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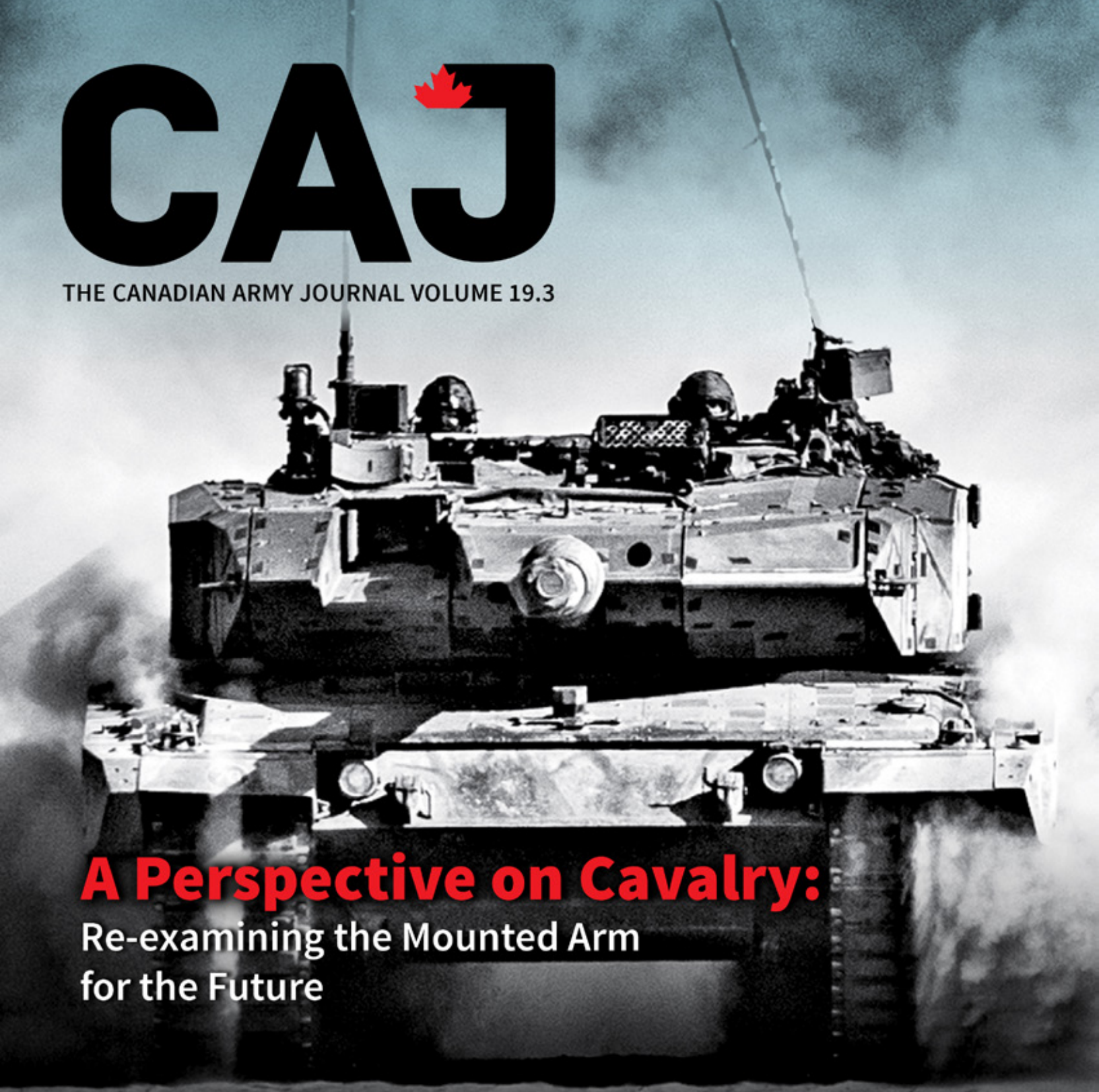

A Perspective on Cavalry:
Re-examining the Mounted Arm for the Future

Defining Cavalry: Within the Royal Canadian Armoured Corps

National Defence Défense nationale

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THE CANADIAN ARMY JOURNAL

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CANADA'S PROFESSIONAL JOURNAL ON ARMY ISSUES

The *Canadian Army Journal*, a refereed forum of ideas and issues, is the official publication of the Canadian Army. This periodical is dedicated to the expression of mature professional thought on the art and science of land warfare, the dissemination and discussion of doctrinal and training concepts, as well as ideas, concepts, and opinions by all army personnel and those civilians with an interest in such matters. Articles on related subjects such as leadership, ethics, technology, and military history are also invited and presented. The *Canadian Army Journal* is central to the intellectual health of the Canadian Army and the production of valid future concepts, doctrine, and training policies. It serves as a vehicle for the continuing education and professional development of all ranks and personnel in the Canadian Army, as well as members from other environments, government agencies, and academia concerned with the Canadian Army, defence, and security affairs.

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EDITORIAL

"Change is inevitable. Change is constant." These prophetic words of former United Kingdom Prime Minister Benjamin Disraeli are as true today as when they were first spoken. I wanted to highlight the issue of change in my final editorial, as that is what has best characterized my short tenure as Editor-in-Chief. I have witnessed change as a condition, a reality we must accept and are unable to directly influence, and change as a process, the leadership and actions we take in creating responses to change. As reflected in recent the Canadian Army Journal (CAJ) editions, we undertook to refresh and revitalize the print and electronic formats and developed a new and more interactive web page. We also increased output from one to three editions per fiscal year. This could not have been achieved without patience and understanding from you, the contributors. The Army Publishing Office (APO) and Army Public Affairs (DAPA) also played a crucial role in enacting these changes, which remain works in progress as we attempt to balance external conditional change with internal process change in delivering a scholarly, peer-reviewed and professional army journal.

Speaking of internal change, I want to welcome two new members to the CAJ production team. First, I extend a warm welcome to our new Editor-in-Chief, Doctor Aditi Malhotra. Doctor Malhotra joins the CAJ team with in-depth publication experience as an author and editor. She will inject enthusiasm into the CAJ and we look forward to her guidance and contributions in future editions. I also want to acknowledge and welcome Major Bruce Rolston. Major Rolston has in-depth IT experience as well as publishing experience with the University of Toronto. He has assumed responsibility for the CAJ web page and its content. Please join me in welcoming both of them to the CAJ production team.

Staying with the theme of change, this edition commences with an important ongoing change initiative within the Royal Canadian Armoured Corps (RCAC). We welcome a guest editorial from Colonel Robin Dove, Director of Armour, who offers detail and insight into the background of the RCAC's shift to a cavalry concept. In addition, Colonel Chris Hunt and Captain Bryce Simpson offer their unique and in-depth conceptual reviews of what the cavalry concept means for the RCAC. These submissions contribute to the debate and discussion on the meaning of the cavalry concept, and they offer balanced critiques of the ongoing shift within the RCAC.

Other notable, forward-looking articles include a critique of "Close Engagement" by Major John Keess and an account of the innovative use of additive manufacturing in response to COVID-19 by Major Jess Ross and Captain Chad Mooney. Also of note are the two historical pieces, one from Major John Rickard, who offers an interesting look at German forward command during the Second World War, and the other from Captain Tim Gallant, who presents a viewpoint on General Stanley McChrystal's performance as a strategic leader. Rounding out the feature articles for this edition is an informative look at the impact of musculoskeletal injuries during infantry training and the way ahead in reducing this priority threat to operational readiness.

Accompanying the feature articles are the equally compelling "Note-to-File" and "Stand-up Table" sections offering opinions and discussion on a variety of issues relevant to the Canadian Army. Last but not least, we complete this edition with four book reviews. As you may be aware, in concert with the ongoing changes to the CAJ noted above, we have attempted to offer a more scholarly approach to book reviews, and we believe you will enjoy the current submissions.

I will have left the Editor-in-Chief position by the time this edition is published and, as my final comment, I would like to take this opportunity to express my thanks. First, I thank you, the contributors to the CAJ. Your patience and understanding as we moved to a new peer-reviewed print and web version of the CAJ were much appreciated. It should go without saying, but the CAJ simply would not exist without your submissions. To the APO, Translation Bureau and DAPA teams, your professionalism, skill and patience in producing CAJ and translating the new vision into reality was significant, and you have my sincere gratitude and thanks. I will be forever grateful to the Editorial Board members for their interest and assistance in moving the CAJ forward as a peer-reviewed scholarly journal and for the wise counsel and advice provided to me by the Associate Editor, Peter Gizewski. Lastly, I would like to thank the members of the Canadian Army Land Warfare Centre (CALWC), and especially the Concepts Team (both current and past members—Lieutenant-Colonel Brandon Kew, Major Pat Newman, Major John Bosso [CAJ Production Manager] and Major Geoff Priems) for making me feel welcomed and a part of the CALWC team. It has been an interesting couple of years, dealing with constant, and perhaps inevitable, change. Please remember that the CAJ is your journal, and only through your continued interest and submissions will it be successful. Signing off…

Lieutenant-Colonel Michael Rostek, CD, Ph.D., APF
Editor-in-Chief

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ARMOURED CORPS MODERNIZATION:

AN OVERVIEW OF THE CAVALRY CONCEPT

Colonel R. D. Dove, CD · Guest Editorial
Director Royal Canadian Armoured Corps

Since I recently returned from a two-year posting with 1st Cavalry Division, US Army, getting back up to speed with the Canadian Army (CA) in my new capacity as Director, Royal Canadian Armoured Corps (RCAC) has been a unique challenge, especially as I have had the privilege of witnessing pivotal events that have affected our organization and the Canadian Armed Forces (CAF) over the past several months. Indeed, reconstituting the CAF after a period of high tempo, optimizing the domestic and expeditionary outputs of our forces, supporting Canadians through COVID-19 and concurrently protecting our people, all while wrestling with culture and recruiting challenges, amount to no small feat. Nonetheless, the CA continues to think deeply and challenge our ways of doing business in order to prepare for the next conflict. Force 2025 (F2025) and the Canadian Army Modernization Strategy are the catalysts, but the changes in the RCAC have been underway for more than half a decade. To highlight Armoured Corps modernization, an overview of the cavalry concept will set the stage for some of the outstanding contributions to this edition of the *Canadian Army Journal* (CAJ), outlining and advancing the discourse on where the RCAC is headed and where refinements will be needed.

In 2015, the Corps began moving towards implementation of the Armoured common concept, transitioning from separate "recce" and "tank" streams to a single armoured construct for both Regular Force and Reserve elements. This change bridges Military Employment Structure (MES) and individual training uniquely, as the size of our Corps was not large enough to support two separate streams of officer and soldier military occupational specialties. The Armoured common approach culminated with the completion of the MES review in 2021, and the natural extension was a common approach to doctrine and force structures that would become the cavalry concept.

Following approval of the broad cavalry concept from Commander Canadian Army at Army Council in February 2021, the RCAC is moving forward with refining and operationalizing the tenets of this approach. At its simplest, the structural identity of the cavalry concept is characterized by the principle of four: four armoured fighting vehicles (AFV) per troop, four troops plus a headquarters for each squadron. This configuration may understandably be seen as a move "back to the future," given that tanks and other AFVs in "sabre" squadrons have been organized this way in our recent past. However the generation of officers and soldiers who have experienced the post-2004 recce-centric training and employment model may view the Armoured common and cavalry concept changes more emotionally, as existential. The cavalry concept can be best described as a conceptual pathway from the provision of a narrow dual-stream direct fire versus furtive reconnaissance approach, towards an integrated, cohesive mounted manoeuvre force capable of

delivering firepower and battlefield effects across the spectrum of conflict. Since "the devil is in the details," the RCAC is currently refining exactly how the Corps will move forward with Canadian Armoured Cavalry (Armd Cav), pending decisions on Army structure through F2025. This is a period well suited to discourse, debate and unofficial experimentation as the Corps gains consensus on what Armd Cav is and is not, how to optimally employ it, and how to mitigate known gaps in equipment, personnel and doctrine.

The role of Armd Cav is to shape and define the battlefield by informing and protecting the commander's manoeuvre space and defeating the enemy through mounted manoeuvre. Underlying this role is shock action derived from the use of mobile, protected, direct fire vehicle platforms, integrated with enablers. Armd Cav encompasses the breadth of the RCAC F-echelon capabilities. Most numerous are the Light Armd Cav squadrons, typically mounted on the light armoured vehicle family of vehicles (FOV) and, sub-optimally (from a direct fire support perspective), on tactical armoured patrol vehicles. Heavy Armd Cav squadrons will be mounted primarily on the Leopard 2 FOV. It is important to note that we are not discussing tank squadrons versus Armd Cav squadrons; tanks are our key anti-tank asset at present, and they have a vital role to play in reconnaissance and security tasks—including screen, cover and guard forces—as part of the "cavalry gap" that previously existed between stealth recce forces and tanks. This is not to say that there is no longer a role for Heavy Armd Cav in providing intimate support to the infantry during an assault; however, this cannot be the only role for which tanks are retained. There are risks, certainly, that recce and tank skills could be diluted or lost as we attempt to cover a broader spectrum of tasks with Armd Cav forces. The cavalry concept, however, is an acknowledgement of the size of our Corps and the requirement to generate and maintain combat-capable, multi-purpose land forces—which inherently means accepting some risks in order to remain relevant and sustainable. As a vital element to consider and include in the evolution of our Corps, the cavalry concept encompasses both Regular and Reserve Force elements of the RCAC, as the basis of training will focus on the same core tasks, varying in breadth rather than depth. This commonality will enable seamless integration in a domestic or expeditionary context, with equipment-specific training bridging the cross-over where required, to enhance our overall flexibility. Augmentation of Regular Force squadrons with Reserve elements can therefore occur at troop level or as low as single-vehicle or individual levels. Challenges with staffing levels in both Regular and Reserve units of the RCAC are acknowledged, as is attrition; the cavalry concept will seek to leverage commonality of training and tactical employment in order to increase Regular/Reserve Force integration, benefiting from synergy to increase effectiveness and retention, which are both key components in the CA reconstitution plan.

While these "big-hand, small-map" concepts are neither new nor complex, the articles in this edition of the CAJ demonstrate the gaps and seams that belie the simple explanations offered above. Captain Bryce Simpson, in "A Perspective on Cavalry: Re-examining the Mounted Arm for the Future," provides an outstanding historical perspective, with quantitative and qualitative comparisons of Canadian Armd Cav concepts and those of our closest allies. Captain Simpson posits that our focus should shift from a platform-agnostic attempt to "do" cavalry in the "tank trainer" fashion towards an enabled, purpose-built cavalry force that can conduct reconnaissance and security while fighting to gain information if required. Colonel Chris Hunt, in his article "Defining Cavalry within the Royal Canadian Armoured Corps," highlights firepower as the key RCAC value proposition and examines means to optimize firepower and use it to update our doctrine and classification of cavalry in a Canadian context. No mounted anti-tank guided missile is currently part of the CA arsenal, and Colonel Hunt's article shines a light on the challenges involved in providing Armd Cav with firepower beyond that found elsewhere in the empowered combined arms team. Both of these articles are enlightening and thought-provoking; they reflect the healthy debate that is key to defining issues and addressing the evolving identity of our Corps. Part of the challenge lies in focusing and framing the debate: with issues from Armoured Corps personnel generation, roles and equipment—further convoluted by a mix of terminology not clearly defined in a Canadian context—it is easy to talk past one another. As the CA solidifies its direction towards F2025, it is up to us as leaders and professionals to read, write and continue to examine the direction of our Armoured Corps and our Army through the force development continuum. With personnel generation addressed through the Armoured common approach, and equipment allocations/capabilities known for the short term, framing the debate around roles—to include tasks, tactics and Armd Cav as a combat / combat support element—is most likely to bear fruit. The RCAC's current "identity crisis" (as some have labelled it) is a natural result of the challenging of our assumptions and the way we have adapted over the past two decades. While there is a requirement to be synchronized and in line with the CA, as decisions are made towards F2025 from a "whole-of-Army" perspective, the RCAC can nonetheless seize this opportunity to be at the forefront of modernization. To remain relevant, we must embrace change and move forward; our flexibility and agility, earned on the battlefields of the past, will allow us to adapt to the next conflict.

Worthy!

A PERSPECTIVE ON CAVALRY:

RE-EXAMINING THE MOUNTED ARM FOR THE FUTURE

Captain Bryce Simpson

INTRODUCTION

The Royal Canadian Armoured Corps (RCAC) is, we are told, currently struggling to make sense of its role as one of the Army's two manoeuvre arms due to "a marked departure from the Corps' fighting doctrine, and thus a fundamental shift in the way armour is employed today."[1] Some point to the effects of recent operations and their influence on the RCAC's thinking and practices, asserting that "given how armour was employed unconventionally in Afghanistan, this would suggest that a generation of armoured leaders is missing the fundamentals of concentration, firepower, aggressiveness, shock action, and manoeuvre during all-arms operations."[2] Indeed, the Corps' purported predicament may go beyond simple doctrinal confusion about its present and future role, brought on by a perceived imbalance in light and heavy platforms, with some commentators pointing to an institution "suffering from an identity crisis."[3]

Freudian-neuroses aside, those apprehensions are worth addressing, particularly as the Canadian Army as a whole embarks upon an ambitious program to design and implement Force 2025—the form and function of the Army of tomorrow.[4] Consequently, this article will endeavour to address some of the more recent concerns posed by alarmed members and observers of the RCAC. Ultimately, it will make the case that the RCAC is far from requiring a fundamental reimagining of its force-generated capabilities and an associated revision of its doctrine proposed by some critics and that, instead, an application of the tried-and-true thinking and principles of armoured warfare reaching back to the beginning of its Corps can provide its members with a window into its future.

Source: Combat Camera

Source: Combat Camera

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A CORPS IN (PERPETUAL) CRISIS

First, we must dispel any notion that the Corps' contentious state is somehow novel or unique to our present position in history.[5] The post-Second World War RCAC was in a constant state of tension between its aspirational (and doctrinal) goals to maintain a heavy combat force consisting primarily of tanks and the reality of its fiscal limitations, which forced the Corps to adopt a hybrid structure with Canada-based light armour and European-based heavy forces.[6] The end of the Cold War left the Canadian Army with this hybrid fleet of light armoured vehicles and tanks.[7] The impending replacement of the main battle tank with a wheeled direct fire support vehicle provoked a groundswell of concern for the Corps' future. From 1999–2005, there were no less than 15 prominent articles directly addressing the imperilled future of the Corps as a warfighting arm, including some directly questioning whether a requirement for a separate armoured corps even existed in a tankless Army.[8] Then, as now, the debate over what the RCAC should do with a minority of tank subunits in a corps that was mostly equipped with light armour, or worse, in the event of reaching "a bleak, tankless future," often took on existential proportions.[9]

The increasingly panicked tenor of the debate over armour in Canada slowed to a trickle almost overnight in the mid-2000s—a temporary armistice that we can credit to the Leopard 2 purchase, which reinvigorated the heavy end of the RCAC spectrum. Tanks, with their unique combination of firepower, mobility and the protection necessary to operate in close-combat against dug-in enemy positions, had once again proven their distinct relevance in an operational setting. Then-Major T. J. Cadieu, the first officer commanding (OC) of an Afghanistan-deployed tank squadron, argued that "by deploying tanks and armoured engineers to Afghanistan in October 2006 and supporting the acquisition of the Leopard 2, the leadership of the Canadian Forces (CF) has acknowledged the importance of maintaining heavy armour in a balanced force."[10] This apparent institutional acceptance of the need to continue to support a heavy armoured presence in the Army seems to have quelled concerns that the RCAC was on a fast-track to irrelevance or extinction, at least for a time.

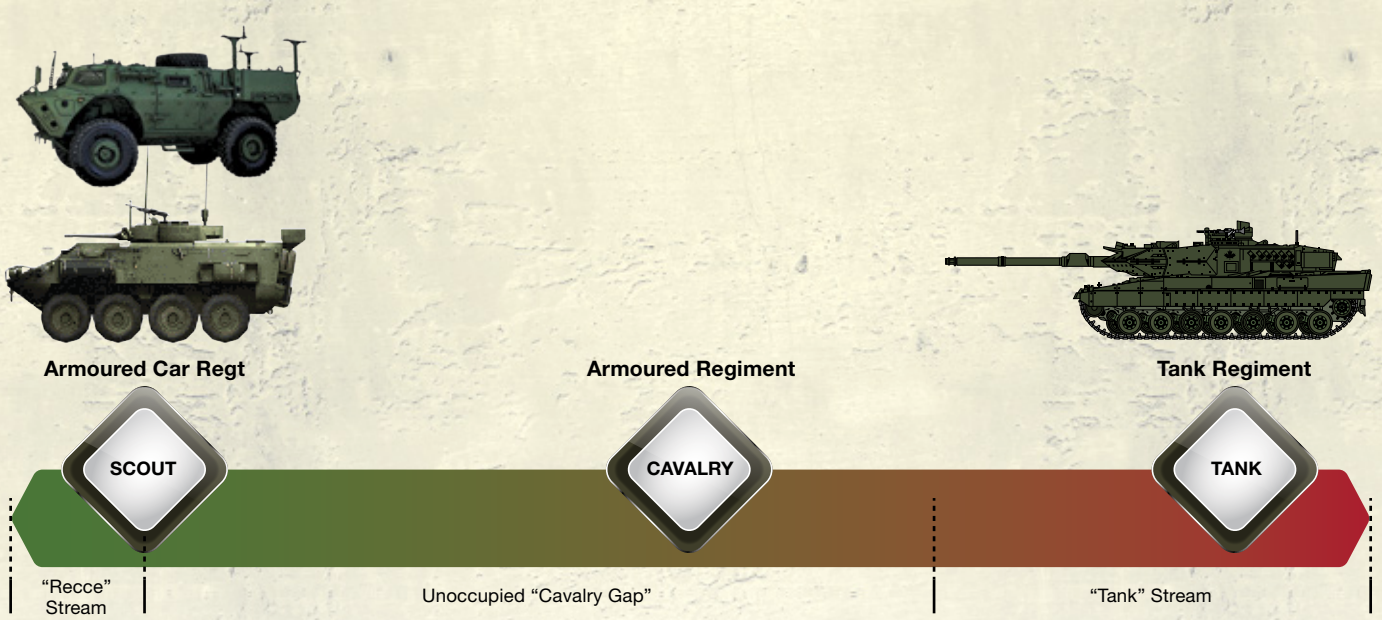


Figure 1: The "Cavalry Gap" (from Matthew McInnes, "First Principles and the Generation of Armoured Fighting Power," *The Canadian Army Journal* 17.3 [2017]: 95).

A RESURGENT CRISIS: THE ROYAL CANADIAN ARMOURED CORPS TODAY

The recent introduction of the tactical armoured patrol vehicle (TAPV) and still-to-be delivered light armoured vehicle (LAV) reconnaissance and surveillance system (LRSS) variant seems to have provoked a renewal of this doctrinal debate within the Corps over the best employment of non-tank forces.[11] Lieutenant-Colonel Halton speaks for many when he argues that the Corps must rebalance itself away from its current "overabundance" of medium-role reconnaissance forces by converting a significant proportion of subunits to the armour role, where they will utilize the current generation of armoured vehicles (such as the TAPV) in a "tank-trainer" role.[12]

The tank-trainer "resolution" to the apparent problem of a light-heavy mix in armoured fighting vehicle (AFV) platforms is not a new one. As Halton himself freely admits, the RCAC employed the Cougar in this fashion from the 1970s until the early 2000s, though of course these vehicles were not restricted to training and found themselves employed operationally throughout the 1990s.[13] In the late 1990s and early 2000s, the Coyote briefly replaced the Cougar in the "tank-trainer" role, with four four-car troops making up a direct fire support vehicle (DFSV) squadron.[14] Those squadrons were widely referred to in the RCAC as "cavalry squadrons."[15] The creation of those cavalry squadrons in place of the previous tank-trainer squadrons attracted immediate criticism from serving armoured officers who emphasized that a squadron of nineteen Coyotes with 25-mm cannons contributed little in terms of capability to a brigade where infantry companies were equipped with the identically-armed (and better-armoured) LAV III.[16] Indeed, the creation of these squadrons, which offered so little in terms of capability to the brigade fight, contributed to a situation where some commentators within the Army began to argue for the RCAC's disbandment altogether.[17] This utilization of light armour in a structural mirror image of a traditional tank squadron—and these squadrons eventually gaining the title of "cavalry"—is essential to understand current trends in RCAC thinking.

Following the extended reprieve from the internal debates of the 1990s–2000s, there has been a resurgence of a "cavalry concept" in RCAC thinking, with a diverse range of officers arguing for the adoption of a "cavalry" doctrine, structure, and mindset within the Corps.[18] What precisely is entailed in the cavalry concept can be challenging to pin down. Many critics argue that there is simply a need for a "mentality shift" from the current focus on reconnaissance-by-stealth to fighting for information.[19] More recent arguments favouring the concept have taken on more substance than a simple adjustment of the Corps' psyche. They have specifically identified what they assert is a "cavalry gap" in RCAC doctrine. In a recent edition of this journal, Captain Matthew McInnes makes the case that there is an "unoccupied cavalry gap" in Canadian doctrine that formerly was "the exclusive domain of our Second World War armoured regiments, which illustrates the gravity of the current situation."[20] Specifically, he argues that there is a doctrinal requirement for a force that is "responsible for the conduct of the traditional armoured cavalry tasks such as pursuit, raids, penetrations, aggressive (fighting) reconnaissance, and economy of force tasks"—tasks that neither "recce nor tank stream[s]" currently feel responsible

to fulfill.[21] McInnes' solution to this cavalry gap rests on the notion of "platform neutrality," with his proposed armoured cavalry subunits, regardless of equipment, being organized and trained along similar lines utilizing the four four-car troops of a traditional tank squadron.[22]

As currently expounded by its proponents, the Canadian cavalry concept is the logical outgrowth of the tank-trainer concept, which has been one of the recurring "resolutions" to the perpetual turmoil in the RCAC over the existence of a hybrid light-heavy equipment divide.[23] From the Cougar squadrons of the Cold War-era and continuing with the DFSV Coyote squadrons of the 1990s (known semi-officially as "cavalry"), the Corps may soon be welcoming the arrival of TAPV "cavalry squadrons" organized and trained to conduct the broad spectrum of armour tactics. However, despite the apparent inexorableness of the tank-parched RCAC continually returning to the same doctrinal "tank-trainer/cavalry" watering-hole, it is worth asking several questions. First, how do the employers of existing cavalry units worldwide define their tasks and equip them? Second, does Canada have a doctrinal requirement for those forces and, if so, do we have historical models of our own to fall back on? Third, does the Canadian cavalry concept as outlined above bear any resemblance to other countries' cavalry forces? Lastly, what would be required to implement a Canadian cavalry concept? It is to these questions that this article shall now turn.

