of 1989 caused thousands of space objects, including hundreds of operational satellites, to lose many kilometres of altitude.[7]

The health of space crews can be harmed from space weather radiation exposure. In addition to astronauts, travelers in aircraft making use of polar routes are also exposed. Routes across the northern Polar region have been increasingly used for fuel and time savings since the beginning of the 21st Century. Unfortunately, since the Polar region can be directly connected to solar wind, humans are susceptible to absorbing significant radiation doses.

Power grids are also sensitive to space weather. In fact, the chain of events resulting from enhanced solar activity causes strong electrical currents to flow in the ionosphere, especially at high latitudes and within the auroral oval. These ionospheric currents in turn induce currents in the ground, which travel through least resistance paths, often power transmission lines, oil or gas pipelines, telecommunication cables, or railway circuits. These geomagnetically induced currents (GIC) have the capability to overload and knock out electrical components. Also, they can reduce the lifetime of ground infrastructure by enhancing corrosion and aging of transformers. A notable example of GIC event is the 1989 Hydro-Québec power grids blackout resulting from a CME-driven geomagnetic storm. The entire province electrical power system collapsed in 90 seconds, and US distribution grids were also affected. It lasted for nine hours and caused economic losses in excess of two billion US dollars.[8]

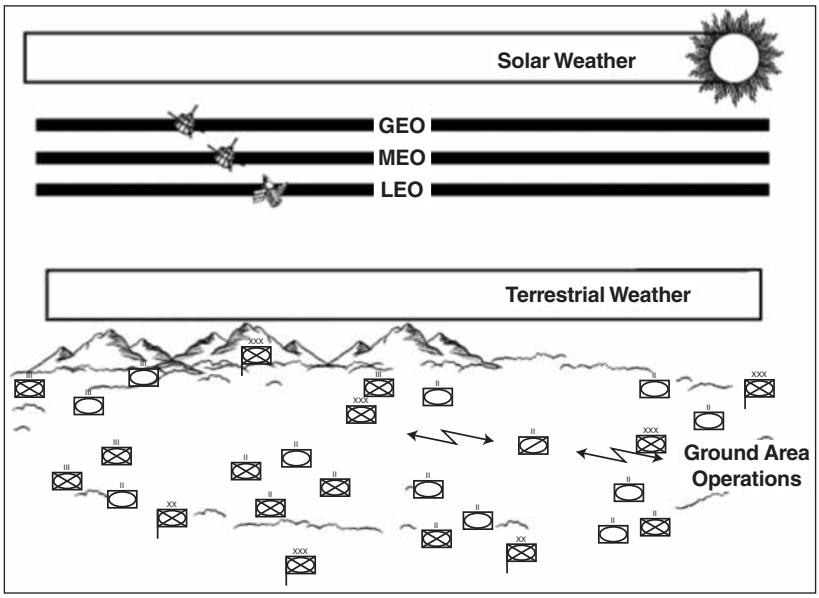
Extreme space weather occurrences can have extensive socio-economic consequences. On 23 July 2012, the most powerful CME ever recorded narrowly missed the Earth by approximately one week. Had it been directed toward the Earth, scientists believe that it would certainly have triggered a geomagnetic storm comparable to the largest events of the 20th Century.[9] This recent event demonstrates that extreme space weather conditions can happen even during a modest solar activity cycle such as the one presently underway. Such extreme space weather events have the potential to cause long duration outages to power grids with catastrophic consequences.

In addition to power grids, space weather can seriously perturb communication, timing, and navigation systems by modifying the density distribution of the ionosphere. These irregularities cause scintillations, or fading, of radio signals travelling through the ionosphere. Also, it gives rise to GPS ranging and timing errors that can be considerable. Furthermore, long-range radio communications at high-frequency (HF) are sometimes completely blacked out, due to accrued absorption of radio signals, especially in auroral and polar zones. In this case, trans-polar airlines, which rely upon HF communications, must be re-routed to lower latitudes at great expenses. A notable example of communication failure occurred in 2003 when aviation communications were disrupted for 18 consecutive days.[10]

The occurrence of space weather adverse effects upon military systems is not new. In fact, during the Second World War, British radar operators reported periodic 'jamming' of the country's radar defence system. An investigation found that the interference was not caused by the Germans but by electromagnetic signals from the Sun, which was undergoing strong activity.[11] As far as CAF joint operations are concerned, demands on space-based assets for communications, weather, navigation and intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) purposes will continue to increase with time. Therefore, space weather cascading effects on these systems should be forecasted or at least, monitored and understood. This will be even more challenging when deployed in the vicinity of the auroral and polar regions, which are more variable and affected.

Space Weather Situational Awareness and Joint Space Effects

Armed forces in many countries have realized the criticality to develop a space weather SA picture, as part of the overall SSA. Developing SSA is essential to the success of space operations, analogously to land, air, or maritime SA. According to US joint doctrine, space operations comprise four mission areas: space force enhancement, space support, space control, and space force application.[12] SSA, a sub-mission area of space control, underpins all four mission areas. By definition, "SSA involves characterizing, as completely as necessary, the space capabilities operating within the terrestrial environment and the space domain. It includes components of



Reproduced from US Army Field Manual FD 3-14, *Space Support to Army Operations*.

Figure 5 ~ Space AOI. Space (solar) weather needs to be considered as part of the space IPB input because of the effects on joint operations within the AOI. LEO signifies Low Earth Orbit, MEO is Medium Earth Orbit, and GEO is Geostationary Earth Orbit.

Intelligence Surveillance Reconnaissance (ISR); environmental monitoring, analysis, and reporting; and warning functions."[13] The environmental monitoring component can be further described as including "the characterization, analysis, and prediction of space weather, terrestrial weather near important ground nodes, and natural phenomena in space."[14] Other authors used the expression 'Environmental SSA' instead of 'Space Weather SA,' whose given definition is "…the requisite knowledge of current and predicted environmental conditions and the effects of those conditions on space events, threats, activities and space systems to enable commanders, decision makers, planners and operators to gain and maintain space superiority across the spectrum of conflict."[15]

According to the US Army Field Manual FD 3-14, "Space Support to Army Operations," a space input is required to the Intelligence Preparation of the Battlefield (IPB). The purpose of space input to the IPB is "…to provide the G2 with a highly detailed analysis of the space medium and its capabilities and effects within the battlespace."[16] The first step consists of defining the environment and its effects. Indeed, space weather is considered to be part of the space IPB input because of its important effects on joint space operations within the Area Of Interest (AOI). An example of space AOI is provided in Figure 5. Then, as part of the space estimate process, space weather battlefield effects should be identified and linked to specific joint space capabilities.

Similarly, the United Kingdom (UK) recognizes that space weather is an essential component of SSA. In fact, the UK Future Air and Space Operating Concept stipulates: "Space situational awareness is necessary to prevent collisions, mitigate space weather effects and assist in anomaly resolution, including radio frequency interference."[17] Another document produced by the UK's Development, Concepts, and Doctrine Centre states that SSA involves, not only cataloguing space objects' orbital characteristics, but also the "collection of space weather information to provide advance warning."[18]

North Atlantic Treaty Organization (NATO) doctrinal terminology being somewhat different than the US counterpart, the 'space weather component' of SSA is named: 'Space Environment Operations.' The NATO Research and Technology Organization (RTO) defines SSA as "the knowledge and the understanding of military and non-military events, activities, circumstances and conditions within and associated with the space environment or space related systems that are relevant for current and future NATO interest, operations and exercises."[19] Space weather being an important component of SSA, NATO-RTO recently mandated the Systems Concept and Integration Panel 229 Task Group to provide Space Environment Support to NATO SSA.[20]

Developing space weather SA is crucial for the successful conduct of joint operations since the adverse effects of space weather impact joint space capabilities. Table 1 presents examples of linkages between space mission and sub-mission areas, space weather events and effects upon technology and joint space capabilities.[21] According to US Army doctrine, these linkages are part of the space estimate. The last column of Table 1 contains examples of current (in blue) and planned future (in red) Canadian joint space capabilities that could be adversely altered by space weather events. Note that this table mostly includes adverse effects on joint space capabilities. As alluded previously, space weather can also negatively impact ground or air based technologies critical to military operations, such as electrical power grids or HF over-the-horizon radar systems.

It is the effects of space weather on joint capabilities that are of concern to our commanders. Analogously to any other physical domain, monitoring and predicting environmental effects should be synchronized with commanders' courses of actions. For example, based upon the prediction of an imminent solar storm, a commander could decide to delay an operation, or to carry it forward, knowing that the adversary's communication, navigation, or targeting systems would be degraded. Also, operators must have the capability to discriminate among effects of natural origin and intentional enemy disruptions, such as jamming. In order for a commander to apply knowledge and to make sound decisions, the space weather SA data must be fused, to become relevant information, into a space Common Operating Picture (COP). The desired end state of space weather SA is the "effective application of space weather SA information," in other words, "to mitigate negative impacts on and improve performance of our space systems, and exploit potential space environment impacts on enemy systems."[22] However, this desired end state should not be restricted solely to space systems, but to any ground or space-based systems that could be negatively affected by space weather. Space weather products could be displayed as COP overlays highlighting the regions within the area of operation where operational capabilities are affected, for instance, UHF satellite communication scintillation maps, GPS receiver error maps, HF illumination maps or radar auroral clutter maps. These products would assist commanders and staff in mitigating space weather effects on their systems by synchronizing operations differently, by planning for alternate means, or by exploiting enemy space weather susceptibilities for possible advantage.

Space Mission Areas	Sub-Mission Areas	Joint Space Capability Examples	Space Weather Events	Effects on Technology	Impacts on Joint Space Capability	Examples of current (Blue) or planned future (Red) Canadian capability impacted
Space Force enhancement	ISR	Intelligence	Solar flares, Ionospheric storm, Aurora clutter	Radio frequency (RF) interference, Range uncertainty, Loss of target discrimination, Spectral distortions, Degraded system performance, Reduction in resolution of SAR images	Inaccurate enemy position data, Loss/Degradation of intelligence data	Joint Space Support Project (JSSP)
		Space IMINT				Polar Epsilon (RADARSAT)
		Space RADAR				
	SATCOM and Long-range comms	Strategic comms (Wideband)	Solar flares, Polar Cap Absorption (PCA), Ionospheric storm, Auroral Absorption	RF interference, Scintillation, Comms blackouts	Inability for Comds to exercice C2, Decreased ability to tie sensors to shooter, Inability to send MEDEVAC, Life of small teams at risk	MERCURY GLOBAL, MILSATCOM
		SATCOM on the move				Land Command Support System (LCSS) Life Extension Project
		Tactical comms (Narrowband)				Polar Comms and Weather (PCW)
		HF Arctic comms				Tactical narrow-band SATCOM
	Environmental monitoring	Meteorology and Oceanography	Solar flares, Ionospheric storm, Aurora clutter	RF interference, Scintillation, Reduction in resolution of multispectral and hyperspectral imagery	Impacts on joint intelligence preparation of the battlefield (JIPB), Decreased ability to perform BDA	PCW, RADARSAT
	Positioning, navigation and timing	Precision Engagement	Solar flares, Ionospheric storm	GPS signals scintillation, Ranging errors, Degraded positioning accuracy, Time errors, Impacts on timing	Precision guided munition miss target, Increased collateral damage, Risk of friendly fire	Excalibur artillery projectile, PLGR, IRIS (TCCCS) System
		GNSS/ NAVWAR			Loss of navigation and maneuvering accuracy, Decreased ability to synchronize ops with precision timing, Decreased COMSEC	
		Precision Timing				
	C2	Friendly Force Tracking		GPS scintillation, Ranging errors	Loss of Blue PA	No known Canadian space-based Blue PA capability
	Personal Recovery Ops	Friendly Force Tracking		Scintillation, Positioning errors	Decreased probability of saving lives	Low/Medium Earth Orbit search and rescue satellite repeaters (LEOSAR, MEOSAR)

continued on next page

Space Mission Areas	Sub-Mission Areas	Joint Space Capability Examples	Space Weather Events	Effects on Technology	Impacts on Joint Space Capability	Examples of current (Blue) or planned future (Red) Canadian capability impacted
Space Support	Satellite/Payload Ops	Telemetry, tracking, and commanding	Energetic particles, Geomagnetic storms, Radiation Belts	Satellite electronics anomalies or permanent failures, Satellite Drag	Decreased operational payload utility, Decreased ability to control satellites	Surveillance of Space Satellite – SAPPHIRE, NEOSat, RADARSAT, PCW
Space Control	SSA	SST	Solar flares, Ionospheric storm, Aurora clutter	RF /RADAR interference, Scintillation	Risk of collisions, Loss of satellite tracking	SAPPHIRE, NEOSat

Table 1: Relations between space mission areas, space weather events, effects on technology and joint space capabilities. Examples of current (in blue) or planned future (in red) Canadian joint space capability that could be adversely impacted are also presented.

Canadian Context

The DND and the CAF acknowledge space as a separate and unique joint domain within the strategic environment that should be considered in all levels of operations.[23] The DND/CAF integrated capstone concept publication states that space-based assets are critical mission enablers "in support of achieving Canadian strategic goals, such as exercising sovereignty in the Arctic." It emphasizes that the CAF "will need to expand its role in space to protect and exploit vital information and communication sources."[24] Although the document indicates that "space is extremely hostile to human habitation," and that "space vehicles must be designed to endure the harsh conditions of space,"[25] space weather adversarial effects on the conduct of joint operations are not specifically discussed therein.

The DND and the CAF have had a space policy since 1992. The most recent official version, dating from 1998, identifies space as a foundation of military operations.[26] Additional guidance is provided to capability developers, such that opportunities for collaboration with OGDs and international partners should be sought in order to carry out defence-related space activities in the most efficient manner. Significant progress has been made since the release of this policy by the organization responsible for space related capability development within the Chief of Force Development structure, namely, DG Space. There now exists a Defence Space Program in place addressing several capability gaps, for example, global communications, maritime and global domain awareness, SSA, Search and Rescue, and navigation warfare (NAVWAR). A National Defence Space Policy and Strategy have been drafted to support the six core mission areas identified in the Canada First Defence Strategy. That new defence space policy "reflects the strategic importance of space to the DND/CAF and reinforces the fact that assured access to space capabilities are essential for the CAF to successfully conduct operations."[27] Since it would be financially impossible for DND to develop an independent military space program, this policy document emphasizes the requirement for Canada to establish a whole-of-government (WoG) and comprehensive approach, as well as seeking cooperative opportunities with key allies, in order to deliver space effects. In addition, it specifies three overarching objectives that are to deliver and sustain space effects, to integrate space effects, and to assure freedom of space operations.[28] The third objective contains an important sub-goal, which is to deliver indigenous space domain awareness. This sub-objective indicates that DND will "create a space domain awareness road map that will address sensors (both ground and space based); agreements for space weather/solar events data; and agreements and mechanisms to obtain system status and state-of-health."[29] It further states that DND "will develop an indigenous orbital analysis capability to effectively contribute to the characterization of the environment, quickly differentiate man-made from environmental effects and forecast system degradations."[30] Clearly, DND has recognized the importance to understand the space environment, to protect our systems from natural threats in order to ensure the continuity of operations.

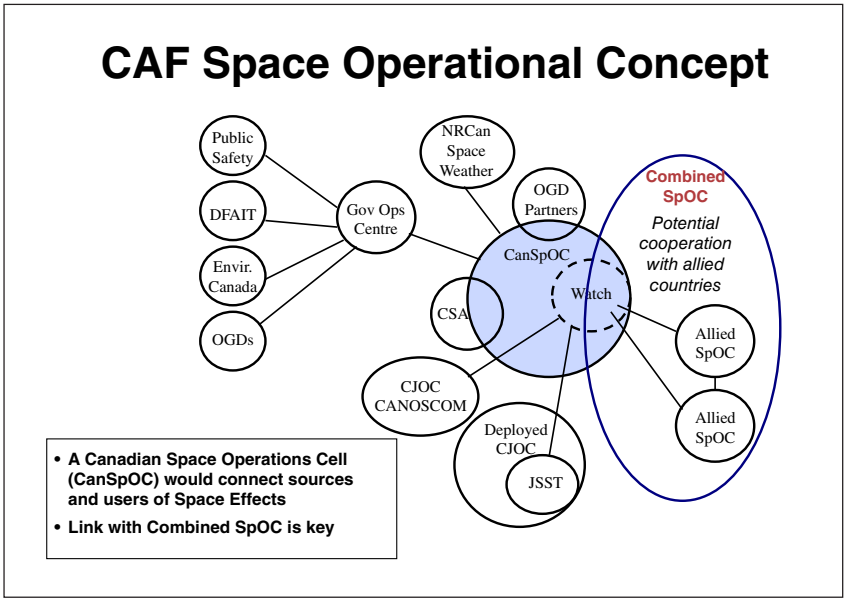


Figure 6 ~ CAF Space Operational Concept

Ralph Lee Hopkins/ National Geographic Creative Image ID 1052290

The DND/CAF recently created the Canadian Space Operations Centre (CanSpOC), as part of the Canadian Joint Operations Command (CJOC), the purpose of which is to connect sources and users of space effects, in addition to providing SSA to CJOC commander and staff. A schematic of the CF Space Operational Concept, linking the CanSpOC, OGDs, Allied SpOC and users is shown in Figure 6.

At this point, one might ask who the space weather stakeholders in Canada are, and which organization should be leveraged by DND/CAF?

Canada has a long history of accomplishments in space weather R&D owing to its strategic geographical position. For example, Natural Resources Canada (NRCan) has monitored the geomagnetic field for more than 150 years, using a vast network of government-owned ground-based magnetometers. NRCan has also operated the Canadian Space Weather Forecast Centre since 1974.[31] It monitors, analyzes, and forecasts space weather, and dispatches warnings and alerts across Canada.

The Geospace Observatory (GO) Canada program is the largest and most powerful ground-based network of sensors and instruments in the world, aimed at observing the space environment.[32] The deployed ground-based instrumentation consists of radar systems, optical imagers, ionosondes, magnetometers, radio receivers and GPS ionospheric scintillation monitors, to name a few. The Canadian Space Agency (CSA), which is the federal government organization leading the GO Canada science program, works in close relationship with several space science research groups embedded in Canadian universities, international partners, and NRCan, to understand and improve the prediction of space weather events. Although optical instruments would not allow continuous monitoring of space weather events, due to clouds and terrestrial weather phenomena, other types of sensors, based upon radio waves, have the capability to continually observe the space environment. For instance, NRCan operates a deployed network of Relative Ionospheric Opacity Meters (RIOMETERs) that are used for continuous measurement of ionosphere absorption.[33] RIOMETER measurements can be directly linked to HF signal degradation.[34] Hence, this example shows that existing space weather sensors could be used to estimate the level of attenuation that long-distance communication HF radios would undergo in an Arctic environment.

Other federal government organizations also share important stakes in space weather forecasting and research. In particular, National Research Council (NRC) is responsible for the F10.7 solar radio-monitoring program. This has been running since 1947, and, after sunspot numbering, it is the most widely used index of solar activity.[35] Some OGDs are especially concerned with extreme space weather events for the purpose of protecting Canada's critical infrastructure, for instance, Public Safety Canada (PSC) and the Royal Canadian Mounted Police (RCMP).

Relevance of Space Weather SA for Canada to Achieve Effects in a Joint, Interagency, Domestic, and Arctic Environment

Space environment SA takes on extreme importance in the Arctic region, due to its enhanced vulnerability to space weather. In this section, it is argued that, notwithstanding the sharing and collaboration with Allied countries, the DND/CAF should develop its own space weather ground-based monitoring and forecasting capability by leveraging the existing expertise of Canada's OGD, academia, and industry in this field, as well as the unique, ground-based network of sensors. The reasons

are threefold. First, this type of capability would mitigate space weather adverse effects upon Canadian space-based assets, or any other satellites used for the successful planning and conduct of joint operations in the Arctic. Secondly, Canada because it is the most vulnerable country in terms of space weather, a tailored and leveraging Canadian monitoring capability would better suit its defence requirements. Lastly, since Canada has the best observing geography, and the most robust ground-based space weather network of sensors in the world, leveraging this existing technology and infrastructure would be the most cost-effective option for DND.

Exercising sovereignty in the Arctic region is a top priority of Canada's foreign Arctic policy.[36] In support of achieving Canadian strategic goals, the DND/CAF will continue to play a crucial role in developing, generating, and employing joint task forces capable of producing effects in this northern region. The immensity of Canada's arctic territory, combined with the harsh climatic conditions, make it difficult for the CAF to maintain a permanent military presence in the majority of the area. Instead, Canada must develop the capability to rapidly project task-tailored forces in dispersed areas as needed. To achieve this capability, developing and maintaining SA is fundamental. This SA requirement makes space-based surveillance assets critical mission enablers. For example, the Canadian RADARSAT series continues to provide a vital capability for Arctic and maritime surveillance, since it can collect images during darkness or cloudy conditions. And yet, 284 space weather events were recorded when RADARSAT was travelling through the South Atlantic anomaly,[37] a region where the Van Allen radiation belts come closest to the Earth's surface, and where higher levels of radiation are present. Furthermore, six events, possibly related to space weather, caused a 'reboot' of the satellite as it was passing over the poles.[38]

Moreover, the establishment of communication links in this vast territory must often rely upon SATCOM resources. To this end, CSA, in partnership with DND and other federal departments, is developing the Polar Communication and Weather (PCW) mission aimed at providing weather and communication services to the arctic region. We can expect PCW to experience disruptions and anomalies when placed into orbit, since it will spend a large portion of its orbiting time in a high-radiation environment. Perfect radiation hardening engineering solutions are impossible, and trade-offs between cost, weight, and space must be considered. One way to mitigate space weather adverse events is to enhance awareness and to properly account for these effects in the joint operational planning cycle.

As mentioned before, a WoG approach is key to achieving the objectives of Canada's foreign Arctic policy. This is especially relevant for the CAF Space program to remain flexible, agile, reliable, and affordable in the future Arctic security environment. Space weather related capabilities would also need to be leveraging and collaborative. Canada is already the home of the most robust and extensive network of ground-based sensors observing space weather. Also, a vast amount of space weather expertise already resides within numerous groups and OGDs. It would be in Canada's utmost interest to leverage this existing specialized knowledge, which requires decades to build up, in order to develop a Canadian space weather capability that would better suit its current and future defence requirements. Indeed, the CanSpOC cannot just integrate space weather products from Allied countries in the planning and conduct of domestic operations, due to Canada's unique location with respect to space weather phenomena. The geospace processes above Canada are much different than those observed at mid-and-low latitudes. What is more, the ionosphere dynamics are more intense in Canada than in Scandinavian countries, because of the presence of the geomagnetic pole within Canada. Hence, integrating other countries' space weather products would be equivalent to applying terrestrial weather forecasts to the wrong area of interest. The recent lack of access to Allied space weather reports, due to the US government partial shutdown of Autumn 2013, constitutes another compelling argument in favor of developing a Canadian space weather SA solution.

Finally, Canada has the best geography to observe space weather phenomena. Using ground-based sensors is an option significantly cheaper than building and launching satellites into orbit. For example, the cost for a single RIOMETER instrument is on the order of a few thousand dollars. Yet, this instrument can provide valuable insight into the status of the ionosphere and the level of absorption that radio waves would undergo. Therefore, leveraging the existing ground-based infrastructure would be the most affordable joint capability development option. This course of action would also be in line with the spirit of DND space policy and Canada's foreign Arctic policy documents.

Conclusion

Space weather features originating from the Sun can lead to disruption of satellite and polar aviation operations, and degradation of SATCOM, radar, and/or navigation systems. These adverse effects are directly linked to equivalent joint military capability impacts. For this reason, several modern Allied militaries have acknowledged the requirement to develop an environmental SSA in order to achieve joint space effects.

Space weather effects should be adequately integrated into the planning and execution of domestic, joint, and interagency operations to ensure strategic success in Canada's Arctic region. The DND/CAF should leverage the already existing Canadian world-class expertise in space weather R&D in order to develop an inter-agency and affordable Canadian ground-based SSA capability, better suited to mitigate Canada's extreme and unique vulnerability to space weather.

Space is essential to joint military operations, especially in the Arctic, and operational dependencies and vulnerabilities must be understood. Canada's space weather vulnerability cannot be neglected in terms of joint capability development simply because it will grow exponentially with time, along with the CAF's critical reliance upon infrastructure and technologies. By developing situational awareness of space weather effects, we can better execute the command, sense, act, and shield functions of our defences, and deliver them more effectively. Hence, capability developers should carefully compare each of these functions in the space domain against each of the six core missions of Canada's Defence Strategy in order to deduce the exact future requirements.

Brian J. Skerry/National Geographic Creative Image ID 699233

NOTES

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DND photo AR2008 T193 11 by Master Corporal Bruno Turcotte

The deputy commander of Joint Task Force Afghanistan, Colonel Christian Juneau, welcomes the Minister of Foreign Affairs, the Honourable Maxime Bernier, to Kandahar, Afghanistan, 13 April 2008.

Explaining Collaboration failures in Canada's Mission in Afghanistan

by Brendan Alexander

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Author's note: This article is adapted from a chapter of a thesis written for the degree of Master of Philosophy (MPhil) in International Relations at the University of Oxford between 2012 and 2013. It makes use of interviews conducted with a range of civilian and military officials, some of whom have requested to remain anonymous.

Introduction

The bewildering complexity of contemporary violence has left Western governments scrambling to implement more integrated, comprehensive, and "whole of government" (WoG) approaches to building peace in a post-Cold War world. These various catchphrases share a common vision of government departments pooling their expertise and resources in order to achieve effects which are greater than the sum of their parts. This theme became increasingly popular in Canada after 2005, when it assumed responsibility for the civil-military Kandahar Provincial Reconstruction Team (KPRT) in Afghanistan. Since then, Canada's participating government departments have made much of their collaborative policies, most notably the changes which followed the 2007 Independent Panel on Canada's Future Role in Afghanistan, commonly known as the Manley Commission. These reforms included the establishment of the cross-departmental Afghanistan Task Force, the Cabinet Committee on Afghanistan, Canada's priorities and signature projects, benchmarking and quarterly reporting to Parliament, an enhanced military presence, and increased civilian capacity in the KPRT.[1]

Although Canada's mission in Afghanistan did come to display significant collaboration *in its final years*, the path to reach this state of affairs was arduous, beset by setbacks, and by no means inevitable. As one senior military official sardonically notes, early attempts at WoG floundered in the "hole" of

government.[2] The shared use of ambiguous buzzwords like WoG, 'defence, diplomacy, and development' (3D), and 'comprehensive approach' has obscured the fact that militaries, development agencies, foreign affairs departments, and their leaders often understand these terms in fundamentally different ways. Their diverse worldviews are informed by diverging bureaucracies and organisational cultures which generate conflicting goals, strategies, and beliefs about whether collaboration is even desirable. Furthermore, those charged with encouraging collaboration often forget that it is only a means to an end, and not an end in itself.