ARMOUR'S DISTINCT RELEVANCE

Before addressing modern cavalry directly, we must discuss it in relation to what we traditionally speak of as armour. Current Canadian doctrine defines armour's role as being to "defeat the enemy through the aggressive use of firepower and battlefield mobility," with the overall concept of armour broken into two "capabilities": tank elements and armoured reconnaissance.[24] Tank elements are *extremely* platform-specific and are characterized "by their mobility, firepower, and protection. Equipped with one of the most decisive weapons on the battlefield, tanks produce shock action through the violent application of (direct) firepower and mobility."[25] Armoured reconnaissance elements, on the other hand, are not associated with a specific platform and "are defined by their mobility, light protection, communications, and firepower. They can fulfill a variety of combat roles but their primary task is reconnaissance."[26] In current doctrine then, the RCAC has a series of armoured subunits: some tank squadrons, and some reconnaissance squadrons, all under the overarching umbrella of "armour."[27]

Our closest allies are much narrower in their definition of armour, choosing to associate it *only* with the role and characteristics Canada currently ascribes to tank elements and eschewing the umbrella-term "armour" to describe their mounted reconnaissance and security forces. For instance, the mission of armour elements in the U.S. Army is "to close with the enemy by maneuver to destroy or capture the enemy, repel the enemy's assault by fire, and engage in close combat and counterattack," while their cavalry elements exist to "set conditions for successful operations of the unit for which they are conducting reconnaissance and security tasks."[28] The United Kingdom also draws a sharp line in roles and characteristics between armour and armoured cavalry, with the former characterized by their platforms (the tank), which provide "the brigade's principal protected, precision shock action capability" while armoured cavalry are "FIND, UNDERSTAND and EXPLOIT assets that are able to fight for information, in extremis, if required."[29]

As our allies do, associating the role and characteristics of armour with a specific platform (the tank) and outlining separate roles and characteristics of reconnaissance or cavalry forces was also Canada's approach to doctrine until recently. Canada's 1990 doctrinal statements on armour did not divide this concept into tank and reconnaissance elements. Instead, doctrine described armour's characteristics as directly associated with a specific platform: "the battlefield requirements of firepower, mobility, and protection are present, in the tank … Tanks can produce shock action through the violent application of firepower and mobility."[30] Despite occasional arguments to the contrary, the "tank" is not going to become obsolete until it is "surpassed by new weapon systems that do a better job of combining direct firepower, protection and mobility in a single package."[31] Consequently, armour's role and characteristics should remain closely associated with the combination of firepower, protection, and mobility currently embodied by the main battle tank. However, despite the platform-driven and distinct role for armour (tanks), there remains a distinct—but complementary—role for those mounted forces that do not operate tanks.[32]

ALLIED CAVALRY

As seen above, "cavalry" among our closest military allies refers to specific organizations with separate roles and characteristics from those associated with armour. The two branches of mounted manoeuvre remain conceptually distinct. The U.S. Army (with perhaps the most extended history of mechanized cavalry employment) describes how the cavalry squadrons[33] assigned to brigade combat teams (BCT) are the brigade commander's "main organization" for the conduct of reconnaissance and security tasks as follows:

> Commanders use reconnaissance operations to understand the situation, visualize the battle, and make decisions. Security tasks provide reaction time and maneuver space so commanders can make decisions and protect the force from unanticipated danger … The Cavalry squadrons of the BCT can conduct security tasks and fight for information.[34]

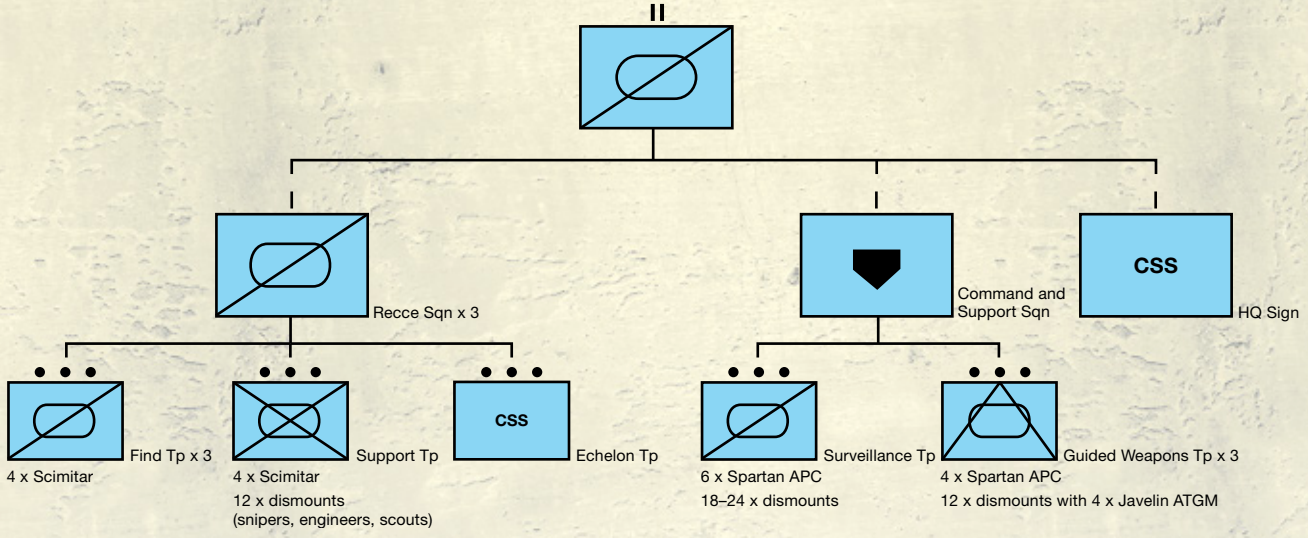


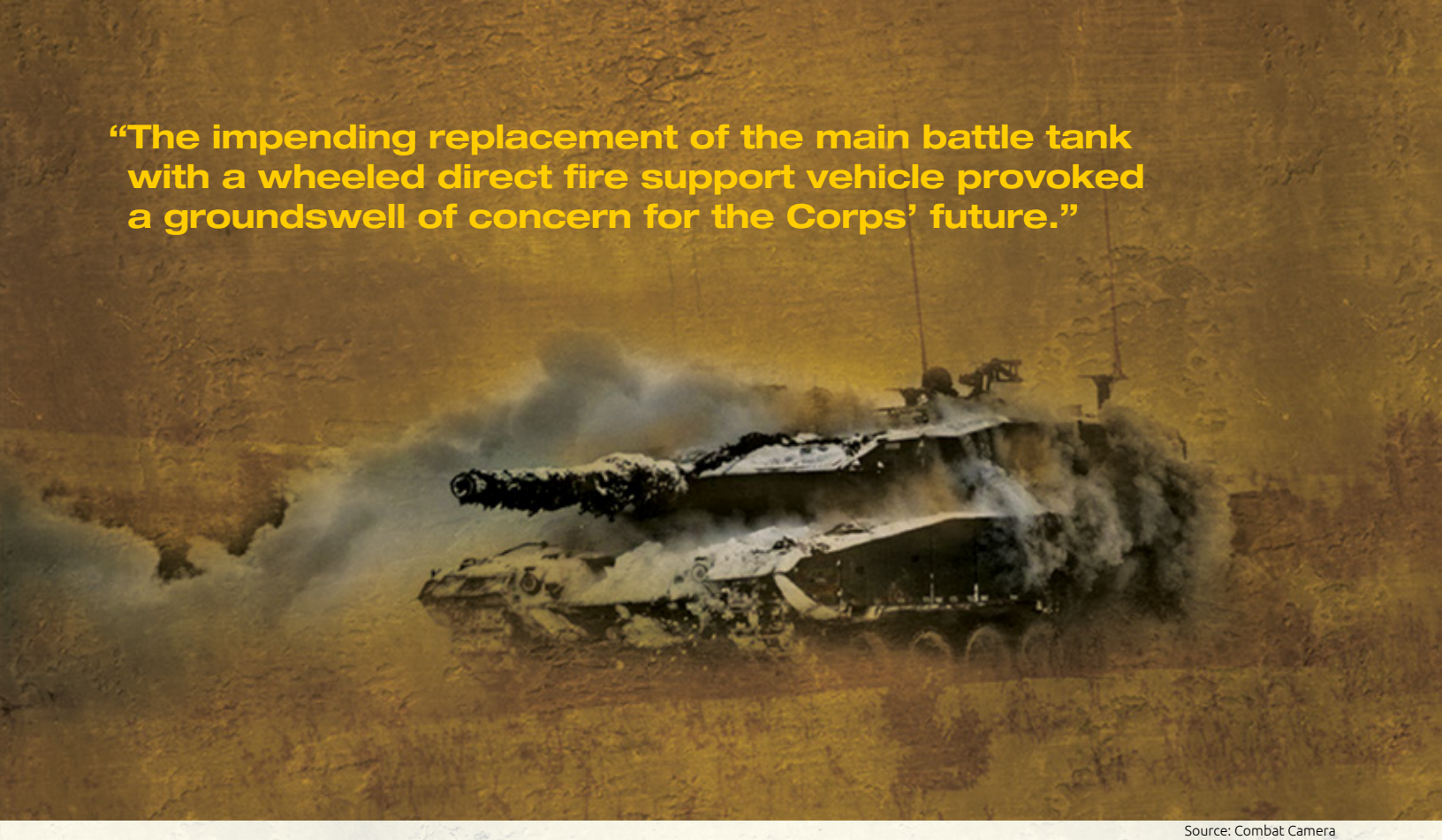
Figure 2: British Armoured Cavalry Regiment (2019).

Major Amos C. Fox, a prolific commentator on recent developments in American cavalry, explains the dual reconnaissance and security function of cavalry units as being analogous to the "shield" of traditional manoeuvre forces, which constitute the "sword."[35] The cavalry "shield" is by no means a passive or defensive tool and indeed is a weapon in its own right, existing to shape "the environment and the situation of its supported force" by softening targets with direct and indirect fire, informing commander's decisions, misleading the enemy on the direction of the supported forces' intended direction of advance, facilitating positioning and manoeuvre of other units, deceiving the enemy about what lies to its front, and providing warning and stand-off during defensive operations.[36] The central roles of cavalry in American thinking (reconnaissance and security) are heavily associated with providing *information* to the supported commander.[37]

The British Army takes a similar view of cavalry, describing both light and armoured variations of these units jointly as "ground mounted reconnaissance" whose "primary role" is "acquiring information."[38] Both types of units are also capable of conducting security tasks. The expectation of providing information does not cease, with armoured cavalry, in particular, being capable of "aggressive reconnaissance" because of its platforms' capability.[39] Importantly, cavalry is not considered merely another manoeuvre unit but instead constitutes a specialized "FIND" asset structured to conduct reconnaissance tasks with the associated ability to EXPLOIT as a result of integral combat support enablers.[40]

The distinction between cavalry and manoeuvre elements in both the American and British armies is key to understanding their employment and provides the starkest contrast with the Canadian "cavalry concept" discussed above. McInnes' conception of cavalry excludes specialized reconnaissance elements, and he asserts that "reconnaissance is simply a tactical task inherent to all combat units and, in fact, activities, which during times of major combat will naturally be conducted by multi-purpose combat forces whether there are dedicated specialist reconnaissance units present or not."[41] The danger of such thinking is evident to our allies, who have utilized their own specialized reconnaissance cavalry forces for a much more extended period. American doctrine is explicit in its warning to those who would use cavalry as only another combat unit: "Reconnaissance is significantly degraded when Cavalry units assigned to close combat missions become decisively engaged. When reconnaissance ceases, the potential for achieving and capitalizing upon information collection is lost."[42] Major Fox further explains that commanders who use cavalry "as another combined arms or infantry battalion … mismanage their available forces, which in the case of mismanaged cavalry, equates to fighting with a blindfold strapped around one's eyes."[43] That is not to say that British and American doctrine does not contemplate the use of cavalry forces in the traditional offensive or defensive tasks. However, when cavalry is employed in such tasks, it is an "economy of force" element for its supported formation.[44] For American cavalry squadrons, "when the squadron conducts offensive and defensive missions, the BCT made a deliberate decision to employ the cavalry squadron outside its intended role," which remains the provision of reconnaissance and security.[45]

It is also worth noting that the post-Cold War era has seen a proliferation of cavalry elements at the brigade level. Whereas both British and American forces previously employed their specialized reconnaissance and security units at division- or corps-level, often



Source: Combat Camera

entirely eschewing the establishment of such units in their brigades, today they both operate full units in their brigades to fill the cavalry role.[46] Indeed, the U.S. Army has entirely deleted division- and corps-level cavalry from its organization.[47] That has important implications for the Canadian Army. Whereas before we could assume that, when deployed as part of a multinational force, there would be dedicated units or formations fulfilling cavalry roles provided by our allies' divisions or corps, today this is not the case. Consequently, it may be time to examine whether a single reconnaissance/cavalry squadron in our brigades can fulfill all reconnaissance and security tasks that a commander could place upon it.

For our closest allies, cavalry consists of specialized mounted reconnaissance and security elements that are capable of fighting for information and, using the combat capabilities that allow them to fulfill their core information-gathering function, are capable of conducting economy of force tactical tasks up to and including traditional offensive and defensive operations. They are distinct from conventional manoeuvre forces in *role* (reconnaissance and security) despite sharing similar equipment as other mounted forces. This conception of cavalry bears little resemblance to the current direction in RCAC-thinking, where non-tank-equipped subunits are structured identically and designed to operate with the same mission-set as their heavier cousins. As we will see, we would be wise to pursue our Allies' vision of cavalry, and we will therefore examine this vision of cavalry further.

CAVALRY IN RECONNAISSANCE OPERATIONS

As we have seen above, cavalry's *raison d'être* is the provision of information. We shall therefore examine how cavalry has historically fulfilled its primary role. First and most importantly, cavalry formations have predominantly been structured so that their ability to conduct this primary role is optimized. McInnes asserts that the "principle of four" AFVs predominates in mounted combat and further claims that troops/platoons any larger than that are "unable to survive the demands of a counterinsurgency campaign, let alone general war, due to an inherent lack of fighting power, [and] have no place in Canada's warfighting doctrine."[48] However, in Figure 3, we can see nine historical and current reconnaissance or cavalry units compared based on the number of platoon-sized elements in their subunits, the number of vehicles in those platoons, as well as weapon systems and dismount capability. What quickly becomes apparent when comparing these units is that platoons of more than four vehicles have historically been the norm and remain so despite the seven decades that separate the earliest organization listed (1944) to the present day. Most of the British, American, and Australian cavalry organizations listed have been tested in combat ranging from conventional warfare to counterinsurgency, in various terrain and tactical conditions. Yet, they seem to have gone through this experience without resorting to a universal "principle of four," which did not prevent them from accomplishing their missions. There is a remarkable continuity in the sizes of troops/platoons over time. Why should that be the case?

SELECT RECONNAISSANCE AND CAVALRY ORGANIZATIONS	NUMBER OF PLATOON-SIZED RECONNAISSANCE/ CAVALRY ELEMENTS PER SUBUNIT	NUMBER OF VEHICLES IN PLATOON-SIZED ELEMENT	HEAVIEST VEHICLE-MOUNTED WEAPON SYSTEM	NUMBER OF INTEGRAL PLATOON DISMOUNTS[49]
UK Armoured Cavalry Regiment (2019)[50]	3	4 (4 x Combat vehicle reconnaissance (tracked) (CVR[T])	30 mm cannon	0*
U.S. Mechanized Cavalry Reconnaissance Squadron (1944)[51]	3	9 (6 x jeeps, 3 x armoured cars)	37 mm cannon	17
U.S. Division Armoured Cavalry Squadron (ca.1964)[52]	3	9 (5 x M114, 2 x Sheridan light tanks, 1 x M113, 1 x M113 w/mortar)	152 mm (Sheridan light tank)	10
Cavalry Squadron, U.S. Armoured Brigade Combat Team (2016)[53]	2	6 (6 x Bradley cavalry fighting vehicles)	25 mm cannon/TOW missile	18 (room for 6 x more attachments)
Cavalry Squadron, U.S. Stryker Brigade Combat Team (2016)[54]	2	6 (6 x Stryker reconnaissance vehicles)	.50 cal machine gun (MG) / 40 mm automatic grenade launcher	24
U.S. Marine Corps Light Armored Reconnaissance Battalion (2009)[55]	3	4 (4 x LAV-25)	25 mm cannon	16
Australian Cavalry Regiment (2004)[56]	3	12 (9 x LAV-Reconnaissance (Recce), 3 x LAV-personnel carriers [PC])	25 mm cannon	12
Australian Cavalry Squadron (2016)[57]	3	6 (4 x LAV-Recce, 2 x LAV-PC)	25 mm cannon	6*
Canadian/UK Division Reconnaissance Regiment (1944)[58]	3	12 (2 x heavy armoured cars, 3 x scout cars, 7 x universal carriers)	40 mm cannon	14*
4 Canadian Mechanized Brigade Group Reconnaissance Squadron (ca. 1960s)[59]	3	7 (7 x Ferret)	ENTAC missile	0*
Canadian Light Armoured Regiment (1972)[60]	3	7x (5 x tracked reconnaissance veh, 2 x direct fire support veh)	76 mm cannon[61]	0*
Canadian Brigade Reconnaissance Squadron (1979)[62]	3	7 (7 x Lynx)	.50 cal MG	0*
Canadian Division Reconnaissance Regiment (1988)[63]	3	7 (7 x Lynx)	.50 cal MG	0*
Canadian Brigade Reconnaissance Squadron (2015)[64]	4 (3 x medium, 1 x light)	8 (8 x Coyote)	25 mm cannon	8
*Further dismounts available at subunit-level.				

Figure 3: Select reconnaissance and cavalry organizations compared based on the number of platoon-sized elements per subunit, numbers and types of vehicles, integral dismounts, and weapon systems.

As it turns out, armies have been doing things this way for the simple reason that three to four sub-platoon elements are the optimal structure for the conduct of cavalry and reconnaissance organizations' most common tasks: route, area, point, and zone reconnaissance and the conduct of screens. Canada rediscovered that fact in the 1990s when it reduced the troops' size in reconnaissance squadrons to five cars and redistributed Coyotes to create DFSV/cavalry squadrons on the four-car tank model. Then-Captain T. J. Cadieu critiqued that decision, noting that "by removing three patrols from the Reconnaissance Squadron arsenal, many of the technological advances offered by the Coyote have been neutralized, flexibility has been lost, and the overall effectiveness of the squadron has been diminished."[65] Specifically, he outlined how the five-car troop was "ineffective" during offensive operations, as it could not adequately conduct a route recce without a third patrol (which involves tracking the route and clearing terrain adjacent to it out to anti-armour weapon range).[66] Screening operations were also hampered by an inability to provide depth within the troop and the requirement to employ all troop vehicles as sensors, which rapidly diminished patrols' abilities to conduct surveillance tasks for more than 24 hours.[67]

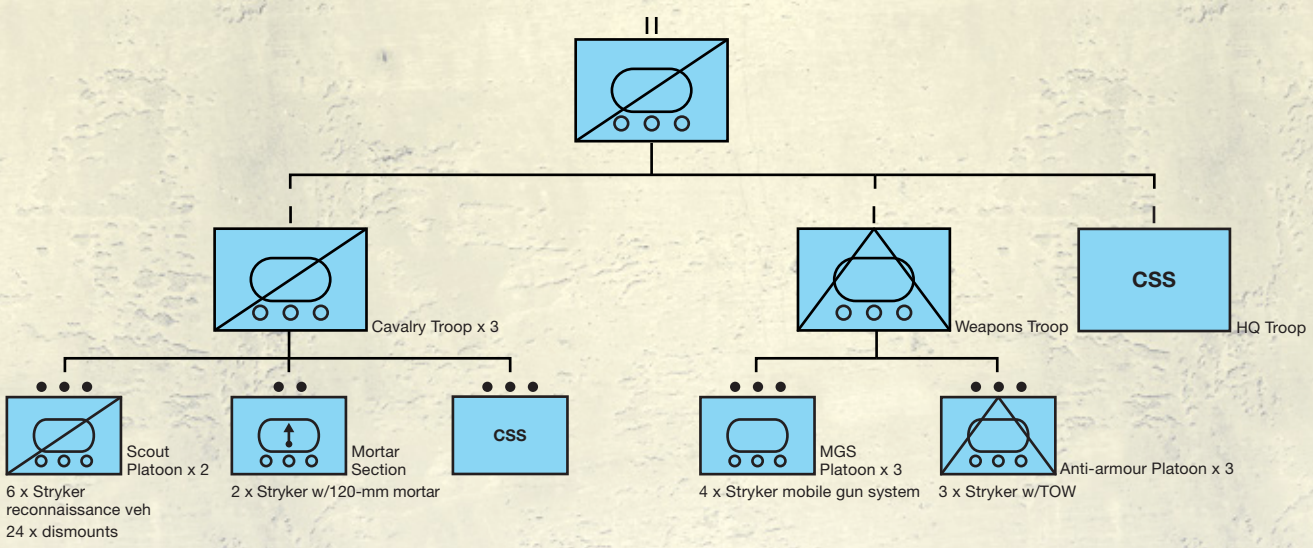


Figure 4: Stryker Brigade Combat Team Cavalry Squadron (2016).

Other critics of reduced troop size quickly emerged. In 1999, the Royal Canadian Dragoons experimented with five-, seven-, nine- and thirteen-car (!) reconnaissance troops before concluding that the seven-car troop was optimal for many of the same reasons outlined by Cadieu.[68] The commanding officer (CO) of the Dragoons, P. J. Atkinson, entirely dismissed the idea that the four-car troop of his cavalry squadron was capable of reconnaissance and surveillance tasks and assigned those to his dedicated reconnaissance squadron.[69] Future Lord Strathcona's Horse (Royal Canadians) CO, Major P. P. J. Demers, concluded vociferously that "five-car troops have proven to be inadequate, even in peace support operations, in properly conducting route, area, or zone reconnaissance or escort tasks. Clearly screen or guard tasks are even more significantly hampered by the reduced troop size."[70]

The RCAC can perhaps be forgiven for once again dabbling with reduced troop size in its reconnaissance organizations, given that a cursory examination of some of our Allies' doctrine might suggest that it is a viable construct. Our American allies experimented with the cavalry squadrons of their Stryker BCTs, introducing four-vehicle platoons in 2003. Extensive testing (both at the National Training Center and in combat operations in Iraq) revealed that it took an entire troop (company) to conduct reconnaissance of a single route as a result of the limited platoon size.[71] The Americans rectified that structural deficiency in 2016, increasing platoon size to six vehicles while retaining only two platoons in the troop.[72] Marine light armoured reconnaissance (LAR) battalions, which utilize four-vehicle platoons, have explicitly accepted this deficiency in their doctrine, by stating that *single* route reconnaissance is a task for a full company (though LAR battalions have up to five subunits to compensate).[73] British armoured cavalry regiments resolve this deficiency by supplementing their four-vehicle Scimitar troops with sections from support or guided-weapons troops, thus making the size of the employed Scimitar troop in the six-to-eight vehicle range.[74] From that, we can conclude that the four-vehicle platoon/troop is by no means universal and that forces whose primary mission is the provision of information tend to be structured in such a way to optimize the completion of those tasks.

"TO FIGHT OR NOT TO FIGHT": THE QUESTION OF STEALTH

The debate over whether mechanized reconnaissance/cavalry forces should (or can) conduct their mission by stealth or by fighting for information has dogged such organizations since their inception and has cropped up again in the Canadian cavalry concept.[75] McInnes contends that elements mounted in armoured vehicles are virtually incapable of conducting reconnaissance by stealth and should therefore be structured to fight for information (in four, four-vehicle troops). He dismisses the possibility of mounting a significant dismounted element in armoured reconnaissance units "as one would naturally detract from the other."[76] McInnes, then, is firmly in the camp that argues that armoured reconnaissance elements should fight for information.