This article examines those instances where collaboration broke down or failed to emerge between Canadian government departments during the Afghanistan mission, despite their professed willingness to work more closely together. These failures are attributable to four categories of factors:

1) Experience and capacity
2) Organisational behaviour
3) Politics
4) Culture

Canada began to systematically address the problems in these areas after the release of the Manley Report in early 2008, although some of them persisted, and a few have yet to be resolved. This process of reform has been outlined elsewhere, and is not the focus of this article.[3] Instead, it provides an identification and explanation of the failures which inspired those solutions. Highlighting early stumbling points is important, because failing to do so risks ignoring or simplifying the problems which necessitated change in the first place, and creates a susceptibility to repeat the same mistakes all over again. Complex operations requiring responses from multiple organizations are here to stay, and better collaboration between those groups can only be achieved by understanding the origin and nature of the factors which tend to drive them apart.

Collaboration

Collaboration is the process by which groups work together to produce unity of effort toward a shared goal. Unity of effort implies the harmonization of activities toward a common objective, even if the participants are not all placed under a single authority (unity of command). A collaboration *failure* is best described through an anecdote provided by Galal Ali, a water expert, technical advisor, and programmer for the Canadian International Development Agency (CIDA). He recalls that the Canadian Forces (CF) [now Canadian Armed Forces – CAF ~ Ed.] and CIDA had not been adequately sharing information in the early years of the mission. In his first (and long overdue) briefing to a civil-military cooperation (CIMIC) unit, he found out that such units had been providing fertilizer and well-drilling services to Afghans after military operations between 2003 and 2007, but that their drilling cap was restricted to $5,000. Unfortunately, $5,000 did not take the wells' depth beyond the region's shallow aquifer, which had been polluted by the Afghan's inappropriate use of the fertilizer the military

DND photo AR2008-Z139-06 by Corporal Simon Duchesne

Corporal Mark Talf of the Kandahar Provincial Reconstruction Team (KPRT) during a foot patrol in Panjwayi District, Afghanistan, 29 April 2008.

17 Wing Publishing, Winnipeg

itself was distributing. As Mr. Ali pointed out, without CIDA's expertise in this area, the CIMIC units had been inadvertently poisoning the people they meant to help.[4]

Factor 1 – Experience and Capacity

Civil-military interaction has been a recurring phenomenon throughout much of Canadian military history, but the degree of collaboration necessitated by the Afghanistan mission had rarely, if ever, arisen since the Second World War. Canadian government departments were 'caught flat-footed,' and were especially surprised by the emergence of an entrenched insurgency in Kandahar by 2006. One senior military official confides that he had been training his subordinates "…for a mission…we didn't understand, an environment we didn't appreciate, and a challenge we didn't quite comprehend."[5] On the diplomatic front, Canada did not even have an embassy in Afghanistan when the mission began. In terms of aid and development, CIDA is traditionally a national-level development organisation, with little sub-national experience, and even less exposure to violent insurgencies.[6] "We're development bureaucrats, we're funding bureaucrats," declares a CIDA official. "We're not development officers…That's not what we do."[7]

With little experience upon which to fall back, initial efforts to align polices and operations were understandably ad hoc and confused. Although the 2007 Manley Panel initiated by Prime Minister Stephen Harper called for greater interdepartmental collaboration, there was no clear understanding of how to actually integrate military and civilian objectives.[8] This inexperience led to collaboration breakdowns, such as a lack of recognition as to where civilians could (and should) have input into the military planning cycle. One such example was the attempt to implement a population-centric counterinsurgency strategy in Kandahar, known as the "key village approach."[9] As a 'clear-hold-build' strategy, its final stages involved the introduction of civilian experts to oversee projects to foster development and governance. The problem in one instance, however, was that the military planners had not consulted their civilian counterparts before military forces began their clear operation.[10] As a result, troops cleared and held a 'district' which was not actually recognized as such by the government of Afghanistan. By the time Department of Foreign Affairs and International Trade (DFAIT) officials pointed out the mistake, it was too late. Since the district did not officially exist, there was no 'buy-in' from the Afghan government when it came time for civilians to undertake the 'build' phase of the operation. DFAIT

then had to expend extra time and resources to lobby the Afghans to create the district, just so that governance resources could be brought into its villages.[11]

Collaboration was also frustrated in various ways by a lack of resources. An especially problematic issue was a lack of military resources to act as protection for civilian members of CIDA and DFAIT, who themselves lacked the capacity to safely conduct their work 'outside the wire.'[12] Even the Representative of Canada in Kandahar (RoCK), Canada's most senior civilian in Kandahar, did not possess dedicated military assets for mobility in the early years of the mission. "While it improved over time," recalls former RoCK Elissa Golberg, "it was frustrating and a difficult transition. Until mid-2008, the civilians were not prioritized, as our need to get out and about to engage with stakeholders or visit projects were not seen as operational imperatives…civilians were often made to feel like they were imposing by requesting transport. It should never have been that way."[13]

"Time constraints meant civilians failed to attend key military meetings or keep up with the military's planning cycle, giving the perception they were uninterested in collaboration."

The paucity of resources for civilian protection was not necessarily the fault of the military; it barely possessed the resources to provide for its own protection and mobility, let alone those of Canadian civilians.[14] "We all knew that we were under-equipped and undermanned in Kandahar," says Lieutenant-General Jon Vance. "It's not that Canada didn't send enough people – we sent all we could – but the international community hadn't sent enough people to soak it properly for counterinsurgency effect."[15] In an environment of such scarcity, military resources could not always be directed towards collaborative projects with civilian partners. This environment induced civilian dependencies on the CF, and gave it disproportionately large amounts of influence over civilian projects.

CIDA and DFAIT struggled find the resources to keep up with the operational tempo of their military counterpart. No department (aside from the Department of National Defence) possesses dedicated budgets to be used for international missions, meaning any resources they expend must come from their own limited international assistance envelopes.[16] Such capacity and power imbalances, both real and perceived, were early stressors with respect to collaboration. As one government official notes, "when you don't control the assets, you don't control the agenda."[17] Rightly or wrongly, many civilians believed the military privileged its own priorities, and "too often diverted PRT resources to military operations elsewhere in the province."[18] More generally, the PRT initially suffered from inadequate resources, civil-military tensions over mission priorities,

DND photo AR2010-0177-03 by Sergeant Daren Kraus

General David Petraeus, Commander International Security Assistance Force (ISAF), and then-Major-General Jon Vance, Commander Task Force Kandahar (TFK), tour a newly-constructed checkpoint in District 9 of Kandahar City, 9 July 2010.

DVIDS photo 610870 by Mark Ray

The Dahla Dam

poor communications, inadequate transport, insufficient civilian capacity, and disconnects with Ottawa.[19] As one DFAIT official describes, even when collaboration was desirable for both sides, the lack of civilian capacity meant they could "often barely keep up…things happened in a 24 hour cycle that were just unthinkable for Ottawa...And it wasn't for a lack of trying. It was just the frictions of war."[20]

The rapid rate of rotations in and out of Afghanistan, especially by the CF, was another constant frustration. Each military commander possessed autonomous command authority over the assets he controlled, meaning campaign plans had the potential to change direction with every rotation. The problem was not unique to the military; CIDA and DFAIT officials were similarly quick to switch direction when inspired by a new idea that promised to bring quick success. "A huge amount of my time was spent fending people away from diverting the mission," recalls Afghanistan Task Force leader David Mulroney.[21] These problems had repercussions for projects like the rehabilitation of the Arghandab valley irrigation system and the Dahla Dam. Such projects had time horizons of years, not months, and their success was hampered by inconsistent strategic direction over their lifetimes.[22]

For civilian departments, inadequate expeditionary capacity greatly diminished their ability to work with the military. In terms of planning, executing, and sustaining overseas operations, the CF possessed everything CIDA and DFAIT did not: a dedicated budget for overseas deployments, an institutionalized force development and projection system, the in-theatre resources to protect and sustain the force that it sent, and the experience, capacity, and capability to continually plan and execute operations on the ground. With so few staff dedicated to force development, civilian departments struggled to conduct pre-deployment training with the CF, or to recruit and train additional personnel. "Within CIDA," remembers one CIDA official, "it was really hard to recruit...professionals who were willing to go to Kandahar, or frankly, have anything to do with Afghanistan."[23] In Ottawa, there were insufficient interdepartmental exchanges and daily interaction in the years before the mission, leading to ignorance about other departments' structures, routines, and cultures. "Going in…we didn't have a lot of experience about each other's cultures and structures. We had not worked together very much," remembers former Ambassador to Afghanistan Arif Lalani.[24] It is therefore unsurprising that the departments were so unfamiliar with how their counterparts functioned.

Gaps in capacity and capability had predictable results. DFAIT sent individuals who had never been in an embassy before, or who or had never worked abroad.[25] CIDA was initially unable or unwilling to send experienced policy programmers. Time constraints meant civilians failed to attend key military meetings or keep up with the military's planning cycle, giving the perception they were uninterested in collaboration.[26] The less each group knew about each other's operations, the greater the chance for duplication of effort or interference of security operations in areas with fragile civilian projects. One senior official concisely summarizes the civilian problem: "Does the government want to have an expeditionary WoG capability or not? If the answer is yes, then you gotta pay for it…It means you have to have structure, people who are deployable. Organizations that can track them, train and prepare them, and sustain them when they're gone… just like [the

military does]."[27] As government leaders soon realized, however, it was one thing to recognize the solutions that were required, but it was quite another to implement them.

Factor 2 – Organisational Behaviour

Following the release of the Manley Report in early-2008, the Canadian government attempted to impose six "priorities" and three "signature projects" for its mission in Afghanistan, a strategy by which to achieve them, and bureaucratic mechanisms to ensure compliance and collaboration to that end.[28] This imposition faced two types of organisational hurdles. First, it met heavy resistance from entrenched bureaucratic interests and established departmental power structures. Second, the push for a more collaborative effort had unintended consequences in the form of red tape and a proliferation of Afghanistan task forces. These barriers hindered the implementation of Ottawa's strategy in the field, and sometimes undermined the very goals the bureaucracy was attempting to support.

Some bureaucratic hurdles to collaboration were a legacy of Canada's earlier '3D' approach to stability operations. By dividing themselves into independent pillars differentiated by function, the CF, CIDA, and DFAIT effectively entrenched themselves more deeply into their bureaucratic fiefdoms. "CIDA was so siloed that things would just stop," remembers David Mulroney. "No one would know why."[29] This system tended to militate against horizontality, and its vertical orientation made it difficult to break down bureaucratic stove-pipes. For example, when one department took the lead on a particular project, directors from other departments were reluctant to defer to what they saw as being an equivalent level director, and stalled collaboration by sending issues up to the ministerial level.[30]

In May 2007, the government founded the Afghanistan Task Force within DFAIT to harmonize government efforts, led by David Mulroney at an Associate Deputy level.[31] The problem was that DFAIT did not have the authority to actually tell other departments what to do; coordination depended on consensus and agreement. Predictably, other government departments were reluctant to be 'collaborated' by a counterpart which they viewed as (at best) an equal.[32] Even when Mulroney was promoted to Deputy Minister to chair the more powerful Pricy Council Office Afghanistan Task Force in 2008, each department maintained its own independent task force, and these subunits were where "90% of the work still happened."[33] Mulroney therefore had difficulty in establishing the "common narrative" he was appointed to create.[34] In one notable communication breakdown, then-Deputy Minister of Foreign Affairs Peter Harder found out *after the fact* that the Prime Minister's Office and top CF generals had made the decision to take responsibility for Kandahar Province. As Harder describes, "That was a pretty consequential decision, and it revealed, in my mind, the dysfunctionality of the senior decision making processes that were in Canada at the time."[35]

Attempts to break down these stovepipes encountered opposition from civil servants and military personnel alike, who were reluctant to cede authority in their areas of expertise. Although departments agreed to collaboration on paper, many leaders were unwilling to take the risks and exposure which true collaboration required. As Arif Lalani explains, "Many saw Afghanistan...like any other normal program, and reverted to normal bureaucratic tendency, which in a bureaucracy helps you succeed: keep your head down, don't take any tough decisions, don't take risks, just get along."[36] The situation was complicated by the parallel lines of authority which evolved when the civilian and military missions were brought closer together, but never unified under one command. "I sometimes had 3 or 4 different bosses," remembers one CIDA official. "And each boss thought they were the boss, and that I should report through them."[37]

DND photo IS2010-4059-06 by Master Corporal Pierre Thériault

Barbara Humick from the Canadian International Development Agency (CIDA) and Sergeant Jason Powers assess construction progress on the expansion of the Kandahar Teacher Training College, 26 November 2010.

To ensure compliance with its vision of the war, Ottawa initially kept its delegation of authority to civilians in the field to a minimum. This undermined the flexibility of civilian practitioners and created disconnects with CF operations, since even minute changes of direction required approval from Ottawa. One government official who

DND photo IS2005-0406 by Master Corporal Robert Bottrill

RCMP Superintendent Wayne Martin (right) reviews a survey at Police Sub-station 2 in Kandahar, 17 November 2005.

served in Kandahar observed the consequences of the contrast between the powers of the civilian RoCK and the military's task force commander: "There was no true delegation of authority… [the Privy Council Office] was watching *everything*....And because of that, the civilian decision chain was much slower than the military. And the military was extremely frustrated with that."[38] Likewise, stringent security requirements, especially after the death of Canadian diplomat Glyn Berry in 2006, made civilians more dependent on the military for mobility, and hindered collaboration by restricting the areas in which civilians could operate.[39] "Ottawa was very concerned…about the level of risk that the police assumed," remembers Assistant Commissioner (Ret'd) Graham Muir of the Royal Canadian Mounted Police (RCMP), appointed as Canada's first Canadian Police Commander in Afghanistan in 2009. "It was like tectonic plates coming up against each other... it was palpable."[40] Regardless of their individual willingness to accept risk, civilians could be perceived as foot-draggers when security restrictions or bureaucracy hindered their ability work with their more action-oriented CF counterparts.

Ottawa's voracious appetite for information from civilian departments, including its demand for quarterly reports to Parliament, meant civilians had to spend significant amounts of time reporting on what they were doing, rather than actually doing it. This meant less time to collaborate with the military on projects. As Muir describes, "While no one was driving from the back seat in Ottawa – not intentionally – there…was a level of curiosity, and an appetite for reporting, that was, to say the very least, burdensome."[41] Headquarters were stuffed with additional communications personnel and parliamentary affairs teams in order to prepare briefings and reports for the ever-watchful Cabinet Committee on Afghanistan, which met two-to-three times per month. "I could have spent my day just monitoring my five computers on my desk, and doing nothing else," recalls one government field official.[42] Too often, bureaucratic regulations meant that collaboration was pursued for collaboration's sake, rather than as a means to a higher end.

One of the most profound bureaucratic fissures between (and within) departments, civilian and military alike, was over benchmarking and quarterly reporting to Parliament. From a bureaucratic standpoint, these measures were very effective for defining, narrowing, and measuring Canada's efforts. Many on the ground, however, chafed at what they perceived to be an empty policy statement, rather than a strategy.[43] Resentments flared when

DND photo IS2007-1013 by Sergeant Roxanne Clowe

RCMP officer Corporal Barry Pitcher, and Sergeant Mark Kluke, a member of the Military Police, speak with a representative of the Afghan National Police at a temporary vehicle check point in Kandahar City, 29 March 2007.

bureaucrats from Ottawa forced what practitioners perceived to be obsolete objectives upon a rapidly changing environment. To avoid these restrictions, military commanders often used their personal contingency funds to finance projects of their choosing, such as schools for local Afghans. The problem was that such projects did not always fit into Ottawa's or Afghanistan's national development plans, raising the risk for duplication of effort or working at cross purposes.

DND photo IS2009-3076-04 by Master Corporal Angela Abbey

Lieutenant Jillian Dulle, from Camp Nathan Smith, speaks with an Afghan woman over chai tea during the celebration of Eid al-Adha by the Kandahar Provincial Reconstruction Team, 21 November 2009.

Factor 3 – Politics

The political impediments to collaboration can be broken down into the actions of individuals, the issue of strategy and civil-military relations, and governmental politics in Ottawa. Since Canadian departments are comparatively small, the actions of individual leaders have a profound influence in encouraging or discouraging collaboration. One senior official recalls that "There were some very senior people who had different visions about what was needed, how to interpret things, how to interpret the Manley Report. And it became very personal, and very difficult. There was an impact on mutual trust, an impact on the willingness to work together."[44] An early example of this discord is in the demise of the Strategic Advisory Team, a CF initiative championed by General Rick Hillier (ret'd), which placed senior CF and Department of National Defence employees into key advisory roles in the Afghan government.[45] This generated a "bloody minded" resentment in Ottawa, which questioned the political implications of military personnel advising Afghan officials on how to run their own government.[46]

Collaboration also suffered simply because leaders lacked the time, attention, or political capital to devote to maintaining interdepartmental harmony. DFAIT ministers had other international missions to attend to, CIDA's president was keen to maintain departmental autonomy, and military generals rightly saw the prosecution of a war, not politics in Ottawa, as their primary responsibility. In the RCMP, Graham Muir found that "[senior leadership] were, frankly, very busy with their day jobs, which were predominantly focused on domestic issues."[47] Collaboration requires leadership, constant attention, and the willingness to spend political capital, none of which are guaranteed. In his leadership of the interdepartmental Afghanistan Task Force, David Mulroney faced political resistance, apathy, and disinterest, and encountered diminishing returns the harder he pushed for collaboration. "You have to be tough," he notes, "but you can only be tough for so long."[48]

Similarly, some civilians found it particularly difficult to exert influence over what they perceived to be a 'lead, follow, or get out of my way' style of military leadership, especially in headquarters in Kandahar. "If you have a hyper macho general… with a Napoleon complex," notes one CIDA official, "and if you have a RoCK go in that's more an intellectual type guy… how does he assert his authority?"[49] In such circumstances, civilians could easily be sidelined by Canadian and American generals if they did not understand how to assert themselves in that context. As DFAIT officer Philip Lupul notes, "If the military perceived weakness, they would walk all over you."[50]

"Another early culture clash was over what collaboration looked like in practice, and why it was being pursued in the first place."

Strategy was another political issue which caused collaboration problems. Although there was agreement on the overarching goal to prevent Afghanistan from relapsing into a failed state that provided a safe haven for international terrorism and crime, there was no concrete blueprint for how to get there. There was a generic commitment to the 2001 Bonn Agreement and 2006 Afghanistan Compact, but neither were war plans.[51] In Canada, there was no single interdepartmental strategy for the Afghanistan mission, and this hindered early collaboration attempts.[52] Until the convening of the Manley Panel (and the establishment of the priorities, signature projects, and benchmarks which followed it), Canada's departments had few common goals to achieve, or unified ways in which to achieve them. Collaboration was therefore left to the units at the operational and tactical level, through such mechanisms as the PRT. When it occurred, it was at the tactical level, ad hoc, temporary, and vulnerable to personality clashes.[53]

The debate over where politics ends and military operations begin is a perennial issue in civil-military relations. The problem was particularly acute in Afghanistan because of the

DND photo IS2010-4059-03 by Master Corporal Pierre Thériault

Barbara Humick and Mark Duah from CIDA with a CF member assessing construction progress in Kandahar, 26 November 2010.

intimate involvement of civilian organizations in the war, their functional overlap with some CF operations, and the keen interest Ottawa took in field operations. Military leaders did not always welcome the intrusion into what they regarded as a uniquely military realm of expertise, and were wary of attempts to nationalise what they say as an international mission. "Canada was participating in an *alliance* effort," stresses Lieutenant-General Vance. "We weren't just there as a Canadian isolated contingent in…island Kandahar."[54] Senior civil servants who were mandated to impose collaboration did not appreciate this perspective. "I thought it was disappointing, to the point of being a bit shocking, that you have a

DND photo IS2010-4061-02 by Master Corporal Pierre Thériault

Personnel from the Department of Foreign Affairs and International Trade (DFAIT), alongside a CF Specialist Engineering Team member, discuss the reconstruction progress of the Kandahar Provincial Council Hall with the Deputy Chairman of the Kandahar Provincial Council, 29 November 2010.

Canadian general who is spending more time preparing with the Americans than with the Canadians," states David Mulroney. "And I must admit, I did detect a real lack of enthusiasm at the highest levels of the Forces for this new kind of mission."[55]

Likewise, CIDA practitioners were loath to be seen as part of what they perceived as the politicization of a development and reconstruction mission. They resented Canadian goals which (in their opinion) had been devised politically, rather than professionally, and which blended civilian humanitarian work with military priorities.[56] Military leaders were similarly reluctant to engage with politically-driven goals that they perceived as being increasingly divorced from the ever-changing reality on the ground. One senior soldier describes intense frustration at being told to support a political "feel-good policy" of rehabilitating Kandahar's Sarpoza prison, while in the surrounding community, "people [were] starving, [they had] no running water, and their kids [were] filthy and dying."[57] These disagreements consumed time and energy, decreased collaboration between Ottawa and the field, and encouraged CF leaders to look increasingly towards NATO, which they perceived to be more effective and important to mission success.

Factor 4 – Culture

Military and civilian organisations are culturally different in how they plan, prepare for, execute, and learn from their activities. Furthermore, they have diverging ideas about security, governance, development, the application of violence, and how they should fit together in a foreign intervention. These deeply-engrained facets of their identities influence why they collaborate, how they do so, and whether they think it is even a good idea in the first place.

The survival of all militaries depends on their ability to act quickly, decisively, and aggressively. The result is a culture of which is action oriented, privileging 'effects' which increase their security and achieve tangible progress towards their mission. Their unique function instills a warrior ethos within military professionals, an ethos which the CF was particularly keen to reinvigorate after its "decade of darkness" in the 1990s.[58] In Afghanistan, these cultural attributes had important implications for collaboration with civilian organisations. For example, officials in CIDA and DFAIT are often willing to question authority if it means the formulation of better policy, a trait which clashes with the principle of hierarchical military command. Understanding why these differences existed was not always forthcoming on either side. As a senior civilian official recalls, "[I saw civilians] talking to senior military people in a way that implied disagreement or criticism in front of subordinates. Some of those things that you just can't do in the military. And that led to deeply held grudges, and in some cases declining cooperation."[59]

Another early culture clash was over what collaboration looked like in practice, and why it was being pursued in the first place. CIDA and DFAIT saw Canada's mission as a reconstruction effort enabled by the 'security bubble' of the CF. Military personnel saw a NATO counter-counterinsurgency in which 'civil effects' would be delivered by civilian actors according to a military timetable. Many military leaders were sceptical of the entire WoG concept, since it implied an approach limited to Canadian, rather than NATO, objectives.[60] In Afghanistan Task Force leader David Mulroney's opinion, "What [the military] had a hard time understanding is what the public service calls democratic values. They mean that, at the end of the day, whatever your views, we had just had an election, and they decided. If you don't like it, you give your best professional advice, and you either resign or you carry it out."[61] This strong language reflects deep cultural divides with respect to what Canada's goals were, and how Canada's departments should best go about fulfilling them.

The CF's security-centric view of the Afghanistan mission was informed by its primary task of achieving physical security (the absence of violence), and in its constant exposure to danger. Through the lens of counterinsurgency, military leaders tended to see development and governance as tools to help win a war, rather than as ends pursued unto themselves. Military CIMIC units undertook projects to 'win hearts and minds' in order to support the commander's intent, rather than to do truly sustainable development or governance work.[62] As Lieutenant-General Jon Vance describes, "from a military perspective, the effort to try to build a school has a deleterious effect on the enemy. It may not have a tremendously positive effect on the education system. But it's harmful to the enemy, because they see something built, and they have to destroy it, and then they're seen to be destroying schools, which is good. The military doesn't do these humanitarian things for humanitarian reasons. We do it because we're trying to achieve military objectives. And I [make] no secret about that. That's the game we're in."[63]

The more humanitarian-minded civilians felt that these motivations clashed with the principles of humanitarianism, namely humanity, impartiality, and independence.[64] They complained that CF leaders were focusing too much upon enemy activity, rather than those areas which had the most potential for economic growth and governance gains. They also criticized what they saw as the short-term nature and amateurish execution of CF projects. "They kind of had this ridiculous notion of how things were – if you command it, it will be done," recalls one CIDA official. "It doesn't work that way."[65]

These disputes revealed fundamental differences regarding time horizons of development and governance. For their part, military leaders feared losing momentum in the kinetic side of the war, and were dangerously overstretched as it was.[66] By virtue of their six-to-nine month rotations, military personnel were keen to see "shovels in the ground" on projects that created quick jobs and brought visible progress, and were reluctant to commit resources to projects which they felt had no immediate benefit.[67] For example, CF leaders were initially dismissive of Canada's Dahla Dam project, because CIDA first engaged in over a year of negotiation and planning to ensure sustainability and local engagement.[68] The CF sometimes took a lack of visible progress on civilian projects as evidence that they were doing nothing at all, and reacted accordingly. As Philip Lupul explains, "Militaries abhor a vacuum, or perceived vacuum, and will always move in to occupy what they perceive to be unoccupied or insufficiently occupied space."[69]

The CF's short-term tendencies were anathema to CIDA's "principles of effective development," which were designed to be sustainable and consensus-based.[70] Many CIDA officials were sceptical about the military's assumption that development and governance activities could be pursued alongside combat in an ongoing war. They also feared (rightly, as it turns out) that the vast sums flowing into Kandahar would create distortions in the local economy, and be diverted into the hands of power brokers such as

DND photo SU2006-0523 by Master Corporal Jill Cooper

Hamid Karzai, President of Afghanistan, 22 September 2006.

Ahmed Wali Karzai, the brother of President Hamid Karzai.[71] This was also an internal debate within CIDA itself, between those that had "drunk the WoG Kool-Aid," and those who saw counterinsurgency and true development work as being mutually exclusive.[72] "At the grass roots level, people were resisting," remembers CIDA official Galal Ali. "Why do we want to get involved in this? What does CIDA have to do with this? This is a war zone."[73]

In summary, DFAIT and CIDA are consensus-based policy formulators, not military campaign planners. Furthermore, civilian supervisors cannot knowingly put their employees at risk, an obvious problem in a war zone. Military personnel saw civilian organizations as being culturally disinclined to do what was needed to fight the war, and civilians perceived a unidimensional fighting machine which could never understand development or governance. The CF's cryptic language, war-fighting culture, and military doctrine were mystifying to civilians who had never experienced them. With little prior interdepartmental training or experience, the first civilian practitioners in Afghanistan had to spend as much time adjusting to the omnipresent military culture as doing the job they were sent there to do in the first place. Although Canadian departments eventually found enough common ground to coexist, many of their more fundamental philosophical differences have yet to be resolved.

DND photo AR2008-Z139-16

A female KPRT member gives a pen to an Afghan girl, 30 April 2008.

Conclusion

Experience and capacity, bureaucracy, politics, and culture encompass the range of factors that frustrated the efforts of Canadians to act more collaboratively in the early (and sometimes in the later) years of the Afghanistan mission. Distinguishing between these categories is crucial, because it highlights why collaboration problems persisted even after leaders addressed the more visible problems relating to capacity and bureaucracy. Lessons-learned processes tend to gloss over the political and cultural barriers to collaboration, since they are often beyond a commander's direct control, and are frustratingly resistant to change. These omissions are dangerous, because they paint a simplistic caricature of collaboration as something which can be achieved by 'knocking heads together,' providing top-down direction, or cutting red tape. Highlighting the more entrenched barriers to collaboration serves to caution against the belief that interdepartmental harmony is a natural state of affairs, when the reality is anything but that. By frankly and openly assessing the origins and consequences of these problems, it is possible to gain a more complete picture of why they persisted for so long, and how similar problems can be overcome in the future.

NOTES

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DND photo IS2014-7759-053 by Captain Christopher Daniel

Two CF-18 *Hornets* in formation with two MiG-21 *Lancers* during joint training between the Canadian Air Task Force Romania and the Romanian Air Force (RoAF) on 18 July 2014 during Operation *Reassurance*.

From First Principles – The Need for a Fighter-Capable Air Force

by Richard Shimooka and Don Macnamara

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Introduction

When assessing Canada's defence needs, and hence procuring major weapons systems such as tanks, aircraft and ships, public discussion of the background to the process and the essential and often classified research necessary is seldom evident, nor is accurate and relevant media reporting and commentary. This, coupled with a certain skepticism and cynicism over defence matters in general and frequently condescending attitudes that such equipment is just 'toys for the boys,' in addition to the increasingly common perspective of opposition solely for the sake of opposition. This makes a serious and knowledgeable discussion difficult in Parliament, the media, or among what we would hope to be an informed and involved public – all essential elements in our democratic system, but also deserving of serious attention.

The Fundamentals

It is important, at the outset in any such discussion, to recognize and understand the fundamentals. The first and most important responsibility of government is to provide for the security of the country, its sovereignty, and the safety of its inhabitants. That means the Government is responsible for the protection and promotion of Canada's national interests. The first and foremost of these interests, for any country, is indeed security, and having the capability to defend its sovereignty and interests, including the use or threat of force if that security is threatened. The second national interest is the economic well-being of the citizens – their prosperity – important because that also provides the means to support resources for security. As a trading nation, prosperity will be dependent upon a third interest – a stable world order that permits an uninhibited global trade environment and maximizes the generation of wealth. Such stability also contributes to both national and international

security. The final national interest is the protection and support of our values –democracy, the rule of law, individual freedom, and human rights. Taken together, our values and our interests reflect our very way of life in Canada, and what and why Canada tries to contribute to the world at large.

Since the end of the Second World War, Canada's basic defence policy has been to first provide for the defence of our sovereign land, sea, and aerospace approaches – a very demanding expectation, given our being the country with second-largest land mass in the world, with the longest coastline, and a comparatively small, widely scattered population, largely residing within 160 kilometres of the Canada – United States border. Second priority is the joint defence of North America with the United States. This has been a pillar of Canadian defence policy since the Ogdensburg Agreement of 1940, essentially accepting that the United States 'would not stand idly by should Canada be attacked by a foreign power,' and Canada, in return, agreed not to permit an attack on the United States from across Canadian territory. Today, the defence of North America in conjunction with the United States continues, and it is confirmed by the North American Aerospace Defence agreement originating in 1958, wherein both Canadian and United States fighters provide a capability to identify, track, intercept, deter, deflect, or even destroy intruders in the approaches *to* or *in* the sovereign aerospace of either Canada or the United States. Finally, Canada has long recognized its responsibility for international security and its obligations to contribute to NATO and UN military interventions and stabilization operations. Simply put, Canada would want to defend its interests as far as possible from its homeland, given the difficulty of defending its own sovereignty and land area.

"Finally, Canada has long recognized its responsibility for international security and its obligations to contribute to NATO and UN military interventions and stabilization operations."

When called upon to respond to the perceived threats using force or the threat of force, the capabilities of the Canadian Armed Forces – the Royal Canadian Navy, the Canadian Army and the Royal Canadian Air Force – will represent the whole spectrum of military means available to the Government for operations within Canada, or to contribute to alliance or UN operations abroad in support of our own interests. At the same time, it is absolutely essential to recognize that the members of an all-volunteer Canadian Armed Forces serve under a condition of 'unlimited liability' – that is that they may be called upon by their Government to commit their lives in the defence of the nation's interests. In a democracy, there is a reciprocal moral duty – a covenant – understanding that the Canadian Armed Forces

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Prime Minister William Lyon Mackenzie King and President Franklin D. Roosevelt.

or any of its components will not be committed or placed 'in harm's way' capriciously or ill-prepared. Accordingly, they should also be appropriately equipped and trained to undertake the nature of mission predicted and supplied with the necessary logistic support consistent with their deployment. All or many of these obligations appear to be easily forgotten in the haste to deploy or to disengage. Similarly, public, parliamentary, and media discussions and arguments concerning major equipment procurements are often conducted without reference to these fundamental understandings.

The International Security Environment – Challenge and Response

A global strategic assessment of the international security environment, and identification of events or trends that represent risks or threats to Canadian security, are essential foundational steps. Such assessments, now termed 'The Future Security Environment," are normally conducted by the Department of National Defence in cooperation with the Department of Foreign Affairs, academia, NORAD, NATO, the Governments of Canada's allies, and Non-Government Organizations (NGOs). Recognizing that the future truly cannot be forecast, that the only future certainty is surprise, and the only constant in this environment is change, a prudent Government attempts to chart a course to provide the required capability and flexibility needed to protect sovereignty, security, prosperity, world order, and our values. This *has been* and *is* accomplished by identifying the capabilities that the Canadian Armed Forces require, by taking into account trends, the full spectrum of risks, evolving military technology, and forecasting uncertainty.

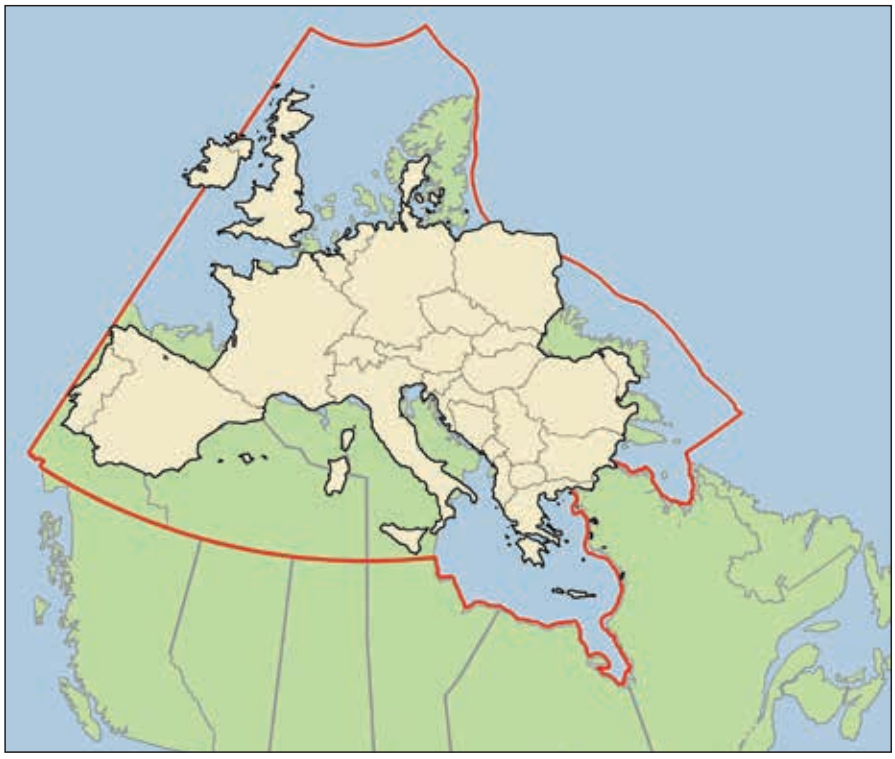
This strategic assessment* has shown that the world is indeed a messy and dangerous place full of unpredictability. *[Editor's note: The Summary of Deductions of the 2008 *The Future Security Environment 2008–2030* assessment as released by the Chief of Force Development, National Defence Headquarters, is attached in its entirety as Appendix 1 to this article.] The global security environment today is complex, dangerous, and even frightening if one starts with the changes brought to the international system over the last century, let alone since 1989, with the collapse of the former Soviet Union . Since then, the locus of attention has shifted from Central Europe and the Cold War, to the Middle East and surrounding areas in the 1990s, Southwest Asia post-'9-11,' and now to the Asia Pacific region.

For the Canadian Armed Forces, the 'Defence of Canada and its Interests' is a daunting challenge. Our total force, by world standards, is very small. Indeed, Canada is virtually incapable of large-scale independent combat operations. This is understandable as, beyond the Defence of Canada role, it is unlikely that Canada would act unilaterally beyond its borders, and yet, Canada commonly contributes to coalition operations. However, Canadian deployed operations are limited in size because, whether land, sea, or air forces, the rotation of manpower, equipment, and logistics support dictates a limited commitment.

The vast size of Canada and its coastline, and the long trans-oceanic distances to virtually all coalition operations, mandate the response, speed, and flexibility of airpower to defend Canada's interests at home and abroad. The surveillance and defence of our land, sea and air approaches require long-range patrol and intelligence gathering aircraft, long-range strategic airlift and shorter-range tactical airlift, medium-to-heavy lift helicopters for troop transport into otherwise inaccessible sites, anti-submarine fixed-wing aircraft and helicopters, and manned fighter aircraft to provide accountable, precise, and, if so authorized and directed, lethal force.

It must not be forgotten that, if Canada did not have a capability to effectively observe and defend its territory, and could not meaningfully contribute to the defence of North American aerospace, the approaches across Canadian territory would be a threat to the United States. In their own vital interest, the United States would be compelled to provide the necessary defence operations in and over Canadian territory – a huge, and, to most Canadians, an unacceptable loss of Canadian sovereignty. Therefore, no Canadian Government could abrogate its commitments to the United States or to Canadian citizens to secure Canadian sovereign territory and our maritime and air approaches to the North American continent.

Within the context of the Asia Pacific and the Arctic, there are indeed foreseeable risks. In the past five years, China has undertaken an increasingly aggressive policy towards asserting its territorial claims in the region. These include disputing the Senkaku Islands with Japan, the South Seas islands with Vietnam, Philippines and Malaysia, and the Line of Actual Control with India. The tenor of these incidents has increased dramatically in recent years, including direct confrontations in the air and on the



17 Wing Publishing, Winnipeg

The vastness of Canada's Arctic is graphically driven home through this overlay of Europe upon the region.

sea between Chinese and other states' militaries. They included a recent standoff between the People's Liberation Army Navy and Japanese Maritime Self Defence Force destroyers off the Senkaku Islands after the unilateral imposition of an air defence zone in the area, and the sinking of several Vietnamese fishing boats by Chinese vessels. Any one of these encounters had the potential to escalate into a major military conflict, which illustrates the tenuous security situation in the region.

It is interesting to note that China is pursuing these military confrontations with its largest economic partners. This throws into doubt claims that globalized trade relationships may constrain or avoid future conflicts. Rather, it suggests that maintenance of a robust military and stable security situation is essential for the continued health of the current economic system and Canada's prosperity. More broadly, globalization means that we live in a complex 'system of systems,' and the state is vulnerable to the effects of changes in component systems in all parts of the world, and such changes within a single system *can* and *will* have an impact upon other systems, the consequences of which can truly threaten our security and other interests.

While the threat of direct attack may appear to be minimal, Canada faces greater challenges for maintaining its sovereignty, particularly in the Arctic. Russia has renewed its interest in the region for geostrategic reasons. This is partly due to deteriorating relations between it and the United States. Polar routes are the most direct avenue of approach between Russia and the United States, a critical strategic consideration. Moreover, the Russian Navy uses the Arctic as a bastion for its ballistic missile submarine fleet, which is a critical consideration with respect to its nuclear capability. In addition to military concerns, Russia has a growing interest in northern economic opportunities. With the growing exhaustion of its oil and gas reservoirs in southern latitudes, domestic firms must increasingly rely upon new reserves in Siberia and the Arctic to meet the growing demand. The massive liquefied natural gas developments on the Yamal and Sakhalin Peninsulas are two examples of this growing trend.[1] These aims, among others, have led the Russian government to be more active in maintaining its territorial integrity in the Arctic. Russian bomber and reconnaissance missions *in* and *around* the North American air defence identification zones continually challenge our sovereignty, and they force a NORAD reaction to counter the threat. Given the vast distances and sparse population in the north, and the need to react quickly with a response that ranges from identification and monitoring, to lethal force, Canada's tactical fighters are the country's only credible response to these and other intrusions to our sovereignty.

UAVs versus Manned Tactical Fighter Aircraft

Given these considerations, it is clear that tactical fighter aircraft are critical for maintaining Canada's security at home, and asserting its interests abroad. They possess several key features that make them particularly valuable, including responsiveness, flexibility, accountability, and cost efficacy. Moreover, there is no suitable replacement for a manned fighter aircraft in the near term. While Unmanned Aerial Vehicles (UAVs) have been used effectively in niche roles, there are serious technical and legal challenges that will likely prevent a transition to an unmanned fighter force for some time, probably for decades. In this context, the US Navy has downgraded its requirements for its Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) program to focus upon Intelligence, Surveillance, and Reconnaissance (ISR) and light strike functions, over a more expansive set of capabilities. In addition, the challenges of developing an Unmanned Combat Air Vehicle (UCAV) with the full range of fighter capabilities and attributes were confirmed in 2012 by, then-United States Air Force Chief of Staff General Norton Schwartz, who envisioned that manned fighters will be required for at least another 30 years.[2] Even if UCAVs mature enough to meet these requirements, operations in northern latitudes present further difficulties. Harsh weather, limits on satellite communications and vast uninhabited stretches of territory will prevent unmanned systems from being a reliable and effective replacement for a manned fighter capability until UAV technologies are developed to mitigate these challenges.

In addition to domestic security concerns, tactical fighters are an essential instrument for Canada's foreign and security policy. As noted earlier, China's economic rise and assertive military posture have resulted in a growing sense of insecurity by China's neighbours and the United States. Any conflict in the Asia-Pacific would likely involve six of Canada's top ten trading partners, accounting for over 90 percent of our foreign trade. Furthermore, any conflict that may occur will likely be fought with 'cutting edge' military capabilities, and possibly, over large ocean expanses for deployment and engagement. When such a situation demands immediate action, precision, and accountability, tactical fighters are the only credible response Canada can make to any crisis in the region.

"The disappointing outcome of operations in Iraq and Afghanistan, coupled with their high costs, has decreased decision makers' appetites for large ground deployments."

The focus on a new massive confrontation in the Asia Pacific ignores the wide variety of possible scenarios in which states may engage using military force. In the past five years, potential areas of involvement have included North Korea, Ukraine, Afghanistan, Libya, Iran, and Syria. While Canada and the international community have not been involved in all these conflict zones, manned tactical fighters provide the government of the day with an extremely flexible response to any crisis in which it deems action to be in Canada's interest. They can be deployed to a crisis anywhere in the world (provided the necessary facilities exist) in less than 72 hours after the issuance of a warning order, and they can undertake a wide variety of missions. For example, RCAF CF-18s have been called upon to enforce no-fly zones in Bosnia, to provide ground support for NATO peacekeepers in Bosnia, to perform interdiction missions in Kosovo, to contribute to the NATO operation in Libya, and, as a component of NATO's 'show of force' to conduct a deployment in response to the ongoing crisis in Ukraine. Removing Canada's tactical fighter capability would rob Canada of the flexibility and responsiveness to meaningfully contribute to world security, and, in due course, would impact Canada's economic development.

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Four possible contenders for the CF-18 *Hornet* replacement. Left-to-right, top-to-bottom: the Boeing F/A-18E/F *Advanced Super Hornet*; the Lockheed Martin F-35A *Lightning II*; the Dassault *Rafale*; and the Eurofighter *Typhoon.*

Cost Effectiveness

Moreover, airpower as an instrument of military power *vis-à-vis* other forms of force has increased in the past decade. It is agile, integrated, precise, accountable, and responsive, and it has global reach. The disappointing outcome of operations in Iraq and Afghanistan, coupled with their high costs, has decreased decision makers' appetites for large ground deployments. Large standing armies are costly to support, not only in peacetime and during operations, but also for decades afterwards in the form of entitlement programs for veterans. These costs have generally exceeded inflation, particularly when death and long-term disability payments from operations are factored in.[3]

Air capabilities certainly have high capital costs. Tactical fighters are expensive to develop, acquire, and sustain. Canada's current generation of fighters, the CF-18 *Hornet,* is rapidly reaching the end of its usable service life, and it must be replaced by a newer aircraft. This fleet will also require periodic avionics and systems upgrades to maintain combat capabilities, which can be a costly proposition.[4] Once these costs are paid, however, tactical fighters can be a much cheaper alternative to other forms of national power, particularly due to significantly lower personnel costs. For example, a Canadian Armed Forces battle group deployment into a conflict involves upwards of 2000 soldiers often supported by a large-scale air mobility operation. The deployment of six fighters, tankers, transport, and Long Range Patrol aircraft to Italy for Operation *Unified Protector* over Libya required only 200 personnel in support.

In the final analysis, an air force with balanced capabilities that can provide a rapidly deployable lethal force of fighter aircraft is an essential component of both continental and international defence of Canada's national security interests.

Conclusion

When addressing Canada's defence needs from first principles – from a Government's first responsibility to secure the country, the *role of* and *duty to* the nation's armed forces, the strategic assessment of threats to Canada's security, sovereignty, and other national interests, to the determination of the means and capabilities to provide for that first responsibility – it is clear that Canada is challenged by the emerging security environment. Discussions of specific equipment needs, whether aircraft, ships, or army combat capabilities and assets, must be holistic, and they must incorporate the various principles and issues identified in this article. When it comes to fighter aircraft, the speed, flexibility, accountability, and lethality of a fighter-capable air force is very much in Canada's national security interest. Furthermore, the need for an engaged

and informed public, insightful media, and knowledgeable and detailed Parliamentary debate is indeed in the best interests of the protection of Canada's national interests.

Appendix 1:

The Future Security Environment 2008-2030

Chief of Force Development
National Defence Headquarters
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Ottawa, Ontario K1A 0K2

Available at: http://publications.gc.ca/collections/collection_2011/dn-nd/D4-8-1-2010-eng.pdf.

Summary of Deductions
Economic and Social Trends

1. While globalization will bring greater economic prosperity to more nations, the gap between rich and poor nations and individuals could possibly widen. Economic disparity will be a source of tension and potential conflict.
2. Developed nations will find it in their best interest to pursue diplomatic solutions for the protection of economic investments, trade, and transportation routes; however, aggressive responses to threats to trade or economic well- being are always a possibility.
3. Protection of both continental and international trade routes from disruption will be essential to Canada's economic well-being. Because of the trans- national nature of maritime trade, the CF could possibly be asked to provide increased surveillance and other resources to keep potential threats away from vulnerable ports and transportation routes and to respond to threats that find their way into Canada's transportation infrastructure system.
4. The mass movement of large segments of people is destabilizing and may result in civil unrest, regional clashes, or humanitarian crises that require response and resolution through the diplomatic, development, and/or defence instruments of developed nations.
5. The urbanization of the world's populations will continue. The failure of the megalopolis in the developing world will increase the risk of disease, pandemic, and humanitarian crisis and will also accentuate the increasingly urbanized nature of conflict and the need for urban warfare capabilities.
6. Nations will have to be prepared to respond to the consequences of the global outbreak of infectious diseases.
7. Sub-Saharan Africa and Central Asia are regions where instability and inequality stemming from extreme poverty could possibly require humanitarian and/or stabilization missions
8. Religious extremism will continue to be motivated by narratives founded on disagreement with secular and pluralistic social and governance models. The simplicity of these narratives will continue to attract followers across the globe, threatening Canada and its interests at home and abroad.
9. Youth bulges and high unemployment will continue to characterize the demographic profile of the developing world and will act as a root cause of regional and international instability.
10. Aging Western populations will be challenged to find recruits to sustain defence and armed force structures as competition for labour will occur worldwide in the private, public, and defence sectors, especially in Canada.

Environmental and Resource Trends

11. Climate change will result in increasingly violent weather patterns, drought, and natural disasters that will demand military support to assist victims around the world, ranging from humanitarian relief to full scale stability operations.
12. As the impact of global climate change becomes more widespread, the CF will need to consider the effectiveness of military systems, capabilities, and platforms associated with operating in extreme environmental conditions. Increased access to the Arctic, brought about by climate change, will have sovereignty, security, and environmental implications for Canada that will result in increased CF engagement in the Arctic region.
13. Worldwide harvesting and exploitation of the ocean's resources will not only continue in the future but will also intensify to the point where access, stewardship, and ownership may be possible sources of confrontation. There will be greater demand for the maritime surveillance capabilities of the CF and for standing patrols of marine space under Canadian jurisdiction.
14. Sufficient potable water and food – basic life requirements – will remain inaccessible to millions of people, particularly in the developing world. Developed nations will probably be called upon to provide humanitarian, stabilization, and/or reconstruction assistance.
15. Concerns over rising prices for, and access to, oil will probably be addressed through diplomatic means, but tensions and – even conflict – could possibly arise between states that are pursuing control over dwindling supplies. As demand for oil begins to outstrip supply, viable energy alternatives will have to be found to run economies and militaries.
16. Competition for strategic minerals and metals will slowly increase as technological developments result in increased demand for them. Dollar diplomacy and diplomatic pressure could possibly succeed in securing adequate supply and access for the most powerful states.

Geopolitical Trends

17. Multilateral cooperation will remain essential, although coalitions of the willing will arise to challenge the perceived inertia of traditional organizations.
18. The effectiveness of the UN in dealing with violent crises will continue to be limited, but the organization will continue to play an important relevant role in humanitarian crises.
19. NATO will continue to play an important role in Western security affairs in the foreseeable future. However, it is probable that coalitions of the willing will displace the Alliance on many missions considered politically sensitive or urgent.
20. The EU will play a growing role in European security affairs but, barring the emergence of a direct and clear threat to European security, will probably continue to focus more on issues of internal governance than on international security.
21. Canada will continue to be interested in, and supportive of, the initiatives of the Organization of American States since it will

ensure greater political and social stability in the region and will continue to be a mechanism for assisting in the prevention of terrorist attacks in the Western Hemisphere.

22. The Association of South-East Asian Nations will continue to play a regional security role by providing a forum for dialogue and cooperation; this will probably indirectly enhance the security of the member countries by building economic and cultural relationships.
23. The Asia-Pacific Economic Cooperation will continue to play a valuable role in fostering and maintaining non-security related relationships, but its effects on the security environment will be of second order, rather than direct.
24. The African Union is a potential entity for contributing to peace, prosperity, and stability on the African continent. Increasing AU capabilities could possibly reduce demand for military engagement in Africa, as unrest and instability could possibly be addressed through the AU and through diplomatic and development aid.
25. The continued existence and expansion of the Shanghai Cooperation Organization (SCO) will have to be monitored closely as the SCO could possibly increase tensions between eastern and western powers.
26. The United States will retain conventional military supremacy, but increasing economic challenges could erode its dominant position. Because of its unmatched military capabilities, adversaries will focus on asymmetric ways and means of undermining the superpower status of the United States.
27. The economic, military, and diplomatic rise of China will alter the global balance of power in the coming decades. China will be a regional, and possibly global, challenger to the economic power of the United States and, at the very least, a regional challenger to US military power in the Asia-Pacific region. It is unlikely that the US will quietly accept the erosion of its influence, which could possibly lead to increased tensions.
28. India's plans for military modernization are ambitious but will take many years to come to fruition.
29. Wanting to be a player on the world stage again, Russia will pursue warmer relations with Europe, NATO, and the United States in order to prevent marginalization and help recreate Russia as at least a regional power. For the foreseeable future, Russia will not aggressively challenge the United States or its allies.
30. The existing security environment in Latin America appears benign at first glance, but the activities of violent non-state actors will increase, possibly causing, as a second- or third-order effect, limited state-on-state conflict.
31. Maritime Southeast Asia and the South Pacific will continue to face massive developmental challenges over the coming decades, with a number of key areas threatened by Muslim extremism. Australia and New Zealand will continue to be challenged by the need to balance great and regional power relationships, instability within what they consider their inner strategic arc, the enormity of the geographic reality of the region, and the variance in socio-cultural and ethnic context of state fragility that does not allow for blanket regional stability and development strategies.
32. The Middle East will remain volatile for the foreseeable future, and current conflicts show little promise of quick resolution. Western nations will probably provide diplomatic aid as opposed to engagement in prolonged regional and internal confrontations. Nevertheless, an expansion of American participation in conflicts in the Middle East cannot be dismissed it if is deemed to be in the interests of the United States.
33. A growing trend towards radicalized Islam and increasingly weak governance structures will continue to threaten the stability of the Central and South Asian region, prolonging the need for an international presence in Afghanistan and further eroding central authority in Pakistan.
34. Based on indicators of instability, Sub-Saharan Africa will probably see a significant number of states fail. The requests for developed nations – including Canada – to intervene with humanitarian, stabilization, and/or reconstruction missions will probably increase.

Science and Technology Trends

35. Nanotechnology will be instrumental in revolutionizing science and technology developments such as miniaturization, thereby altering defence applications for materials, processors, sensors, and human performance.
36. Developments in information, communications, computing, and sensor technologies are resulting in network-centric concepts and solutions that challenge existing hierarchies. Trends in technology will reach a point where computing, knowledge access, sensing, and the increased use of autonomous intelligent systems are omnipresent.
37. Convergence of bio and nanotechnology will develop new drug therapies, customized treatments, organic prosthetics, and enhance human performance. It is probable that adversaries will exploit these advances in to create more potent biological weapons, which will be countered by simultaneous advances in detection capabilities.
38. Although slow to emerge, the development of new energy technologies will be market driven and should somewhat reduce the demand for oil and fossil fuel worldwide. Research and development into more efficient electrical energy generation will allow military forces to function autonomously in remote regions for extended periods of time.
39. Advances in cognitive and behavioural science may make it possible to overcome traditional human barriers resulting from sustained operations, environmental ambiguity, and information overload.