However, proponents of the Canadian cavalry concept, and others who have made this argument over the years, create a false dichotomy between stealth and the ability to fight for information. In his comprehensive study of manoeuvre reconnaissance in American history, Robert S. Cameron concludes that "doctrine must embrace the value of both fighting and stealthy reconnaissance … The ability to fight for information or collect a steady stream of intelligence from an undetected observation post are both

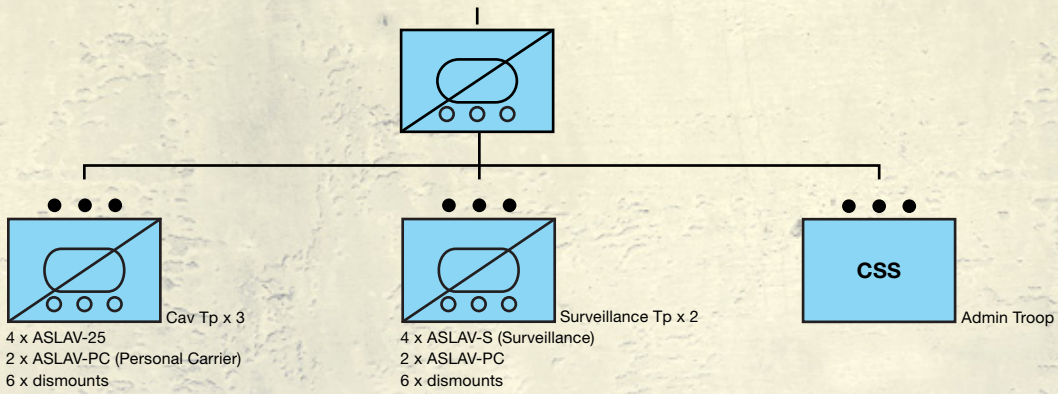


Figure 5: Australian Cavalry Squadron (2014).

valid methods of securing details on threat activities. They are not mutually exclusive but complementary."[77] Indeed, as we saw above, both the U.S. and British Armies characterize cavalry organizations by their ability to conduct their tasks through either method.[78] Arguably, the most salient feature of cavalry in both armies has been the *flexibility* to do so.

Whether a cavalry force conducts its reconnaissance function by stealth or through fighting is less a matter of choice and more a question of tactical conditions. Figure 5 proposes a relationship between the manoeuvre space available to a reconnaissance or cavalry force and the amount of combat power required to accomplish its information-gathering tasks. In relatively static conditions with two opposing forces already closely engaged (such as on the Western Front during the First World War or the Italian Front in the Second), cavalry forces will struggle to fulfill their optimal information-gathering function. They will instead conduct economy of force tasks or even re-role to other functions.

In the middle of the spectrum, cavalry is often forced to fight for information and concentrate its assets to achieve its core function. Many recent counterinsurgencies (such as American and Australian cavalry in Vietnam or our own recent experience in Afghanistan) could arguably fall into this category. With every culvert and piece of disturbed earth a potential "enemy," the *psychological* distance between a counterinsurgent force and its guerrilla opponents is minimal indeed.[79]

Cavalry, however, *thrives* in conditions where manoeuvre space is plentiful. It can take maximum advantage of its mobility differential between both the supported friendly force and the enemy. In particular, when a breakthrough has been achieved or conditions enable a great deal of physical space between belligerents (such as following the Normandy campaign or the recent French cavalry operations in Mali), cavalry is the optimal force to conduct pursuit and exploitation operations, ranging far ahead of their supported force (in the above campaigns, sometimes by days and hundreds of kilometres).

A significant portion of cavalry's flexibility to operate across this continuum of manoeuvre space and combat power comes from the option entirely dismissed by McInnes: the provision of substantial numbers of dismounted soldiers in a cavalry unit. As Figures 3 and 9 show, the vast majority of reconnaissance and cavalry organizations utilized historically and today have had significant dismounted components at either the platoon/troop or subunit level. The ability to dismount has long been considered essential for all armoured crews, as George S. Patton noted in the early days of the Second World War: "When any of you gets to a place where your experience tells you there is apt to be an anti-tank gun or mine or some other devilish contrivance of the enemy, don't ride up in your scout car or tank like a fat lady going shopping, stop your vehicle, take a walk or crawl and get a look."[80] In particular, cavalry units must possess dedicated dismountable components that do not compromise the operation of the unit's armoured fighting vehicles (i.e. an assault troop or the scout squads of U.S. Army, U.S. Marine and Australian cavalry/light armour units). Indeed, the presence of integral dismount elements is part of what distinguishes cavalry units from traditional armoured ones, and Cameron concludes that "[r]econnaissance organizations require a robust dismount capability. The ability to dismount ensures a degree of stealth capability even for heavily armed and armored reconnaissance organizations."[81]

The requirement for a dismounted capability is the closest parallel between modern mechanized cavalry and the horse cavalry of the late nineteenth and early twentieth century, which armies primarily utilized for its mounted mobility, but they often conducted reconnaissance or fought dismounted to maximize firepower and survivability.[82] From that, we must conclude that where armour's core competency

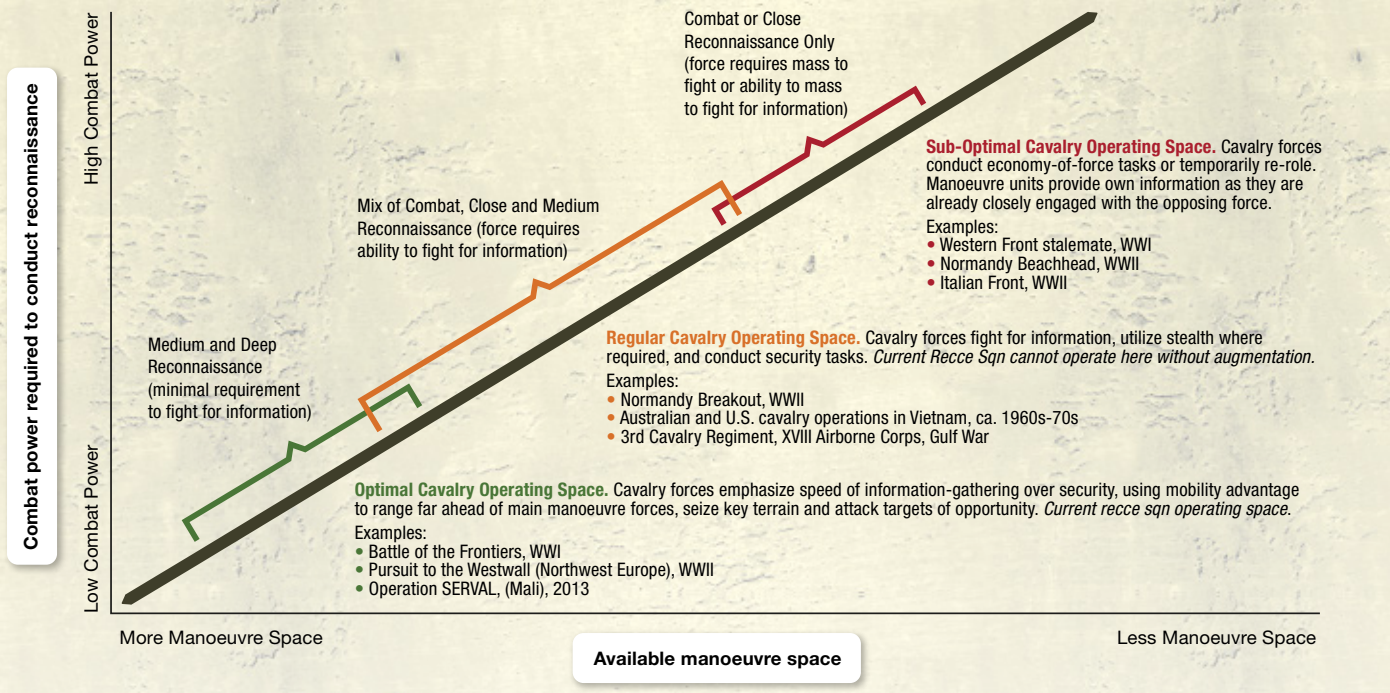


Figure 6: Influence of Available Manoeuvre Space on Reconnaissance Operations.

is mounted *combat*, the core competency of cavalry must be mounted *mobility* with the choice of whether to operate (or fight) mounted or dismounted being dictated by the tactical situation. A robust dismount capability is useful in either extreme and, as we shall see, along with other combat enablers, is essential for the conduct of cavalry's second prominent role: security operations.

CAVALRY IN SECURITY OPERATIONS

Security operations (which include screening, guards, and covering forces) are the other significant role of cavalry units. They are also closely tied to the provision of information, early warning and protection to supported formations.[83] Current Canadian reconnaissance squadrons are capable of only the least kinetic of these tasks: the conduct of screens where there is no requirement to protect the main force by "fighting to gain time" or "intercepting, engaging, delaying, disorganizing and deceiving the enemy before he can attack the covered force."[84] Genuine cavalry organizations must be capable of conducting the more kinetic end of security operations if they are truly to be of use to their supported formation. Our allies have recognized that cavalry must be capable of fighting in its security role and have organized their cavalry elements accordingly. However, they have not created units capable of fighting highly contested guard or covering force actions by merely increasing the number of AFVs or organizing their cavalry organizations like those of armour, as Canadian cavalry concept proponents would have us do. Instead, they have emphasized the inclusion of integral combat support elements within their units along with the dismounted capability discussed above.

Figure 9 shows the same cavalry and reconnaissance units examined in Figure 3 compared based on their available integral combat support enablers and where they were echeloned. Several trends quickly emerge: first, as we have already seen, a dismounted capability is nearly universal and may arguably be the single capability that defines cavalry units (as opposed to light armour or armoured car units, which generally lack dismounts). A close second is the existence of anti-tank capability and/or direct fire support assets. Finally, integral indirect fire assets in the form of mortars exist in most of the examined units. It is important to note that they are *integral* assets, not ad hoc attachments for temporary tasks. It is the ability to conduct all of its assigned functions without significant enhancement through attachments that makes a cavalry element effective (and distinguishes a cavalry organization from the current Canadian reconnaissance squadrons). As Cameron argues, "units dependent on regular augmentation to perform their missions are improperly designed."[85]

The addition of significant combat support elements, all mounted in highly mobile platforms with the associated agility of all mounted units, allows cavalry to combine a high degree of firepower delivered rapidly to any location on the battlefield with a relatively low-density of personnel. For instance, American mechanized cavalry reconnaissance squadrons in 1944 could generate 200% more firepower than an infantry battalion while possessing only 75% of the manpower.[104] Cavalry then is a multi-arm element that utilizes its integral combat enablers to achieve its tasks at the more kinetic end of the security operations spectrum and is best characterized by high firepower, high mobility, and low personnel density.

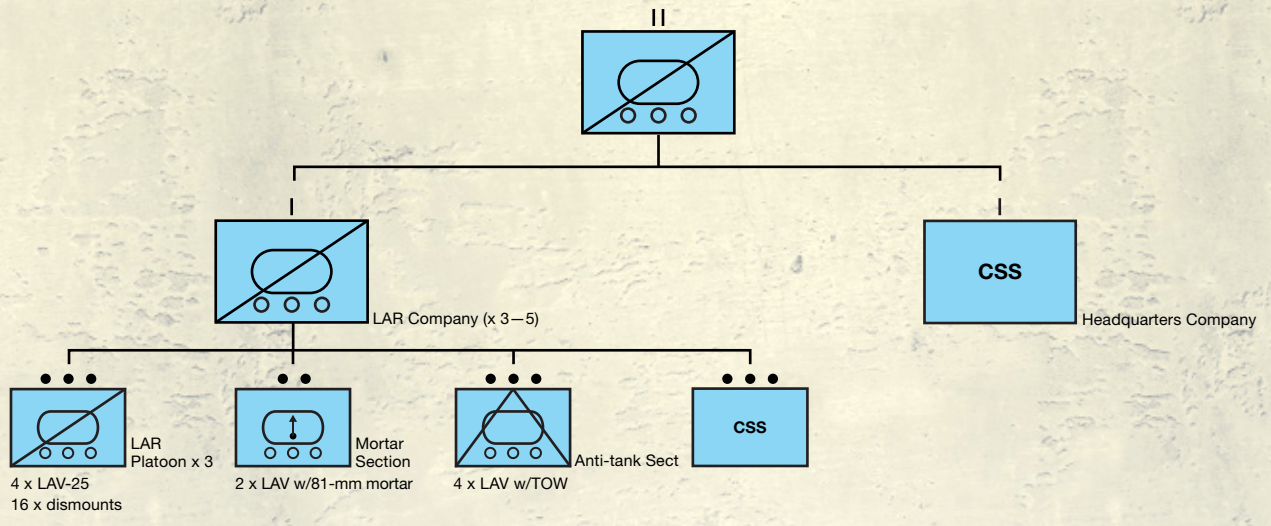


Figure 7: U.S. Marine Corps Light Armoured Reconnaissance Battalion (2009).

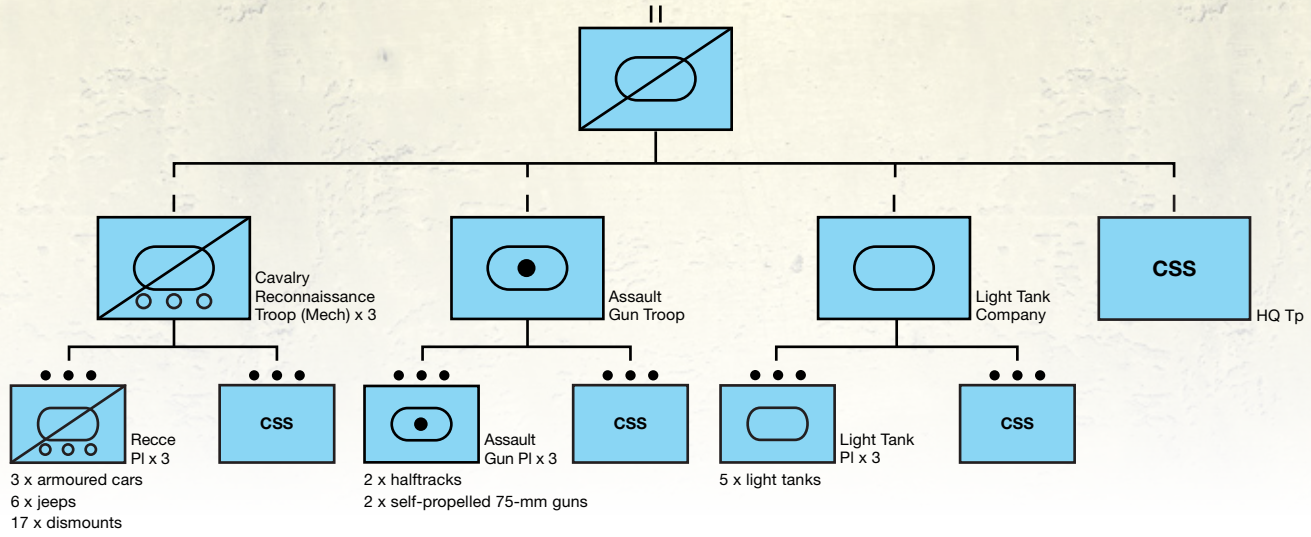


Figure 8: U.S. Cavalry Reconnaissance Squadron (Mechanized) [1944].

Those inherent characteristics of cavalry units make them the optimal choice for economy of force offensive or defensive tasks within a formation. However, it is essential to recognize that they do not achieve success in these missions by fighting symmetrically to their opponents, pitting cavalry (which are less protected and more sensitive to personnel casualties) against their enemies' strength. For instance, American Stryker cavalry squadrons emphasize the necessity for flexible groupings of anti-tank and mobile gun system assets with cavalry scouts to allow them to succeed against conventional enemy forces in "hunter-killer" teams.[105] LAV-equipped Marine units in the Persian Gulf War fought a classic cavalry engagement against attacking Iraqi armour in January 1991 as part of their duties as the formation guard force. However, they did so by applying asymmetric tactics, making heavy use of air and artillery support, integral anti-tank assets, and dismounted capabilities.[106] The ability of cavalry to conduct economy-of-force tasks results from them being structured with sufficient combat power to accomplish their fundamental security mission.

CONSENSUS ON CAVALRY

The above analysis of historical and current cavalry organizations among our allies reveals remarkable consensus in cavalry elements' basic structure and mission. Cavalry is a specialized reconnaissance and security element, structured to conduct its primary tasks and capable of fighting for information. It contains integral combat support elements and is characterized by high mobility, high firepower, and low personnel density.

SELECT RECONNAISSANCE AND CAVALRY ORGANIZATIONS	MORTARS (LIGHT, MEDIUM OR HEAVY)			ANTI-TANK (MOUNTED/ DISMOUNTED ANTI-TANK GUIDED MISSILE OR TOWED ANTI-TANK GUN)[87]			DIRECT FIRE SUPPORT (TANKS OR ASSAULT GUNS)[88]			DEDICATED DISMOUNT ELEMENT[89]		
	Unit	Subunit	Sub-Subunit	Unit	Subunit	Sub-Subunit	Unit	Subunit	Sub-Subunit	Unit	Subunit	Sub-Subunit
UK Armoured Cavalry Regiment (2019)[90]				X						X	X	
U.S. Mechanized Cavalry Reconnaissance Squadron (1944)[91]			X				X					X
U.S. Division Armoured Cavalry Squadron (ca.1964)[92]			X						X	X		X
Cavalry Squadron, U.S. Armoured Brigade Combat Team (2016)[93]		X				X	X					X
Cavalry Squadron, U.S. Stryker Brigade Combat Team (2016)[94]		X		X		X	X					X
U.S. Marine Corps Light Armored Reconnaissance Battalion (2009)[95]		X			X							X
Australian Cavalry Regiment (2004)[96]												X
Australian Cavalry Squadron (2016)[97]	N/A			N/A			N/A			N/A	X	X
Canadian/UK Division Reconnaissance Regiment (1944)[98]	X		X	X							X	
4 Canadian Mechanized Brigade Group Reconnaissance Squadron (ca. 1960s)[99]	N/A	X		N/A		X	N/A			N/A	X	
Canadian Light Armoured Regiment (1972)[100]		X							X		X	
Canadian Brigade Reconnaissance Squadron (1979)[101]	N/A			N/A			N/A			N/A	X	
Canadian Division Reconnaissance Regiment (1988)[102]								X			X	
Canadian Brigade Reconnaissance Squadron (2015)[103]	N/A			N/A			N/A			N/A		

Figure 9: Select reconnaissance and cavalry organizations compared based on integral combat support enablers.[86]

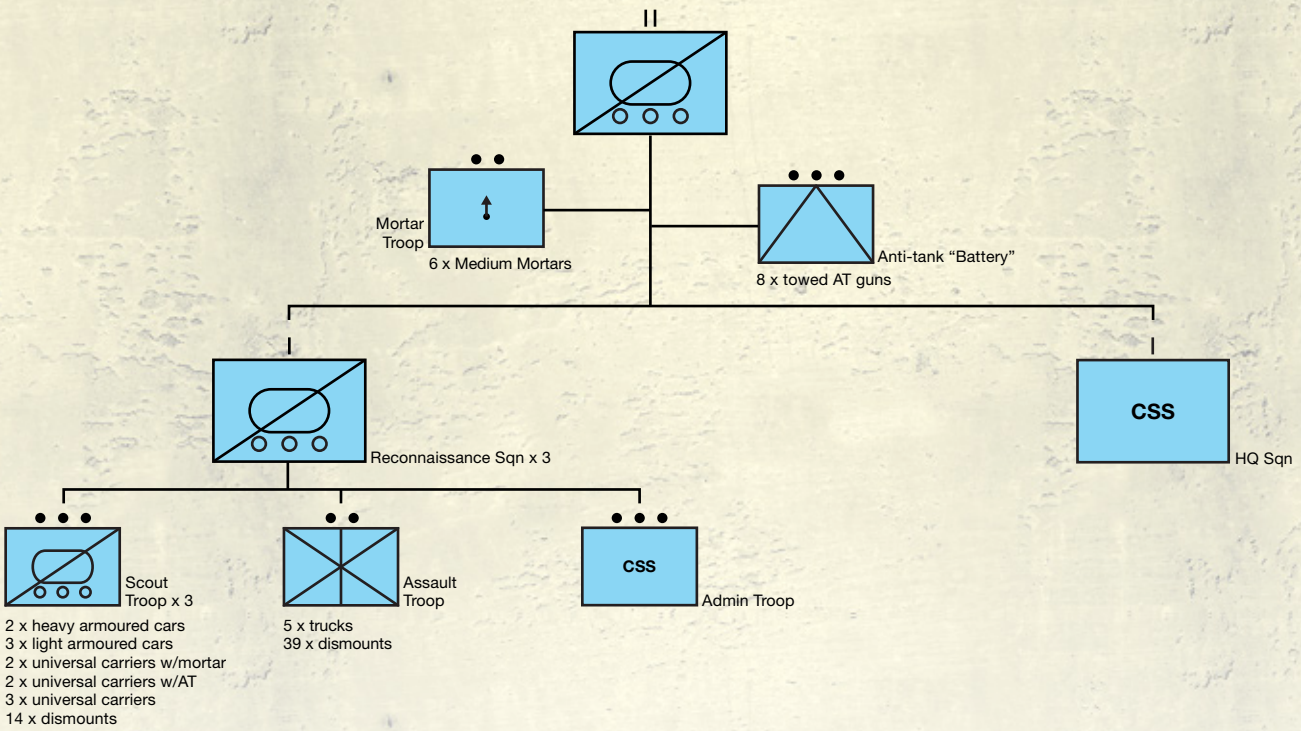


Figure 10: Second World War Proto-Cavalry? (Division Reconnaissance Regiment, 1944).

It is an inherently flexible organization capable of gaining information by stealth or by combat and reorganizing to engage in specific tasks. Its core competency is mounted mobility, with the decision to operate mounted, dismounted, or in a hybrid form dictated by the situation and the cavalry organization's task.

That definition of cavalry is radically different from that proposed in the currently in-vogue Canadian cavalry concept, which proposes using light armoured vehicles in structures similar in form and tactics to tank squadrons, reviving the tank-trainer concept that Canada has utilized before. However, Canada should not be so quick to dismiss the cavalry structures of our allies. Indeed, they may provide an ideal model for the RCAC to structure itself upon in the ongoing discussions surrounding Force 2025. Conveniently, the RCAC also has a rich history of mechanized cavalry tradition to draw upon in discussions of this nature.

CANADIAN PROTO-CAVALRY: FROM THE SECOND WORLD WAR TO PRESENT

Proponents of tank-trainer/cavalry concepts are fond of pointing to Canada's tank-equipped armoured reconnaissance regiments of Canada's Second World War RCAC as exemplars for units that conducted a range of tasks using explicitly tank-tactics.[107] However, they are less likely to comment on Canada's infantry division reconnaissance regiments of the Second World War, which have not received significant scholarly attention in Canadian military history.[108] As such, their operational role and experience are not well understood in the Canadian Army of today. Unlike the armoured car regiments assigned directly to corps (which were purely armoured vehicle formations with limited combat support enablers), and the tank-equipped armoured reconnaissance regiments, which were designed "to carry out the role of *close reconnaissance* [emphasis added] on the armoured divisional front, and of detailed reconnaissance after contact has been gained,"[109] division reconnaissance regiments (also part of the RCAC) were well-balanced, all-arms units operating in the medium reconnaissance role for infantry divisions.

In 1944, during the fighting in Northwest Europe and Italy, a division reconnaissance regiment was made up of three squadrons. Each squadron deployed three "scout troops," which consisted of *twelve* integral armoured vehicles, including armoured cars and universal carriers with anti-tank weapons and mortars.[110] At squadron level, an assault troop of infantry-trained soldiers provided a dedicated dismounted element.[111] At regimental level, there was an anti-tank battery of towed anti-tank guns and a troop of medium mortars, both of which were designed to be quickly allotted down to squadron- or troop-level command.[112]

Existing training pamphlets emphasize the flexible nature of these regiments, with "troops and even sections" capable of operating on independent tasks at a great distance from regimental support and with a suite of combat support enablers.[113] That allowed the regiment to cover vast distances in reconnaissance tasks, with each combined-arms

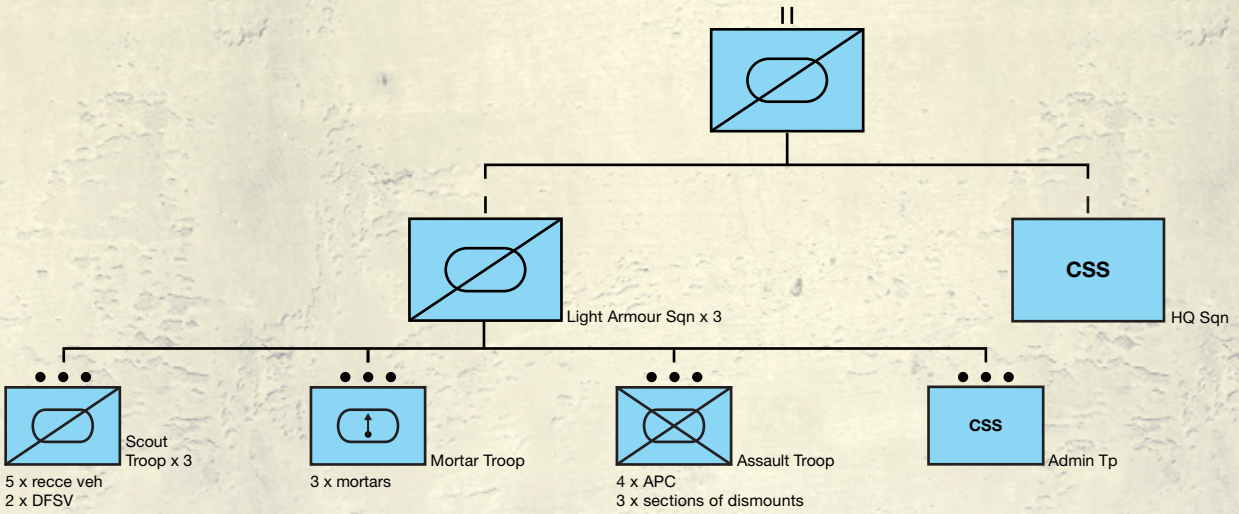


Figure 11: LCol St. Aubin's attempt to bring cavalry to Canada (Canadian Light Armoured Regiment, 1972).

scout troop grouping being assigned a single major route to recce in support of an advance.[114] However, the significant mounted and dismounted firepower contained in a unit smaller in manpower than an infantry battalion, but far more mobile, allowed it to mass to conduct a broad range of "protection" tasks for infantry divisions at the squadron or regimental levels, including acting as covering forces, acting as an advanced guard, covering a withdrawal, seizing and holding vital ground "for a limited time," pursuing a "beaten and disorganized enemy," and providing a mobile reserve of firepower.[115]

In optimizing for reconnaissance and security tasks, integral combat support elements, high mobility and firepower, and the ability to fight for information mounted or dismounted, division reconnaissance regiments were clearly cavalry in all but a formal title. Indeed, the men of these units considered themselves to be cavalrymen.[116] Despite being attached to infantry formations, these units of the RCAC were all formed from prewar militia cavalry units, and they maintained those traditions throughout their extensive combat experience in Italy and Northwest Europe.[117] Canadian commanders seemingly valued the characteristics of these units. Even as they converted the tank-equipped armoured reconnaissance regiments to simply being armoured regiments and converted armoured car regiments to other roles, they maintained the infantry divisions' reconnaissance regiments in the postwar period.[118] By 1947, the "divisional regiment, RCAC" of all postwar Canadian divisions was made up of a mix of armoured cars, light tanks, and armoured personnel carriers (APC) and was unmistakeably a descendent of the wartime reconnaissance regiment.[119] In short, the only two combat-proven RCAC unit types to survive the Second World War (in an organizational form) were armoured regiments and the long-forgotten reconnaissance regiments.