Military and Security Trends

40. Future operations will find the CF working among, with, and against a diverse array of other armed groups, such as private military contractors, militias, armed followings, bandits, criminal syndicates, gangs, and insurgents. Additionally, the CF and its allies will also need to work with NGOs, who will be increasingly present in future theatres of operation, whenever possible to help achieve desired ends.
41. Adversarial non-state actors will seek to overcome an advanced military's strengths through employing such means as irregular warfare, the acquisition and use of Weapons of Mass Destruction, and the disruption of electronic information infrastructures through cyber attacks. Asymmetric tactics will also be viable options for state adversaries.

42. Countering terrorism is primarily a political and legal challenge, but the trans- national nature of this threat means that militaries will probably be called upon in certain circumstances to assist civil authorities and will certainly be faced with the effects of terrorism in operational theatres.
43. The increasing commercialization of weapons will allow some developing nations and non-state actors to acquire inexpensive and sophisticated military capabilities. Hence, Canada and its allies will be confronted by a mixture of conventional, CBRN, and novel technology weapons in the hands of a variety of state and non-state actors, thus necessitating that Canada be able to apply the full spectrum of capabilities, even against non-state actors.
44. Modern nations will have a stake in protecting space-based assets and will need to maintain robust and redundant capabilities that anticipate the loss of at least some current competitive information technology advantages. Interstate rivalries and conflict in the future will probably extend into space, and even non-state actors and some less developed nations will probably be able to access and use assets in this environment, thus eroding the exclusive advantage currently possessed by modern militaries.

Conclusions

45. A complex future security environment will demand a comprehensive, integrated, adaptive, and networked focus in the application of government policy.

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DND photo IS2014-1031-01 by Sergeant Matthew McGregor

A CF-18 *Hornet* comes alongside an RCAF CC-130T *Hercules* to refuel just off the coast of Hawaii during Exercise RIMPAC, 14 July 2014.

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The Proliferation, Diversity and Utility of Ground-based Robotic Technologies

by Gary Martinic

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Introduction

By contrast to weapons development, which has occurred progressively over thousands of years, the pace of development of information technology and electronics has been staggering. It has led to the 'age of the machines,' where robotic warfare and lethality via remote-control are no longer the preserve of science fiction novels.

These new 'machines' include unmanned aerial vehicles (UAVs), unmanned ground vehicles (UGVs), robotic ground platforms (RGPs), unmanned surface vessels (USVs), and unmanned underwater vessels (UUVs), as well as unmanned weapons and surveillance systems (UWS), all of which have already been deployed in military operations.

With each passing year, the technologies involved have grown smaller, faster, and more sophisticated, mirroring developments in the 'smart-phone' industry, which essentially uses the same electronic components, namely optics, embedded micro-processors, sensors, and batteries. And while robotic technologies to date have featured most prominently in the air environment, state-of-the-art robotic ground vehicles and platforms are proliferating, and they are being incorporated militarily by an increasing number of nations.

In recent years, for example, the US Army and the US Marine Corps have reportedly deployed at least 6000 UGVs in Iraq and Afghanistan, primarily on intelligence, surveillance and reconnaissance (ISR) tasks, as well as for the detection of improvised explosive devices.[1] And while details are somewhat sketchy, South Korea has reportedly deployed stationary armed surveillance 'robots' in the demilitarised zone along its border with North Korea since 2010, and they are capable of detecting movement over a distance of three kilometres.[2]

This article will briefly describe the advances in ground-based unmanned weapons and surveillance platforms and systems, and outline their broad capabilities and military advantages. It will also address their potential use to the CAF, especially as this applies to currently available 'off-the-shelf' acquisitions. It purposely does

not address UAVs, which have been reasonably covered in past issues of the Australian Defence Force Journal.[3]

The Development of Unmanned Systems

Germany was one of the earliest users of unmanned radio-controlled weaponry. Most people are familiar with the V-series rockets of the Second World War. However, as early as the First World War, Germany had deployed the FL-7, a wire-guided motorboat carrying 300 pounds of explosives, designed to be rammed into enemy ships.[4] It demonstrated its effectiveness when it struck and damaged HMS *Erebus* off the coast of German-occupied Belgium in October 1917. But early guided weapons were also developed for use on the ground. A rather crude example was the 'land torpedo,' an armoured tractor packed with about 400 kilograms of explosives, intended to be detonated after it reached enemy trenches.[5]

DVIDS image 92713 by Sergeant Giancarlo Casem

A *Talon* robot goes in for a closer look at a suspected improvised explosive device.

SWAT BOT robot by Chris Rogers at Corofiot

Mil-Sim A5 Robotic Weapon UGV.

Today, unmanned ground vehicles are generally known as UGVs, although there is a sub-class of robotic ground platforms (RGPs), such as 'quadrupeds' and 'bipeds,' which use robotic limbs to achieve movement, rather than a wheeled-or-tracked chassis. Initially, most UGVs were designed specifically for particularly dangerous tasks, such as explosive ordnance disposal. They generally are fitted with on-board sensors to scan and monitor their environment, and they operate either via a human controller, or autonomously.

Remotely-operated UGVs (ro-UGVs)

The remotely-operated vehicles work on the same principle as a remote-controlled toy car in that their movement is controlled by a human operator, either via the use of sensors (such as digital video cameras), or by direct visual observation. Most have been developed to inspect and disable explosive devices, providing a safer alternative to human operators in high-risk situations. But increasingly, their use has been extended to include ground surveillance missions, urban 'strike' operations in law enforcement and military operations, military checkpoint monitoring, and even for some peacekeeping tasks. Currently, there are more than 20 types of ro-UGVs available 'off-the-shelf.'

Other ro-UGVs include the 'I-Robot 110,' which is a lightweight, remotely-controlled UGV designed to provide a quick assessment of 'situational awareness' and persistent observation in confined spaces.[6] Weighing only 13 kilograms, and fitted with four cameras and night vision optics, it can be deployed into buildings in search of insurgents or snipers. Another is the 'Mil-Sim A5 Robotic Weapon,' an all-weather/all-terrain UGV weighing 90 kilograms, which can be operated remotely by day or night from up to half a kilometre away via wireless control.[7] It can be armed with lethal or non-lethal munitions, depending upon mission requirements. [Of note, the version illustrated is the 'crowd control' variant, capable of firing 1100 hardened rubber-ball rounds at up to 20 rounds per second, and this is possible while the UGV is moving].

Another is the Modular Advanced Armed Robotic System (MAARS) UGV.[8] It weighs around 100 kilograms, has a speed of 10km/hr, and can be equipped

US Army photo http://www.army.mil.media/316424 by Patrick A. Albright

MAARS ro-UGV.

with an array of weaponry, including a machine gun and grenade launchers. It is operated remotely from a lightweight control unit, and its surveillance capabilities include day and night cameras, motion detectors, an acoustic microphone, and a hostile fire detection system. The MAARS UGV enables its operating force to project firepower while remaining under cover; the obvious weakness is its vulnerability to enemy direct fire.

Yet another ro-UGV, reportedly at an advanced stage of testing, is BAE Systems *Black Night*, which is similar in size and appearance to a traditional tank, complete with a turret-mounted 30 mm cannon.[9] While it is operated remotely, it reportedly has the capacity for a number of autonomous functions, including route planning and obstacle avoidance. A prototype has been under evaluation by the US Army since 2010.[10] The obvious advantage of a remotely-controlled tank—or indeed, any remotely-controlled fighting vehicle—is that it enables the engagement of targets and the projection of firepower without direct risk to human operators.

Autonomous UGVs (a-UGVs)

As their name implies, a-UGVs operate without direct human control. They have in-built sensors which scan and monitor their immediate environment, with sequential activities determined by the use of pre-assigned control algorithms. They typically have the capacity to traverse long distances and to operate for long mission hours without operator intervention, while some also have limited self-repair capabilities. There currently are more than 25 types of a-UGVs available 'off-the-shelf.'

One of the most successful and well-known is the Mobile Detection Assessment and Response System (MDARS), a-UGV developed jointly by the US Army and US Navy for patrolling and guarding military warehouses, airfields, and port facilities.[11] It provides an automated intrusion detection capability, as well as an ongoing assessment of the status of inventoried items, through the use of transponder tags, as it patrols warehouses and storage sites in shifts of up to 12 hours without the need to refuel. It requires operator input only

in assessing the severity of an intrusion. According to its developers, the MDARS a-UGV has been so successful that it has been the first 'robot' to be employed in guarding sensitive US nuclear sites. It reportedly is also saving the US Department of Defense millions of dollars annually in labour and security-related costs.[12]

Another innovative a-UGV is the US Army's *Big Dog*, which is a robotic quadruped, designed to carry equipment for ground troops over difficult or rough terrain.[13] It is also known within the US Army as the 'Multifunctional Utility/Logistics and Equipment' robot, or 'MULE,' for short. Weighing 110 kilograms and standing 76 centimetres, it can carry 154 kilograms of explosives at an average speed of six km/hr, and climb hills at an incline of up to 35 degrees. *Big Dog* has the capability to jump over low obstructions, climb over low vertical obstacles, and to walk on ice. Importantly, 'it never falls off its feet.'

Another important semi-autonomous RGP, which was designed to locate, lift, and rescue people out of harm's way, is the 'Battlefield Extraction Assist Robot,' or BEAR.[14] Developed with funding from the US Army Medical Research and Materiel Command, it has the capability to lift up to 200 kilograms, a top speed of 10 km/hr, and can negotiate difficult battlefield terrain. One can easily deduce that this prototype RGP would also have useful application in the civilian area of emergency medicine, such as the retrieval of victims from hazardous road accident environments, or from damaged buildings following an earthquake.

Current Limitations

While some of the autonomous functions of UGVs are well advanced, such as mobility, endurance, communications, and navigation, the development of behavioural functions relating to their adaptability and employment in complex tactical scenarios is still at an early stage. One particular issue is whether to limit UGVs (and other robotic technologies) to adaptive control solutions, or whether to incorporate artificial intelligence, ultimately seeking UGVs capable of complete and 'responsible' autonomous operation.[15]

Advantages of Ground-Based Robotic Technologies for the CAF

Undoubtedly, the most valuable advantages of UGVs are their ability to perform ISR tasks, to aid and complement the mobility of soldiers on the battlefield, and, when armed, to project firepower while protecting the operator

USMC 14026-M-NS272-686 by Corporal D.J. Wu

MDARS a-UGV.

DVIDS image 1445401 by Sergeant William L. Holdaway

The Legged Squad Support System *Big Dog*, a load-carrying robotic quadruped being tested during Exercise RIMPAC.

from direct enemy action. These features have made them particularly attractive to armed forces and law-enforcement agencies worldwide, including in unconventional warfare and counter-terrorism operations.

UGVs are versatile, agile, and relatively rugged. Moreover, with the ability to perform repetitive tasks with speed and precision—and being devoid of human emotion—UGVs are tenacious, tireless, and fearless. This makes them extremely useful for a range of the more mundane, tedious, and dangerous tasks on the modern battlefield, especially ones that would otherwise expose combatants or human operators to higher-than-normal risk of injury or death.

Moreover, as the development and proliferation of UGVs continues, their acquisition cost will continue to decline, making them even more cost effective for militaries around the world, particularly where their employment can reduce overall manpower requirements, or minimize the risk of death or injury to service personnel. These attributes have been recognised by the US Congress, which mandated in 2000 that one in every three future US combat systems should be unmanned.[16]

For the CAF, the potential utility of these technologies—and ultimately, their effectiveness and reliability on the future battlefield—will need to be weighed against specific mission requirements and detailed cost benefit analyses. On one hand, it is relatively easy to justify the acquisition of a particular UGV to meet a specific, existing capability, particularly one involving highly-dangerous tasks, such as explosive ordnance disposal. The considerably more difficult exercise is to contemplate the required force structure for a future battlefield involving a combination of manned and unmanned platforms and systems, operating as an integrated battlefield network.

The other challenge, which has been addressed by a number of commentators—including in earlier issues of the *Australia Defence Force Journal*—is the complex question of the ethical, legal, and political implications of employing increasingly- autonomous robotic technologies in offensive operations.[17] While some might argue that this issue is overblown and the stuff of science fiction novels, it seems inevitable that future unmanned systems will progressively incorporate artificial intelligence systems, giving them *increased* if not *eventual complete autonomy* from a human operator.

Conclusion

The possibility of using robotics on the battlefield has long been envisaged by military planners. Just as UAVs have made a revolutionary impact in the air, it seems certain that UGVs and RGPs will continue to proliferate in ground operations, where they have the potential to greatly enhance combat effectiveness while reducing human casualties on the battlefield.

In the longer-term, it seems inevitable that the battlefield of the future will be dominated by increasingly-autonomous unmanned weapons platforms and systems, operating across the environments of air, sea, land, and space. How those platforms and systems are integrated into future force structures—including for the CAF—is a complex issue, requiring considerable analysis and planning, as will the associated ethical and legal questions surrounding their employment.

This article has attempted to provide some vision of what future ground warfare and surveillance using 'weaponized' UGVs, may look like. In some ways, these UGVs are perhaps the 'perfect soldier' in the sense that they are dangerous, mission-driven, highly-survivable, easily-repairable, and, if required, disposable. Their effectiveness will only be enhanced further when questions regarding the human-robot interface are solved, as will be their repertoire of military uses, as increasing levels of operating autonomy are achieved.

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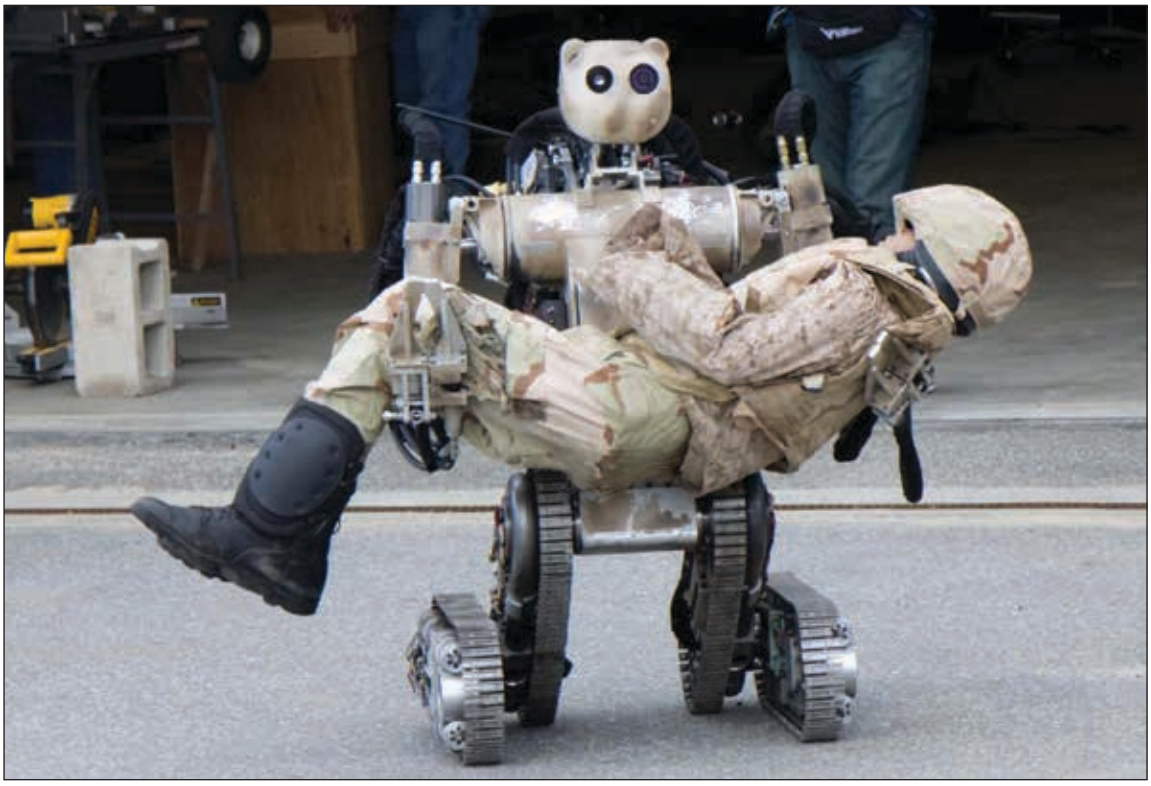

TATRAC

A Battlefield Extraction Assist Robot (BEAR).

NOTES

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Library and Archives Canada, Acc. No. 1991-274-2

The Surrender of Poundmaker to Major-General Middleton at Battleford, Saskatchewan, on 26 May 1885, by Robert William Rutherford.

The Second Métis War of 1885: A Case Study of Non-Commissioned Member Training and the Intermediate Leadership Program

by Robert-Falcon Ouellette

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> *I say we have an interest, as a part of the great Empire—as sharers in its prosperity, as sharers in its shame; we have an interest in everything which will tend to develop the strength and the unity of that Empire; we have an interest in every great and important question affecting the general constitution and organization of the Empire at large.*
>
> *~Edward Blake, House of Commons Debates, 20 April 1882*[1]

Introduction

The manner in which the Canadian state and Aboriginal peoples see military history is very different. They just have different ontologies or world-views. As an Aboriginal military member of the Canadian Armed Forces (CAF), I have had the privilege of taking various training courses on Canadian military history and the opportunity to study that history from multiple world-views. This is not due to the CAF training I received, but to my own unique life's experiences. The idea of world-view needs to be addressed in greater detail. For the Indigenous Eskimo anthropologist Oscar Kawagley (Yupiq), it is closely related to definitions of culture and a cognitive map. "A worldview consists of the principles we acquire to make sense of the world round us. Young people learn these values, traditions and customs from myths, legends, stories, family, community and examples set by community leaders. The worldview (cognitive map) is a summation of coping devices that have worked in the past [but may not

work in the now or future]… The worldview [allows a people who self-identify] to make sense of the world around them, make artifacts to fit their world, generate behavior and interpret their experiences."[2] This idea of world-view could equally apply to Indigenous peoples and members of a specific group.

The military has its own world-view that enables members to perceive the world around them, and to create a reality that they feel to be true.[3] Indigenous peoples of Canada also have differing world-views, or ontologies. A fine example of the divergence of views is the Northwest Rebellion of 1885. There is orthodoxy in the manner the Northwest Rebellion is studied in military academies in Canada. The study of this conflict usually uses a linear model of analysis or an empiric-historic method, and it often ignores other perspectives which are also important in understanding the conduct of war, its outcomes, and its interpretations. For instance, the *Canadian Forces Intermediate Leadership Program* (ILP) course required participants to explain how the Canadian and British soldiers used the ten principles of war to defeat the Métis and Indians in 1885.[4]

The ILP, while very beneficial, is also very simplistic in the manner it presents Canadian history.[5] It is this example of 1885 and Canadian military history which does not produce great reflection in the training of non-commissioned members (NCMs), but rather, an anti-intellectual linear thinking. In the reading for the ILP, it was highlighted that in all military conflicts, there are ten Principles of War that must be addressed in some manner, and when one of them is ignored, defeat is often the outcome.[6]

Principles of War

1. Selection and maintenance of the aim;
2. Maintenance of morale;
3. Offensive action;
4. Security;
5. Surprise;
6. Concentration of force;
7. Economy of effort;
8. Flexibility;
9. Cooperation; and
10. Administration and supply.

The presentation of these principles is very important, but it is their interplay within the confines of politics which makes them more interesting and valuable to members of the CAF to make reasoned decisions. Often during my ILP studies, I heard from other students and even professors about how the Canadian military, despite growing pains in the early years of Confederation, was able to use technology and overwhelming force to defeat the Indian and Métis on the battlefield. It was, as they say, 'a foregone conclusion,' or as we might say, civilization was 'on the march,' and the Indians were being relegated to the dustbins of history.[7] There was an orthodox view during the studies that was difficult to challenge with respect to this important moment of Canadian history. Many were frankly against my view that, in fact, the strengths of the Aboriginal peoples almost led to their victory in 1885, while the Canadians and British almost lost, in spite of their supposed strengths. The course almost appeared to be a means to conduct nation building within the ILP cohort.

It is becoming less pertinent to be training NCMs for past linear wars. It seemed many students were unable to grasp the idea that one's world-view will give one a different perspective, and they had a desire to quickly pass on to the next assignment in order to be expedient in their reasoning. It was the feeling that students were more interested in being celebratory of Canadian nationalism than in actively reflecting upon different views concerning this important conflict. It did not help that supplementary material provided by the ILP did not present a variety of views, but only an orthodoxy that had been long-established. This presents great dangers for the CAF, for as NCMs who have higher education levels are asked to fulfill important leadership roles, they must have an understanding of warfare, not in a linear concept, but as a holistic model of warfare that allows various points of view. Soldiers must be able to situate themselves geo-politically in multiple complex situations so they serve the best interests of the Canadian government and the Canadian public.

I would like to conduct the same analysis using these ten principles, but from an Indigenous perspective, or, the opposite of what is often termed the 'victor's history,' which, while of great interest to the public, often has little to offer with respect to deeper insights into warfare. I hope to demonstrate that the level of subjectivity that is often used to highlight national histories prevents long-term understanding of an issue, and is not currently serving NCMs and the CAF well.

Discussion

My purpose here is not to enter into the many facts surrounding the 2nd Métis War (AKA the Resistance of 1885), but simply to present a view that calls into question today's Canadian military and political orthodoxy. The Resistance of 1885 *was,* and *still is* seen as the first Canadian military action and victory with a major force being deployed. However, there should be greater consideration given to the terms 'Rebellion' and 'War.'[8] The use of the word Rebellion presupposes that a group was waging a form of armed conflict against a central or legitimate power. The Oxford Dictionary defines Rebellion as "…an act of armed resistance to an established government or leader."[9] Many Métis writers, such as Louis Barkwell[10] and Auguste-Henri de Trémaudan,[11] believe that while the Canadian government had declared their authority over the Northwest, they did not have sufficient forces on the ground to establish their authority. In fact, many Indigenous groups maintained their own governments and legal systems independent of the central Canadian government, and many continue to do so today.[12]

"Many were frankly against my view that, in fact, the strengths of the Aboriginal peoples almost led to their victory in 1885, while the Canadians and British almost lost, in spite of their supposed strengths."

Many Western governments based their claims to lands taken from Indigenous populations upon the concept of *terra nullius*.[13] This is the idea of empty wastelands that Aboriginal peoples were not appropriately and efficiently using, and that allowed European powers to take possession of them. By taking possession of tribal lands, Western governments have broken the covenant between specific Aboriginal nations and the lands, destroying both power and place. In Australia, in 1992, this idea was overturned by the Mabo ruling of the High Court of Australia. The court ruled that there are surviving principles of cultural, territorial, and legal configurations

This map of the Selkirk Grant, while pre-dating the 1885 campaign, provides a useful depiction of some significant portions of the territory over which the campaign was waged.

that originated in forms of human understanding and organization predating the jurisdiction of European imperialism,[14] and it rejected as unfounded that Aboriginal peoples did not have pre-existing ownership prior to Australian sovereignty. While this is case from Australia, it also has repercussions here in Canada because of the shared legal system that once existed between Canada, Australia, New Zealand, and Great Britain.

"After the Red River Rebellion of 1870 and his exile to Montana, Riel was not interested in returning to Canada."

In 1870, the entry of Manitoba under the Manitoba coalition government (a government formed of all peoples residing in Manitoba) and the people of Rupert's Land into Confederation could be seen as a legitimization of the Canadian government's power. It is the subsequent reneging by the Canadian government of the negotiated conditions that could entail the idea that the covenant had never been fully implemented. A lack of full implementation created a condition whereby the Canadian government did not establish its authority, and the subsequent war with the Indigenous peoples of Saskatchewan constituted a War of Conquest.

While I recognize that, after 1870, Manitoba had been effectively occupied, it is important to note that a campaign of terror by Canadian military forces had begun almost immediately against the Indigenous inhabitants that included murder, rape, and destruction of property, commencing in 1870.[15] It is these acts and the subsequent ignoring of the bilingual nature of Manitoba which could allow the nullity of the authority of Canada. If the French, Catholic, Métis Indigenous peoples, and the Canadian government could not meet the requirements of their entry into Confederation, and the Indigenous peoples continued to maintain a separate authority in parallel using Indigenous title, their actions in 1885 were not rebellion, but rather, resistance against an occupying force conducting a War of Conquest.