Given the lack of a division on the regular order of battle in the postwar Canadian Army, these division reconnaissance regiments in their proto-cavalry Second World War form did not reappear in the RCAC, which instead toyed with the structure and equipment of its brigade group reconnaissance squadrons for much of the Cold War.[120] Perhaps ahead of their time, attempts were made at a revival of the sort of multi-arm, flexible, reconnaissance and security units that were of such broad utility in the Second World War. Historian Sean Maloney outlines how in 1967, Lieutenant-Colonel J. A. St. Aubin (CO, 8th Canadian Hussars [Princess Louise's]) studied Canada's Second World War reconnaissance units' experiences extensively and concluded that purely light AFV-equipped units "could not acquire the information necessary for the commander to reach appropriate decisions in a mid-to-high intensity war."[121] St. Aubin was also strongly influenced by the American cavalry doctrine of the day. In response to those two influences, he reorganized his unit along multi-arm cavalry lines with integral dismounts, mortars, and DFSV in each reconnaissance squadron.[122] His regiment became the model for the 1972 "light armoured regiment" to which all Canada-based armoured regiments were to convert.[123]

Of course, this reorganization never took place, as other units of the RCAC immediately grouped the tanks they were issued as DFSV-surrogates into small tank squadrons. When the DFSV (the Cougar) was finally procured, it was immediately employed in the tank-trainer role.[124] Canada's first attempt to revive its successful Second World War cavalry traditions had failed. A second near-revival took place in the 1980s as part of the Corps 86 Force Development project. The (highly) notional Canadian Corps in this structure was supported by an "armoured cavalry brigade group" conducting "security and reconnaissance tasks" for its supported formation.[125] Division reconnaissance

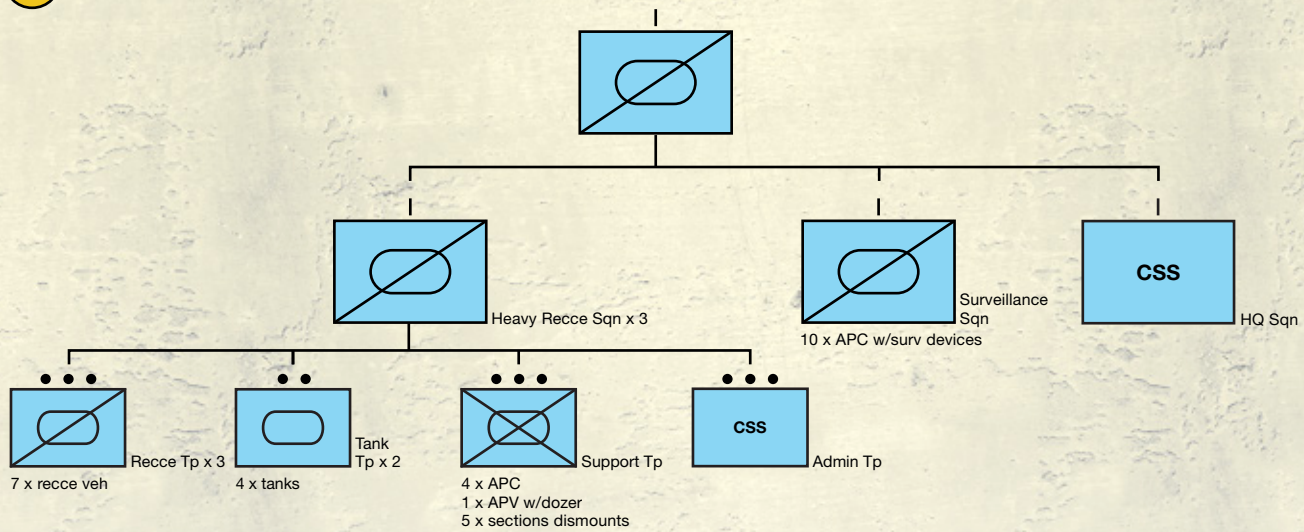


Figure 12: Canadian Division Reconnaissance Regiment, 1988 (not fielded).

regiments were to be multi-arm organizations of dismounts, reconnaissance vehicles and a small complement of tanks, conducting similar reconnaissance and security tasks at the division-level.[126] The post-Cold War period's peace dividend aborted the creation of even the smaller of these units. When "cavalry" subunits finally came into being in Canada, it was the rebranded DFSV tank-trainer squadrons of the 1990s.

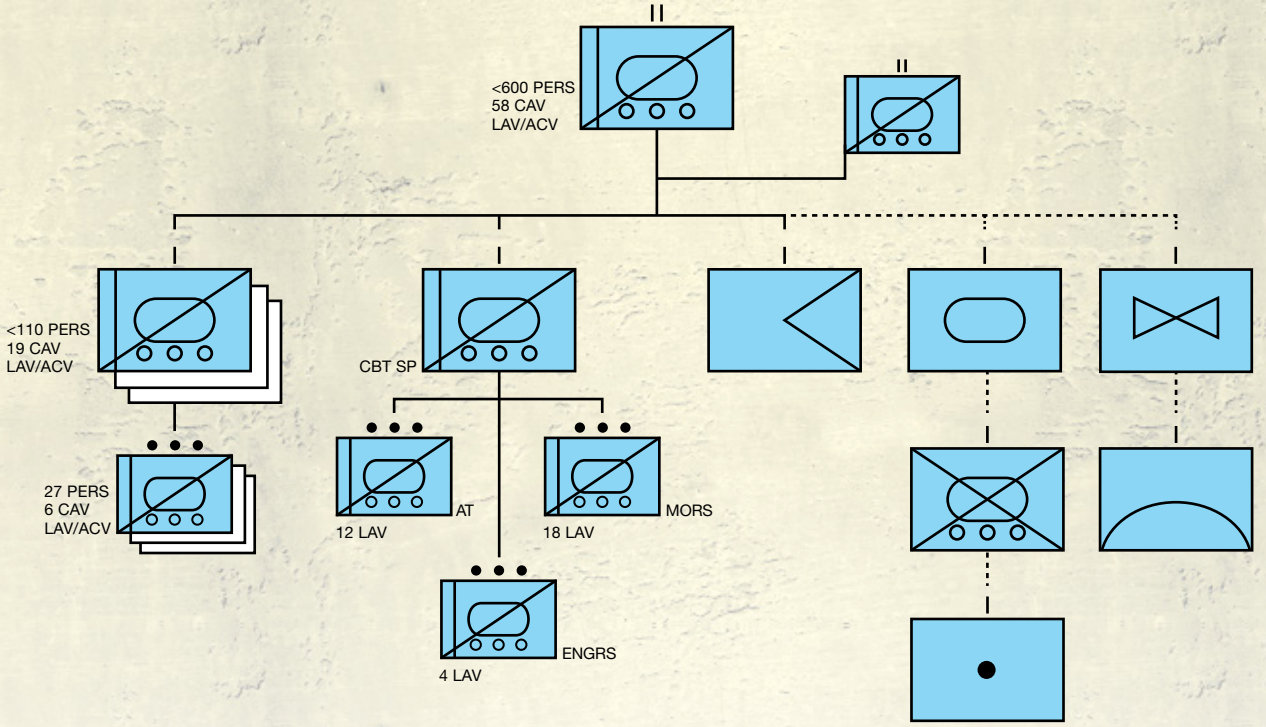
Like Lieutenant-Colonel St. Aubin in the 1960s, some RCAC officers proposed a way out of the doctrinally dubious tank-trainer concept. In 1999, then-Major S. J. Bowes confronted the reality that the reorganization of armoured regiments to contain reconnaissance, armour (tank) and cavalry subunits had made it "inconceivable that any one of the armour regiments could be cohesively deployed as a multipurpose, combat-capable unit without a major reorganization."[127] He proposed creating a Canadian "light cavalry regiment" along the lines of the light armoured regiment of the past and drawing heavily on then-current American cavalry doctrine. This unit would be structured for the provision of reconnaissance and security and equipped with plentiful dismounted capability and the requisite combat support enablers, including mortars and anti-tank vehicles.[128] Unfortunately, Bowes' proposal to create highly flexible cavalry units in the Canadian Army seems to have been a non-starter. The units of the RCAC have continued along to the present day, seemingly fretting over a perceived imbalance between the light and heavy subunits that constitute it.

RECOMMENDATIONS

Though the RCAC's historical precedent would suggest that it is likely to retread the well-worn path of generating and calling what essentially amounts to tank-trainer squadrons "cavalry," perhaps the time has come to pursue an *actual* cavalry capability along lines that our allies would understand and that they have proved in decades of combat across the spectrum of operations. Indeed, to maintain the relevance of itself as an institution, the adoption of a true cavalry capability may be necessary for the survival of the RCAC as the mounted arm of manoeuvre. To that effect, below are several recommendations for a way forward:

1. **Doctrine:** Define cavalry's role in Canadian doctrine. Such a definition could be a variation of the following: *The role of cavalry is to conduct reconnaissance and security for its supported formation through a combination of mobility, firepower, and flexibility.* Cavalry's characteristics in Canadian doctrine should and must include its core competency as mounted mobility, the ability to accomplish its missions by either stealth or force, the flexibility to operate mounted or dismounted, the provision of integral combat support capabilities, and its suitability for economy-of-force tasks.

2. **Royal Canadian Armoured Corps Structure:** The Army should acknowledge the growing proliferation of full cavalry *units* (vice subunits) at brigade level amongst our allies and accept the reality that we can consequently no longer count on augmentation from higher-level allied cavalry units in operations. It may be worth examining whether a Canadian mechanized brigade group (CMBG) requires a cavalry *regiment* for the conduct of reconnaissance and security tasks. Such a unit would provide the Army with a self-contained and unique capability that could operate as part of its parent formation or help to fill the formation-level reconnaissance gaps that exist in Allied structures. Significant work remains to be done to design such a regiment, taking into account the requirement to provide integral combat support capabilities (including antitank and



Note: Although the Mortar Platoon is depicted under the control of Combat Support Squadron, each of the three firing groups would normally operate in support of a squadron and is comprised of two firing teams and a mortar fire controller (MFC). The platoon retains the capability to support regimental operations.

Figure 13: S. J. Bowes' proposed light cavalry regiment. From: S. J. Bowes, "The Case for a Light Cavalry Regiment (LCR) for Canada's Army," *Canadian Army Doctrine and Training Bulletin* 2.4 (Winter 1999): 111.

potentially indirect fire elements) as well as sufficient dismounts. Admittedly, some capabilities may require the expansion of existing procurement programs, the initiation of new ones, or the reallocation of existing equipment, and initially a cavalry regiment may have to be designed for-but-not-with certain types of equipment. However, we could do far worse than returning to S. J. Bowes' proposal, that of the St. Aubin's light armoured regiment or even Second World War-era division reconnaissance regiments to seek guidance in designing a modern Canadian cavalry regiment. Given that significant quantities of new equipment and personnel are unlikely to appear overnight, it may be necessary to sacrifice total numbers of subunits to build correctly enabled cavalry units. Still, the increase in employability should more than offset this difficult institutional change.

3. **Army Structure:** The Army is currently examining itself through the Force 2025 initiative and is at least tacitly considering the notion of "asymmetric brigades" once again, where light, medium, and heavy formations could be created across the Army.[129] The RCAC should be the loudest voice in the room in favour of such a move. The creation of light, medium, and heavy forces would allow the Corps to concentrate its medium and heavy mechanized forces to the greatest possible effect and ensure that existing mechanized forces are properly enabled with *both* cavalry and armour assets. For instance, a heavy brigade could consist of an armoured regiment and a cavalry regiment, with a medium brigade supported by a cavalry regiment (with a potential for a dual-mission of providing light armour support to a light brigade).[130] Currently, the RCAC spreads itself thin across three CMBGs; the Corps should seize the opportunity to ease that stress on the institution.

4. **Mindset:** Accept that cavalry exists to complement the traditional ground manoeuvre elements, armour and infantry. Discard the notion of "platform neutrality" introduced in recent Canadian armoured doctrine and associate armour strictly with the combination of mobility, firepower, and protection currently resident in the tank. Further, at least one tank-equipped armoured regiment should remain in the RCAC. Cavalry, however, is not subordinate to either infantry or armour in the doctrinal hierarchy but is a distinct capability all its own. Throughout history and on a variety of mounts, cavalry has always been an entity distinct from the other arms (including, after its introduction, armour) and has often seen itself as an *elite* force. Cavalry organizations in many nations have sought to attract and recruit the best (and most dashing) soldiers of many historical and contemporary armies. Modern cavalry fills a vital

role and acts as the commander's eyes and ears on the battlefield. It is often the first formation into the ground fight and conducts perhaps the widest variation of tactical tasks of any arm. Canadian cavalry should adopt this mindset wholesale, and, indeed, all armour officers and non-commissioned members should ideally serve in both organizations throughout their careers, regardless of regimental affiliation.

CONCLUSION

The adoption of a conception and structure of cavalry as outlined above would constitute a return to the forgotten history of our Second World War division reconnaissance regiments. It would also be a suitable acknowledgement of the postwar RCAC officers who attempted to reintroduce this unique capability in Canada. More importantly, it would constitute a recognition that cavalry as a capability is distinct in function and structure from armour. This is not to say that both branches of mounted manoeuvre should not coexist under the existing RCAC structure. For a resource-constrained mounted force trying to define itself for the next decade and beyond, operating in a multinational environment where increasingly we will be unable to count on the provision of division- or corps-level cavalry organizations of comparable capability by our allies, perhaps now is the opportunity for Canadian cavalry to ride again.

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ENDNOTES

1. Matthew McInnes, "First Principles and the Generation of Armoured Fighting Power," *The Canadian Army Journal* 17.3 (2017): 84.

2. Canada, Department of Defence, The Army Lessons Learned Centre, B-GL-050-000/FT-003, *Dispatches: The Royal Canadian Armoured Corps in Afghanistan* 18.1 (April, 2016): 19.

3. Phillip J. Halton, "The Re-Transformation of the Armoured Corps," *The Canadian Army Journal* 17.3 (2017): 65.

4. Commander, Canadian Army, "Force 2025 – Commander's Planning Guidance," DLFD S1-2, dated 10 September 2020.

5. Indeed, internal Corps conflict may be built straight into the foundation of the RCAC's origins as a compromise grouping of technically minded advocates of mechanization and the diehard horse cavalrymen of Canada's interwar Army, many of whom resisted the inevitable death of their traditional arm to the bitter end. For a discussion of the interwar tensions between traditionalists and advocates of mechanization in Canada, see J. L. Granatstein, *The Generals: The Canadian Army's Senior Commanders in the Second World War,* (Toronto: Stoddart Publishing Co., 1993), 122–124.

6. See Sean M. Maloney, "A Proportion of Their Cavalry Might Be Converted: Light Armoured Force Development in Canada's Army, 1952–1976," *The Army Doctrine and Training Bulletin* 2.4 (Winter 1999): 83–103.

7. Of course, the Canadian Army was not titled as such during the 1990s, where the country's ground forces changed title from "Mobile Command" to "Land Forces Command." However, this article will utilize the commonly used title "Canadian Army" to refer to all of Canada's historical land forces despite the official nomenclature of the day.

8. Some notable examples include: P. J. Atkinson, "The Armoured Combat Vehicle and the Future of the Armoured Corps," *The Army Doctrine and Training Bulletin* 2.4 (Winter 1999): 104–106; Charles Branchaud, "Let's Face Reality," *The Army Doctrine and Training Bulletin* 2.4 (Winter 1999): 116–117; Richard Moreau, "Concept for the Employment of the Cavalry Squadron," *The Army Doctrine and Training Bulletin* 2.4 (Winter 1999): 118–125; Jeff Barr, "Let's Have Another Look: Employment Options for the Equipment Redistribution Plan Reconnaissance Squadron," *The Army Doctrine and Training Bulletin* 2.4 (Winter 1999): 126–138; Dave Banks, "A Single Combat Branch," *The Canadian Army Journal* 7.2 (Summer 2004): 26–33; Shane Brennan, "Time for Consideration: One Combat Arms Classification." *The Canadian Army Journal* 8.2 (Summer 2005): 52–65; C. M. Fletcher, "Armour at the Crossroads," *The Army Doctrine and Training Bulletin* 3.1 (Spring 2000): 26–30; Lee J. Hammond, "Tank: The Canadian Army's Four-Letter Word," *The Army*

Doctrine and Training Bulletin 4.4 (Winter 2001): 74–82; D. J. Senft, "The Mobile Gun System is Coming!... Now What?," *The Army Doctrine and Training Bulletin* 6.3 (Fall/Winter 2003): 26–32.

9. Halton, 67.

10. T. J. Cadieu, "Canadian Armour in Afghanistan," *The Canadian Army Journal* 10.4 (Winter 2008): 5.

11. The TAPV and the LRSS are not the first vehicles to cause doctrinal churn in the RCAC. The Coyote, now in its third decade of service with a generation of armoured soldiers who appreciate many of its characteristics, was not universally acclaimed upon arrival in the 1990s and led to a similar re-examination of doctrine and the development of new tactics, techniques and procedures. For a discussion of the doctrinal teething problems with the Coyote, see Senft, 26.

12. Halton, 78.

13. Ibid., 75.

14. Fletcher, 26–30.

15. The "cavalry" moniker can possibly be credited to the Lord Strathcona's Horse (Royal Canadians), who have been referring to their DFSV squadron by this title since at least 1997. See Atkinson, 105.

16. Major Richard Moreau went as far as to assert that the permanent organization of Coyotes into the four-car troop cavalry squadrons would mark "the end of the armoured corps," as the institution would have ceased to provide anything unique in terms of firepower, protection, or mobility to the combined arms fight. See Moreau, 119.

17. In arguing for a single-combat branch containing infantry, armour, artillery, and engineers, Lieutenant-Colonel Dave Banks contended that "regrouping all LAV Coyote in armoured regiments is, in [his] opinion, job protection." See Banks, 24.

18. See: Sean Maraj, "Discussion Paper – Revisiting the Concept of Armoured Cavalry," *Armour Bulletin* 47.1 (2014): 48–51; J. W. Ring, "Armoured Bulletin Cavalry Article – What is Canadian Cavalry," *Armour Bulletin* (2015): 57–60; and W. D. Lambie, "Armour or Calvary [sic]: Which Way to Turn," *Armour Bulletin* (2016): 48–50.

19. Ring, 57.

20. McInnes, 95.

21. Ibid., 95.

22. McInnes goes as far as to argue that the four-vehicle troop (regardless of platform) is the RCAC's "institutional vital ground." McInnes, 90.

23. McInnes cites the example of the Cougar tank-trainer concept favourably as part of his argument for a Canadian cavalry concept with existing AFV fleets. McInnes, 95.

24. Canada, Department of Defence, Canadian Army Doctrine Note (CADN) 17-1, *The Armoured Regiment in Battle*, (18 July 2017): 1–2.

25. Ibid., 3

26. Ibid., 4.

27. Proponents of the cavalry concept would argue that "armoured cavalry" should replace reconnaissance squadrons in the current definition and take over some (or all) of the tank squadron's tasks, blurring the distinction in tasks between tank elements (focused on a platform), and non-tank armour (which are platform-neutral).

28. United States of America. Headquarters, Department of the Army, ATP 3-90.1, *Armor and Mechanized Infantry Company Team*, (Washington, D.C.: 27 Jan 2016): 1–4; and United States of America. Headquarters, Department of the Army, FM 3-98, *Reconnaissance and Security Operations*, (Washington, D.C.: 1 July 2015): 1–3.

29. The British Army also has a further delineation of mounted manoeuvre forces known as "Light Cavalry." United Kingdom, Ministry of Defence, Capability Directorate Combat, Army Field Manual, Volume I, Part 1B, *Brigade Tactics*, Army Code 71982, (2012), 1–15; and United Kingdom, Ministry of Defence, Capability Directorate Combat, Army Field Manual, Volume I, Part 2, *Battlegroup Tactics*, Army Code 71648, (2014), 1–15.

30. The 1990 doctrinal statement associating armour directly and specifically with tanks is still current since the publication in question has not been superseded. This actually leaves Canada in the position of having two doctrinally correct definitions of armour: one associated directly with tanks and one subdivided into tank and armoured reconnaissance elements. See Canada, Department of Defence, B-GL-305-001/FT-001, *Armour, Volume I: The Armoured Regiment in Battle*, (31 December 1990), Chapter 1, Section 2.

31. Halton, 65.

32. It is worth noting that Canada's ratio between light and heavy armour subunits is actually quite comparable to our allies. Canada has three tank subunits and seven (including two understrength) reconnaissance subunits, meaning roughly 30% of our Corps' units are heavy. The Regular British Army by comparison has three light cavalry regiments, three armoured cavalry regiments, and three armoured regiments, meaning roughly a third of the Royal Armoured Corps is mounted in tanks. In 2015, the U.S. Army had 96 active-duty cavalry subunits (42 of them mounted in Humvees) and only 66 tank companies, meaning that just 41% of the subunits in the U.S. Armor Branch were heavy while the balance was made up of

light armour. It appears that having roughly a third of an armoured branch in tanks seems to be the norm across multiple armies. See Nathan A. Jennings, "Arming for Impact: Empowering Cavalry to Enhance Joint Combined-Arms Operations," *Armor* 125.1 (January–March, 2015): 116–120.

33. Cavalry in the U.S. Army use a different nomenclature from that of Commonwealth armies, which can lead to confusion. A cavalry "regiment" in the American context is a brigade-sized formation, "squadrons" are battalion-sized, "troops" are company-sized, and platoons make up the sub-subunits of troops. In Canada, "regiments" are battalion-sized, "squadrons" are company-sized, and "troops" make up the smallest sub-subunits.

34. United States of America, Headquarters, Department of the Army, ATP 3-20.96 (FM 3-20.96), *Cavalry Squadron*, (Washington, D.C.: 12 May 2016), 1-1.

35. Amos C. Fox, "On the Employment of Cavalry," *Armor* 133.1 (Winter 2020): 34.

36. Ibid.

37. See Robert S. Cameron, *To Fight or Not to Fight: Organizational and Doctrinal Trends in Mounted Maneuver Reconnaissance from the Interwar Years to Operation Iraqi Freedom* (Fort Leavenworth, KS: Combat Studies Institute Press, 2010), 371–372.

38. United Kingdom, Army Field Manual, Volume I, Part 2, *Battlegroup Tactics*, 1-15. Note that the British Army's adoption of the "armoured cavalry" unit structure in 2014 can be somewhat confusing given that there have always been "cavalry" units in the British Army—some historically organized for reconnaissance and some as armoured regiments. Today, some cavalry units are armoured cavalry (such as the Royal Lancers) and some are armoured (such as The Queen's Royal Hussars). Both maintain the connection to their cavalry traditions, while only the former is officially organized as an "armoured cavalry regiment." There is consequently a distinction between *historical* cavalry units and those organized for the role of modern cavalry today.

39. British armoured cavalry are equipped with combat vehicle reconnaissance (tracked) (CVR[T]) Scimitars with 30-mm cannons along with supporting anti-tank and dismounted capabilities. These are soon to be replaced with the Ajax family of vehicles, which provide increased combat capabilities. United Kingdom, Army Field Manual, Volume I, Part 2, *Battlegroup Tactics*, 1-A-1.

40. United Kingdom, Army Field Manual, Volume I, Part 1B, *Brigade Tactics*, 1-15.

41. McInnes, 105.

42. United States of America, ATP 3-20.96 (FM 3-20.96), *Cavalry Squadron*, 1-1.

43. Fox, 34.

44. In British parlance, this is referred to as "economy of effort." United Kingdom, Army Field Manual, Volume I, Part 1B, *Brigade Tactics*, 1-15.

45. United States of America, ATP 3-20.96 (FM 3-20.96), *Cavalry Squadron*, 5-1.

46. See Cameron, 395.

47. There is a concerted effort by some in the U.S. Armor Branch to return these cavalry units to higher-level formations. See Nathan Jennings, "Reconsidering Division Cavalry Squadrons, Part IV," *Armor* 132.2 (Spring–Summer 2019): 5–12; Joseph J. Dumas, "Modern Application of Mechanized-Cavalry Groups for Cavalry Echelons Above Brigade," *Armor* 131.3 (Fall 2018): 34–39; Nathan Jennings, "Fighting Forward: Modernizing U.S. Army Reconnaissance and Security for a Great Power Conflict," *Military Review* 99.6 (Nov–Dec, 2019): 100–108.

48. McInnes, 101.

49. This is the number of personnel that can be dismounted from vehicles without a consequent loss in combat capability for AFVs. For instance, a Coyote-equipped Canadian Recce Troop may dismount crew commanders and the surveillance operator in order to create a two-soldier dismounted team (for a total of 16 soldiers for the troop), but that would degrade the fighting capability of the AFV, so Coyote-equipped troops are indicated as having eight dedicated dismounts only.

50. United Kingdom, Ministry of Defence, Head of Warfare Development, *The Ground Reconnaissance Tactics Handbook*, Army Code 72118, (2019): 2–5.

51. Matthew Darlington Morton, "Men on 'Iron Ponies,' the Death and Rebirth of the Modern U.S. Cavalry," unpublished dissertation, (Florida State University, 2004): 349–352.

52. Peter S. Kindsvatter, "The Army of Excellence Divisional Cavalry Squadron – A Doctrinal Step Backward?," monograph, (Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1985): 44–46.

53. United States of America, Headquarters, Department of the Army, MCoE Supplemental Manual 3-90, *Force Structure Reference Data: Stryker Brigade Combat Team*, (Fort Benning: October 2016), 34.

54. United States of America, Headquarters, Department of the Army, MCoE Supplemental Manual 3-90, *Force Structure Reference Data: Armor Brigade Combat Team*, (Fort Benning: October 2016), 41.

55. United States of America, U.S. Marine Corps, MCWP 3-14, *Employment of the Light Armored Reconnaissance Battalion*, (2009): 2-2–2-3.

56. Roger Noble, "Australian Light-Armoured Vehicles (ASLAV) as Mounted Cavalry: Vanguard for a Hardened Army," *Australian Army Journal* 2.1 (Winter 2004): 39.

57. Australia, Australian Army, Doctrine Note DN 2-2014, *Combat Brigade Aide Memoire*, (30 June 2014): 1–17.

58. United Kingdom, Military Training Pamphlet No. 60, Part 4, *The Tactical Employment of Armoured Car and Reconnaissance Regiments: The Reconnaissance Regiment*, (1944), 2.

59. Maloney, 97.

60. Canada, Department of Defence, CFP 305 (2), *Armour, Volume II: Light Armoured Regiment*, (18 February 1972), 1-11.

61. Centurion tanks were employed in the DFSV role on an interim basis. Later the Cougar would be procured (and utilized in tank-trainer squadrons rather than in its intended role). See Maloney, 96–97.

62. Canada, Department of Defence, B-GL-305-002/FT-001 (CFP 305 (2), *Armour, Volume II: The Reconnaissance Squadron in Battle*, (9 February 1979).

63. Canada, Department of Defence, CAF Catalogue #07482A, *Division Reconnaissance Regiment in Operations* (training film), Direction and Production Coordination by Pierre Gadbois Productions Ltd, 1988, https://www.youtube.com/watch?v=oZcsp4lSDLk (accessed 6 Jan 2020).

64. Canada, Department of Defence, B-GL-394-002/FP-001, *Ground Manoeuvre Reconnaissance*, (2015): 2A-1-1.

65. T. J. Cadieu, "Alternatives to the Five Car Coyote Troop," *Armor Bulletin* 33.2 (September 2000): 12.

66. Cadieu recommended a return to seven-car troops, even if it meant utilizing a light platform instead of two more Coyotes. Cadieu, "Alternatives to the Five Car Coyote Troop," 13.

67. The requirement for crew rest in extended screen tasks is important, and observation posts are generally considered to consist of two vehicles at a minimum in order to provide for adequate crew rotation. Cadieu, "Alternatives to the Five Car Coyote Troop," 14.

68. The Dragoons also determined that AFV troops utilizing only mutual support by fire tactics (as proposed by Canadian cavalry-concept advocates) resulted in all tactical tasks taking up to 40% longer. One wonders if this figure would be similar or even vastly greater for a four-car troop of TAPVs, given the much shorter effective range of its main armament compared to the Coyote. See Barr, 126–138.

69. Note that Canada's brief 1990s experiment with DFSV/cavalry squadrons did not replace reconnaissance squadrons as the current restructure of the RCAC does. Atkinson, 105.

70. P. P. J. Demers, "The Brigade Reconnaissance Squadron – Recommended Organization Based on Multi-National Operations in Bosnia," *Armour Bulletin* 35.1 (2003): 25.

71. See Cameron, 443.

72. The choice to create two six-car platoons over three four-car platoons is an interesting one, indicating that the designers of the current Stryker cavalry squadrons prioritized the increased effectiveness of their platoons above simple gross numbers of sub-subunits. United States of America, ATP 3-20.96 (FM 3-20.96), *Cavalry Squadron*, 1–19.

73. United States of America, U.S. Marine Corps, MCWP 3-14, *Employment of the Light Armored Reconnaissance Battalion*, 3–5.

74. Interview with Captain Thomas Gray, Royal Lancers (Queen Elizabeth's Own), conducted 5 Feb 2021.

75. Robert S. Cameron says of the stealth vs fighting for information debate: "The related issues continue to defy permanent resolution, and, in fact, have been recurring points of debate at least since the 1930s." Cameron, xvi.

76. McInnes, 95.

77. Cameron, 576.

78. British Armoured Cavalry "can operate mounted to provide a responsive find capability for high tempo manoeuvre or, dismounted …." United Kingdom, Army Field Manual, Volume I, Part 1B, *Brigade Tactics*, 1-15; American cavalry squadrons all have varying levels of dismounted capability, United States of America, ATP 3-20.96 (FM 3-20.96), *Cavalry Squadron*, 1–8.

79. Therefore, the concentration of Canadian armoured reconnaissance troops into three to four vehicle patrols during the war in Afghanistan should not come as a surprise or be seen as a repudiation of existing Canadian doctrine. Indeed, regrouping for the conduct of specific security or economy of force tasks is precisely the sort of flexibility required of cavalry organizations. For a discussion of reconnaissance troop reorganization to support specific operational conditions, see Canada, B-GL-050-000/FT-003, *Dispatches: The Royal Canadian Infantry Corps in Afghanistan*, 7.

80. Quoted in Cameron, 41.

81. Ibid., 578.

82. See Michael Howard, *War in European History*, updated edition, (Oxford: Oxford University Press, 2009), 104.

83. Indeed, in Canadian doctrine, reconnaissance and security operations are tied together under the title of "enabling operations." Canada, Department of Defence, B-GL-300-001/FP-001, *Land Operations*, (1 January 2008) 7-109.

84. Ibid., 7-110.

85. Cameron, 577.

86. Note that this comparison includes only assets integral to the unit order of battle. Other units could be attached to the base organizations.

87. Includes dedicated AT assets only (i.e. excludes standard short-range-style weapons like Second World War-era anti-tank rifles or the current M72 light anti-tank weapon).

88. Includes all large-calibre direct fire guns including light tanks, medium tanks, main battle tanks, assault guns, tank destroyers, and the Stryker-based mobile gun system. Not all of these systems provided the ability to kill tanks of the day, though some did (and thus offset lack of anti-tank (AT) firepower elsewhere in the organization).

89. This only includes elements of *at least* section-size (eight+ personnel) with a dedicated command element (i.e. the 1–2 scouts per reconnaissance vehicle are not counted if there is not a purpose-designed command structure within the platoon/troop to command them upon dismount). Roles for these dismounts vary in the various organizations from operating as standard infantry, light engineering tasks, dismounted reconnaissance, etc.

90. United Kingdom, *The Ground Reconnaissance Tactics Handbook*, 2-5; note that British armoured cavalry regiments employed in experimenting with the "strike brigade" concept (such as the Royal Lancers [Queen Elizabeth's Own]) utilize a slightly different organization. They contain four reconnaissance squadrons (vice three), each with two Scimitar "FIND" troops and two "fire support" troops that combined the support and guided weapons troops of the base organization cited above. Interview with Captain Thomas Gray, Royal Lancers (Queen Elizabeth's Own), conducted 5 Feb 2021.

91. Morton, 349–352.

92. This squadron consisted of perhaps the most radical grouping of assets at the platoon-level in any cavalry organization, with a cavalry platoon consisting of armoured reconnaissance vehicles, tanks, infantry, and a mortar detachment (all under a second lieutenant). The squadron also included an air cavalry troop with scout and attack aviation as well as an airmobile rifle platoon. See Kindsvatter, 44–46.

93. United States of America, ATP 3-20.96 (FM 3-20.96), *Cavalry Squadron*, 1-9–1-21.

94. Ibid.

95. United States of America, U.S. Marine Corps, MCWP 3-14, *Employment of the Light Armored Reconnaissance Battalion*, 2-2–2-3.

96. Noble, 39.

97. Note that the cavalry squadron is a part of a three-squadron "armoured cavalry regiment" that contains a tank squadron, a cavalry squadron and an APC squadron. However, this organization is a force-generation HQ and does not deploy as a cohesive unit as well as having no combat support assets at regimental-level. See Australia, Australian Army, LWD 3-3-4, *Employment of Armour*, (2016): 23.

98. United Kingdom, *The Tactical Employment of Armoured Car and Reconnaissance Regiments: The Reconnaissance Regiment,* 2.

99. Maloney, 97.

100. Canada, CFP 305 (2), *Armour, Volume II: Light Armoured Regiment*, 1-11.

101. Canada, B-GL-305-002/FT-001 (CFP 305 (2), *Armour, Volume II: The Reconnaissance Squadron in Battle.*

102. Canada, *Division Reconnaissance Regiment in Operations* (training film).

103. UAS have been incorporated into many current Recce Sqns in Canada, though they remain outside the integral structure outlined in the cited pam. Canada, B-GL-394-002/FP-001, *Ground Manoeuvre Reconnaissance*, 2A-1-1.

104. Morton, 365, 475.

105. Mark H. Hoovestol, "The Stryker Brigade Cavalry Squadron in Decisive Action," *Armor* 127.1 (January–March, 2016): 7–9; and Jared Wayne, "Strength Punishes, Speed Kills: The Stryker Weapons Troop at the National Training Centre," *Armor* 128.2 (Spring 2017): 18–25.

106. It is also a myth that 25-mm-equipped LAV-25s conducted the main anti-tank fight during this engagement, where tanks were mostly destroyed by a combination of airpower, artillery, and the TOW-equipped LAV-AT. See David E. Johnson, Adam Grissom, and Olga Oliker, *In the Middle of the Fight: An Assessment of Medium-Armored Forces in Past Military Operations*, (Rand, Arrayo Centre, 2008), 60–61.

107. See Halton, 76; and McInnes, 99.

108. Victoria McGowan, "The Development of the 7th Canadian Reconnaissance Regiment in Normandy and the Scheldt," master's thesis, (University of Calgary, 2019), 1, http://hdl.handle.net/1880/110177.

109. The current Canadian cavalry concept is actually much more similar to the Corps armoured car regiments of the Second World War, which contained four to five armoured cars per troop and contained minimal combat support enablers. United Kingdom, Military Training Pamphlet No. 60, Part 1, *The Tactical Employment of Armoured Car and Reconnaissance Regiments: General Principles Regarding the Tactical Employment of Reconnaissance Units*, (1943): 10.

110. One of the earliest of many examples of cavalry platoons or troops consisting of more than the allegedly "universal" doctrinal principle of four-vehicle troops.

111. United Kingdom, *The Tactical Employment of Armoured Car and Reconnaissance Regiments: The Reconnaissance Regiment*, 2.

112. Ibid., 14.

113. Ibid., 5.

114. Ibid., 10.

115. Ibid., 5.

116. When the 4th Reconnaissance Regiment (4th Princess Louise Dragoon Guards) was temporarily forced to dismount and fight as infantry during the Italian campaign, their war diarist noted the loss of morale associated with losing their mechanized steeds: "These were our homes for a long time, and no cavalryman ever felt sadder at losing a faithful and tried mount." G. W. L. Nicholson, *Official History of the Canadian Army in the Second World War, Volume II: The Canadians in Italy, 1943–1945*, (Ottawa: Queen's Printer, 1956), 480.

117. In the British Army, reconnaissance regiments were initially called "battalions" and formed from infantry units who organically adopted cavalry culture in dress and organization, to the point that the War Office had to simply accept the practice and officially retitle them as reconnaissance regiments in 1942 with their cavalry traditions intact. Richard Doherty, *The British Reconnaissance Corps in World War II*, (Oxford, UK: Osprey Publishing, 2007), 4.

118. In the case of the armoured reconnaissance regiments, this conversion was a recognition of the fact that, during the fighting in Northwest Europe, these tank-heavy units had almost universally been used identically to armoured regiments and had rarely been available for their intended close reconnaissance role. Indeed, medium reconnaissance assets from Corps were regularly attached to armoured divisions in Northwest Europe to provide a dedicated reconnaissance asset. See H. F. Joslen, *Orders of Battle: Second World War, 1939–1945*, (Uckfield: Naval and Military Press, 2003), 10; and Canada, Canadian Military Headquarters, Historical Section, *Canadian Participation in the Operations in North West Europe, 1944. Part IV: First Canadian Army in the Pursuit (23 Aug–30 Sep)*, (22 September 1947), 90.

119. Maloney, 86.

120. See ibid., 83–103.

121. Ibid., 96.

122. St. Aubin's unit structure is remarkably similar to the 1964 American Division Cavalry Squadron, then in use in Vietnam. Ibid., 96.

123. Ibid., 96–97.

124. Ibid., 97–101.

125. Canada, Department of Defence, B-GL-301-001-FP-001, *Land and Tactical Air Operations, Volume I: Land Formations in Battle*, Book 1, (26 November 1987), 2-2-3.

126. Note that division reconnaissance regiments were not to be all-tank organizations as suggested by McInnes (see McInnes, 98). Rather, they were to consist of three "heavy reconnaissance squadrons" that controlled three seven-car scout troops and two four-tank tank troops. Essentially, the tanks were to operate as the DFSVs had in the aborted light armoured regiment of 1972. Canada, *Division Reconnaissance Regiment in Operations* (training film).

127. S. J. Bowes, "The Case for a Light Cavalry Regiment (LCR) for Canada's Army," *The Army Doctrine and Training Bulletin* 2.4 (Winter 1999): 110.

128. Ibid., 111.

129. Commander, Canadian Army, "Force 2025 – Commander's Planning Guidance," DLFD S1-2, dated 10 September 2020.

130. An RCAC structure along these lines was recently proposed by Lieutenant-Colonel Cole F. Peterson, who has supported the creation of an "asymmetric Army" with a heavy brigade based in Western Canada. See Cole F. Peterson, "The Asymmetric Army: Transforming the Army for Force 2025," *Canadian Army Journal* 19.1 (2021): 48–65.

DEFINING CAVALRY:

WITHIN THE ROYAL CANADIAN ARMOURED CORPS

Colonel Christopher W. Hunt, CD

The current security environment seems to have many historical parallels with the 1970s.[1] Adversaries are modernizing and expanding their military capabilities significantly,[2] regional conflicts are frequent and often influenced by great power competition, and military technology is evolving rapidly while the Royal Canadian Armoured Corps (RCAC) itself needs to recapitalize large portions of its armoured fighting vehicle (AFV) fleet at a time when financial constraints are significant. All but perhaps the first point also applied to the 1990s, when the RCAC went through a similar cycle of struggling with fleet recapitalization and relevance.[3] The RCAC conducted mission analysis on armoured (armd) regimental structure that examined assigned tasks, evolving doctrine, and lessons learned from recent and ongoing conflicts. That work resulted in recommendations to standardize the 4x AFV troop within an armd squadron (sqn), whatever the platform, consolidate into one armd trade and offer career progression between the Regular and Reserve components, and confirm the RCAC core capability as mounted close combat. The analysis also identified that the RCAC must be able to generate armd sqns to support battle groups (BG) as well as armd regiments (regt) to conduct unit level manoeuvre in a brigade.[4] The analysis proposed the doctrinal reconnaissance (recce) sqn be replaced by (medium) cavalry (cav) and light cav sqns, and subsequent proposals have included various sqn configurations of homogenous or mixed platforms.[5] "Transition to a new cavalry-type function" is now identified as part of "Armour Corps re-alignment" under one of the seven principles of Force 2025 development.[6] RCAC School (RCACS) proposals further emphasized an "Armour-common approach [of] one trade, one doctrine, one organization, one RCAC."[7] The RCAC's transition to cavalry roles and structures as a means of aligning armoured tactics, techniques, and procedures (TTP) is already being implemented at the troop level as it draws upon already established tank troop TTP; however, additional work is required at the sqn level and above to refine organizational concepts around the vision for the RCAC. This paper will argue that the RCAC should further refine armoured doctrine to define cavalry sub-units and sub-sub units based on broader Army definitions for heavy, medium, and light forces,[8] further emphasizing cavalry's integral firepower in order to more clearly promote their value to combined arms teams and provide doctrinal guidance for fleet re-capitalization.

The Canadian Army Modernization Strategy (CAMS) draws inspiration from a variety of sources, but "Close Engagement: Land Power in the Age of Uncertainty is the capstone future land operating concept designed to guide the development of Canadian land forces for the next 10 to 15 years."[9] Indeed, Lieutenant-General Lanthier clearly stated, "Adaptability and agility are key factors against which we will assess organizations, systems and processes. The procurement of broadly useful and appropriately adaptive equipment is a necessary condition to ensure robust land forces."[10] *Close Engagement* identified several evolutionary enhancements that need to occur in the Canadian Army over the next 15 years that offer significant opportunities for the RCAC to meaningfully contribute to the Army's operational capabilities. Those enhancements emphasize agility, adaptability, and robustness,[11] all of which are strengths of the RCAC. *Close Engagement* also identified that mounted direct fire capability may be grouped at unit or sub-unit level and rapidly reconfigured with the appropriate mix of armoured troops, infantry platoons, combat support, and combat service support elements for tasks as required.

Source: Combat Camera

It also stated that "the primary combat element of Canadian land forces will remain based on a central core of a sub-unit that is organized and re-organized as required by its current set of tasks: the empowered combined arms team (ECAT)… [which] may include up to eight subordinate elements."[12] If one considers a square combat team, a recce sqn combat team with enablers, or other sub-unit sized combined arms groupings, the ECAT is really just a new name for a very familiar concept. The need for mounted manoeuvre that can find and fix the enemy (especially enemy armour), and then destroy enemy fortifications and remaining armour to allow the ECAT to close with and destroy the enemy, will remain essential to ECAT's assigned combat tasks.

As of September 2021, recent RCAC force design work has emphasized the capabilities that the armd regt provides a brigade group as a unit; that work should also explain the capabilities an armd BG offers compared to a mechanized infantry BG, as well as when armoured heavy ECATs would be most appropriate, and what capabilities

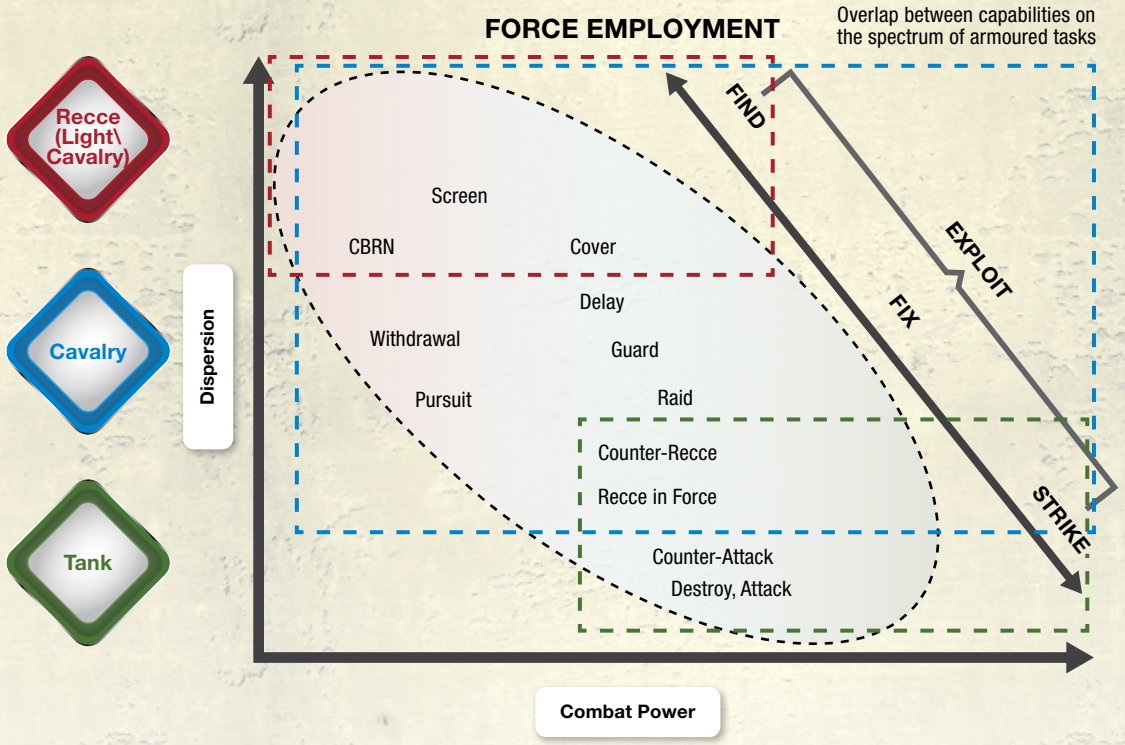


Figure 1: This figure demonstrates the spectrum of armoured tasks and the types of armoured elements that are optimized for those tasks.

armd troops bring to an ECAT. While this information does exist within existing doctrine manuals, the point is that the RCAC needs to promote the value proposition of its various sizes and types of elements in order to demonstrate the agility, adaptability, and robustness it offers across a wide variety of operational tasks now and over the next 15 years.[13] Given the Canadian Armed Forces core missions and (types of) concurrent operations defined in *Strong, Secure, Engaged,*[14] it seems likely that the vast majority of Canadian Army deployments will remain below brigade group level; therefore, the RCAC should be focusing more on its value proposition for contributions at the battle group level and below. Irrespective of the type of element provided, the RCAC needs to clearly promote the primary value proposition (i.e. role) of cavalry in a combined arms team. Quite simply, cavalry should be organized to bring disproportionate firepower, sense, and mobility capability to the combined arms team for the size of its respective element. This value proposition aligns with the doctrinal role of armour to defeat the enemy through aggressive use of firepower and battlefield mobility.[15] Insightful analysis published in *The Canadian Army Journal* noted that the manoeuvre and direct engagement functions of armoured and infantry elements are essentially the same, but

> "the biggest difference between the two occupations is not one of purpose but one of scale, with armoured forces manoeuvring over greater distances and more compressed timelines than the infantry, due to the inherent characteristics of armoured fighting vehicles, the significantly longer weapons and observation ranges of higher-calibre direct fire weapons, and the way in which these systems are employed. Subsequently, when analyzing any differences between the two in terms of organization or limitations, such as the inherent strengths and weaknesses of each in open or close terrain or of their suitability for stealthy versus aggressive reconnaissance, they are attributed to the difference in scale rather than in fundamental role."[16]

The RCAC shift back to a consolidated armd philosophy, trade, and training over the last five years recognizes the need for a returned focus on mounted manoeuvre and direct fire. Moreover, work by the RCACS articulated three different armd sub-unit structures proposed for Force 2025: tank sqn, cav sqn and light cav sqn. These distinctions were based on whether the sqn was primarily equipped with the Leopard 2, light armoured vehicle (LAV), or tactical armoured patrol vehicle (TAPV). RCACS' analysis recognized the "cavalry gap" (see Figure 1), which developed under the distinct tank and recce streams that existed with the RCAC.[17] All of the armd sub-unit structures proposed by the RCACS are based on a common framework structure of a squadron headquarters (SHQ), four armd troops of four AFVs each, and an admin troop. The tank sqn was essentially status quo in terms of structure, equipment, and proposed employment. Proposed cav and light cav that would conduct traditional cavalry tasks are proposed: find, fix, penetrate, exploit, raid, dislocate, advance to contact,

Tanks (heavy cavalry) provide the best firepower, protection, and tactical mobility compared to other armoured fighting vehicles.

reconnaissance, and security.[18] Subsequent RCACS proposals adjusted terminology based on platforms but still followed the same organizational structure.[19]

The shift to 4x AFV troop TTP instead of smaller patrols for each task means that a baseline cav or light cav sqn will have less frontage and capacity to handle concurrent security and reconnaissance tasks than it did under the 8x AFV troop model. This issue could be offset by augmenting the baseline sqn structure with additional 4x AFV troops, including troops from the Reserve component, depending on mission requirements. While the four armd troop sqn provides a solid foundation for force generation and TTP, leaders and organizations must be agile enough to incorporate additional elements, including additional armoured sub-sub-units to form ECATs that are relevant and effective for the missions assigned.

The proposed cav sqn structure will still have significant limitations until platforms with more firepower are acquired. Although the RCACS' cav and light cav sqn proposals include mounted anti-armour capabilities,[20] the RCAC needs to further anchor doctrinal descriptions of (medium weight) armd cav and light cav that are platform-independent in order to provide clarity for the Corps and Army on their employment and shape future equipment procurement so that these types of sub-units remain relevant. It should also be explicitly stated that both the cav and light cav sqn structures proposed by the RCACS are medium force structures and that, as of September 2021, no role was envisioned for the RCAC to generate "light forces" as an integral part of a light infantry battalion group. Instead, light armoured forces of LAV 6.0 or TAPV would be provided to support light battalion groups.[21] The problem with this approach is that a LAV 6.0 or even TAPV armd sqn is a medium-weight force that will considerably increase sustainment requirements for a light battalion group. The RCAC should have true light cav capable of delivering firepower and battlefield mobility on even lighter platforms such as the light utility vehicle (LUV) or CANSOFCOM next generation fighting vehicle (NGFV) in order to provide the Army with more strategically deployable and sustainable cavalry options. While protection is obviously a consideration in employment and the resiliency of an element in contact, an element's firepower and mobility really prioritizes the types of tasks it can be assigned.