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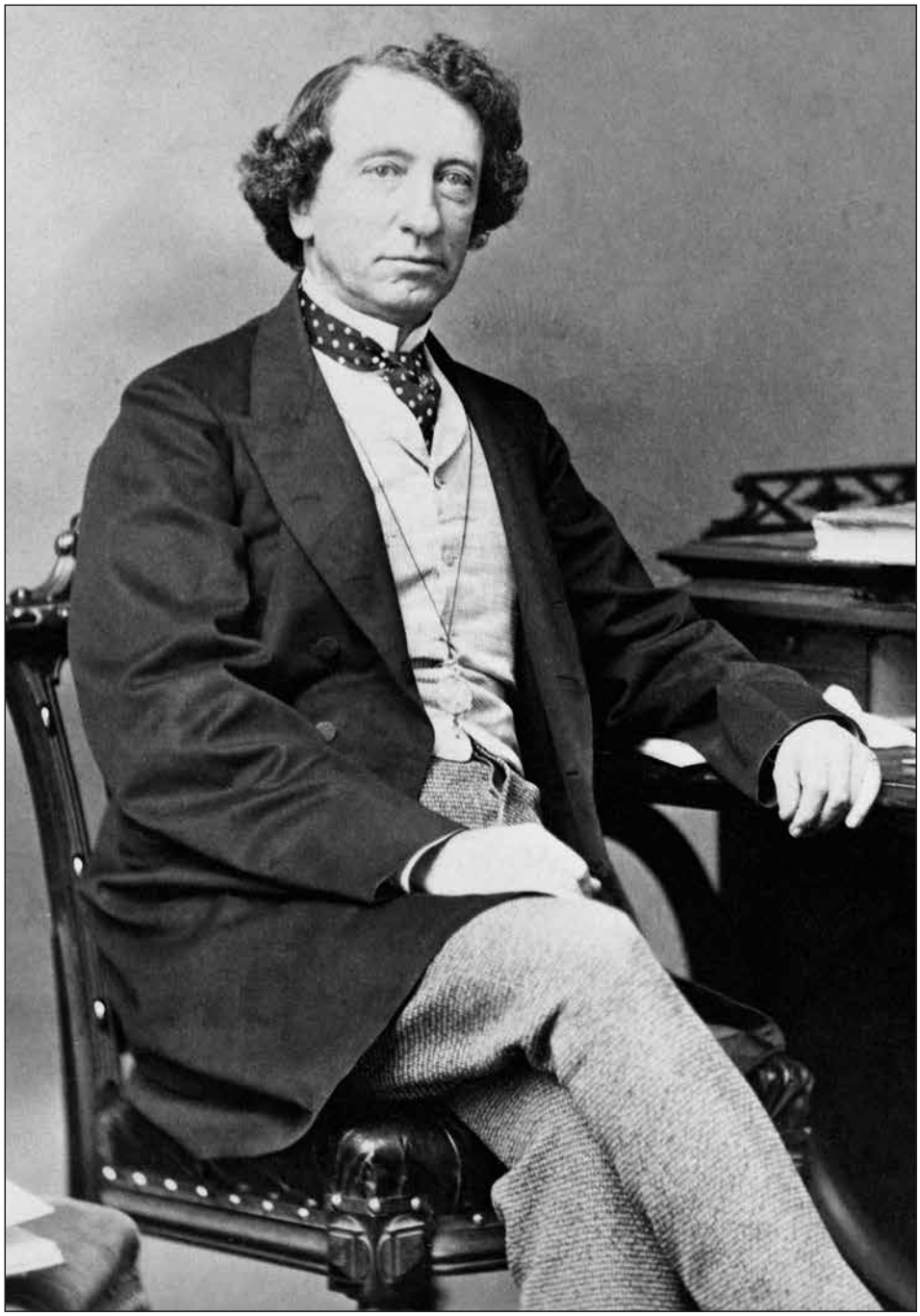
Louis Riel

For many historians, Louis Riel is a personality who is difficult to understand. He went from pursuing a legal and moderate political position of asking the federal government to respect the Manitoba Act (1870), to eventually proclaiming a new religion with Monsignor Ignace Bourget (Bishop of Montreal) as the new pope,[16] and establishing a separate government based in Batoche. Even today, for most Métis people, Riel represents a larger-than-life figure who was only seeking to help the Métis create a sense of national Métis identity by fighting 'perceived' violations of their individual and collective rights.[17]

After the Red River Rebellion of 1870 and his exile to Montana, Louis Riel was not interested in returning to Canada. He changed his mind only after a group of Métis men[18] went to Montana and requested that he return to the Northwest Territories in order to fight for their natural rights. These rights had been enshrined in the 1870 Manitoba Act, but were now being trampled upon by the new government of the territories and the Canadian federal government.[19] The federal Conservative government under John A. Macdonald eventually decided that armed conflict was the only logical political solution that would bend and break the Métis[20] and end any resistance to further Canadian control and settling of the territories. One can opine that if the Métis and Indians had been allowed to continue in their grievances without being checked by the Canadian government, they would have been calling into question the supremacy of the Anglo-Saxon way of life, and, in essence, the Canadian rule of law in the Northwest Territories.

Very few actually believed in the ability of the Métis to win in the final outcome, and this included some Métis, but not all their leadership, including Riel's military field commander, Gabriel Dumont. Most realized that, with the railway, the ability of the federal government to bring troops to the territories would be far easier than was the case in 1870. In much of the literature, it is noted that the Métis were always hoping to negotiate a settlement, and even up until the final Battle of Batoche, they were still hoping that British



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Sir John A. Macdonald

field force commander Major-General Frederick Middleton, and especially, Prime Minister Macdonald, would negotiate. On 9 May 1885, Gabriel Dumont was "…realistic enough to know that they would not beat the British, but believed they could still negotiate."[21] I believe that the Métis were more surprised by the fact that when the Macdonald government did negotiate, it was in such bad faith. For instance, a number of Métis demands were met, but they were delivered in such a manner as to be insulting to the entire movement.[22]

"Most likely, the British and Canadian forces suffered from overconfidence. They felt that there was no way they could lose this campaign."

How do Indigenous nations, with crude, musket-style weapons, defend themselves against a far larger and better-equipped force? The Métis numbered only 250 participants in the Battle of Batoche, ranging in ages from 13 to 93.[23] Middleton had over 800 men directly under his command at the principal Battle of Batoche, as well as adequate logistical support, and he was also in possession of a boat, cannons, and Gatling guns. When one considers the use of a Gatling gun on a battlefield against Métis men, women, and children, even by the standards of the time, this would have been considered dishonorable.[24] In the entire Northwest Territories, there were 8000 troops available to fight and support the federal government. The Aboriginal forces were able to muster only a maximum of 500 men including Indians, and at Batoche, many fewer warriors were available to fight. Riel was even opposed to taking enemy lives.[25] This brings into hypothetical question what the consequences are when one side readies for total war, while the other seeks a negotiated peace.[26]

It was obviously very difficult for Riel to be engaged in war. He was attempting to create a new nation (Aboriginal) out in the prairies. One might offer that it was possibly his religious beliefs that impeded him, and subsequently his troops, from engaging in far more offensive actions against Middleton. He would often hold a cross and pray in the open while the battles were raging around him.[27] Riel's nephew, Auguste Vermette,[28] recounts that Riel was a gentle, incorruptible leader who would often restrain his troops and Gabriel Dumont from attacking and killing Canadian troops, but was ready to give his life for the Métis cause.[29] If Riel had allowed the Métis to conduct 'total war' in this instance, would this have been a precursor to the Boar War and the guerilla tactics conducted therein?

However, the Canadian effort faced many difficulties. The campaign to destroy the Métis forces was a logistical nightmare from the beginning because the Canadian forces believed they possessed a comfortable superiority of power. Also, the Canadian minister responsible, Sir Adolphe Caron, made every effort to institute a logistics and

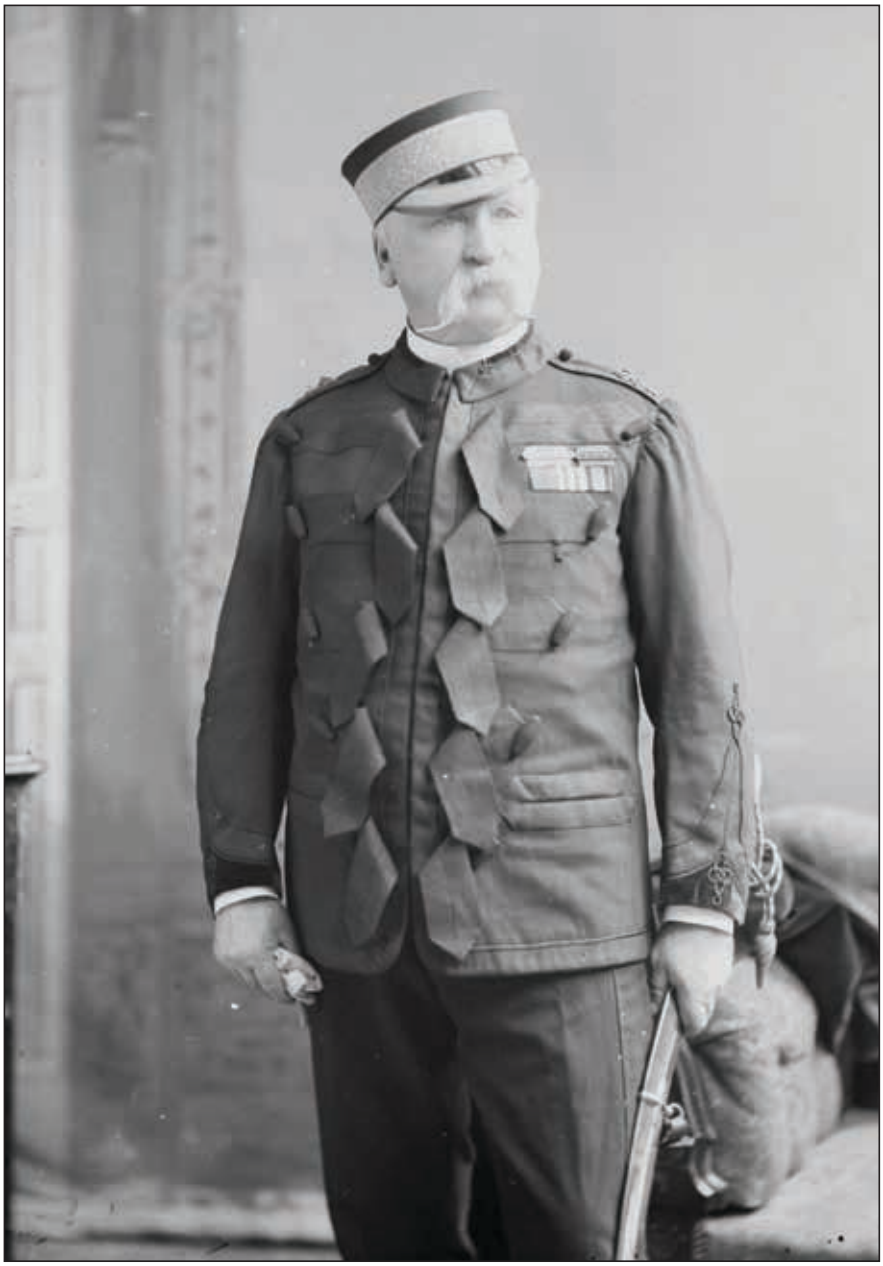
Glenbow Archives NA-1063-1

Gabriel Dumont, Red River, Alberta

Most likely, the British and Canadian forces suffered from overconfidence. They felt that there was no way they could lose this campaign. The only defeat of British Empire military forces in history by Indigenous peoples had been that orchestrated by the Zulus at the 1879 Battle of Isandlwana. This track record bolstered the feeling of invincibility of the military personal over the Indigenous peoples. It did not, however, make for actual superiority in the field, because when troops are overconfident and meet resistance, the effect can be doubly demoralizing. The Canadian leadership was extremely weak, but Middleton would ascribe his slowness and procrastination to the inexperience of his subordinates, in whom he had little confidence. It should be noted that the feeling was mutual. It was the general's view that he had prevented the Batoche engagement from ending in failure, but others could not forget that he had been unable to use his mounted forces or manoeuvre his troops, or that his timid approach was the cause of the lack of fighting spirit in his men.[32]

transportation system that relied upon private enterprise. The Canadian military's lack of preparation was apparently behind this solution, which eventually cost the government $4.5 million, an enormous amount for the late-19th Century.[30] The military, medical, and supply services were cobbled together in just four days. The variety of weapons issued was not seen as a major concern. Men left for war with Snider, Winchester, and Martini-Henry carbines and rifles. Similarly, they carried three types of ammunition that had to be distributed to units that were often situated great distances apart. Some of this ammunition turned out to be unusable or non-existent. For example, Major-General Thomas Strange in command of the Alberta Field Force reached Frenchman's Butte with only 22 artillery shells.[31]

The greatest mistake on the other side was the failure of the Aboriginal coalition[33] to ensure an adequate supply of ammunition (logistics/principle of administration), and in not comprehending the political advantages that the revolt offered the government. The Aboriginal peoples at Batoche were supposedly firing rocks and nails near the end of the battle, due to a shortage of ammunition.[34] They thus failed to adequately plan their future needs. The Métis and Indians were supplied almost exclusively by the Hudson's Bay Company and other small outfitters for their weapons, but once the provisional government had been declared, this source of supply was extinguished. It is known that they did raid the *Walters and Baker* weapons store at Batoche, seizing a number of arms and ammunition, but this was evidently not enough to meet needs.[35] It is not known what other measures were taken to acquire



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Major-General Sir Frederick D. Middleton

ammunition after the fighting had started, but it must be assumed that they were unsuccessful in obtaining any large quantities, because, in the two engagements at Frenchman's Butte, the Aboriginal forces were unable to generate a decisive victory over the Canadian forces. And the lack of ammunition and the concentration of force by the enemy resulted in their defeat at Batoche.

From an Aboriginal viewpoint, the wonder should not be with respect to which principle of war was most decisive in Middleton's victory over the Métis, but how the Métis and their Indian allies bested the Canadians and the British during the engagements at Duck Lake, Frog Lake, Fish Creek, Cut Knife, and initially, at Frenchman's Butte.[36] These five engagements, often downplayed in Canadian history as small skirmishes of little value, are viewed by Aboriginal peoples as important victories. These victories also affected the Canadians' ability to maintain their war effort and therefore the principle of maintaining morale. One might suggest they are downplayed in Canadian history books because they cannot be seen to support the ideals of Canada as a forward nation, a nation of progress.[37]

Even though Riel had very few troops on the ground (approximately 250, according to multiple sources), many were excellent horsemen, knew the terrain, and were more experienced than their adversaries with respect to combat and hunting. They also held many advantages over Middleton and his troops with respect to the principles of war, such as the maintenance of the aim, morale,[38] offensive action, surprise, security, effort, and co-operation. They were, however, lacking in concentration of force, flexibility, and administration. These three elements turned out to be the deciding factors. For instance, Dumont was able at Batoche to ground the Canadian Steamboat *Northcote* (armed with a Gatling gun) and disable it, so that it could play no major part in the battle on 9 May.[39] Dumont did have success in the early part of the battle, but was unable to maintain offensive (defensive) action, due to a lack of ammunition (administration).

In spite of their multiple successes, more Aboriginal peoples did not join Riel in his crusade. They had little logistical support in terms of weapons and ammunition. Also, the large numbers of women and children located at Batoche kept the Métis fighters from being able to move swiftly across the prairies.[40] This showed that the principle of flexibility was also violated. Other principles were thus constrained, and the fighters had to make a stand at a specific location, thereby bringing about their one and only decisive defeat. At the Battle of Batoche, which lasted four days, the Métis held off a larger and better equipped force. At one point, the Canadians were even preparing to fall back and concede defeat. Only a last-minute decision by an officer to charge the Métis lines against orders showed how truly weak the supply issues of the Métis had become. There are many Métis authors and some leaders who have called to account the official Canadian version of history. The influential 20th Century Métis academic and activist Howard Adams[41] writes that Canadian history presents the Aboriginal peoples in such a manner as to make them seem simple yet honest people who were doomed to defeat and to be swallowed up by history, as all Indians were to disappear into the dustbin of history. Adams protested until his death against this continuing neo-colonialist affront to all Indigenous peoples of Canada.[42]

Library and Archives Canada C-002425

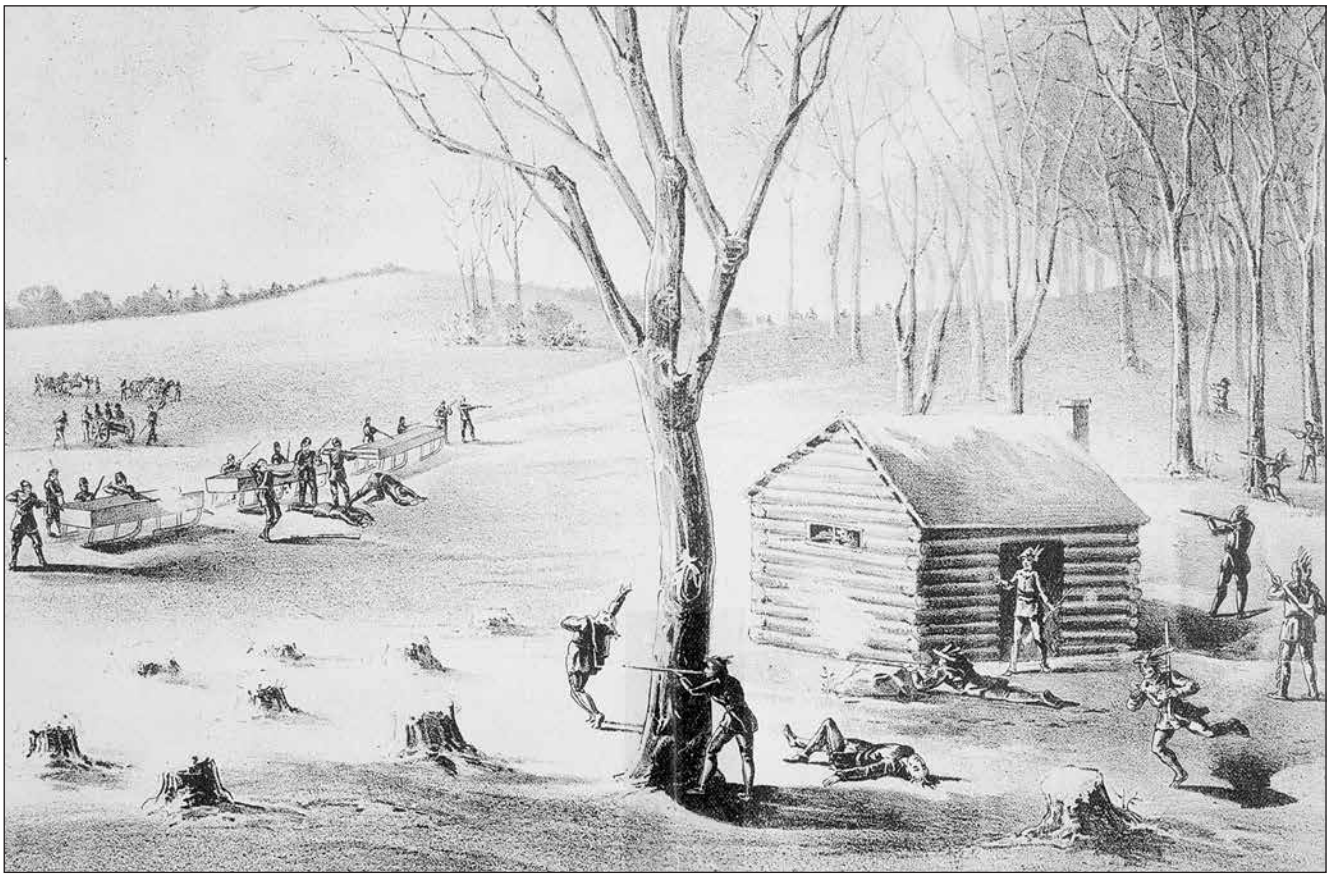
The Battle of Fish Creek.

Glenbow Archives NA-1039-1

Louis Riel and his associates.

Time Line of Events[43]

24 March 1884	South Branch Métis hold a meeting in Batoche to discuss grievances. The 30 representatives vote to invite Louis Riel back to act as political advisor and leader.
6 May 1884	At a joint meeting, the South Branch Métis and English half-breeds pass several resolutions specifying grievances and adopt a motion to seek Louis Riel's assistance.
18 May 1884	Métis delegation leaves Batoche for Montana to solicit Louis Riel's aid.
16 December 1884	Louis Riel sends a petition to the Secretary of State outlining Métis grievances and demands.
28 January 1885	John A. Macdonald's cabinet authorizes the creation of a three-person commission to review and settle Métis and half-breed claims in Manitoba and the Northwest Territories.
5 March 1885	Louis Riel and a group of prominent Métis hold a secret meeting. They sign an oath to "save our country from a wicked government by taking up arms if necessary."
18 March 1885	Métis seize control of St. Anthony's Church: they take hostages and cut the telegraph lines at Clarke's Crossing.
19 March 1885	Métis form the ministry and the army of the Provisional Government of Saskatchewan.
21 March 1885	The Provisional Government demands the North-West Mounted Police surrender Fort Carlton.
22 March 1885	The Winnipeg Militia is ordered to a state of readiness and Major-General Frederick Dobson Middleton is given command of the troops.
26 March 1885	Métis force under Gabriel Dumont engage in an unplanned skirmish with Superintendent L.F. Crozier's Mounted Police and volunteers at Duck Lake. The police are routed.
27 March 1885	The North-West Mounted Police abandon Fort Carlton (accidentally burning it as they leave) and retreat to Prince Albert.
28 March 1885	News of Duck Lake hits eastern Canada. The Federal Government raises a Canadian Militia Force. Within two weeks, three columns of the Northwest Field Force are in motion.
29 March 1885	Assiniboine warrior Ikteh kills farm instructor Payne on the Mosquito reserve.
30 March 1885	The 'Siege of Battleford' begins. Pitikwahanapi wiyin (Poundmaker) arrives at Fort Battleford. The Indian Agent refuses to meet with him. The combined Battleford bands loot the town.
2 April 1885	The Frog Lake Massacre. Members of Mistahimaskwa's Cree Nation led by Ayimisis and Kapapamahchakwew (Wandering Spirit) kill Indian Agent Quinn and eight other whites.



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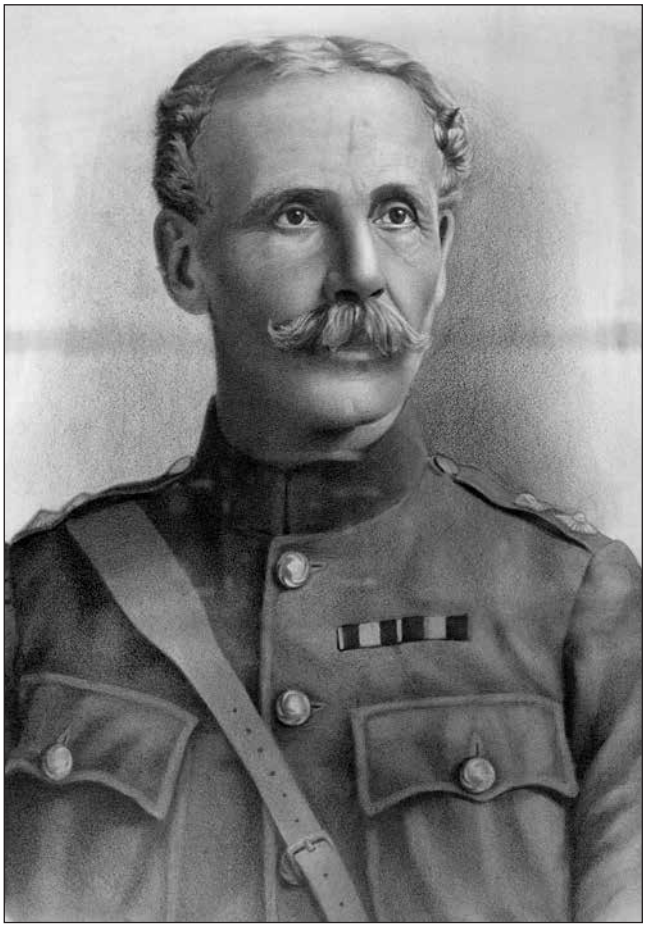
The Fight at Duck Lake.

3 April 1885	Cree of the Little Hunter and Blue Quill bands raid government store house at Saddle Lake (130 km northeast of Edmonton).
17 April 1885	Fort Pitt is taken by warriors of Mistahimaskwa's band. Mistahimaskwa negotiates the evacuation of the fort by the North West Mounted Police.
24 April 1885	Gabriel Dumont ambushes Middleton's column at Fish Creek.
24 April 1885	Lieutenant-Colonel William Otter relieves the ‹siege› of the Fort Battleford without a battle. The Battleford bands have left the area and established a camp at Cutknife Hill.
26 April 1885	Indians raid HBC post at Lac La Biche, Alberta.
2 May 1885	Colonel Otter's column attacks Pitikwahahnapiwiyin's camp at Cut Knife Hill. Otter is forced to retreat to Battleford. Pitikwahahnapiwiyin prevents Indians from attacking retreating troops.



Glenbow Archives NA-827-1

Lieutenant Colonel William Dillon Otter

9–12 May 1885	Battle of Batoche. Middleton defeats the Métis force in a four day battle.
14 May 1885	At Eagle Hills, Battleford Indian bands capture wagon train carrying supplies for Colonel Otter's column. Twenty-one teamsters are taken prisoner.
15 May 1885	Louis Riel surrenders and is transported to Regina for trial.
26 May 1885	Pitikwahanapiwiyn surrenders to General Middleton at Fort Battleford.
28 May 1885	Mistahimaskwa's band and Major-General T.B. Strange clash at Frenchman's Butte.
3 June 1885	Steele's and Mistahimaskwa's forces engage in a skirmish at Loon Lake.
2 July 1885	Mistahimaskwa surrenders to North-West Mounted Police at Fort Pitt.
6 July 1885	Riel is formally charged with high treason.
20 July– 1 August 1885	Riel is tried and found guilty of treason. Judge Hugh Richardson sentences Riel to hang 18 September.
24 July 1885	William Henry Jackson is found not guilty by reason of insanity. Jackson is sent to a lunatic asylum in Manitoba.
5 August 1885	Sir John A. Macdonald requests that murder charges be laid against the Indians involved at Frog Lake and in the killing of Payne.
13 August 1885	Kapeyakwaskonam (One Arrow) tried on the charge of treason-felony, is found guilty and sentenced to three years imprisonment.
14 August 1885	A number of Métis involved in the rebellion plead guilty to treason-felony and receive prison sentences ranging from one-to-seven years.
17-19 August 1885	Pitikwahanapiwiyin is tried on the charge of treason-felony, found guilty and sentenced to three years imprisonment.
9 September	The Manitoba Court of Queen's Bench rejects Riel's appeal.
11 September 1885	Mistahimaskwa is tried on the charge of treason-felony, found guilty and sentenced to three years imprisonment.
25 September 1885	Kapapamahchakwew (Wandering Spirit) is tried at Battleford and sentenced to hang.
5 October 1885	Ikteh and Man Without Blood are tried, found guilty and sentenced to hang for killing Payne.
10 October 1885	Five Indians are tried in Battleford for involvement at Frog Lake, are found guilty and sentenced to hang.
22 October 1885	Judicial Committee of the Privy Council rules against Riel's appeal.
9 November 1885	The Medical Commission, created to examine Riel's mental condition, submits its report to the Prime Minister. The Commission is divided on the question of Riel's sanity. Cabinet decides to proceed with death penalty.
16 November 1885	Riel is hanged in Regina.
27 November 1885	Kapapamahchakwew and seven other Indians are hanged at Battleford.

Conclusion

I hope that I have been able to offer a more Indigenous perspective concerning the 2nd Métis War of 1885. From this viewpoint, it was a war of conquest and a total war against peoples who only wished to have justice. The Canadian government had not established its legitimate authority because it had not fulfilled the treaty requirements concerning the Indigenous peoples of the prairies. If Middleton had had the flexibility and willingness to negotiate, would many of today's issues, court cases, and treaty land entitlement negotiations still be in play here in Canada? Chief Warrant Officer André Normandin spoke about the need for CAF soldiers to have an understanding of the overall mission and the long term interests of Canada when engaged in warfare.[44] In order to do so, we must not study with hubris, but with the ability to self-criticize and to analyze why and when Canada has won or lost in an honest, forthright manner, and if we have fulfilled the longer-term needs of our nation in given situations. While many may say that the military must simply and blindly follow orders, I believe this to be both false and dangerous. In the case discussed herein, instead of a partnership that could have been established over one hundred year ago, many Aboriginal peoples exist in poverty today with multiple social ills that could be traced back to how the war of conquest was conducted by Canadian forces. We can only imagine what life would be like if the military had had the foresight and courage to speak to their political masters concerning durable options for Canada. While many may ask why NCMs should have such training, the reality is that it better situates and prepares for any debate, informs the chain of command, and aids in the completion of any given mission. Soldiers are also citizens with rights and responsibilities within Canadian society.