Going back to the role of armour, the doctrinal descriptions of cav and light cav sqns should provide additional clarity on the nature of the firepower and battlefield mobility that these sub-units bring to a battle group. This clarity can be accomplished by reviewing the existing doctrinal descriptions of tank and armoured reconnaissance squadrons and mixing and modifying those characteristics to reflect the desired mixes in the new armd cav and light cav concepts.[22] More simply, the distinction between armd cav and light cav elements should be based on broader Army definitions for medium and light forces, further emphasizing cavalry's integral firepower. Armd cav elements prioritize operational mobility over protection and should have sufficient firepower to conduct conventional mechanized operations. Light cav elements prioritize strategic and operational mobility over protection further, and their light weight may allow them to travel in some complex terrain inaccessible to heavier vehicles. Light cav elements should have sufficient firepower to defeat light targets and some anti-armour capability. Tanks (heavy cavalry) still provide the best firepower, protection, and tactical mobility compared to other AFVs.

The medium weight armd cav sqn should be characterized by its operational mobility, firepower, and light protection. It should fulfill a variety of combat tasks but be optimized for transitional and security tasks against mechanized forces. Armd cav elements should have sufficient firepower to defeat light, medium, and heavy stationary and moving targets. During the assault, armd cav elements should be able to provide direct fire support for the infantry, cut-offs, and flank security, and be able to protect the assault force

from mechanized counter-attacks. Armd cav elements should be protected from small arms and heavy machine guns but may be vulnerable to medium and large calibre cannons as well as anti-armour weapons. This vulnerability may be reduced with active protection systems. Armd cav elements should be able to move by road or cross-country in any terrain that is passable to mechanized forces. The high speed and agility of the F echelon vehicles should permit wide-ranging operations and fast shifts in groupings and direction of effort. Flexibility should derive from a combination of firepower, mobility, and communications. At the squadron level, with its inherent administrative echelon, and the range of its vehicles, the armd cav sqn should be capable of extended operations with a minimum of logistic support.

Source: P. Valpolini

The Centauro II, left, and its predecessor, right. Bigger, more protected, with a greater firepower and linkable to the networked environment, these are the main features of the new platform.

Source: Combat Camera

Tactical Armoured Patrol Vehicle. Armoured cavalry requires upgrades from the current remote weapon station package.

Note that the proposed description of armd cav is platform-agnostic. But if armd cav brings firepower and battlefield mobility to the combined arms team, then it must bring relatively more mobile firepower than comparable mechanized infantry platforms.[23] Indeed, an armd cav sqn could consist of a variety of F-echelon platforms to deliver the capability described above; however, currently the only mounted anti-tank capability that the Canadian Army possesses is the Leopard 2. The Canadian Army needs to enhance and diversify its mounted direct fire anti-tank capabilities so that tank sqns can be concentrated where needed and commanders have more tactical options when conducting operations against mechanized adversaries. If there is to be a foundational platform for armd cav capability, the LAV 6.0 and TAPVs should be viewed as interim platforms with more firepower ultimately required. More analysis is required as to what this firepower capability looks like, but there are many examples of medium armoured cavalry in allied armies and most either involve a medium auto cannon or large bore cannon.[24] Many remote weapon stations (RWS) offer integrated auto cannon and anti-tank guided missile (ATGM) capability that can be mounted on a wide variety of platforms that would be ideal for armd cav tasks.

The proposed doctrinal characteristics of the armd cav sqn above includes capacity to defeat light, medium, and heavy targets. That is an important distinction from the old recce sqn construct, which lacked the capacity to defeat even single heavy armoured targets with direct fire. Given the nature of cavalry tasks, an armd cav sqn requires some (limited) capacity to defeat heavy armour (i.e. a limited number of ATGMs or an adequate gun, on a foundational platform), otherwise tanks or dedicated anti-tank detachments would be required as part of a task element in order to generate any armd cav capability.[25] This integrated anti-armour capability aligns with doctrinal structures of allies, including the US[26] and French armies.[27] Under this proposal, both the LAV 6.0- and TAPV-based squadrons would require some anti-armour capability through firepower upgrades or fleet re-capitalization to generate true armd cav capability.[28] Such a doctrinal definition based on firepower could therefore provide justification for future upgrading of those platforms or for future purchases. A cav variant of the armoured combat support vehicle (ACSV) chassis, as a successor or addendum to the project, would be an alternative or complementary option to the Army reallocating LAV 6.0 to the RCAC from other arms.[29] Indeed, there are already hundreds of LAV 700s in a variety of variants being manufactured in Canada for export,[30] so there may be opportunities to leverage those economies of scale.

The distinction between ATGM-equipped cavalry and dedicated anti-armour elements is that ATGM-equipped cavalry typically have more of a "skirmish" and/or counter-

recce function, whereas dedicated anti-armour elements typically provide the integral anti-armour direct fire support to an infantry battalion and are the primary anti-armour defence in that unit. As such, anti-armour elements typically carry more heavy anti-armour ammunition than armd cav elements of comparable size and are more likely to be employed in decisive engagement of heavy armour.[31]

Conversely, the light cav sqn should be characterized by its strategic and operational mobility, light firepower, and light protection. It can fulfill a variety of security and reconnaissance tasks, including for domestic and continental operations. Light cav elements should have sufficient firepower to defeat light targets, and limited capability to defeat armoured targets, but otherwise share similar characteristics to the armd cav sqn. That means that light cav elements could be armed with machine guns and/or automatic grenade launchers, and those could be in manned stations or RWSs, accompanied by limited mounted or dismountable anti-armour weapons. Light Cav elements should provide mounted recce, direct fire, and anti-armour capabilities for light forces. The LUV project should also be updated to include cav and light cav variants for RCAC Army Reserve units instead of the command and recce variants, or the fleet requirements should be transferred from the LUV project and piggy-backed on the CANSOFCOM NGFV project.[32]

This paper has argued that the RCAC should further refine armd doctrine to define cavalry sub-units and sub-sub-units based on broader Army definitions for heavy, medium, and light forces, further emphasizing cavalry's integral firepower in order to more clearly promote their value to the combined arms team and provide doctrinal guidance for fleet re-capitalization. The RCAC needs to update its doctrine through a new doctrine note to define tank, armd cav and light cav capabilities in terms of battlefield mobility (operational and tactical) and firepower, which will provide clarity on their capabilities in relation to each other. Those doctrinal definitions will then allow the RCAC to provide clear recommendations to the Army regarding balanced, relevant force structures and capabilities that can deliver effective mounted manoeuvre and direct firepower as part of ECATs and other combined arms groupings at higher echelons. Those force structure and capability decisions should then provide clarity to equipment projects so what gets fielded better aligns with doctrinal needs. Regardless of the doctrinal nuances proposed above, a key point is that RCAC training for both Regular and Reserve components would remain anchored on a common foundation of vital armd skills, and the ability to shoot, move, and communicate mounted in such a way as to maximize the capabilities of a platform, troop, squadron, or combat team. Non-commissioned officers and officers trained in armoured tactics with a standardized 4x AFV troop can easily adjust to employment in a tank, armd cav, or light cav sqn.

Source: Rafael Advanced Defense Systems

The SAMSON All-in-One provides combat vehicles with main battle tank-level protection and mission-appropriate fire power without degrading mobility.

Source: Kongsberg

The PROTECTOR RS6 is a modular platform that can easily be adapted to suit various operational needs.

Source: AUSA 2018

Comparison of Auto Cannon Ammunition From 25 mm to 50 mm.

Source: defense-arab.com

Light Armoured Vehicle 700s in 105-mm and 30-mm Direct Fire Support Variants.

Source: Scott Gourley

Joint Tactical Light Vehicle Equipped With Protector RWS-LW30 and Javelin Anti-tank Guided Missile. Could this be a potential remote weapon station upgrade for the tactical armoured patrol vehicle?

However, given the short timelines for CAMS Force 2025 decisions, quick interim decisions will be required by the RCAC, and its Force 2025 input should include several placeholders for subsequent capability and equipment upgrades, leveraging broader army equipment programs (i.e. ATGM, ACSV, LUV) that would allow it to generate more cav capability over time while preserving its ability to generate tank sqns. Now, as in the 1970s and 1990s, the challenge for the RCAC remains familiar: how to generate mounted manoeuvre and direct fire capabilities that are relevant to the Canadian Army in an era of fiscal restraint. Clarifying the RCAC vision for delivery of mobile mounted direct firepower through distinct tank, armd cav, and light cav capabilities to combined arms teams will subsequently help the RCAC maintain a sense of direction and momentum, and help effectively influence army capability development.

ABOUT THE AUTHOR

Colonel Christopher W. Hunt has served in the Canadian Army for over 28 years with time spent evenly between Regular and Reserve components. He has served in a variety of command and staff positions in both tank and recce squadrons, and at unit and formation level. Colonel Hunt served on Operation KINETIC, Roto 0, in Kosovo, TF 1-06 in Afghanistan, and several domestic operations. Colonel Hunt commanded The King's Own Calgary Regiment and was Deputy Commander of 41 Canadian Brigade Group. He has a Master of Arts in War Studies from the Royal Military College of Canada. He is currently 3rd Canadian Division Headquarters Assistant Chief of Staff (Support) and the Division's Armoured Advisor (Reserve).

ENDNOTES

1. John Marteinson & Michael R. McNorgan with Sean M. Maloney, *The Royal Canadian Armoured Corps: An Illustrated History* (Kitchener, Ontario: Royal Canadian Armoured Corps Association, 2000), 379–393.

2. Statement by The Honorable Mark T. Esper, Secretary of the Army, and General Mark A. Milley, Chief of Staff, United States Army, before the US Senate Armed Services Committee First Session, 116th Congress on the Posture of the United States Army, 26 March 2019, aps_2019.pdf (army.mil).

3. Various authors, "The Future of the Armoured Corp and the Combined Arms Team," *The Army Doctrine and Training Bulletin*, Vol. 2, No. 4, Winter 1999, 83–138. This special feature included seven separate articles on the future of the RCAC and the combined arms team and is well worth a read, as there are many parallels to the present.

4. Major Pascal Croteau, RCAC_BB DArmd_LRSS-TAPV integration_regt structure_4 Nov 2020 PPT, slide 14.

5. RCAC HQ, *Canadian Cavalry 101 PPT*, May 2021, presented at the 2021 RCAC Conference.

6. Canadian Army, Force 2025 video, Senior Army Leadership Symposium, 16 Sep 2021.

7. Major Mathew McInnes, RCAC_Corps update_CAFJES_Sept 21 PPT, slide 6.

8. A light force is a force that is rapidly deployable at all levels of command and that is optimized for operations in terrain unsuitable to medium or heavy forces (DTB Record 34051).

A medium force is a conventional force that consists predominantly of armoured fighting vehicles and that prioritizes strategic and operational mobility over armour protection (DTB Record 27430). A heavy force is a conventional force that consists predominantly of armoured fighting vehicles and that has greater armour protection and firepower than a medium force (DTB Record 19949). Canada, Department of National Defence, B-GL-321-003/FP-001, *Brigade Tactics* (Kingston, Ontario: Canadian Army Doctrine and Training Centre Headquarters, 2017), 1–12.

9. Canada, *Canadian Army, Close Engagement – Land Power in an Age of Uncertainty – Evolving Adaptive Dispersed Operations* (Kingston, Ontario: Canadian Army Land Warfare Centre, 2019), 6.

10. Ibid, 7.

11. Ibid, 20.

12. Ibid, 23.

13. Lieutenant-Colonel Phil Halton described an RCAC identity crisis that has led to an unbalanced force structure that undervalues and underdelivers mounted direct fire capability to the Army in his article: Lieutenant-Colonel Phillip Halton, "The Re-transformation of the Armoured Corps," *Canadian Army Journal*, 17.3, 2017, 65–81. Moreover, he identifies a change in mindset as the first step to regaining relevance and effectiveness.

14. Canada, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: Minister of National Defence, 2017), 17.

15. Canada, Canadian Army Doctrine Note 17-1, *The Armoured Regiment in Battle* (Kingston, Ontario: Army Doctrine Centre, 18 July 2017), 1/12.

16. Captain Mathew McInnes, "First Principles and the Generation of Armoured Fighting Power," *Canadian Army Journal*, 17.3, 2017, 89. Both McInnes and Halton's papers provide excellent insights on the post-Afghanistan considerations for the RCAC.

17. Ibid, 95.

18. Figure modified by author from: PPT by Major Ed Frost-Kell, Canadian Army Doctrine Note (CADN) 17-01, *The Armoured Regiment in Battle* (Ottawa: RCAC Conference, 27 October 2017), slide 5.

19. Major Mathew McInnes, RCAC_Corps update_CAFJES_ Sept 21 PPT.

20. Major Pascal Croteau, RCAC_BB DArmd_LRSS-TAPV integration_regt structure_4 Nov 2020 PPT, slides 35, 36, 37.

21. Major Mathew McInnes, "The Armoured Cavalry Concept for F2025 PPT," August 2021, slides 17–20.

22. Canada, Canadian Army Doctrine Note 17-1, 3/12–4/12.

23. Major Richard Moreau, "Concept for the Employment of the Cavalry Squadron," *The Army Doctrine and Training Bulletin*, Vol. 2, No. 4, Winter 1999, 119.

24. The Australian Army recently fielded the Boxer combat reconnaissance vehicle primarily armed with the Mauser/ Rheinmetall Mk30-2/ABM (air burst munition) dual feed automatic cannon. The French Army is fielding the Jaguar armed with the CT40 firing 40-mm case telescoped ammunition, but it also carries 2 x MMP anti-tank missiles. The Jaguar is replacing three different vehicles: the AMX-10RC, ERC 90, and VAB Mephisto armed with HOT ATGMs. The Italian Army recently purchased 136 wheeled Centauro II tank destroyers armed with a 120-mm cannon. The British Army is fielding the Ajax primarily armed with the CT40 firing 40-mm case telescoped ammunition. The US Army is considering a Bradley replacement based on the Ajax but armed with the XM913 50-mm Bushmaster chain gun.

25. Going back over 20 years of computer-assisted exercises and field training exercises, the lack of anti-armour capability within Canadian recce sqns severely limited their employment against mechanized adversaries, particularly when conducting offensive operations, unless they were significantly augmented.

26. ATP 3-20.96 (FM 3-20.96), *Cavalry Squadron* (Washington D.C.: Headquarters, Department of the Army), 12 May 2016, ATP 3-20.96 Working Edit.pdf (army.mil).

27. RCACS 9920-2 (Adjt), Post Visit Report – École de Cavalerie de Saumur, France – 24 May to 2 June 2019.

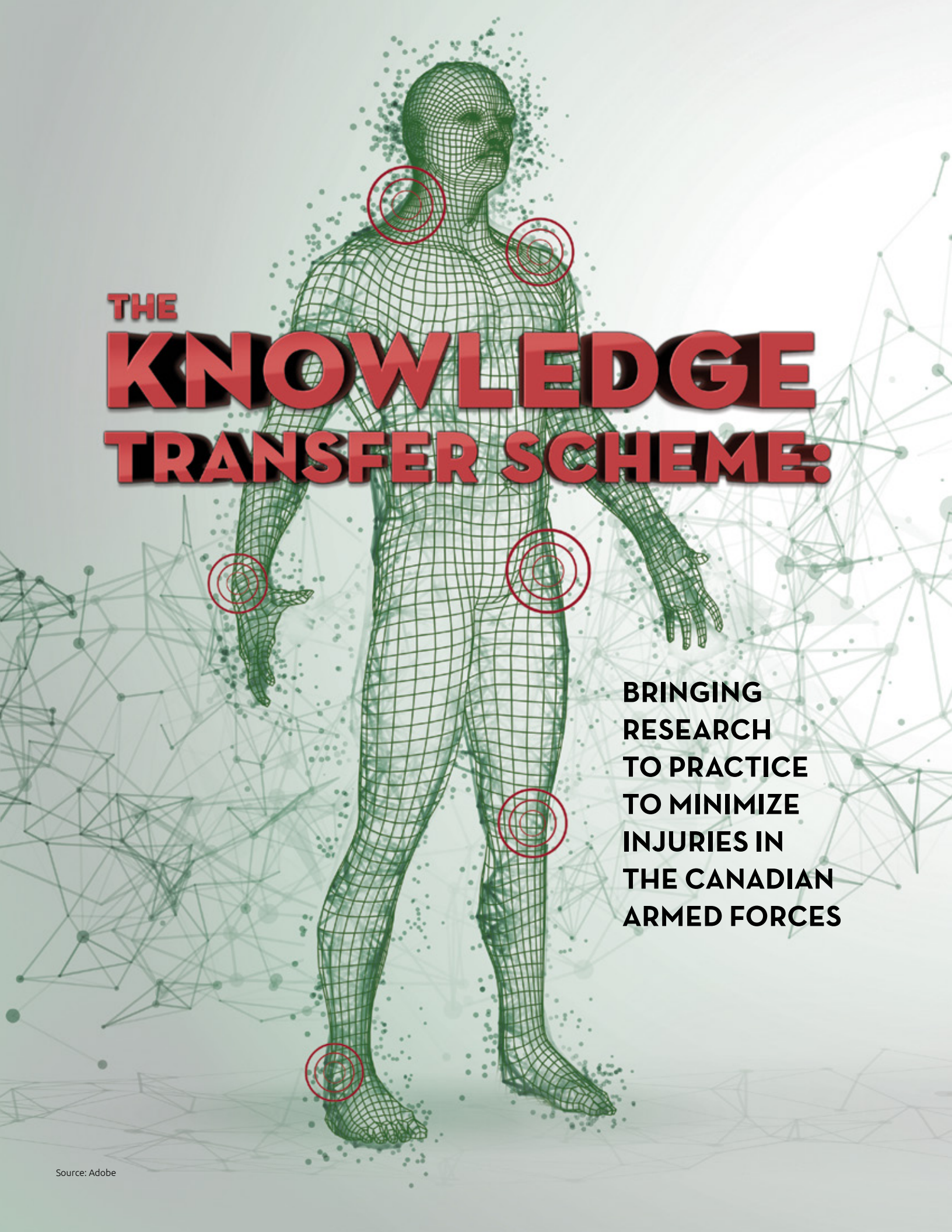
28. Note that an investment in ATGM systems was mentioned directly in *Strong, Secure, Engaged*, 36.

29. Production of the ACSV is underway and expected to continue to 2025: Production of Armoured Combat Support Vehicles Begins - Canada.ca. A cav variant would allow the production line to be maintained and fix a significant RCAC and Army capability gap.

30. LAV-III Light Armored Vehicles - Saudi Arabian National Guard (globalsecurity.org).

31. Canada, Department of National Defence, B-GL-309-001/ FT-001, *The Infantry Battalion in Battle* (LFC HQ, G3 Infantry, 1995), 4-7-1. Both more recent publications *Land Operations* and the *Battle Group in Operations* do not contain a description of anti-armour elements.

32. RFI - Next Generation Fighting Vehicle (NGFV) Project (W6399-19KH53/A) - Buyandsell.gc.ca.



THE KNOWLEDGE TRANSFER SCHEME:

BRINGING RESEARCH TO PRACTICE TO MINIMIZE INJURIES IN THE CANADIAN ARMED FORCES

Source: Adobe

Source: www.cafconnection.ca

Source: Adobe

"THE CANADIAN ARMY HAS A PT CULTURE OF FAVOURING PROLONGED LBM AND UNIT RUNNING, WHICH HAVE BOTH BEEN ASSOCIATED WITH AN INCREASED RISK OF MSKI IN INFANTEERS."

It is well established that musculoskeletal injuries (MSKI) impact the Canadian Armed Forces (CAF) both in-garrison and on deployment through several measures of burden, including medical employment limitations (MEL), repatriation, attrition, and the related administration and financial costs.[1,2] In fact, for almost a decade, military authors have declared MSKI as the primary threat to the CAF's operational readiness and force strength.[3] Research has consistently shown that the most effective intervention to minimize MSKI in military populations is modified physical training (PT).[4,5] However, to date, modified PT has not been widely implemented across the CAF.

Implementation of research evidence into practice to minimize MSKI is a challenge.[6] Researchers typically develop interventions using comparable participants in controlled, low-risk settings and presume that demonstrating effectiveness under these conditions validates wide-scale implementation. In contrast, military training often includes disparate participants, in adverse, high-risk settings that require interventions that are adapted to be practical. Furthermore, at its core, implementation implies the necessity of behavioural change, which may be particularly challenging for the CAF as an institution that values its traditions in PT.[7] Such contextual discrepancies may contribute to a disconnect between research and practice that has impeded implementation of interventions to minimize MSKI in the CAF.

Figure 1: Knowledge Transfer Scheme[8]

The Knowledge Transfer Scheme[8] is an original, five-step framework. It has been developed specifically to bridge the gap between research and practice by engaging researchers to collaborate with stakeholders in order to adapt effective interventions into context-appropriate, evidence-based products for implementation (Figure 1). Although developed to implement strategies to minimize MSKI during sports participation, each of the steps may be adapted to the military context. Therefore, this paper will briefly describe each step of the Knowledge Transfer Scheme, then outline how each step was adapted by an implementation lead (primary investigator) to guide a collaboration between researchers and stakeholders that facilitated the development and evaluation planning of an evidence-based PT program intended to minimize MSKI in candidates on basic infantry training courses. The purpose of this article is to serve as an exemplar for peer stakeholders across the CAF interested in implementing evidence-based PT as a strategy to minimize MSKI.

STEP 1 – PROBLEM STATEMENT

The first step in the Knowledge Transfer Scheme is to describe the problem in terms of magnitude, impact and context. The implementation lead explored these factors through informal discussions with local stakeholders and historical reports.

Magnitude

The 4th Canadian Division Training Centre (4 CDTC) is the central host for the Developmental Period 1 infantry course (DP1), the basic occupational qualification for CAF infantry candidates. Over the past several years, 4 CDTC has reported an increase in DP1 attrition from 26% in 2015 to 32% in 2018.[9] Medical returns to unit have consistently been reported as the most common cause of DP1 attrition from 44% in 2015 to 58% in 2018,[9] with MSKI reported as the most frequent contributor. Overuse MSKI, the result of cumulative trauma where tissues are damaged by overuse or repetitive movements, represent an average of 60.6% of all MSKI seen in rehabilitation between 2015–2018,[10] with load bearing marching (LBM) and unit running/PT reported as the most frequent contributors. Specific efforts to minimize overuse MSKI rates during LBM and unit PT may be the most effective method to minimize medical returns to unit and attrition rates while maximizing graduation rates of the DP1 at 4 CDTC.

Impact

As the CAF is in the early stages of integrating MSKI surveillance into their health information system, the impact of MSKI in DP1 will be described qualitatively. The impact of MSKI in DP1 may be estimated from the following: quality of life measures and MEL of DP1 candidates; administrative workload of 4 CDTC training and holding companies to re-course/re-train DP1 candidates; medical costs (imaging, medication, external supports, rehabilitation workload, specialist consultations, operative procedures) of 31 Canadian Forces Health Services Centre (31 CFHSC) Detachment Meaford; low graduation rates challenging the reputation of 4 CDTC leadership; low occupational capacity reducing operational readiness of the Combat Training Centre; and attrition reducing force strength of the CAF. The burden of MSKI in DP1 has local, regional and national impacts, ultimately affecting CAF operational readiness and force strength.

Context

The context of MSKI in DP1 includes its training plan, Canadian Army PT culture and the CAF current physical performance strategy. DP1 delivery is guided by its training plan, which outlines how training centres meet infantry basic occupational qualification standards. The DP1 training plan outlines strenuous occupational requirements, including the following: handling of personal and section-level weapons; construction of field defences; dismounted offensive and defensive operations; and completing a 13-km load-bearing march carrying 24.5 kg in less than 2 hours, 26 minutes, 20 seconds. However, the DP1 training plan offers no direction on LBM or PT program to prepare candidates for those demanding tasks. The lack of standardization allows DP1 instructors the autonomy to plan LBM and PT. With limited formal training in PT delivery, DP1 instructors may rely on their previous course-based experiences or their personal preferences, both of which may not be aligned with fundamental principles of exercise prescription[11] and may contribute to overuse MSKI by exceeding the capacity of DP1 candidates.

The Canadian Army has a PT culture of favouring prolonged LBM and unit running,[7] which have both been associated with an increased risk of MSKI in infanteers.[12] While the majority of DP1 candidates are young and otherwise healthy, many do not meet the quantity or quality of recommended exercise for adults.[9 10] It is well established that soldiers with lower levels of physical fitness are more likely to sustain MSKI.[5] The lack of habitual exercise inherently limits a candidates' PT tolerance and, when faced with the strenuous occupational demands of the DP1, elevates their risk of overuse MSKI.

Summary

Overuse MSKI sustained during LBM and unit PT during the DP1 infantry course at 4 CDTC burden several stakeholders, ultimately impacting CAF operational readiness and force strength. Contextual factors affecting MSKI rates include the lack of PT standardization in the DP1 infantry TP, the culture of PT in the Canadian Army and the limited baseline fitness of DP1 candidates.