> *[Trans] I have been criticized for referring to Louis Riel as "my brother." I would rather call Louis Riel "my brother" than do as some men do and call the Orangemen their brothers. I would rather be related to a Métis than to certain politicians who seek to crush our race and destroy our religion. I have never been ashamed of a hanged man who hanged for the love of his country. I have never been ashamed of a De Lorimier, a Duquet or a Chénier; I have never been ashamed of my father, who was imprisoned in 1837 because he loved his country.*
>
> *~ Honoré Mercier, 7 May 1886*[45]

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Library and Archives Canada C-002424

The Capture of Batoche

NOTES

1. Hansard (House of Commons Debates), 4th Parliament, 4th Session, vol. 1, 1882, p.1042, taken from a speech by Edward Blake. Quoted by Honoré Mercier, leader of the Parti National and former leader of the Opposition Liberals, to the Legislative Assembly of Quebec on 7 May 1886.
2. A. Oscar Kawagley, *A Yupiaq Worldview: A Pathway to Ecology and Spirit*, (Prospect Heights, IL: Waveland Press, Inc., 1995), p. 8.
3. David W. Grebstad, "Rowboat Diplomacy: The Dominion of Canada's Whole Government Approach to the Red River Rebellion," in *Canadian Military Journal*, Vol. 13, No. 3, Summer 2013, pp. 57-66. This article is a prime example of Canadian world-view about the lack of consideration of the sovereignty of Indigenous peoples in Canada and Turtle Island. While the author is sympathetic, saying the Métis wanted to protect their way of life, he also points out that the Hudson Bay Company administered this territory. I am sure that the Indigenous peoples did not see the Hudson Bay as a government, but as just another player within their own efforts of controlling their traditional territory. The author uses terms of "Whole" government, including Diplomacy, Development, and Defence. In 1869, Macdonald lied to the people of Red River about the exact nature of their joining with Canada. Even the Supreme Court of Canada has recognized that government did use fair dealing when further negotiating the rights of all peoples in the Red River. Also, the use of the term Defence in Whole government is misleading, because, in this author's opinion, this was not a defensive act by the Canadian government, but a war of conquest.
4. I was enrolled in the DL ILP training in 2008-2009 and the residential component in 2012.
5. I have heard the comment made during by staff that the ILP course is not about learning and challenging individuals, but about networking, building up a list of contacts across the CAF that will help NCMs further the objectives of the organization (personal communication 2012). I believe that there should be a larger debate with respect to the type of education that we expect for our NCMs, and what the final outcomes should be. Maxime Rondeau & Lisa Tanguay, "What Education Should Non-Commissioned Members Receive?" in *Canadian Military Journal*, Vol. 13, No. 3, Summer 2013, pp. 49-58.
6. Intermediate Leadership Qualification. Distance Learning Division NCM Professional Development Centre. ILP version 8.08. 2006.
7. Anthony J. Hall, *The American Empire and the Fourth World: The Bowl with One Spoon: Volume One*, (Montréal & Kingston: McGill-Queen's University Press, 2003).
8. In 1886, when Battle Honours were being bestowed, all Canadian regiments that participated in the 'Rebellion' received them. The victory of Canada over the Métis and Indians in 1885 is seen as justified because it maintained Canadian law in Western Canada and confirmed the superiority of the British way of life over that of 'inferior' races. The Voltigeurs de Quebec have, for their Battle honours: the Nord-Ouest du Canada, 1885 (this date was incorporated into the regiment's cap badge from 1928 to 1984), Mont-Sorrel, Cote 70, Somme, 1916, Ypres, 1917, Arras, 1917, and Amiens. I suspect they removed the term 'Rebellion' in 1984, when it was no longer politically correct to still use it.
9. Oxford Dictionary. Accessed on 11 November 2013 at: http://www.oxforddictionaries.com/definition/english/rebellion
10. Lawrence J. Barkwell, *The Reign of Terror against the Métis of Red River,* (Winnipeg, MB: Louis Riel Institute, 2008).
11. Auguste-Henri De Trémaudan, *Histoire de la Nation Métisse dans l'Ouest Canadien,* (Montréal: Éditions Albert Lévesque, 1935).
12. Ghislan Otis, *L'adoption coutumière autochtone et les défis du pluralisme juridique,* (Québec, PQ: Presses de l'Université Laval, 2013).
13. Hall, p. 31.
14. *Ibid.*
15. Barkwell.
16. Bernard Saint-Aubin, *Louis Riel: Un destin tragique,* (Montréal: Les Éditions la Presse Ltée, 1985), pp. 214-247.
17. Jennifer Reid, *Louis Riel and the Creation of Modern Canada: Mythic Discourse and the Postcolonial State*, (Winnipeg, MB: University of Manitoba Press, 2012).
18. I would like to mention that my ancestor, great-great-grandfather Moïse Ouellette, was part of that expedition, and that my family had the honour of hosting Riel in our home upon his return to the territories. Moïse was also a member of the 1885 provisional government.
19. Macdonald also needed a reason to justify the bankrupt Canadian Pacific Railway that had cost millions, and he received needed funds from the Canadian Parliament. Ismène Toussaint, *Louis Riel : Le bison de cristal. Hommage,* (Montréal, PQ: Les Éditions internationales Alain Stanké, 2000).
20. Carl von Clausewitz, *On War*, (London: Penguin Books, 1968), pp. 12-13.
21. Saint-Aubin.
22. *Ibid.*
23. The father of Moïse Ouellette was Joseph Ouellette, who, at 93 years of age was killed on the last day of the four-day Battle of Batoche. After the Métis positions had been charged and almost overrun, he stayed behind, thus allowing his son to lead his wife and children to safety. Gabriel Dumont said later of the "old" Ouellette: "My companions and I fought our way to the hilltop between Fisher's house and store, and held our position there. That was where old Ouellette was killed. I must say this: it was his courage that had sustained us all. Although he was ninety-three years old, he would not leave the battlefield. Several times I said, 'Father, we must retire.' And he answered, 'Wait a minute. I only want to kill one more Englishman.' 'Okay', I said. 'Let us die here.' When he was shot, I thanked him and he sent me away."
24. Julia Keller, *Mr. Gatling's Terrible Marvel: The Gun That Changed Everything and the Misunderstood Genius Who Invented It*, (London: Penguin Books Ltd., 2008).
25. Saint-Aubin. At the Battle of Duck Lake, Major Crozier's force of 100 men would have been annihilated had Riel not intervened to prevent a massacre and to allow Crozier to escape.
26. *Ibid.*
27. *Ibid.*
28. Riel's nephew and a second-hand eyewitness.
29. Marcien Ferland, *Au temps de la Prairie : L'histoire des Métis de l'Ouest canadien racontée par Auguste Vermette, neveu de Louis Riel,* (Saint- Boniface, MB: Les Éditions du Blé, 2006).
30. This recalls the $ 300 million bill for the siege at Oka against the Mohawks in 1990 (Lubacon News). This was also a similar situation, where Indigenous and Human Rights have not been resolved through the use of military force. We have only seen a delay in a final conclusion with respect to issues concerning the Canadian state and Indigenous Rights. Bob Beal and Rod MacLeod, North-West Rebellion (2008), Accessed 1 August 2013, from The Canadian encyclopedia web site at: http://www.thecanadianencyclopedia.ca/en/article/north-west-rebellion/
31. *Ibid.*
32. *Ibid.*
33. Barkwell. I use the term coalition because researcher Lawrence Barkwell has cataloged all the different Indigenous people involved in the War, and they came from many different backgrounds.
34. Norman Lester, *Le livre noir du Canada anglais.* Tome 1 (Montréal: Les Éditions des Intouchables, 2001), pp. 146-167. Also, Toussaint.
35. Saint-Aubin.
36. Beal & Macleod.
37. Hall.
38. Middleton is said to have had very little confidence in the ability of the French Canadian troops and their loyalty to the ultimate aims of the campaign. For this reason, the carabinier and voltigeur regiments saw little if any action under fire, being primarily relegated to garrison duty. Pierre Vennat & Michel Litalien, *Carabiniers et voltigeurs contre Louis Riel : histoire militaire et politique inconnue,* (Montréal: Les Éditions du Méridien, 2003).
39. Saint-Aubin.
40. *Ibid.* Also, Toussaint.
41. Adams is a former Métis leader who refused to accept federal funds to finance any organizing among the Métis people in the 1970s, and he wrote widely on the issue of neocolonialism and the use of federal funds to co-opt Aboriginal organizations.
42. Howard Adams, *Tortured people: The Politics of Colonization*, revised edition, (Penticton, BC: Theytus Books, 1999).
43. Taken from the Northwest Resistance Chronology of Events. Accessed on 8 November 2013 at: http://library.usask.ca/northwest/background/chronol.htm
44. Speech given by Chief Warrant Officer Normandin on 7 November 2008 to the 5th Field Ambulance at Valcartier, Quebec.
45. Taken from the speech by Honoré Mercier to the Legislative Assembly of Quebec on 7 May 1886.

DND photo

The Strategic Utility of Special Operations Forces

by Bernd Horn

The military has always been a key instrument of national power. Its strategic utility for defending the nation and furthering national interest through the use of direct military force or by assisting friends, allies, coalitions, and/or international organizations has earned it a voice in national security policy formulation and implementation.[1] The three traditional services, the Navy, Army and Air Force, have, for a long time, been recognized as key players in this strategic context. The new millennium, particularly as a result of the terrorist attack on the Twin Towers of the World Trade Center on 11 September 2001 (9/11), has added special operations forces (SOF) to that list of strategic players. The ascendency of SOF in the post-9/11 security environment, where SOF has played key roles in the counter-insurgencies in Afghanistan and Iraq, as well as in the 'global war on terror,' has prompted scholars, military analysts, and practitioners to generate new concepts to describe SOF's strategic relevance and saliency. Specifically, 'SOF Power' and 'Force of Choice' have emerged as common terminology in the defence community. It fact, it is precisely because of SOF's strategic utility that these new perspectives on SOF are well-deserved, and arguably, will continue into the foreseeable future.

Indeed, SOF have evolved constantly over time. The birth of modern SOF is generally accepted as having started during the Second World War. At the time, SOF was generally defined as consisting of 'special men, special training and special missions.' Central to the evolution of SOF was the fact that they were normally marginalized by the larger military institution until crisis, or a gap in military capability, was experienced.[2] Then, normally due to champions in high-ranking political and/or military leadership and command appointments, SOF were relied upon to respond to the new threat or circumstances until, as a minimum, a conventional solution could be prepared, the crisis passed, or the requirement transitioned to a designated SOF capability (i.e., counter-terrorism). Not surprisingly, during the Cold War and subsequent post-Cold War eras, SOF continually evolved to match the constantly changing security environment, which morphed, based upon global shifts and societal changes.

As a result, SOF`s current structure in the Post-9/11 world is a dramatic departure in form and substance from their Second World War roots. The current Canadian definition of SOF is telling:

> *Special Operation Forces are organizations containing specially selected personnel that are organized, equipped and trained to conduct high-risk, high value special operations to achieve military, political, economic or informational objectives by using special and unique operational methodologies in hostile, denied or politically sensitive areas to achieve desired tactical, operational and/or strategic effects in times of peace, conflict or war.*[3]

Encapsulated within the definition is the key to SOF's strategic utility in the contemporary operating environment. SOF provide the government a wide array of cost efficient and effective capabilities and options outside the normal military context and capability set. Their ability to produce on short notice, courses of action in a number of domains, regardless of location, desirable outcomes with a high probability of success, give them great saliency to political and military decision makers. As the internationally renowned strategist, Colin Gray, asserted, "special operations forces are a national grand-strategic asset: they are a tool of statecraft that can be employed quite surgically in support of diplomacy, of foreign assistance (of several kinds), as a vital adjunct to regular military forces, or as an independent weapon."[4]

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Notwithstanding Gray's statement, the true test of strategic utility is what an organization contributes to national power, and the ability to project or defend national interests. Strategy in essence is about ends (objectives), ways (courses of action), and means (resources). Military strategy specifically is commonly understood to mean the *application of*, or *threat of the use of* military force to achieve political ends. Therefore, for SOF to be a 'force of choice,' or to demonstrate 'SOF Power,' means that SOF must have substantive value in the exercise of national interest. In short, they must deliver capability complementary to traditional conventional capabilities delivered by the three services, and they must expand the option space for political and/or military decision makers.

Most would agree, based upon events around the world in the last decade or so, that SOF has demonstrated this capacity. They have achieved success through the nature of its characteristics, operating imperatives, and the emphasis SOF places upon the training and education of their personnel.[5] In total, these factors produce SOF capability, or what many examining the subject call 'SOF Power.'

In essence, SOF have been able to demonstrate their strategic utility through their ability to deal with crisis in a timely and responsive

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manner, usually through innovation and adaptation.[6] Central to this capability are individuals with the cognitive dexterity and agility to assess a situation, often with incomplete information and/or in conditions of ambiguity and chaos, and devise creative solutions not constrained by doctrine or convention. But, in a more 'macro' sense, 'SOF Power' speaks to SOF's ability to provide government:

- High readiness, low profile, task-tailored Special Operation Task Forces (SOTFs) and/or SOF Teams that can be deployed rapidly, over long distances, and provide tailored proportional responses to a myriad of different situations;
- Highly-trained, technologically-enabled forces that can gain access to hostile, denied, or politically sensitive areas;
- Discrete forces that can provide discriminate precise kinetic and non-kinetic effects;
- A deployed, capable, and internationally-recognized force, yet with a generally lower profile and less intrusive presence than larger conventional forces;
- An economy of effort foreign policy implement that can be used to assist coalition and/or allied operations;
- A rapidly deployable force that can assess and survey potential crisis areas or hot spots to provide 'ground truth' and situational awareness for governmental decision makers;
- A highly-trained, specialized force capable of providing a response to ambiguous, asymmetric, unconventional situations that fall outside the capabilities of law enforcement agencies (LEA), conventional military, or other government departments (OGDs);
- A force capable of operating globally in austere, harsh, and dangerous environments with limited support. SOF are largely self-contained, and can communicate worldwide with organic equipment, and can provide limited medical support for themselves and those they support;
- A culturally-attuned SOTF or SOF team that can act as a force multiplier through the ability to work closely with regional civilian and military authorities and organizations, as well as with populations through Defence, Diplomacy and Military Assistance (DDMA)/ Security Force Assistance initiatives;
- A force capable of preparing and shaping environments or battle spaces (i.e. setting conditions to mitigate risk, and to facilitate successful introduction of follow-on forces); and
- A force able to foster inter-agency and inter-departmental cooperation.

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Notwithstanding the strengths and capabilities of SOF, it must be noted that, in accordance with the 'fifth SOF Truth,' most special operations require non-SOF assistance.[7] In other words, in no way should SOF be viewed as a 'silver bullet' or panacea solution. Despite SOF's attributes and characteristics, it relies upon conventional forces to assist in most of its mission sets, either through supporting functions, particularly combat enablers that are not already integrated into standing task forces (i.e., airlift, fires, Intelligence, Surveillance, Reconnaissance (ISR)), or with combat forces (i.e., follow-on forces). As such, SOF is simply another tool in the government's military 'tool box.' It complements and supports the nation's conventional military capability. Although able to work independently, SOF relies upon, enables, and works in close cooperation and coordination with the three traditional services.

In sum, SOF provide significant strategic utility in that they can provide political and military decision makers with a myriad of timely, precise, and tailored options in response to a complex, chaotic, and ambiguous strategic contemporary operating environment. The high readiness posture, small footprint, skill level, and deployability of SOTFs and SOF teams allow for a rapid and determined response, domestically or internationally. SOF teams also serve as a catalyst to unify, extend the reach, and maximize the effects of other instruments of national power. In the end, SOF has consistently proven to be a strategic resource that provides political and military decision makers with a wide range of precise kinetic and non-kinetic options to deter, pre-empt, disrupt, react to, or shape strategic or operational effects domestically or abroad. Importantly, SOF represent a highly-trained and educated, adaptive, agile-thinking force capable of dealing with the threat(s) that has not yet been identified. As such, SOF possess the ability *to provide*, and *have shown their effectiveness in providing*, substantive value to advancing national interests.

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NOTES

1. For example, see Bernd Horn and Emily Spencer, "Force of Choice: SOF as a Foreign Policy Enabler," in Emily Spencer, (ed.), *Special Operations Forces: Building Global Partnerships,* (Kingston, ON: CDA Press, 2012), pp. 1-28.
2. See Bernd Horn, "When Cultures Collide: The Conventional Military/SOF Chasm," in *Canadian Military Journal*, Vol. 5, No. 3, Autumn 2004, pp. 3-16; and Bernd Horn, "Love 'Em or Hate 'Em: Learning to Live with Elites," in Canadian Military Journal, Vol. 8, No. 4, Winter 2007-2008, pp. 32-43.
3. Canada, *Canadian Special Operation Forces Command. An Overview* (Ottawa: DND, 2008), p. 7.
4. Colin Gray, *Explorations in Strategy* (Westport, CT: Praeger, 1996), p. 149.
5. SOF characteristics include:
   a. SOF generate a small footprint /operate as small team deployments;
   b. SOF can operate clandestinely, covertly, or overtly;
   c. SOF operations are often conducted at great distances from a supporting operational base;
   d. SOF utilize sophisticated means of insertion, support, and extraction to penetrate and successfully return from hostile, denied, or politically-sensitive areas;
   e. SOF employ sophisticated communications systems;
   f. SOF are *proficient with*, and *enabled by*, application of advanced technologies;
   g. SOF utilize unorthodox tactics;
   h. SOF often require development, acquisition, and employment of equipment that is not standard for others;
   i. SOF normally conduct operations 'General Purpose Forces' cannot perform;
   j. SOF are well-suited for operations in denied and politically-sensitive environments;
   k. SOF conduct operations, not only against military objectives, but also to support the application of the diplomatic, informational, and economic instruments of national power;
   l. SOF are capable of working independently, or in conjunction with conventional forces or other government agencies, or host nations/ partner nations;
   m. SOF are proficient at inter-organizational coordination; and
   n. SOF missions are differentiated by physical and political risk, operational techniques, modes of employment, and dependence on detailed operational intelligence and indigenous assets.
6. For example, trends in military spending that are arguably indicative of effectiveness highlight the growth of SOF. The US Special Operations Command budget has been increased from $3.8 billion to almost $10 billion over the last decade. Quoted in Aki Peritz & Eric Rosenbach, *Find, Fix Finish. Inside the Counterterrorism Campaigns that Killed Bin Laden and Devastated Al-Qaeda* (New York: Public Affairs, 2012), p. 232. In addition, the US military newspaper *Stars and Stripes* publicly reported that the Pentagon is preparing to "unleash special operations troops worldwide as traditional operations are cut back." Cited in Julie Levesque, "US Army Goes Underground: Special Ops Deployed Worldwide," in *Global Research,* 27 January 2012.
7. The author of the five SOF Truths is American Colonel John M. Collins. Those 'Truths' are:

   Humans are more important than hardware;
   Quality is better than quantity:
   SOF cannot be mass produced;
   Competent SOF cannot be rapidly created after emergencies occur; and
   Most Special Operations require non-SOF assistance.

DND photo by Sergeant Charles Barber, J6 Imagery, Canadian Forces College

The Flipped Classroom and Professional Military Education: A Preliminary Assessment of the Possibilities

by Adam Chapnick

Introduction

Members of the military community responsible for the development and delivery of professional post-secondary education programs cannot help but be aware of recent discussions over the value of the so-called flipped classroom. Not to be confused with Massive Open Online Courses (MOOCs), which merely provide an opportunity for interested individuals to watch a series of lectures and perhaps engage in lightly supervised on-line discussions for which they might obtain a certificate of completion,[1] the flipped classroom is, by its very name, focused on improving the student learning experience in the 'bricks and mortar' school hall in the pursuit of real academic credit.

In theory, it transforms the professor from 'sage on the stage' to 'guide on the side' to better facilitate a deeper student learning experience. In practice, it means taking the idea of a traditional university lecture course – in which students (1) arrive in class, having perhaps completed an assigned reading; listen to an expert wax eloquently on a predetermined theme; (2) hopefully go home and contemplate what they have learned; (3) later take tests or complete problem sets to confirm their recollection of the content of said readings and lectures; and, (4) often after the course is over, receive written feedback of varying quality on what they have done – and flips it on its head. Instead of listening to the lecture in class and then studying alone at home, students watch a pre-recorded talk on-line, and then use the class time with the professor to engage in a more spontaneous discussion that has been designed to clarify any remaining confusion, and to share thoughts and ideas. Flipping the classroom is supposed to enable the professor to monitor student progress more accurately and, as such, provide immediate, direct, and personalized oral feedback that addresses specific student needs more effectively.[2] It should also provide opportunities for more innovative teaching strategies (like small group discussion) in even the largest of classes, and more focused lectures. Students in flipped classrooms, it is said, arrive in class better prepared to genuinely learn, having wrestled with the lecture material beforehand at a date and time largely of their choosing.[3]

This approach to post-secondary education has gained many adherents. Indeed, there is even an organization in the United States

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dedicated to helping interested instructors flip their classrooms.[4] And as with any innovation, it also has its detractors, some of whom note that preliminary research does not seem to indicate significant improvements in student outcomes.[5]

Given the popularity of the flipped classroom idea in civilian circles, it only makes sense for military educators to question whether it should find a place in our classrooms as well. The answer, it appears, is perhaps, but even if we do experiment with flipped classes, we cannot lose sight of the fact that real learning requires sustained hard work[6] – by both instructors and students – and no teaching innovation will ever change that basic idea.

Breaking Down the Flipped Classroom Experience

There are three basic elements to the flipped classroom experience: (1) the instructor redesigns the course; (2) students watch lectures that would have normally been delivered in class on their own devices; (3) formal class time is dedicated to facilitated discussions.

1. Redesigning the Course[7]

Instructors who have flipped their classrooms almost inevitably speak of how much the exercise has improved their teaching. What is less clear, however, is what exactly causes that improvement. Asking professors to translate live lectures into recorded presentations all but requires a number of actions that are consistent with best teaching practice. First, in preparing for their recording sessions, instructors typically review their lectures, and in doing so, pay serious, critical attention to organization and content. Most online lectures are divided into short, 8–10 minute episodes, all but forcing instructors to add rigor to what for many had typically been more organic – and, for students, often difficult to follow[8] – thought processes. Second, completing the flip requires, at minimum, a rudimentary knowledge of some of the more recent advances in academic technology. So professors who flip their classrooms develop new skills that support their teaching efficacy. Finally, if the flip is actively supported by the instructor's institution – whether that be by course relief or research funding to compensate for the significant investment of time and energy that it takes to complete the transformation of the course – it has the potential to generate professional enthusiasm that will often be shared with the student body. From an instructor's perspective, then, the act of flipping one's classroom can improve a course's organization, refine its content, expand one's own teaching and learning tool kit, and generate renewed enthusiasm for interactive education more generally.

All these outcomes should be applauded and encouraged, but none of them are necessarily contingent on the flip itself. Better teacher training, for example, can improve professors' lecturing skills. Indeed, well-organized instructors who design their classes with student learning in mind, as opposed to content delivery, should not have great difficulties transitioning from live lecture to recorded broadcast. Moreover, there are many instructors who have adopted and mastered new academic technologies without ever flipping their classrooms. And one can use the same incentives often offered to instructors to flip to support all sorts of other forms of course redesign.

To summarize, flipping the classroom may be just as much a proxy for greater professional and administrative support to develop best teaching practices as it is a panacea in and of itself. It follows that administrators of professional military education programs

who have contemplated asking instructors to flip their classrooms to reduce costs are in for an ugly surprise. One cannot cut corners if the goal is a profound, meaningful learning experience.

2. *Watching the Lecture On-Line*[9]

While students have initially been quite hesitant to enrol in a flipped course – there is a certain familiarity and predictability to the traditional lecture class that is hard for many to abandon willingly – most seem to report a more positive attitude towards the change in methodology after experiencing one **that has been well-taught**. They tend to suggest that they have learned significantly more through the new format, and that they have emerged from the experience with a better attitude towards the material than they typically would have in a more traditional class. Students also note that flipped classes are significantly more demanding. Because interactive discussions, and often brief quizzes meant to verify that they have indeed watched and understood the lectures, take place every week, they can no longer cram all their 'learning' into the days (or hours) immediately preceding a test or exam.[10] The heavier workload is, however, generally deemed worthwhile.

One must applaud teaching and learning strategies that result in students holding more positive attitudes towards their educational experience, but once again, it is not clear that the flip is key to the impact. Recent research on student learning suggests that effective outcomes are contingent on intense, considered, and focused student engagement.[11] Certainly, one might argue that the novelty of watching lectures on the internet, either at home or on a personal device might pique a student's interest, but if and when such a process becomes normalized, that novelty will expire. The question, then, is whether students will continue to invest the time necessary to prepare effectively for flipped classes once such classes are no longer exceptional.

Looked at another way, there is hardly any difference between a flipped classroom and one in which students are assigned high quality, accessible readings that they are obligated to, and do in fact complete in advance of class. If one adds to these readings a series of focus questions that form the basis of the in-class lecture or lecture-discussion, one can all but reproduce the flipped classroom experience. Similarly, there is no stopping instructors in traditional classes from beginning each lecture with the same sorts of quizzes often used in the flipped classroom. In both cases, by prompting students to invest the time necessary to learn in advance, instructors can improve the learning outcomes of the in-class experience significantly.

The keys, then, rest in finding ways to convince students to spend more time reading and thinking about assigned material throughout the length of the course, as opposed to only at the last minute, and generating enthusiasm to learn among them, rather than prompting a focus upon achieving a certain grade.[12] If the opportunity to view lectures on-line helps, then it should certainly be considered by professional military educators, but before asking instructors to spend tens, if not hundreds of hours redesigning their courses, it would be worth confirming that the impact of the flip can be sustained, and considering whether better teacher training might similarly boost student enthusiasm.

3. *The Class Discussions*

In an effective flipped classroom, instructors assume that students have watched the lecture in advance. (This assumption is often confirmed by having them take quizzes before or during the first few minutes of class. Some instructors also use clickers to track student comprehension throughout the session.) As a result, the 'face time' available to the students can be used to clarify concepts that a quiz or any other form of pre-testing has identified as still problematic; to delve deeper into specific themes or issues that have provoked the greatest interest among the student body – as indicated either through pre-class reflections or in-class responses; or to assign group-based practical activities that can be monitored by instructors who move about the room as students compare thoughts and ideas. **If the class is well-taught**, these practices create a dynamic, vibrant, creative environment in which students take control and responsibility for their own learning, and engage critically and meaningfully with the assigned material, all the while being supported by well-prepared, enthusiastic instructors.[13]

DND photo, Public Affairs, RMCC

Once more, however, the direct relationship between the flip and the outcome is not entirely clear. Nothing prevents instructors in traditional classrooms from testing or monitoring student comprehension of assigned readings in advance of a lecture, for example. Nor is there anything stopping such instructors from modifying their speaking notes to reflect what their students *have*, and *have not*, understood. Indeed, one could argue that the canned lectures

DND photo, Public Affairs, RMCSJ

planned lesson, successful instructors in the flipped classroom have no choice but to think deeply about their subject matter in advance of every class. As for the student body, the creativity evident in most successful flipped classrooms might be attributed just as much as to time on task as it might be to the act of flipping: in other words, the sustained, reflective thinking that takes place outside the classroom results in greater potential for deep learning in the classroom. Looked at another way, if one can motivate members of the student body to do close readings of assigned written material in advance of every class, there is little reason to believe that their response to faculty lectures might not be just as stimulating, leading instructors to lecture less, and engage in discussion more.

needed to produce a flipped classroom in fact prevent some of the flexibility on the instructor's part that the live experience generates.

Moreover, instructors who excel in the flipped classroom appear to do so in part because they set aside time to mentally prepare to deal with the unexpected. Knowing that open discussions can often lead to questions that depart widely from the

In sum, student preparation is critical to student learning; engagement spurs creativity; and well-prepared professors teaching well-planned courses support both. It is certainly possible that, for some, the flipped classroom will inspire such activity, but it should also be possible to achieve all these ends without it. Professional military educators who seek to improve the student learning

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DND photo by Sergeant Charles Barber, J6 Imagery, Canadian Forces College

experience must absolutely pay more attention to how they teach, but whether they choose to flip their classrooms should probably be determined by their particular circumstances.

What Really Matters

Since effective learning outcomes are contingent upon, among other things, the inter-related issues of student engagement and student effort,[14] in thinking about the value of the flipped classroom, one must consider, first, whether students will be inspired to learn (independently) more by the experience of hearing a brilliant lecture, or through the buzz generated by a provocative, well-informed interactive discussion. Moreover, it is not so much the content of these experiences that one must keep in mind as it is their effect upon the learner. Will students, upon leaving the classroom, be more or less likely to investigate the ideas discussed on their own on account of their experience?[15] Much of the recent thinking about this question suggests that it depends. Introverts are more likely to be inspired in the lecture environment while extroverts tend to be energized by the group conversations.[16]

Second, one must ask whether changing the medium through which homework is assigned and delivered (i.e., asking students to watch videos on-line instead of reading articles and book chapters in print) will result in a greater – in terms of both quality and quantity – expenditure of effort and focus. Again, it is not so much how the content is packaged as it is how much time students will spend thinking about the material deeply.[17] And, once more, regardless of whether the student body is made up of civilians or military personnel, it is most likely that some will respond more positively to the digital medium, and others to more traditional texts.

Conclusion

In the end, the debate over the flipped classroom says much more about teaching and learning fundamentals than it does about the value of moving lectures on-line. A combination of well-organized, well-trained, subject matter expert professors, and engaged, inspired, and dedicated students are most likely to produce meaningful learning experiences. Any means by which professional military education administrators can enhance the possibility for such an environment to flourish should be encouraged. If that means, in some cases, flipping the classroom, then let's do it. But there is no reason to assume that flipping will suit every instructor or every class. And there is absolutely no evidence to suggest that flipping will produce better outcomes at a lower cost.

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DND photo by Steven McQuaid, CFB Kingston Imagery

NOTES

1. On the failure of MOOCs to meet the learning goals of post-secondary educators, see Tamar Lewin, "After Setbacks, Online Courses are Rethought," in *New York Times* [on-line], 10 December 2013, at http://www.nytimes.com/2013/12/11/us/after-setbacks-online-courses-are-rethought.html?_r=0, accessed 10 January 2014; University of Pennsylvania, Graduate School of Education, "Penn GSE Study Shows MOOCs have Relatively Few Active Users, with Only a Few Persisting to Course End," 5 December 2013, at http://www.gse.upenn.edu/pressroom/press-releases/2013/12/penn-gse-study-shows-moocs-have-relatively-few-active-users-only-few-persisti, accessed 10 January 2014; and Laura Perna *et al*., "The Life Cycle of a Million MOOC Users," paper presented at MOOC Research Initiative Conference, 5 December 2013, at http://www.gse.upenn.edu/pdf/ahead/perna_ruby_boruch_moocs_dec2013.pdf, accessed 10 January 2014.
2. On the critical contribution of clear, immediate feedback to student learning, see Susan A. Ambrose *et al., How Learning Works: 7 Research-Based Principles for Smart Teaching, (San Francisco: Jossey-Bass, 2010), p. 6.*
3. For a somewhat contrary view, see David Plotnikoff, "Classes Should Do Hands-On Exercises before Reading and Video, Stanford Researchers Say," in *Stanford Report*, 16 July 2013, at http://news.stanford.edu/news/2013/july/flipped-learning-model-071613.html, accessed 9 January 2014.
4. Flippedlearning.org. See http://flippedlearning.org/site/default.aspx?PageID=1, (accessed 9 January 2014.
5. The debate can be traced in the popular media through Abigail Walthausen, "Don't Give Up on the Lecture," in *The Atlantic.com*, 21 November 2013, at http://www.theatlantic.com/education/archive/2013/11/dont-give-up-on-the-lecture/281624/, accessed 9 January 2014; "San Jose State U. Says Replacing Live Lectures with Videos Increased Test Scores," in *The Chronicle of Higher Education* [on-line], 17 October 2012, at http://chronicle.com/blogs/wiredcampus/san-jose-state-u-says-replacing-live-lectures-with-videos-increased-test-scores/40470, accessed 9 January 2014; Carl Straumsheim, "Still in Favor of the Flip," *Inside Higher Ed*, 30 October 2013, at http://www.insidehighered.com/news/2013/10/30/despite-new-studies-flipping-classroom-still-enjoys-widespread-support, accessed 9 January 2014; and Robinson Meyer, "The Post-Lecture Classroom: How Will Students Fare?" in *The Atlantic.com*, 13 September 2013, at http://www.theatlantic.com/technology/archive/2013/09/the-post-lecture-classroom-how-will-students-fare/279663/, accessed 9 January 2014.
6. Daniel T. Willingham, *Why Don't Students Like School? (San Francisco: Jossey-Bass, 2009), p. 139.*
7. For one description of this process, see Rochelle Mazar, "How to Flip You Classroom," *University Affairs.ca*, 11 September 2013, at http://www.universityaffairs.ca/how-to-flip-your-classroom.aspx, accessed 9 January 2014.
8. Ambrose *et al., How Learning Works, p. 5.*
9. For student reactions to the experience of this part of the flipped classroom, see Katherine Mangan, "Inside the Flipped Classroom," in *The Chronicle of Higher Education [on-line], 30 September 2013, at* http://chronicle.com/article/Inside-the-Flipped-Classroom/141891/, accessed 9 January 2014; and Jennifer Ebbeler, "'Introduction to Ancient Rome,' the Flipped Version," in *The Chronicle of Higher Education [on-line], 22 July 2013, at* http://chronicle.com/article/Introduction-to-Ancient/140475/, accessed 9 January 2014.
10. On the value of spreading out the learning experience, see Willingham, *Why Don't Students Like School?*, p. 119; and Michelle D. Miller, "What College Teachers Should Know About Memory: A Perspective From Cognitive Psychology," in *College Teaching 59, No. 3 (2011), p. 120.*
11. Ambrose *et al*., *How Learning Works*, pp. 79 and 127; Miller, "What College Teachers Should Know About Memory," p. 121, Willingham, *Why Don't Students Like School?*, p. 55; and Eric Jensen, *Teaching with the Brain in Mind,* 2nd edition, (Alexandria, VA: ASCD, 2005), p. 34.
12. Christopher J. Voparil, "Assessing for Understanding: Toward a Theory of Assessment as Learning," in Michelle D. Deardorff *et al., (eds,), Assessment in Political Science* (Washington, DC: American Political Science Association, 2009), pp. 17-37. See also Ken Bain, *What the Best College Students Do (Cambridge, MA: Harvard University Press, 2012), p. 36.*
13. Robert Talbert, "What's Different about the Inverted Classroom?" in *The Chronicle of Higher Education* [on-line], 6 August 2013, at http://chronicle.com/blognetwork/castingoutnines/2013/08/06/whats-different-about-the-inverted-classroom/, accessed 9 January 2014.
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15. Jensen, *Teaching With the Brain in Mind, p. 36.*
16. On introverts and extroverts, see Susan Cain, *Quiet: The Power of Introverts in a World That Can't Stop Talking*, reprint (New York: Broadway Books, 2013).
17. On deep learning, see Bain, *What the Best College Students Do*.

DND photo FA2013-3001-13 by Sergeant Paz Quillé.

A new CH-147F *Chinook* medium-to-heavy-lift helicopter on its delivery flight to Ottawa, 25 June 2013.

Procurement, Optics, and *Cyclones*

by Martin Shadwick

Equipment and procurement issues, broadly defined, continue to dominate much of the public face of defence in Canada. By no means a new phenomenon—recall, for a moment, the media firestorm that engulfed the Mulroney government's plans for the EH101 maritime and search and rescue helicopter in the early-1990s—this tendency has been reaffirmed of late by the extensively reported travails of the RCAF's CF-18 *Hornet* replacement and Fixed-Wing Search and Rescue (FWSAR) aircraft projects. Other examples include the Arctic Offshore Patrol Ship (AOPS) and the oft-redefined (and now arguably mislabelled) Joint Support Ship (JSS), and the debate over the acquisition, and ultimate cancellation, of the army's proposed Close Combat Vehicle (CCV).

This is not to lament, in absolute terms, the current levels of media, academic, and other interest in important, and correspondingly expensive or extremely expensive, equipment and procurement initiatives. Indeed, one would like to see an expansion of such coverage and analysis on the premise that the more Canadians know about defence, defence procurement, and defence policy, the better, be it through high-quality reportage and analysis, through the activities of 'think tanks' and research institutes (be they university-affiliated—now significantly less likely in the regrettable absence of the Security and Defence Forum—or independent), through the activities of the Office of the Auditor General (OAG) and other agencies, or through sundry other mechanisms and outlets, including high-quality websites and blogs. In comparative terms, however, there is a risk that a single-minded (if entirely understandable) preoccupation with politically controversial or technologically and/or fiscally troubled capital projects could unintentionally and unduly divert attention from their more successful—or at least *comparatively* more successful—brethren. On the aerospace side, this produces a focus upon the trials and tribulations of CF-18 replacement and FWSAR, while essentially ignoring, for example, the delivery in 2014 of the fifteenth and final CH-147F *Chinook*—a project that more than restored, both qualitatively and quantitatively, a medium-to-heavy lift transport helicopter capability that should not have been allowed to lapse in the early-1990s. On the naval side, it produces a focus upon the machinations of the JSS and AOPS projects while ignoring the technical, budgetary and scheduling successes of the modernization and life extension initiative for the twelve *Halifax*-class patrol frigates. Similarly, on the army side, it produces comparatively heavy attention to CCV, while largely overlooking the successes of the LAV III upgrade.

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The LAV UP/6.0

Much more importantly, an undue or unbalanced preoccupation with troubled (or *perceived* to be troubled) procurement initiatives also runs the risk of diverting media, public, and political attention from other vital questions and challenges surrounding the Canadian Armed Forces (readiness at a time of intense fiscal restraint, for example), as well as from the *core* issue: the appropriateness and credibility (or otherwise) of broader Canadian defence at a time of intense fiscal pressures, and a troubling and unstable geostrategic environment. Expressed another way, we need a more holistic approach—one that combines the best of informed, frank, and candid analysis of often controversial procurement initiatives, with a recognition that not all procurement initiatives are inherently flawed 'boondoggles,' and an understanding that there is infinitely more to defence than defence procurement.

That is, arguably, a prudent goal at any time, but, as Jeffrey Simpson and others have reminded us, the relationship between defence economics, defence procurement, defence policy, and the broader political optics of national defence are unusually complex at the present time. Part of that complexity reflects fiscal and geostrategic realities that would challenge any government, but it arguably also reflects Simpson's analysis, articulated in his *Globe and Mail* column of 28 June 2014, that "Canada's Conservative government loves the idea of the military; it just doesn't always like the military." The "idea of the military conforms to the Conservatives' sense of the country and its history—'true north, strong and free'—and the idea of the military fits the party's political agenda. So we have monuments to the War of 1812, a National Day of Honour to recognize the Afghan mission, military ceremonies at home and abroad and, most recently, the announcement that [$83 million] will be spent over the remainder of the decade to commemorate military history and veterans." Meanwhile, "while all this is being done for public consumption, the defence budget—which is, after all, what reflects any government's real policies—is now smaller after accounting for inflation than in 2007, not long after the government was elected with a pledge to boost military spending."

For "a variety of reasons, [procurement] projects get delayed, run over budget or don't get built at all. At each stage, the government looks bad." The resulting headlines, posits Simpson, "got the government very annoyed at the military, as opposed to the idea of the military." It is "still easier politically, and less costly financially," he observes, to be in love with illusions about the military and its past glories than with the hard realities of today's military and its requirements." The fiscal realities confronting defence in Canada today effectively torpedo the 'warrior nation' hypothesis advanced in some academic and other circles in recent years, but, to others, the result may simply be a paradox—the language of a 'warrior nation,' but not the budget or military capacity of a 'warrior nation.'

* * *

The Harper government can take some solace in the fact that the Sikorsky CH-148 *Cyclone* maritime helicopter, memorably and not inaccurately characterized by former defence minister Peter MacKay as "the worst procurement" in the history of Canada ("and *that*," wryly noted the *Canadian American Strategic Review*, "is up against some pretty stiff competition"), was ordered in 2004 by the Liberal government of Paul Martin to replace the long-serving Sikorsky CH-124 *Sea King*. The *Sea King's* original intended successor, a Canadianized variant of the Anglo-Italian EH101, dated back to the Progressive Conservative governments of Brian Mulroney and Kim Campbell, but was unceremoniously cancelled by incoming Liberal Prime Minister Jean Chretien in 1993. His government's 1994 white paper on defence promised a less expensive and more appropriate alternative for the post-Cold War era, but the following ten years were effectively squandered by what Chretien biographer Lawrence Martin characterized as "a decade-long marathon of indecision, unconscionable delays, and political meddling in helicopter procurement requirements…" The Martin government, having grasped the reality that the *Sea King* would not last forever, authorized a new maritime helicopter competition, pronouncing the CH-148 *Cyclone*—a member of the S-92/H-92 family—the victor in July 2004. Under the terms of the 2004 contract, Sikorsky was to provide "28 fully-integrated, certified and qualified helicopters with their mission systems installed…" Delivery of the first *Cyclone* was pegged for November 2008.

Optimistic—indeed, imprudently optimistic—from the outset, the original delivery schedule was soon invalidated by the myriad challenges inherent in developing a full-fledged, multi-role maritime helicopter from the baseline H-92, itself a militarized variant of the civilian S-92. Accordingly, the contract was amended in December 2008 "to reflect a new, tiered schedule with delivery of interim helicopters beginning in November 2010, and delivery of fully compliant helicopters beginning in June 2012." It was amended for a second time in June 2010 to provide for the "delivery of the first six interim helicopters with a preliminary version of the mission software starting on November 30, 2010." Following a September-October 2013 "options analysis, overseen by [an] independent third party, on the way forward for a maritime helicopter capability"—interpreted by some as a genuine review of alternatives to the *Cyclone* and by others as mere 'political theatre'—contract amendments three and four were signed in April and June 2014. With these amendments, the government and Sikorsky expressed confidence "that Canada will see delivery of helicopters with the level of operational capability required to begin retirement of *Sea Kings* in 2015, and that a [program] to enhance those capabilities will culminate in the delivery of a fully capable CH-148 *Cyclone* [maritime helicopter] in 2018."

As part of the contract renegotiation process, Canada agreed to forego a number of *Cyclone* features, including the ability to

DND photo PM06-0001, © Sikorsky Aircraft Corporation

Composite image of the CH-148 *Cyclone* in flight.

secure the helicopter's rear ramp in various positions during flight, unobstructed hand and footholds for technicians to conduct maintenance, the ability to self-start the helicopter in very cold weather conditions, selected crew comfort and ergonomic features, and, disconcertingly, a system to automatically deploy personnel life rafts in emergency situations. Drawing by far the most criticism, but stoutly defended by Ottawa, was the decision—labelled the "biggest concession" by *Defense Industry Daily*—to "default to FAA civilian standards under FAR Part 29, instead of insisting on [a] 30-minute [run-dry] capability if the main gearbox loses all of its [lubricating] oil." The latter decision is likely to fester for an extended period of time.

Although undoubtedly exasperated by the repeated and lengthy delays (a decade in the case of fully-operational *Cyclones*), the capability walk-backs and the embarrassing political optics—even though a Liberal government actually purchased the still-not-ready-for-prime-time *Cyclone*—the Harper government arguably had few realistic alternatives to the third and fourth contract amendments with Sikorsky. Abandoning the *Cyclone* would have carried profound political, military, financial, industrial, and legal implications, and, lest we forget, would have left Ottawa in need of yet another would-be successor to the already 51-year old *Sea King*. Those would-be successors, moreover, have their own issues. Sikorsky's ubiquitous *Seahawk* has been an export success, but because of its smaller size and other characteristics, it has traditionally had few admirers in the Canadian military. The AgustaWestland AW101 offers intriguing operational attributes, but a return to the EH101/AW101 family after all these years would unearth some messy political baggage. The NHIndustries NH90, while also possessing intriguing operational characteristics, has encountered its own technical issues and delays, thereby forcing some frustrated customers (the RCAF and RCN are not alone!) to accept helicopters in interim configurations. That said, Sikorsky would be unwise to flirt with yet another contract amendment.

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DND photo FA2006-42, © Sikorsky Aircraft Corporation

Another composite image of the CH-148 *Cyclone* in flight.

National Aviation Museum of Canada photo

Billy Bishop, VC – Lone Wolf Hunter ~ The RAF Ace Re-examined

by Peter Kilduff

London: Grub Street, 2014

192 pages, £20/$39.95 (US/CAN)

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Reviewed by David L. Bashow

This is a fascinating and highly informative account of the life and times of an equally fascinating Canadian public figure and acknowledged war hero, William Avery Bishop – known far and wide as 'Billy.' This brash and flamboyant young man from Owen Sound, Ontario, was many things to many people. He was, in ways, a product of his own successes, and undoubtedly, through his own occasional embellishments of his achievements, a *victim* of them. That said, he was a highly skilled and successful warrior possessed of uncommon valour in the face of grave peril, and he served his nation with great distinction in two global conflicts. In this gripping narrative, author Peter Kilduff largely confines his treatment of this Canadian icon to what is perhaps the *best known* yet *least understood* period of his life; his combat career during the First World War.

American author Peter Kilduff has been researching military aviation history for more than 50 years. Dedicated to ferreting out the facts and renowned for his extremely thorough, even-handed, exhaustive and forensic research, an ardent opponent of speculation, he edited and wrote for the U.S.-based *Cross and Cockade Journal* for 18 years and was a founding member of the League of World War 1 Aviation Historians in 1986. He subsequently became the first managing editor of its highly respected quarterly, *Over the Front.* He has authored 16 previous books dealing with aviation history, with emphasis upon personalities who served with the German air service, and he has received numerous awards for his outstanding research. Peter is also a recipient of the Order of Merit of the Federal Republic of Germany.

Lone Wolf Hunter has many positive attributes, and Kilduff's 'jewel in the crown' is his highly-disciplined examination of a plethora of sources, including Bishop's combat reports and related RFC/RAF documents, his personal correspondence, particularly the letters to his fiancée and later wife, Margaret Burden, corroborative correspondence between friends and contemporaries, and, most importantly, a wealth of German sources, which collectively provide an unprecedented analysis of each of the ace's aerial combat claims. The heretofore unrivalled thoroughness of this undertaking has yielded a work that will undoubtedly become the most comprehensive treatment of Bishop's combat experiences ever written.

Kilduff's extensive use of Bishop's letters home to his sweetheart Margaret, dovetailing them as he does with the individual claims analyses, is highly effective, and along with assisting to a limited extent with the claims verification process, it has

provided the reader with a richly-woven tapestry of Bishop's evolving war ambitions and his mental state during various periods of his combat service, for he appears to have been very candid with Margaret. Billy Bishop was bound and determined to become the leading 'British' (if not Allied) war ace, and his vocal, self-centred approach to this goal must have rankled some of his contemporaries with their public school values of contrived modesty, and the whole British propensity, as the author stated, not to laud their heroes until much later in the war. Others were undoubtedly jealous of his obvious successes and recognition. In later years, he admitted that his first book, *Winged Warfare,* was essentially a shameless display of hyperbole, but it was very much what a war-weary Allied camp needed at the time. Here, one has to differentiate between such examples of pure exaggeration (probably encouraged by the public relations folks) and the highly professional, laconic (and occasionally understated) formatting of his many combat reports, and *they* are a matter of record. In sum, Billy Bishop was certainly self-oriented and ambitious, but that did not make him a fraud.

For the dedicated historian, claims verification after a century-passage of time and circumstances has proven to be frustratingly problematic, and that includes the perusal of records from both the warring sides. From the Allied camp, much (including, it is believed, Victoria Cross award files) was lost in the German bombing of the original British Public Records Office [PRO] facility at Somerset House in 1940, and more records disappeared in a massive theft from the PRO's successor, the National Archive at Kew in the late-1980s. However, this lamentable state of affairs pales in comparison to the frustration generated with respect to the dearth of German records. Peter Kilduff explains:

> "Assessing German losses is hindered by the scarcity of official records due to the intentional burning of many *Luftstreitkräfte* [German Air Force] documents in the field during the November 1918 retreat and the near-destruction of the *Reichsarchiv* [Imperial German Archives] outside Berlin by a British bomber on 14 April 1945. Surviving German World War 1 records consist of a small number of *Luftstreitkräfte* pilot and aircrew combat reports, air unit histories, and incomplete sets of *Kommandeur der Flieger* [Officer in Charge of Aviation] weekly reports for various Army Corps. To make this book as comprehensive as possible, this author drew on *Luftstreitkräfte* records available in various German archives and other sources. That research yielded a thorough examination of the most complete broad-view sources of German air operations, the *Nachrichtenblatt* weekly intelligence summaries for the army, and a compilation of similar material for the German Navy. Largely devoted to Western Front operations, both publications reported selectively on individuals and units – and, as will be pointed out, there are flaws in these reports. Post-war memoirs of German airmen filled some of the gaps, but were often very subjective. Also to be considered from the German side is faulty record-keeping or even obfuscation."[1]

Further, "…a great amount of highly-inflammable archive film had also been brought from bomb-endangered Berlin by Göring's Reich Air Ministry and deposited in the crypts beneath the *Frauenkirche* (in Dresden) for safekeeping."[2] That church and its crypts were utterly destroyed in the bombing and ensuing firestorm of Dresden, 13-14 February 1945.

Complicating matters even further, the qualifications for air combat success varied considerably among the participating combatant nations, and also evolved over time. For those readers who associate the myriad inputs of today's battle claims verification processes with what was available during the Great War, this requires some consideration. For one thing, the majority of air combats occurred over the German side of the lines, exacerbating the ability to confirm wreckage with respect to Allied claims. For another, among the belligerents, within the earlier-war rather liberal British claims system, a definitive damage inflicted category of 'Destroyed' was not required to constitute a legitimate aerial victory until May 1918. Until then, a claim category of Driven Down Out of Control (OOC), i.e., forcing an adversary into a combat separation or disengagement, but not resulting in a verified crash, constituted a legitimate victory, and many adversaries categorized as such probably survived such attacks. A significant number of Bishop's claims fall within that 'OOC' category.

Given all the limitations with respect to the confirmation of victory claims already mentioned, and given that these limitations apply virtually 'across the board' to all the Allied combatants, the question remains, how many enemy aircraft did Billy Bishop actually vanquish? In Peter Kilduff's words:

> "Due to various circumstances covered in this book, there can be no definitive answer. To be sure, some of his opponents slipped away after feigning being mortally wounded, and others, who may have died some time later, were not listed on the days they fell; still other victory claims were witnessed by Allied sources, but not acknowledged in German reports. It also needs

> to be remembered that, during an aerial encounter, a combat airman – whether pilot or observer – needed to be aware of his location, altitude, time of day and other flight details. Very importantly, he also had to keep track of the ammunition he expended to avoid running out at a crucial moment. Hence, with all these factors to be borne in mind, detail errors in combat reports were not unusual."[3]

On top of everything else, in recent correspondence between the author and this reviewer, Peter Kilduff stated:

> "As for the inadequacy of German records, I was truly shocked. I've used those sources for a long time and, when looking from a German perspective, they have served me well. But their failure to admit to so many obvious RFC/RNAS/RAF defeats now makes them incredible."[4]

This in no way denigrates the author's findings, and it must be emphasized that his perusal of German sources still made it possible to provide much further clarity to Bishop's claims than has been previously published. However, it reinforces the notion that, given all the limitations of time and circumstances involved (and again, this applies to all the Allied claimants, not just Bishop), many combat claims will probably never be categorically resolved.

As the author explains, many factors contributed to Bishop's success. Perhaps the greatest was simply the fact that he was seeking out and engaging the enemy much more frequently than his colleagues. While he certainly participated in his fair share of formation patrols, he also asked for and received permission to range in harm's way behind enemy lines on extra roving commissions, much like his British predecessor, Albert Ball. Billy also possessed excellent eyesight and was a crack shot. Further, his solo roving patrols over German territory, while making him more vulnerable to attack after a fashion, also provided him an *augmented* mantle of protection due to the increased maneuverability of single-ship combat, and the less-visible footprint of a lone aircraft, as opposed to a battle formation. That willingness to engage the foe is telling. For example, during the spring Arras Offensive of April 1917, "Bloody April," as it was known to the British flying services, due to the Draconian combat losses they incurred, the month was an exercise in survival for most aircrew. For Billy, who scored 12 times during the period, it was a target-rich environment. Attitude and heart count for a lot.