STEP 2 – EVIDENCE SYNTHESIS AND DESCRIPTION

The second step in the Knowledge Transfer Scheme is to summarize the research evidence that has been shown to effectively solve the problem and infer the potential gain of implementing this research to individuals and society. The implementation lead appraised the most recent systematic review of studies investigating the most effective interventions to minimize MSKI to produce this synthesis.

Evidence of effectiveness

In their systematic review, Wardle and Greeves concluded that modified PT programs that were supported by leadership and avoided excessive volume reduced MSKI by a median of 34%.[5] As none of the studies included infantry candidates, those studies reporting that modified PT effectively reduced MSKI in soldiers undergoing active training in army environments were further scrutinized because of their perceived similarity to DP1.[13 14 15]

Knapik et al.[14] evaluated the effectiveness of an experimental PT program compared to a control on MSKI, attrition and physical fitness in American Army recruits during nine weeks of basic training. The experimental PT program consisted of 60 minutes/day of Army PT instructor-supervised exercises: calisthenics (1 x 5–20 repetitions); movement (3 x 25 yards) and stretching drills (1 x 30 seconds); continuous (15–30 minutes) and interval running (6–10 x 30 seconds of sprinting followed by 60 seconds of walking) in ability groups. The experimental program differed from the control PT program in that it alternated days involving cardiovascular and muscle conditioning exercise, outlined progressions that were more gradual than the control PT group, emphasized precision of movement, and reduced running mileage. Physicians diagnosed MSKI using the International Classification of Diseases, 9th Revision. The risk of MSKI was reported as 1.6 times greater and the risk of failing the physical fitness test was higher (3.3%) in control group participants, without any differences reported in attrition rates between groups.

Coppack et al.[15] evaluated the effectiveness of either an experimental PT program or a control on the occurrence of overuse knee patellofemoral pain and attrition in British Army recruits during 14 weeks of basic training. The experimental PT program consisted of Army PT instructor-supervised warm-up and cool-down exercises performed for 15 minutes/day. The experimental warm-up and cool-down exercises were as follows: four conditioning exercises (isometric hip abduction, forward lunge, step downs and single leg squats) performed for three sets of 10–20 repetitions during the warm-up; and four stretching exercises (quadriceps, tensor fascia lata, hamstring and calf) performed for 3 x 20 seconds during the cool-down. The control group completed a standard warm-up and cool-down for the same duration consisting of jogging, abdominal curls, push-ups and stretching. Physiotherapists diagnosed overuse knee patellofemoral pain according to a standardized examination, and a medical officer determined attrition. The authors reported a 75% reduced injury risk in recruits in the experimental group with 10 occurrences of overuse anterior knee patellofemoral pain (1.3%) and three attritions (0.4%), and 36 occurrences of overuse knee patellofemoral pain (4.8%) and 25 attritions (3.4%) in the control group.

Roos et al.[16] evaluated the effectiveness of either: four weeks of modified marching; 10 weeks of modified PT; a combination of modified marching and PT; and a control group on MSKI. Effectiveness was evaluated as reduced attrition and improved physical fitness of Swiss Army recruits during 21 weeks of basic training. The modified marching group differed from the control group by progressively increasing their marching distances over the first four weeks. The modified PT group differed from the control group in that it was supervised by trained professionals, focusing on progressive high-intensity interval running, functional strength circuit training, balance training and team sports, each completed once a week for 30–60 minutes. The combination group combined the elements of the modified marching and modified PT groups. The control group completed a standard PT program according to Swiss Armed Forces regulation, consisting of two sessions with a duration of 180 minutes per week of either: strength, aerobic, team sports, obstacle course, or orienteering. Physicians diagnosed MSKI and determined attrition. Recruits participating in the combined modified marching and modified PT group reported a 27.61% overuse MSKI rate and an 8.59% attrition rate compared to 40.18% and 13.39% respectively in the control group.

Summary
When summarized, these studies demonstrate that the contemporary views and practices of researchers investigating strategies to reduce MSKI in soldiers undergoing active training in army environments include modified PT that:

- Is supervised by professionals;
- Lasts a minimum of nine weeks;
- Alternates days focusing on cardiovascular and muscle conditioning exercises;
- During cardiovascular exercise, has participants run in ability groups, integrates interval running to reduce total running mileage, and progressively increases duration or pace;
- During muscle strengthening exercise, prioritizes the lower extremity, emphasizes precision of movement, and progressively increases demands;
- Progressively increases LBM demands over time.

Potential gain
Should the results of these studies be generalizable to DP1 candidates, the potential gain of implementing evidence-based PT into the DP1 infantry course at 4 CDTC would include:

- Improved physical fitness/occupational performance of DP1 candidates;
- Minimized MSKI, attrition rates and their associated burdens/impacts to 4 CDTC;
- Maximized DP1 graduation rates at 4 CDTC;
- Improved operational readiness of the Combat Training Centre;
- Maximized force strength of the CAF.

STEP 3 – ESTABLISH A KNOWLEDGE TRANSFER GROUP

The third step in the Knowledge Transfer Scheme is to form a Knowledge Transfer Group consisting of representative stakeholders involved in the problem. The implementation lead initiated this step by submitting a briefing note followed by a meeting request to the commanding officer of 4 CDTC.

Briefing note
The implementation lead prepared a one-page briefing note for 4 CDTC leadership that summarized the problem statement (Step 1), the research evidence, and the potential gain of implementing evidence-based PT on DP1 courses (Step 2). The briefing note concluded with a request to meet for further discussion.

Meeting
At the face-to-face briefing with the 4 CDTC command team, the implementation lead expanded upon the content of the briefing note and proposed in broad terms how evidence-based PT could be implemented on DP1 at 4 CDTC. The implementation lead concluded the meeting by recommending the formation of a Knowledge Transfer Group, which, at a minimum, would include stakeholder representatives from leadership, training, fitness, and medical services, who would co-create an evidence-based PT program appropriate for DP1 at 4 CDTC. Leadership stakeholders would include the commanding or deputy commanding officer and the regimental or deputy sergeant major. Training stakeholders would include: the officer or second officer in command and the chief sergeant major or training sergeant of the training company, and the officer or second officer in command and chief sergeant major or training sergeant of the training company. Fitness stakeholders would include the deputy Personnel Support Program manager or the fitness and sports coordinator. Medical stakeholders would include the officer In charge of 31 CFHSC Det Meaford and the physiotherapy team leader.

Summary
The 4 CDTC commanding officer appointed the chief instructor as chair of the Knowledge Transfer Group. The chair was then tasked to populate the group with stakeholder representatives from leadership, training, fitness and medical services, review the content of Steps 1 and 2, co-create an implementable, context-appropriate, evidence-based PT program appropriate for DP1 candidates, and determine how the program could be implemented at 4 CDTC without compromising operations.

STEP 4 – PRODUCT DEVELOPMENT

The fourth step of the Knowledge Transfer Scheme is to coordinate the Knowledge Transfer Group to co-create an implementable, context-appropriate, evidence-based product that addresses the problem. To that end, group members are encouraged to share their individual stakeholder expertise while considering the goal of the product, the target population, and their context. The discussions of the Knowledge Transfer Group will be organized according to stakeholder group, followed by their consensus.

Chair
The chair first summarized that the goal of the product was to standardize an evidence-base PT program in order to minimize MSKI in candidates during the DP1 infantry course. Next, the chair clarified the commanding officer's tasking for the group as described above, and asked each stakeholder group to describe their perception of the problem and their view of an implementable evidence-based LBM and PT program.

Source: Adobe

Training stakeholders
Training stakeholders began by quoting the DP1 training plan related to PT:

> *"All students must achieve the Load Bearing March (LBM) prior to the end of the course in accordance with reference Land Force Command Army Fitness Manual Chapter 1 – Fit to Fight – Weight Load March. March a distance of 13 km in FFO (24.5 kg total kit) in under 2 hrs 26 min 20 sec at an equivalent pace of 5.33 km/h… Ideally, all students will achieve this standard prior to progressing onto the field-training portion of this course…Although there is no formal training time allocated for PT, the training establishment is to include this activity in their daily routines."*[16]

Training stakeholders then reported that PT typically occurred throughout DP1 weeks 1–5 between 0530 hrs and 0630 hrs at the discretion of DP1 instructors and usually consisted of LBM at various loads/distances/paces, unit runs at various distances/paces and/or high intensity calisthenics performed as a circuit. They concluded by suggesting that the combination of the time constraints of the DP1 training plan necessitated large volume increases in PT to meet DP1 requirements and the general lack of physical fitness observed in candidates contributes to their MSKI risk.

Fitness stakeholders
Fitness stakeholders responded by assuring stakeholders that there was a clear relationship between higher levels of physical fitness and lower MSKI rates in soldiers,[5 17 18] acknowledging that 60 minutes per PT session was sufficient but five weeks' duration of on-course PT was insufficient. They proposed that an additional six weeks of pre-course PT for a total of 11 weeks would permit the progressive PT required to build MSKI resilience.[10] They also expressed concern that unit-paced runs contribute to MSKI risk by disregarding the individual abilities of candidates and that unloaded bodyweight exercises were insufficient to allow candidates to develop the necessary strength to tolerate the strenuous LBM requirements of DP1.[19]

Medical stakeholders
Medical stakeholders reported that their most frequent diagnoses in DP1 candidates were overuse MSKI of the lower extremity sustained during LBM or unit running/PT and agreed that modified LBM and PT may be effective in minimizing MSKI.

Consensus
Stakeholders agreed that the DP1 training plan specifications required adherence, that candidate physical fitness is an important factor when it comes to minimizing MSKI, that a 60-minute PT program duration would minimize disruption to 4 CDTC's current procedures (with the exception of LBM where distance would dictate duration), and that adding six weeks of pre-course PT consisting of an LBM and PT program that acknowledged individual abilities and was directed towards minimizing the known MSKI profile would be explored.

LOAD BEARING MARCHING PROGRAM

Chair
The chair requested that the implementation lead begin the discussion by reviewing the best practice recommendations for LBM training[20] to minimize MSKI risk in military populations (Table 1) and propose how they may be adapted for DP1.

Implementation lead
The implementation lead summarized the best practice recommendations and proposed an evidence-based LBM program that was divided into a six-week pre-course load progression led by the holding company and a five-week on-course distance progression led by the training company (Table 2).

TABLE 1: BEST PRACTICES TO MINIMIZE INJURIES DURING MILITARY LOAD-BEARING-MARCH TRAINING[20 21]

Training	Best practices
Frequency	1 x per week load-bearing march training. 2–3 x per week cardiorespiratory training. 2–3 x per week strength training.
Intensity	Begin with light loads. Gradually progress to operational requirements.
Time	Begin with short durations. Gradually progress to operational requirements.
Type	Form up according to height. Self-selected pace (avoid ruck running). Modify based on terrain and conditions. Avoid progressing load and duration simultaneously. Plan regular decreases in volume to avoid overtraining.

Training stakeholders
Training stakeholders challenged the proposed recommendations with the practical necessity for candidates to march as daily transportation to reach lesson sites (i.e. classrooms, range, etc.). They also reported that DP1 instructors and seasonal variations challenged standardization of operational LBM requirements and queried how they were to determine load carried.

Fitness stakeholders
Fitness stakeholders clarified that LBM training differed from daily marching as transportation by gradual and purposeful increases in load, duration or pace. They proposed that the risk of daily marching may be minimized if not exceeding the established weekly progression in load, duration or pace. They also suggested that the DP1 training plan LBM requirements may be the most appropriate standardization, and they recommended that weighing scales or previously measured fighting order kit could be used to calculate load.

Consensus
All stakeholders agreed to an evidence-based LBM program of once weekly, progressed first by load to 24.5 kg while in the holding company, followed by progression in distance to 13 km while in the training company in order to meet the DP1 LBM requirements. Additional daily marching would be limited to load, duration or pace trained that week.

PHYSICAL TRAINING PROGRAM

Chair
The chair requested that the implementation lead begin the discussion by summarizing the best practice recommendations for modified PT to minimizing MSKI risk in military populations (Table 3) and propose how these may be adapted for DP1.

Implementation lead
The implementation lead reiterated that avoiding overuse knee patellofemoral pain should be prioritized, as it is the most common MSKI sustained by DP1 candidates[9] and is usually sustained during LBM or unit running/PT. They proposed adapting best practice recommendations, including the following: progressive LBM,[20 21] limited duration running progressions in ability groups,[14] and strengthening the hip and knee during PT[15 21 22] using a vigorous strength-training prescription[10] of individualized, externally loaded functional exercises to simulate the strenuous demands of DP1.

Training
Training stakeholders expressed a reluctance to accept the recommendation for running in ability groups, citing their concern that candidates would purposely avoid challenging themselves, and queried their DP1 instructor's ability to supervise the recommended externally loaded functional exercises.

TABLE 2: EVIDENCE-BASED LOAD-BEARING-MARCH TRAINING PROGRAM				
Company	**DP1 week**	**Distance**	**Pace**	**Load**
Holding Company	Week 6	5 kilometres	Self-selected	10 kilograms
	Week 5	5 kilometres	Self-selected	13 kilograms
	Week 4	5 kilometres	Self-selected	16 kilograms
	Week 3	5 kilometres	Self-selected	19 kilograms
	Week 2	5 kilometres	Self-selected	22 kilograms
	Week 1	5 kilometres	Self-selected	24.5 kilograms
Training Company	Week 1	6.5 kilometres	Self-selected	24.5 kilograms
	Week 2	8 kilometres	Self-selected	24.5 kilograms
	Week 3	9.5 kilometres	Self-selected	24.5 kilograms
	Week 4	11 kilometres	Self-selected	24.5 kilograms
	Week 5	13 kilometres	Self-selected	24.5 kilograms

TABLE 3: BEST PRACTICES TO MINIMIZE INJURIES DURING MILITARY PHYSICAL TRAINING[10 14 15 20 21 22 23]		
Training	Cardiovascular training	Strength training
Frequency	2–3 x per week	2–3 x per week
Intensity	Ability groups, vigorous effort (i.e. somewhat hard to very hard, 60%–89% maximum heart rate)	Individualized, vigorous effort (i.e. somewhat hard to very hard, 70%–84% of maximum heart rate, one repetition maximum)
Time	≥ 20 minutes	Three sets, 8–12 repetitions, 2:1:2 seconds per repetition, 120 seconds rest per set
Type	Supervised by professionals. Alternate days focusing on cardiovascular or strength training. During cardiovascular training: Run in ability groups, integrate interval running to reduce total running mileage, and progressively increase duration or pace. During muscle strength training: Prioritize the lower extremity, emphasize precision of movement, and progressively increase demands. Plan regular decreases in volume to avoid overtraining.	

Fitness

Fitness stakeholders assured training stakeholders that pace-monitoring watches would ensure that candidates would be appropriately challenged in their peer ability groups and that DP1 instructors would be provided fitness-stakeholder-led train-the-trainer sessions to ensure proficiency in program delivery.

Consensus

Stakeholders agreed to a thrice weekly, standardized lower-extremity-strengthening program and a twice weekly ability group running program, which is outlined in Table 4 and Table 5, in addition to the provision of pace-monitoring watches for candidates and mentorship training for DP1 instructors.

TABLE 4: EVIDENCE-BASED STRENGTH TRAINING PROGRAM	
Training	Best practices
Frequency	3 x per week strength training. 48 hours between sessions.
Intensity	8–12 repetitions maximum, rate perceived exertion 7–9 /10. Load progressed once 12 repetitions may be completed on third set.
Time	Three sets, 8–12 repetitions, 2:1:2 seconds per repetition, 120 seconds rest per set. Every fourth week, decrease volume x 1 week.
Type	Functional exercises prioritizing the lower extremity. Deadlift, lunge, step up, calf raise, clean/press, carry.

Excludes standardized 10-minute warm up and 10-minute cool down.

STEP 5 – EVALUATION

The fifth step of the Knowledge Transfer Scheme involves an evaluation of the implementation of the evidence-base product in a real-life situation. While an evidence-based product is developed from interventions already demonstrated to be effective, and that do not necessarily require effectiveness to be re-established, the feasibility of implementing the product into the intended context with target participants does require investigation. While several frameworks may be used for evaluation, the implementation lead proposed that the framework selected should reflect the Knowledge Transfer Group's consensus on implementation context, outcomes and perceived barriers.

A) IMPLEMENTATION CONTEXT

Chair

The chair requested that the implementation lead initiate the discussion on implementation context.

TABLE 5: EVIDENCE-BASED RUNNING PROGRAM		
Training	Best practices	
Frequency	1 x per week interval running. 1 x per week continuous running.	
Intensity	Ability group determined pace. Gradual weekly progressions.	
Time	20–30 minute sessions. Gradual weekly progressions.	
Type	Every fourth week, volume decreased x 1 week.	
Week	**Interval** **(# repetitions x sprinting: walking)**	**Continuous** **(# min @ min/km pace, per ability group)**
Week 1	6 x 30: 60 seconds	20 min @ 4:45 / 5:15 / 5:45 / 6:15 min/km
Week 2	8 x 30: 60 seconds	25 min @ 4:45 / 5:15 / 5:45 / 6:15 min/km
Week 3	10 x 30: 60 seconds	30 min @ 4:45 / 5:15 / 5:45 / 6:15 min/km
Week 4	8 x 30: 60 seconds	25 min @ 4:45 / 5:15 / 5:45 / 6:15 min/km
Week 5	6 x 45: 90 seconds	20 min @ 4:30 / 5:00 / 5:30 / 6:00 min/km
Week 6	8 x 45: 90 seconds	25 min @ 4:30 / 5:00 / 5:30 / 6:00 min/km
Week 7	10 x 45: 90 seconds	30 min @ 4:30 / 5:00 / 5:30 / 6:00 min/km
Week 8	8 x 45: 90 seconds	25 min @ 4:30 / 5:00 / 5:30 / 6:00 min/km
Week 9	6 x 60: 120 seconds	20 min @ 4:15 / 4:45 / 5:15 / 5:45 min/km
Week 10	8 x 60: 120 seconds	25 min @ 4:15 / 4:45 / 5:15 / 5:45 min/km
Week 11	10 x 60: 120 seconds	30 min @ 4:15 / 4:45 / 5:15 / 5:45 min/km

Excludes standardized 10-minute warm up and 10-minute cool down.

Training stakeholders
Training stakeholders expressed uncertainty that a research experiment could be implemented on DP1 without compromising 4 CDTC operations.

Implementation lead
The implementation lead recommended that comparing outcomes in DP1 cohorts participating in evidence-based PT with DP1 cohorts serving as control by participating in usual PT may be used to observe any differences between groups with the least risk of compromising training. Attempts should be made to ensure one evidence-based and one control group per season to ensure similar variations in load-bearing requirements, terrain conditions, etc., and it was proposed that, given that 4 CDTC traditionally hosts a minimum of six DP1 courses per fiscal year, three courses could run the evidence-based LBM and PT program while another three could run as a control. Furthermore, the implementation lead recommended that a group of researchers from the Directorate of Fitness, Canadian Forces Morale and Welfare Services, join the Knowledge Transfer Group as research stakeholders to consult as subject matter experts in PT program evaluation in CAF members.

Research stakeholders
Given the training stakeholder concerns, leadership stakeholder direction for adoption and the project limited scale to 4 CDTC, the implementation lead and research stakeholders recommended a prospective, cohort feasibility study using a hybrid implementation–effectiveness design where the primary focus is on determining feasibility of implementation and the secondary focus is on determining effectiveness.[23] Furthermore, they recommended stakeholder group input at regular intervals to ensure that, if study processes ever posed an unmanageable demand or compromised operations at 4 CDTC, it could be discontinued.

Consensus
Stakeholders agreed that a prospective, cohort feasibility study using a hybrid implementation–effectiveness design would be used to evaluate the implementation of an evidence-based LBM and PT program into DP1. They also agreed that its effectiveness would be compared to a control; evidence-based and control groups would alternate to account for seasonal variation; and stakeholders would have regular input to discontinue the study if its processes ever posed an unmanageable demand or compromised operations.

B) OUTCOME METRICS
Chair
The chair next inquired as to what metrics should be measured.

Research stakeholders
The implementation lead and research stakeholders recommended following established feasibility study guidelines,[24] which recommend operationalizing implementation with quantitative outcomes related to study recruitment, outcome measurement and intervention processes, with the addition of the qualitative descriptions of manageable study demands from the perspective of stakeholders. The implementation lead then conservatively estimated that the evidence-based LBM and PT program would result in a reduction of ≥ 25% overuse MSKI compared to control, based upon the median 34% previously reported.[5]

Leadership stakeholders
Leadership stakeholders agreed that relative difference of ≥25% overuse MSKI sustained by participants between groups would deliver a minimal operationally important difference.

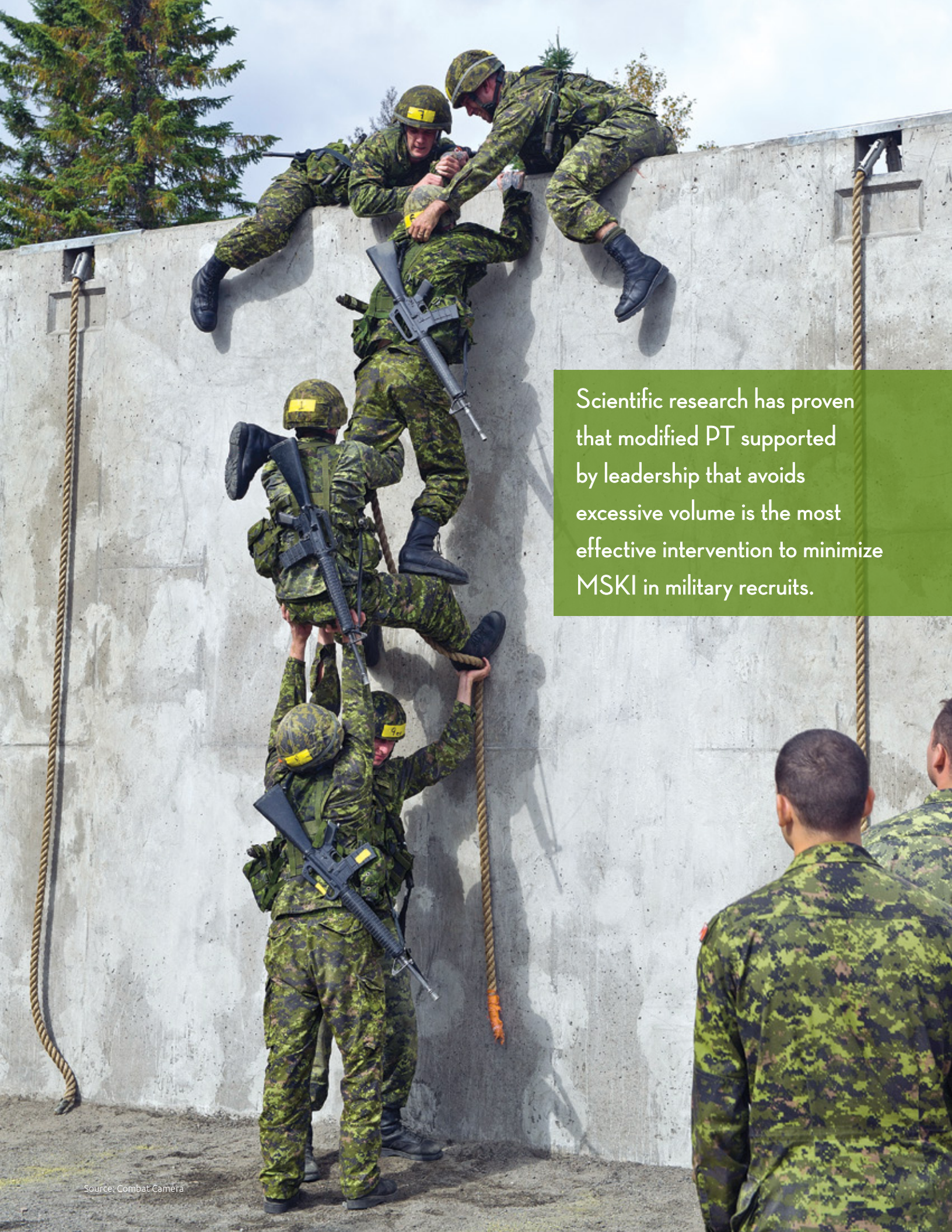
Training stakeholders
Training stakeholders estimated that ≥70% candidates would volunteer to participate in a research study given their historical pass rate and unfamiliarity as research participants, and committed to completing ≥80% of scheduled quality monitoring assessments with DP1 instructors to ensure ≥80% adherence to the study protocol. Furthermore, they expressed uncertainty that an evidence-based PT program would result in fewer MSKI without loss of occupational performance in DP1 candidates.

Fitness stakeholders
Fitness stakeholders recommended that the FORCE evaluation could serve as a measure of occupational performance and estimated that completing it would require three staff three hours and no additional resources. The evidence-based LBM and PT program would require ~$12,000 CAD in resources, and providing DP1 instructor training to lead the evidence-based PT program would require two fitness staff a half day and no additional resources, which could be confirmed following a train-the-trainer trial.

Medical stakeholders
Medical stakeholders recommended capturing pragmatic measures of DP1 candidates' MSKI profile (mechanism, diagnosis) and impact (MEL days), which could be recorded at sick parade, and they estimated that that would require ~2 minutes/patient and ~60 minutes/week, which could be confirmed with a train-the-trainer trial.

Consensus
Stakeholders agreed to the recommended quantitative and qualitative outcomes provided by stakeholder groups as outlined above and in Table 6.