All this being said, readers expecting to be rewarded with definitive closure to Bishop's controversial solo dawn attack on a German airfield on 2 June 1917 will be bitterly disappointed. Regrettably, there is no 'smoking gun' here. That said, while not discounting Esnes as a possible location for the attack, the author does offer what is by his own admission a speculative alternative theory as to the target location of Bishop's attentions that early-June morning so long ago. Given all the aforementioned limitations with respect to Allied, and, even more so, German records, and the obvious passage of time with all that entails, this engagement

DND photo

appears to be eternally consigned to the scrap heap of unresolved mysteries. However, as Peter Kilduff points out, the Germans never did categorically deny that the raid occurred, nor for that matter did they categorically confirm it. That said, the fact that the First World War German Aces Association enthusiastically fêted Bishop and inducted him into their fraternity in Berlin in 1928, given their known respect for courage under fire, makes it highly unlikely that they would have welcomed a fraud into their midst. There seems to be little doubt, as Kilduff has offered, that the raid occurred. The question remains as to *where* it occurred. At any rate, this is all food for thought…

Actually, the exact location of the enemy aerodrome and Bishop's score for the raid are largely inconsequential. As with so much of Bishop's aggressive combat behavior, it was the raid's mere prosecution that made it important. It was totally in lockstep with the Officer Commanding RFC in France, Major-General Hugh Trenchard's exhortations to his airmen to aggressively take the fight to the enemy through bold offensive action. The shining example of Bishop's bold heart and brave actions spurred others to emulate his behavior, and therein lay the raid's true value. The 2 June 1917 entry in the war diary of Maurice Baring, the renowned British poet and diplomat, then serving as personal secretary to General Trenchard, succinctly sums up higher authority's appreciation of Bishop's actions: "Think of the *audace* of it."[5]

In terms of academic thoroughness, this book, which includes extensive endnotes that provide not only source credits, but also considerable additional facts and observations, will satisfy the most critical scrutiny, given the limitations previously discussed. This is particularly critical when dealing with a subject as contentious as the combat career of this great airman.

Dozens of supportive images, many never before published, strategically and supportively woven into the manuscript, along with some excellent technical artwork, really bring the author's words to life. Peter Kilduff has done an outstanding job of providing a fair and balanced assessment of the exploits of a great Canadian icon, William Avery Bishop, VC. Highly recommended reading.

Lieutenant-Colonel (ret'd) David L. Bashow, OMM, CD, *a former fighter pilot, is currently an Associate Professor at the Royal Military College of Canada, and the Editor-in-Chief of the* Canadian Military Journal. *He has written and lectured extensively about the life and combat career of Billy Bishop.*

NOTES

1. Peter Kilduff, *Billy Bishop Lone Wolf Hunter ~ The RAF Ace Re-examined* (London: Grub Street, 2014), pp. 6-7.
2. Frederick Taylor, *Dresden – Tuesday. February 13, 1945* (New York: Harper Collins, 2004), p. 339.
3. Kilduff, *Billy Bishop Lone Wolf Hunter*…, p. 156.
4. E-mail Kilduff to Bashow, 24 June 2014.
5. Baring's war diary was later published as: Maurice Baring, *RFCHQ 1914-1918* (London: G. Bell & Sons, 1920), with the aforementioned quote on p. 228. Attacks on enemy airfields subsequently became quite *de rigueur* as part of the vast Messines Offensive initiated by the Allies against the Germans on 7 June 1917.

The Bombers and the Bombed: Allied Air War Over Europe, 1940–1945

by Richard Overy
New York: Viking, 2013
562 pages, $42.00 (hardcover)
ISBN 978-0-670-02515-2

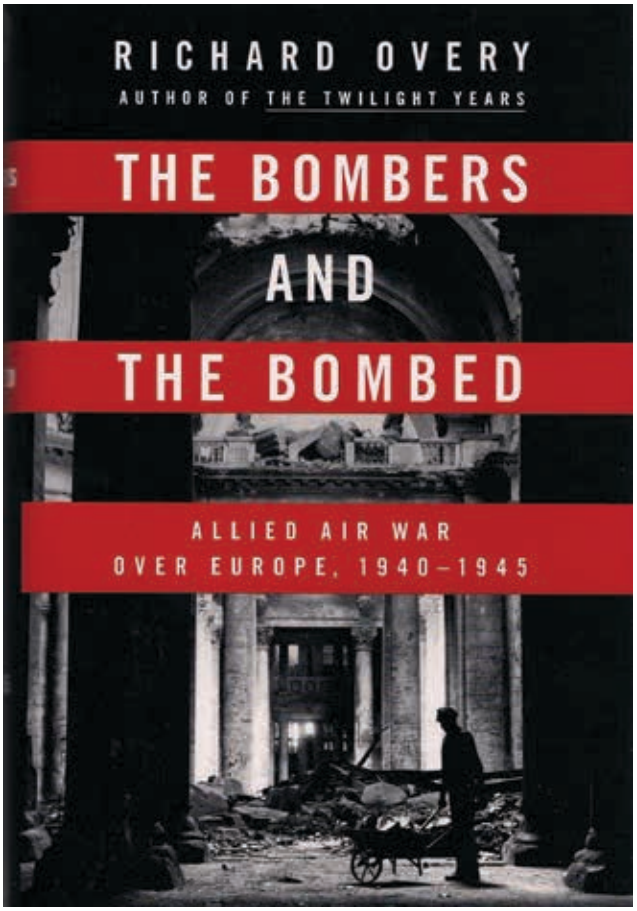
Reviewed by Peter J. Williams

Even though almost seven decades have passed since the end of the Second World War, one of its most controversial episodes, the Allied strategic bombing campaign, still rests uneasy in the memory of many, including those future generations who have written about it. As I have declared elsewhere, wherein I have written reviews of books about aspects of the campaign, I had an uncle killed while serving as a mid-upper gunner on a *Lancaster* during a raid on Munich in April 1944, and therefore, I am not a totally disinterested commentator. To that end, it was with great interest that I learned of this book by noted British military historian Richard Overy, who, himself, is no stranger to writing of the Allied bombing campaign in Europe.[1]

My own library on this subject is quite extensive, and I wondered what could be new about this particular work. Quite early on, Mr. Overy states what distinguishes his work from others on the subject. First, it covers all Europe, including bombing in France, Scandinavia, the low Countries, Italy, and even Bulgaria, the latter being an event of which I was previously unaware, whose purpose was to knock that country out of the war, and which Overy uses quite deftly to examine the assumptions Allied leaders made in deciding to conduct bombing of this German ally. Second, despite popular myths to the contrary, the author offers: "Bombing in Europe was never a war winning strategy, and the other services knew it."[2] Finally, this book provides detailed perspectives both from those who did the bombing and those who endured it, whereas many accounts deal either with 'the bombers,' or 'the bombed.'

The book is arranged largely chronologically, initially describing the evolution of the Royal Air Force (RAF) Bomber Command early in the war, a force which had already decided prior to 1939 that strategic bombing would be taken for granted in any future war. Chapters are then devoted to its efforts against Germany, at first alone, then combined with the United States against targets in Axis Europe.

The perspective of the Germans who lived under the bombing is then covered in perhaps what is one of the more revelatory sections of the book. The German organization to combat the effects of the bombing was quite comprehensive. Indeed, when the United Kingdom formed its first national fires service in 1941, it chose the German model upon which to base its operations. What I also found somewhat surprising was that the German government, at least initially, compensated its citizens who had lost property as a result of the bombing. Indeed, one conclusion reached by the Allies after the war was that rather than cause 'the bombed' to rise up against their overlords, as was hoped would be a collateral effect of the bombing, in the German case, the population became increasingly dependent upon the Nazi state. Interestingly, a Dutch woman who decided to write to King George VI, asking for compensation as a result of her house being destroyed by an Allied air raid, was rebuffed by the Air Ministry, which decided that to accede to such a request would 'open the floodgates' for similar requests.



Chapters are devoted to the bombing of Italy (which received six times the bomb tonnage of Britain during the so-called 'Blitz'), as well as occupied Allied nations, and another chapter is devoted to British and American efforts at measuring the effectiveness of their respective campaigns. Overy concludes with what he refers to as lessons learned and not learned, highlighting that the post-war, nuclear age doctrine of mutual assured destruction (MAD) was shaped to a great extent by the Allied strategic bombing campaign.

Overy has cast his research widely and has consulted archival sources, not only in the United Kingdom, but also in the United States, France, Italy, Malta, and Russia, the latter whose holdings include many German wartime records. Given Canada's contribution to the bombing effort (Number 6 Group of RAF Bomber Command, was a Royal Canadian Air Force [RCAF] formation), I would have expected our own archives would have been consulted, although perhaps RAF records in the United Kingdom contain RCAF documents. That said, the RCAF does merit some entries in the index, although the bibliography of secondary works is somewhat bereft of Canadian sources.

Good history, as my former Royal Military College (RMC) professor, the late Dr Barry Hunt used to say, should teach us something new, and to an extent, present somewhat of a revisionist view of things, a view which can only come with time. Indeed, it seemed to me that in writing this book, Overy was himself reassessing his view of the campaign. Whereas some of his earlier works referenced elsewhere in this review claim that strategic bombing was, "…one of the decisive elements explaining Allied victory,"[3] or that, "…the one area where Britain's military effort made a difference was the bombing war against Germany,"[4] here he appears to distance himself somewhat from those earlier views, concluding, *inter alia*, that, "Bombing was a blunt instrument, as the Allies knew full well."[5] Doubtless, this will not be the last word on this highly emotive campaign, but it is perhaps one of the most comprehensive to date, and Overy is to be commended for describing many hitherto unknown or little explored facets of it.

As our own historians now come to write the history of our engagement in Afghanistan, a campaign not without its own controversy, they may wish to bear in mind that the history of those events will be recounted by many authors after them as well, and will doubtless undergo several reassessments as new information is unearthed. Highly recommended.

Colonel P.J. Williams *is currently serving as Director Arms Control Verification on the Strategic Joint Staff.*

NOTES

1. "The Means to Victory: Bombers and Bombing," in Richard Overy, *Why the Allies Won*, (London: Pimlico, 2006), pp. 123-163., and Introduction by Richard Overy to *What Britain Has Done 1939-45: A Selection of Outstanding Facts and Figures* (London: Atlantic Books, 2007).
2. Richard Overy, *The Bombers and the Bombed: Allied Air War over Europe, 1940-1945* (New York: Viking, 2013), p. xiii.
3. Richard Overy, *Why the Allies Won*, p. 163
4. *What Britain Has Done 1939-45: A Selection of Outstanding Facts and Figures*, p. xv.
5. Richard Overy, *The Bombers*, p. 248.

Churchill's Bomb: How the United States Overtook Britain in the First Nuclear Arms Race

by Graham Farmelo

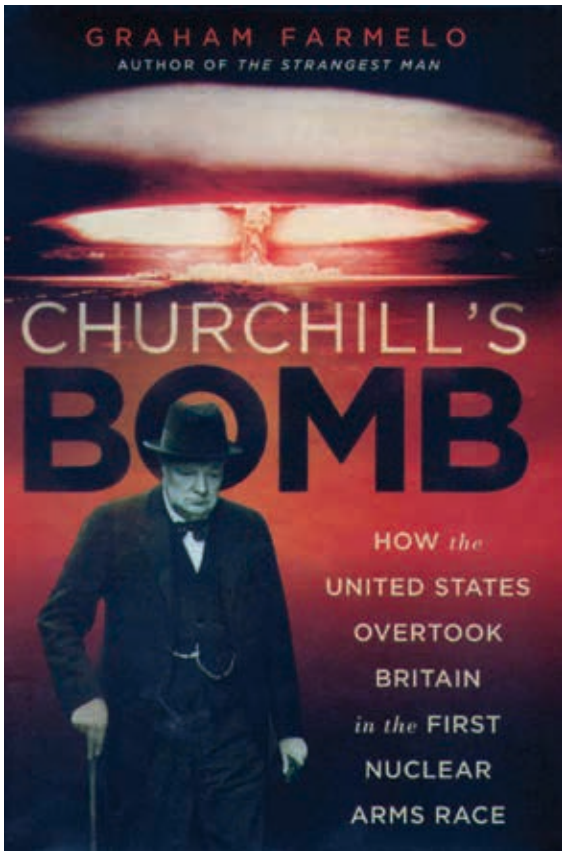
New York: Basic Books, 2013

554 pages, $34.50

ISBN: 978-0-465-02195-6

Reviewed by Mark Tunnicliffe

The title of this book is rather arresting. It immediately tables the proposition that the atom bomb was Churchill's project, and it suggests that the Americans wrested its secrets, and along with it, global leadership from Great Britain. How convincing, then, is Graham Farmelo's case?



No stranger to the world of academia and scientific circles (Farmelo is a professor of physics at Northwestern University), the author takes a personality-based approach to the story of the British involvement in the development of nuclear weapons during the Second World War. Not surprisingly, the strongest personality of the many players involved, Winston Churchill, plays at centre stage of the story. Farmelo starts the account with Churchill and one of his first scientific influencers, the science fiction novelist H.G. Wells. This is a rather surprising but effective entree into a narrative in which hard science forms the core. Ideas and dreams are often the drivers of development and progress in any field. With such a fertile incubator as Wells, Churchill emerges as very adept at foreseeing the political implications of new technology, and a brilliant, if pessimistic, commentator on human interaction with it. Not far from centre stage in the narrative is Churchill's chief scientific interlocutor, Frederick Lindemann (Later Lord Cherwell), an Oxford don dismissed by his fellow scientists as an indifferent researcher, but who appears to have had a gift for distilling complex concepts into concise prose easily digested by politicians. For this reason, he became Churchill's chief scientific advisor and the gate warden for scientific advice getting to the top reaches of Westminster.

The central elements in the story are the scientific concepts emerging from the minds and work of a fascinating array of characters. These include, not only 'home grown' talent, fostered in productive British scientific greenhouses such as Cambridge University's Cavendish lab, but also the relatively large number of talented émigré scientists fleeing eastern Europe in the late- 1930s, whom the British had the wisdom to welcome, and, to some degree, to support. The scientific story begins with the 'godfather' of British nuclear physics, Ernest Rutherford. Rutherford, who did much of his early Nobel prize winning work at McGill University in Montréal, was a brilliant experimenter, and as head of the Cavendish lab, a hugely influential mentor for many key players in the early years of discovery of the structure of the atom, the existence and composition of the nucleus, the nature of radioactivity, and the release of energy inherent in nuclear fission. Brilliant British and expatriate scientists, such as Cavendish, Cockcroft, Frisch, Peierls, Szilárd, Bohr, and Chadwick, as well as their ideas, are then introduced as the evidence mounts to indicate that a nuclear bomb is possible, as well as the danger that Germany might build one first.

That evidence, presented to Churchill in the seminal 1941 MAUD committee report, is shared with the dubious Americans. Roosevelt (portrayed by Farmelo as an accomplished but duplicitous politician who fails to keep records of his conversations with foreign leaders) is eventually convinced that the British might be right, and after briefly offering Churchill an opportunity for collaboration (which a preoccupied PM misses), the US relents and shuts the British out of the Manhattan project in order to 'go it alone.' A subsequent summit meeting in Québec City in 1943 appears to reverse this stance, satisfying Churchill that an understanding has been reached. Employing selected British scientists to address a number of technical issues, the US then proceeds to develop and to use the bomb. However, Roosevelt loses his records of the Québec agreement, and the Truman administration passes the McMahon Act in 1946, banning any cooperation with respect to nuclear development with foreign nations. A betrayed Britain now has to 'pick up the pieces,' and devise its own program amid the frustrations of peacetime bureaucracy and parsimony before being accepted by the Americans as junior partners in the Western nuclear deterrence.

This, then, appears to be the answer Farmelo presents to the task posed in his book's title: the British do the 'heavy lifting' of developing atomic theory and its potential for making a nuclear device, only to have the perfidious Americans 'walk off with the prize,' and shut their generous mentors out.

It is not convincing. He appears to have fallen into the trap of assuming that research and development is one word – a fault shared perhaps by many in academia, government, and even industry. The processes, talents, and resources required for research are often quite different from the engineering, managerial, and resource allocation skills necessary to transition a mature scientific concept into a practical product. Indeed, the resources demanded by a

development effort usually dwarf those consumed in the underlying research program, with the result that many promising ideas 'die on the lab bench' – defeated by the developmental 'valley of death.'

The real triumph of the Manhattan Project was not in the research effort, which, aside from some admittedly important details, had largely already been accomplished, as described by Farmelo. The US however, brought the tremendous drive and management expertise of General Groves, Vannevar Bush, and the scientific leadership of Robert Oppenheimer to the developmental problem of turning theory into operational reality in a constrained wartime environment. That this point seems to have been underplayed in Farmelo's account is underscored by the fact that he also largely ignores the limited success the British had in their own wartime developmental effort.

Much of that was done in Canada. Aside from a single paragraph (Farmelo does not seem to have consulted any Canadian sources), there is little discussion of the work done there. As a result, references to Canadian participation pop in and out of the narrative with no real explanation why this country should have been involved at all. After an initial failure of the British and Canadian effort in Montréal, the effort was revived by a promise of assistance from the US (a by-product of the Québec agreement), new scientific leadership under Britain's John Cockcroft, and the organizational drive and support of Canada's National Research Council (NRC) Director, C.J. Mackenzie, and Canada's 'minister of everything,' C.D. Howe. The result was a laboratory and residential site carved out of the Ottawa Valley bush, and a heavy water reactor designed and built in less than 18 months. The Zero Energy Experimental Pile (ZEEP) at Chalk River 'went critical' two days after the formal Japanese surrender – the first in the world outside the US. Less than two years later, ZEEP was followed by Canada's NRC Reactor eXperimental (NRX), at the time, the largest research reactor in the world. While NRX was not intended for bomb research (although some of the plutonium it produced may have been used in a British bomb), it led to new work in nuclear medicine, power reactor design, and, ultimately, a Canadian Nobel prize in physics. This is a story, unreported in Farmelo's book, of the result of successful management of solid research married to competent development.

Farmelo is an excellent writer. His detailed word pictures (unfortunately unaccompanied by any illustrations or photographs) of the principal players, and the national and individual politics surrounding the British atomic weapons program, are an engaging and welcome addition to the story of wartime nuclear weapons research. However, his personalities-based account focussing upon the research end of the project largely fails to explain why the Americans succeeded and the British lagged, and thus, it fails to provide a convincing answer to the challenge posed in the book's sub-title. That said, perhaps the title answers itself. In the US, the Manhattan project was a triumph of organization, leadership, resource management, and determination. In Britain, it was Churchill's bomb.

Commander (ret'd) Mark Tunnicliffe, CD, *a long-serving naval officer and Defence Scientist with Defence Research and Development Canada (DRDC), and a frequent contributor to the* Canadian Military Journal, *now regularly regales audiences as a National War Museum volunteer.*

FM 3-24/MCWP 3-33.5. Insurgencies and Countering Insurgencies

United States Army Combined Arms Center

Washington, D.C.: Headquarters, Department of the Army, 2014

200 pages, available online at http://www.hqmc.marines.mil/Portals/135/JAO/FM%203_24%20May%202014.pdf

Reviewed by James W. Moore

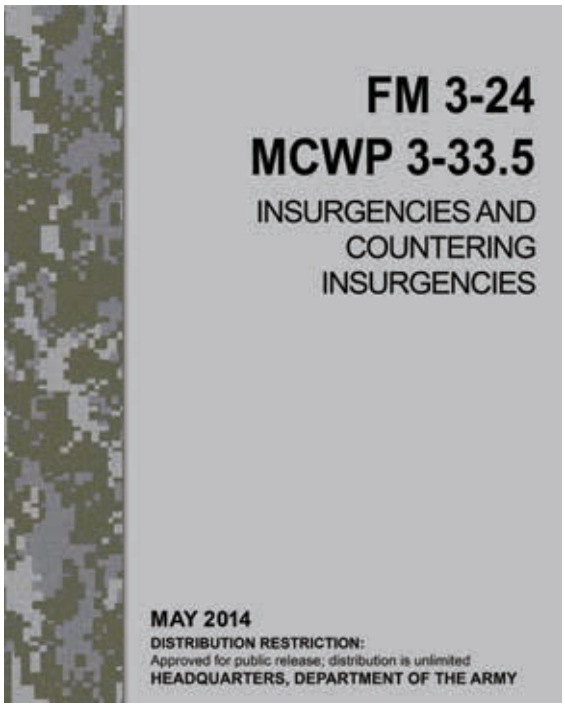
In Hollywood, the general rule for movies is that the sequel never quite lives up to the original. It seems this rule applies to military field manuals as well. The U.S. Army and Marine Corps counter-insurgency field manual, *Insurgencies and Countering Insurgencies*, supersedes the version released in December 2006. The 'population-centric' approach to counter-insurgency elegantly set out in that edition was hailed at the time as "paradigm-shattering,"[1] although it represented more a *revival of* than an *innovation in* counter-insurgency doctrine. Regardless, the 2006 version was always going to be 'a tough act to follow.'

Unlike its predecessor, the purpose of FM 3-24 (2014) is not to re-introduce the lost art of counter-insurgency to the U.S. military. Rather, it is to capture and codify the lessons learned from the hard-fought counter-insurgency campaigns in Iraq and Afghanistan. This version is organized in three parts. The first sets out the strategic and operational context for counter-insurgency operations (*the context*); the second provides the doctrine for understanding insurgencies (*the problem*); and the third lays out the doctrine for overcoming an insurgency (*possible solutions*).

Although FM 3-24 (2014) recaps much of the substance presented in the earlier version, one significant departure lies in the importance ascribed to culture. While FM 3-24 (2006) recognized the significance of culture, this element was nested — or buried — within a hierarchy of factors contributing to understanding an operational environment. Reflecting even more the cultural turn in U.S. counter-insurgency doctrine, FM 3-24 (2014) elevates culture, from one among many, to a factor of "unique importance."[2] It is given its own chapter of 5½ pages (versus a 2½ page section in the 2006 version) that elaborates upon the fundamental aspects of culture; the underlying, predictable patterns of interaction with the world evident in all cultures; and techniques to enhance cultural understanding, including green cells, cultural advisors, and human terrain teams.

In general, FM 3-24 (2014) is a backward-looking document. This is not meant as a criticism. As mentioned earlier, that is precisely its purpose: to look back and to capture the lessons learned from the wars in Iraq and Afghanistan. It is intended to preserve the Army's and the Marine Corps' hard-won institutional wisdom, and to pass on this wisdom to future generations of warfighters, thereby avoiding the need to 're-invent or to re-discover the counter-insurgency wheel,' as was the case in the early years of the Iraqi and Afghan campaigns.

But how relevant will these lessons be in the future security environment? Consider the discussion in FM 3-24 (2014) on remote area operations (paragraphs 7–63 to 7–70). These operations are conducted in insurgent-controlled or contested, unpopulated, rural areas — rugged, inhospitable regions (for example, heavily forested and mountainous areas) that provide insurgents with cover and concealment, and are not easily penetrated by counter-insurgents. While descriptive of many areas of operations in the Afghan campaign, how likely is this a characterization of future areas of operation? In his recent book, *Out of the Mountains* (2013), David Kilcullen argues that four megatrends will shape tomorrow's "conflict climate": population growth, urbanization, littoralization, and connectedness.[3] These drivers will converge (if they have not already) in an operational environment typified by underdeveloped and overburdened coastal megacities. If Kilcullen is right — which is not to say that this would preclude the U.S. military from ever again conducting counter-insurgency operations in rural areas — how applicable would the lessons learned from operations in the mountains of the Hindu Kush be for the counter-insurgent patrolling, say, the teeming slums of Mumbai?



There are other reasons to question FM 3-24's (2014) future relevance. The field manual refers to a spectrum of involvement in countering insurgencies, ranging from enabling host-nation governments and security forces, to direct action with U.S. forces serving as the primary counter-insurgent force. Granted, the spectrum has to be laid out in its entirety in order to cover off all or most contingencies; that is the function of doctrine. However, the prospect of U.S. forces acting as *primary* counter-insurgents in an insurgency is highly unlikely, certainly for the remaining years of the Obama Administration. A key premise of the emerging — and highly criticized — Obama Doctrine is that the U.S. will not commit substantial 'boots on the ground' to fight overseas insurgencies. President Obama made this point explicitly in his 28 May 2014 commencement address at West Point. In dealing with the diffuse threat of terrorism, he said, America needs to develop a strategy that "…expands our reach without sending forces that stretch our military too thin, or stir up local resentments."[4] The U.S. role lies in "empowering partners" — "to train, build capacity, and facilitate partner countries on the front lines"[5] — so that they can shoulder the lion's share of the counterinsurgency burden. Even when faced with the humanitarian disaster in Syria, and ISIS's efforts to carve out an Islamic caliphate in northern Iraq, Obama has been loath to commit American forces to direct military action, save, possibly, for limited and precise air strikes against terrorist targets in Iraq. Moreover, it is hard to imagine Obama's successor in 2016 reversing his 'reluctant-interventionist' approach. As has almost become cliché, the American public is *war* weary, or, more accurately, *world* weary. How applicable will a comprehensive, population-centric, counter-insurgency approach be in a policy environment where the commitment of sizable U.S. military forces overseas is a 'non-starter'?

The writing of FM 3-24 (2014) was a necessary exercise, providing closure on a decade of U.S. direct involvement in two draining counter-insurgency campaigns. But its relevance for the future is an open question. In my opinion, FM 3-24 (2014) is destined for the shelf, there to stay until the Iraq and Afghanistan experiences have faded sufficiently from America's collective memory for the U.S. to once again "go abroad to slay dragons."[6]

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NOTES

1. Samantha Power, "Our war on terror," in *The New York Times*, 29 July 2007.
2. FM 3-24, *Insurgencies and Countering Insurgencies,* (Washington, D.C.: Headquarters, Department of the Army, 2014), p. vii.
3. David Kilcullen, *Out of the Mountains: The Coming Age of the Urban Guerrilla,* (Oxford, UK: Oxford University Press, 2013), p. 28.
4. "Remarks by the President at the United States Military Academy Commencement Ceremony," 28 May 2014. Available online at http://www.whitehouse.gov/photos-and-video/video/2014/05/28/president-obama-speaks-west-point-graduates#transcript
5. *Ibid.*
6. While Secretary of State in the James Monroe administration, future president John Quincy Adams cautioned: "Americans should not go abroad to slay dragons they do not understand in the name of spreading democracy."