TABLE 6: FEASIBILITY OUTCOMES DETERMINED BY STAKEHOLDERS			
Feasibility outcome	**Success criteria**	**Rationale**	**Criteria met/unmet**
Recruitment			
· Recruitment rate	≥70%	Candidates have limited research familiarity. Historical pass rate of 70%.	
Outcome measures			
Survey			
· Understanding	Minimal clarification	Candidates have limited research familiarity and formal education.	
· Time	≤5 minutes	As above, may prolong survey duration.	
FORCE			
· Human resources	Fitness: 3	Train-the-trainer trial will provide human resource requirement.	
· Material resources	$0	Outcome measures purposely selected because they incur no additional cost.	
· Time	3 hrs	Train-the-trainer trial will provide time requirement.	
Intervention			
· Human resources	Fitness: 2 DP1: 2	Train-the-trainer trial will provide human resource requirement.	
· Material resources	<$12,000 CAD	Projected cost to procure training equipment.	
· Time	11 weeks 6 days/week	Similar studies reported a minimum of nine weeks modified PT for effectiveness.	
· Safety	≥25% fewer overuse MSKI	Previous studies reported a median 34% reduction in MSKI.	
· Fidelity check	≥80%	Training stakeholders will ensure that DP1 instructors followed study protocol.	
· Adherence	≥80%	Historical loss ≤20% PT sessions on DP1 because of unscheduled priorities.	
MSKI reporting			
· Human resources	Medical: 1	Train-the-trainer trial will provide human resource requirement.	
· Material resources	$0	Outcome measures purposely selected because they incur no additional cost.	
· Time	≤2 min/item ≤60 min/week	Train-the-trainer trial provided time requirement.	
4 CDTC stakeholder perception			
Leadership	Study processes pose a manageable demand without compromising operations.	Study processes pose an unmanageable demand on resources or compromise operations or would influence recommendations: a) Feasible with current resources. b) Feasible with additional resources. c) Not feasible (cost exceeds gain). d) Not feasible (no evidence of gain).	
Training			
Fitness			
Medical			



Scientific research has proven that modified PT supported by leadership that avoids excessive volume is the most effective intervention to minimize MSKI in military recruits.

Source: Combat Camera

C) PERCEIVED IMPLEMENTATION BARRIERS

Chair

The chair next inquired about perceived barriers to program implementation.

Training stakeholders

Training stakeholders proposed that DP1 instructors may not prioritize the study protocol secondary to directions provided by individuals outside their direct chain of command and may perceive that evidence-based PT would be insufficient to meet occupational performance requirements.

Implementation lead

The implementation lead proposed promoting DP1 instructor fidelity to the study protocol by doing the following: recommending that leadership stakeholders document their formal commitment to the study protocol through a 4 CDTC order; having training stakeholders schedule regular quality monitoring assessments of their DP1 instructors' fidelity to the study protocol; and measuring occupational performance before and after the program to determine comparative effectiveness.

Consensus

Stakeholders agreed to regular DP1 instructor fidelity checks, quality monitoring and addition of the FORCE evaluation as the occupational performance to the outcome metrics.

CONCLUSION

MSKI are the primary threat to the operational readiness and force strength of the CAF. Scientific research has proven that modified PT supported by leadership that avoids excessive volume is the most effective intervention to minimize MSKI in military recruits. However, discrepancies between researchers and military stakeholders may be a barrier to implementing modified PT. As only interventions that are implemented will potentially minimize MSKI and their associated impact, it is recommended that researchers engage with relevant stakeholders in order to adapt interventions to their context.

This paper has outlined an adaptation of the Knowledge Transfer Scheme that was used to guide collaboration between military researchers and relevant stakeholders to plan the implementation and evaluation of an evidence-based LBM and PT program designed to minimize MSKI to candidates during DP1 infantry training. The authors aspire to inspire their respective peers in the leadership, training, medical and fitness domains to cultivate cooperative relationships on their respective CAF bases to promote a wide-scale implementation of evidence-based PT in order to minimize MSKI. The potential gain of implementing evidence-based PT includes the following: improved physical fitness/occupational performance and minimized MSKI, attrition rates and their associated burdens/impacts; maximized graduation rates; improved operational readiness; and maximized CAF force strength. Readers interested in the evaluation of this program as described above may access the results here: https://pubmed.ncbi.nlm.nih.gov/33865697/.

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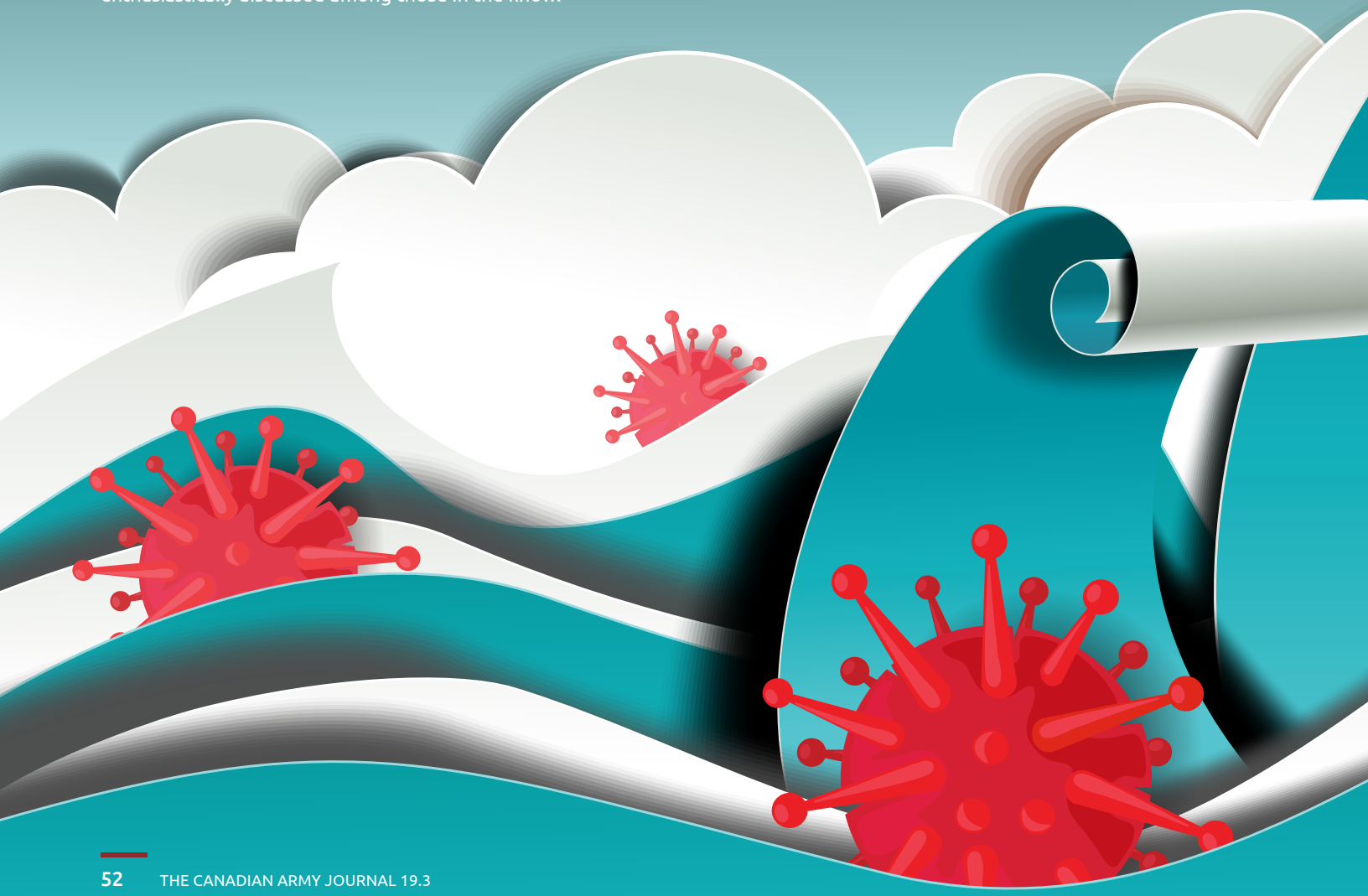
COVID-19:

A PERFECT STORM FOR INNOVATION IN ADDITIVE MANUFACTURING

Major Jess Ross and Captain Chad Mooney

Artist Andy Warhol was an unlikely inspiration for the military community, but he captured the essence of both innovation and initiative when he stated, "They always say time changes things, but you actually have to change them yourself." That could easily be the motto of the grassroots additive manufacturing (AM) community which has been growing in Petawawa over the past year. The Canadian Armed Forces' (CAF) interest in AM has been well documented in the *Canadian Military Journal* and the *Land Equipment Management System (LEMS) Journal*, and the potential benefits are very well understood and enthusiastically discussed among those in the know.

However, while our allies have embraced and implemented this technology, the CAF has struggled with systemic integration of AM due to the complexities of intellectual property rights, governance, safety and training considerations, as well as the lack of a dedicated and resourced team tasked to drive AM implementation Centralized governance will be essential to optimize the full potential of AM, but this article will illustrate the power of progress and innovation at the tactical level through a case study and propose how barriers could be removed so as to harness AM to inform the development of a national AM strategy.



The Department of National Defence (DND) has been grappling with the question of how to integrate AM into existing processes since at least 2014. That was the year when the Canadian Army Land Warfare Centre identified how AM could influence the operational functions at the Emerging Disruptive Technology workshop,[1] and 202 Workshop Depot purchased their first 3D printer.[2] Since then, although there has been little formal direction at the unit level, individual members of the CAF have taken their own interest to the next level by purchasing 3D printers and using online tutorials to hone the design element of this craft and gain in-depth knowledge of the printers and software required to become hobbyist inventors. This was not particularly remarkable until supply challenges due to COVID-19 became a catalyst in enabling the CAF's AM community to innovate and truly demonstrate the benefit and applicability of AM at the tactical level in the Canadian Army for the first time.

Source: Adobe

Source: Major Jessica Ross

Figure 1: Captain Bégin Proudly Showing Off the Very First Print Made by 2 Canadian Mechanized Brigade Group's Ultimaker S5, 3 February 2020

PART I: CASE STUDY

Friday the 13th: Calamity Strikes

In March 2020, the COVID-19 pandemic sweeping the globe started to impact Canada's "normal." In a scene echoed across the country, 2 Canadian Mechanized Brigade Group (2 CMBG) received the previously unimaginable order that Petawawa's March Break would be extended to align with school closures[3] and working from home. Shortly thereafter, the annual Exercise MAPLE RESOLVE was cancelled for 2020.[4] It became clear that the entire world would be dealing with many "unknown unknowns" while trying to navigate new ways of communicating, leading and planning. We were faced with unknown tasks, unknown timelines and a new, unknown enemy: COVID-19. In a culture with a bias toward action, being directed to "shelter in place and do nothing" made people uncomfortable. 2 CMBG quickly realized that in order to operate effectively in a COVID environment, it would need appropriate individual protective equipment (IPE).

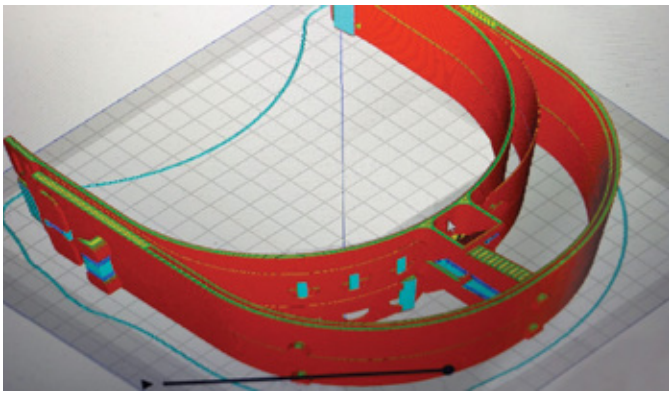
Acquiring IPE proved difficult. With a nation-wide shortage of high-quality N95 masks[5] and other items—a shortage rippling across the world—any orders placed locally by 2 CMBG would deprive front-line medical workers of essential protection. A sustainable mechanism of delivery for these commodities was needed, as it was becoming clear that the Force Health Protection measures would be in place beyond the original timelines. 2 CMBG would need to get creative.

A Unique Opportunity

As luck would have it, a fledgling community of AM enthusiasts had been growing in Petawawa over several months. 2 Service Battalion (2 Svc Bn) had sent representatives to the 2nd Annual AM Forum in Ottawa in early November 2019, and they in turn held the first Petawawa AM Working Group (WG) in early February. This coincided with the procurement of 2 CMBG's first AM printer, which was set up as a stand-alone device in 2 Svc Bn facilities. Its operation was then demonstrated for the local WG's 25 participants (Figure 1). Little did we know just how soon this community and the newly purchased printer would be put to the test.

By the end of March, 2 CMBG was looking to find ways to acquire all types of IPE. Members of Petawawa's AM community—now with time on their hands, working from home—identified a movement across the global AM community that could help solve 2 CMBG's IPE problem: 3D-printed face shields.[6] A small group of officers established a virtual chat to discuss designs that were publicly available and determined that while several might be effective, some customization would be needed in order to improve comfort if they were to be worn for extended periods. The G4 staff discussed design options with the Brigade Surgeon to refine the design, and it was decided that it should include a hinge allowing the shield to move up and down.

To complete this design, a team was needed to test and provide feedback on the prototype, and ultimately to help with the production effort. A new group chat was established, with members spanning all trades, ranks and units—from a new corporal who had not yet completed his Weapons Technician trade training to a Vehicle Technician sergeant who was happy to learn novel skills from that corporal. This resulted in an ad hoc team of 14 members, all of whom either had some formal training in AM or access to a printer at home (and a few had both).

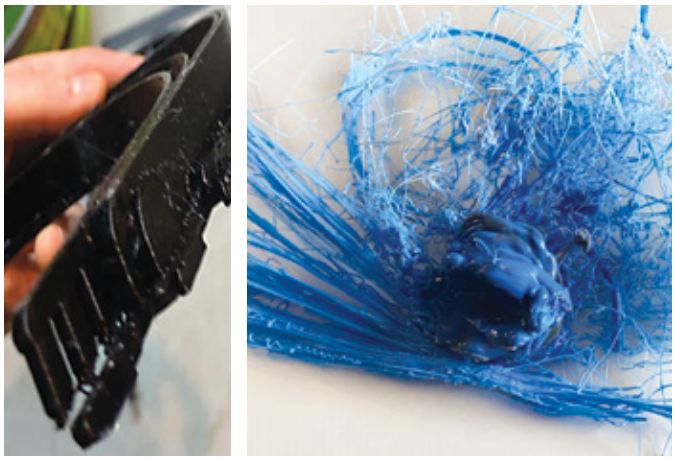


Source: Corporal Dylan van Adrichem

Figure 2: Corporal van Adrichem Tweaked the Design To Optimize It for His Personal Printer

The team needed a technical leader. A Royal Canadian Electrical and Mechanical Engineering captain in 2 Svc Bn had extensive knowledge of SolidWorks design software, acquired while pursuing his undergraduate engineering degree; he led the design process, soliciting feedback from the growing group chat. 2 Svc Bn moved forward in procuring consumable printer filament so that team members could download the new design at home,[7] print it on their personal printers, and provide feedback on areas to improve. The file was then updated and re-uploaded to an open online forum, and the process was repeated in an iterative fashion until the design was optimized.

Trialling the design to achieve functionality became a collaborative group effort. The process focused not only on design modifications in the SolidWorks software, but also individual printer troubleshooting. The junior Weapons Tech corporal was quickly noticed as an individual who had a wealth of knowledge about printer troubleshooting and personally owned two Ender 3 printers. He improved the design's problematic hinge and helped others to bracket and refine their respective printers' unique settings (Figure 2). This is where the collaborative power of the group chat was truly evident: egos were set aside as each small manufacturing flaw was shared with the chat—where rank and unit had no bearing—for assistance (Figures 3 and 4). The design was soon finalized and approved by both



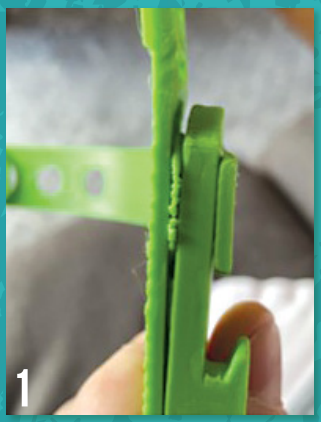
Source: Captain Chad Mooney

Figure 3: Early Failed Prints

the brigade and medical chains of command. The G4, anticipating that 2 CMBG would receive a task requiring the face shields, requested that printing of the final design be commenced. The final design incorporated a reusable plastic shield mount, with clear map talc overlay (a readily available commodity in most military institutions) as the face shield portion. It could be removed and disposed of daily, and the reusable plastic mount was relatively resistant to bleach and other chemicals for cleaning purposes (Figure 5).

The team optimized print time using clever solutions such as stacking designs, spacing them tightly on the printer bed, and amending the code. As many of the members were self-taught, tricks learned from online forums were quickly discussed and implemented, enabling the team to decrease the print time from 12 hours to 4 hours.

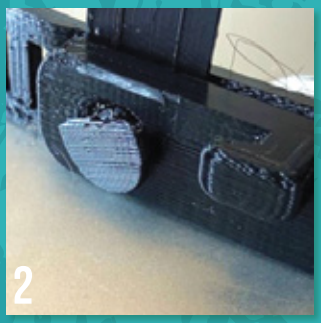
FIGURE 4: GROUP DISCUSSION TO WORK THROUGH A PRINT QUALITY ISSUE



Any idea how to tighten this up? This is the last remaining flaw I have! Broke apart well, but a little weak on the ends. I took Etiennes advice, fan is down to 70%, temp is 210. Most other edges are fusing well. Should I just reduce the layer height?

Coasting maybe. The other option is linear advance but that is alot of work and tuning.

If you start printing .2mm everything could turn problematic again. But that definitely looks like the reason your straps were breaking in the first.



Ensure you free up the outside of the toggles, my fused areas separated well, but I forgot about this area. It should move freely with the innermost piece!

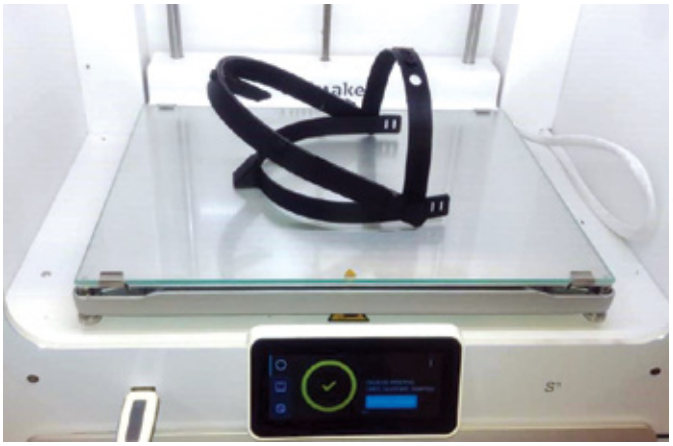
I'm going to save those pics to use in the instructions.

Learn from my mistakes: if this one happens, it's 1st Layer Horizontal Expansion.

Source: Major Jessica Ross

Source: Captain Chad Mooney

Figure 5: Fifty Shields Ready To Be Assembled



Source: Captain Etienne Bégin

Figure 6: Completed Shield Headband on Printer Bed

On 22 April, the 2 CMBG medical technicians were asked to assist with a Long Term Care Facility task[8] that required maximum IPE. Based on the collaborative effort between the AM group and 2 CMBG's medical experts throughout the design phase, the medical technicians were familiar with the design of the 2 CMBG face shields and asked if they could use them. With the quantities being issued as quickly as they could be produced, printers were running in homes almost 24 hours a day. Some members had larger printers running on 12-hour print cycles, while those with smaller printers got up in the middle of the night to restart their printers and remove the finished product. This kept the AM group chat operating at all hours of the night, with members looking for assistance with printer mishaps or just sharing photos of successful prints. In four weeks, approximately 450 shields were assembled, enabling 2 CMBG's medical technicians to operate safely in a COVID-19 environment in Operation LASER, mounted in response to the Government of Canada's request for assistance.

The versatility of AM was evident throughout this case study. The project quickly demonstrated that AM was well suited to navigating the opportunities and challenges created by dispersed work schedules, novel work flows, forum problem solving, and the ingenuity of military members—regardless of rank or trade. Although a relatively simple case study, it was a first step toward a deliberate application of AM technology within the Army in order to solve a problem for the Army and enable the Army to support Canadians.

It didn't need to be unique

The team in Petawawa is proud of the fact that it overcame significant challenges and made a meaningful contribution to the government's efforts to protect Canadians from COVID. However, it could be argued that the project did not involve any specific technical skills or cost-prohibitive technology that were unique to Petawawa. AM technology is not new, and the CAF is well aware of its potential, yet has been slow to adopt it. In addition to many civilian academic and industry papers on the topic of AM, several CAF- or DND-focused papers have been published in recent years, including in the *Canadian Army Journal*. Indeed, no fewer than ten papers were written about the potential of AM during the Joint Command and Staff Program in 2018–2019. Unfortunately, change at the institutional level takes time. So how can we reduce the barriers for implementation and better set the conditions for this kind of innovation across the CAF?

PART II: BACKGROUND

We've talked about this … a lot

Bayley and Kopac's 2018 article in the *Canadian Military Journal* was written with the express goal of convincing the wider CAF community of the value of AM, in the hope that this "tipping-point is reached and the requirement to invest in AM innovations will be realized."[9] The article discusses each of the CAF's operational functions—Sustain, Act, Command, Shield, and Sense—and provides detailed examples and potential benefits drawn from civilian industry and other militaries. It is a detailed and forward-thinking technical paper identifying many valuable use cases across the spectrum of military employment, and the authors' frustration with the slow pace at which AM was being incorporated broadly into DND's procurement and sustainment systems is apparent. However, Bayley and Kopac's article focuses primarily on *what* AM can accomplish, without addressing the more complex question of *how* to integrate it into the CAF, which is beyond the scope of the discussion. As we continue this review, it will become clear that the question of *how* is the real holdup.

The *LEMS Journal* has published articles discussing AM capabilities and use cases in each of its four editions. Hui's 2018 article outlined the progress made at 202 Workshop Depot, a third-line maintenance facility.[10] Another 2018 article looks at the potential for AM to change how mobile repair teams and sustainment are

conducted in the future battlespace.[11] Ross and Goldfinch's 2019 paper explores examples of how certain units were buying and using AM in a limited fashion.[12] Faurbo's 2019 paper introduces the concept of a DND Centre of Collaboration (COC) that was pitched at the 2018 Blueprint 2020 Innovation challenge.[13] The most recent edition of the *LEMS Journal* includes a paper that discusses the state of AM technology, as well as current challenges and initiatives.[14]

Each of these papers provided the LEMS community with interesting information about AM and its potential in various applications. However, only Faurbo presented a clear recommendation about *how* to harness local initiatives across the CAF (not just for the Army) through a COC. That effort won second place out of 174[15] entries at the Defence Team Innovation Challenge in November 2018,[16] which unfortunately meant that it did not receive any resources for an initial stand-up. Provencher's 2020 paper outlines initial plans for 202 Workshop Depot to demonstrate AM during Exercise MAPLE RESOLVE in order to validate the Army's needs and provide preliminary guidance to units that currently hold AM systems. Unfortunately, COVID thwarted those efforts. There is a "chicken or egg" tension between figuring out *what* the Army needs (not just the technology itself, but also the associated governance), versus *how* the Army will use AM and integrate it into existing processes at the tactical level. It will be almost impossible to address the longer-term implementation plan without getting feedback on what does or does not work at the tactical level. Grassroots innovation will therefore be essential as a test bed for incorporating this new technology into the training, tactical sustainment, supply chain management and procurement systems. Because AM has the potential to disrupt each of these complex systems, it will be essential to test ideas on small-scale, low-risk endeavours before attempting to scale up any major changes.

In November 2019, the Director General Land Equipment Management Program within the office of the Associate Deputy Minister (Materiel) [ADM(Mat)] hosted the second annual AM Forum in Ottawa. The Forum was attended by representatives from all L1s, who brought a wide range of experience. The proceedings of the Forum outline an analysis of the technological advantages that AM might provide, as well as a discussion of the myriad challenges to implementation.[17] Table 1 as follows summarizes the key issues identified in support of a DND-wide AM framework.[18] Although the discussions involved many stakeholders, these key takeaways are still being examined and have yet to be incorporated into a coherent action plan for the Army and the CAF. Although the Army is still lagging behind, other L1 organizations have made more concrete progress.

Two engineers at the Royal Canadian Navy (RCN) Fleet Maintenance Facility in Cape Scott established the Laser Additive Manufacturing System Team around 2012,[19] successfully applying metal AM to complete repairs on the RCN's aging fleet that would otherwise have been impossible. In 2019, the RCN announced its intent to expand the use of AM, and identified the lead office with the task of providing specific direction to the Fleet Maintenance Facilities.[20] Canadian Special Operations Forces Command (CANSOFCOM) has also adopted AM, in accordance with its stated goal of being able to operate independently for long periods of time.[21] Some units within the Army have procured AM machines for local initiatives,[22] but the most mature capability lies within the Army Learning Support Centre (ALSC). The ALSC, which is located within the Tactics School in Gagetown, has built a vast library of printable designs for vehicles, weapon systems and buildings to facilitate Army training.[23] With a robust suite of printers and materials available, this organization undoubtedly has valuable and practical expertise to share with units interested in developing their own capability. However, the ALSC does not have the mandate or capacity to serve as a central node to assist a network of start-up AM initiatives.

Although there is a wide network of individuals across DND working on the question of AM implementation, they are doing so in silos. It appears that the integration of AM is suffering due to the lack of a clearly defined central node within the institution who would be enabled with the time, the resources and the technical and procurement background to shepherd this effort. At this time, "AM implementation"is typically a secondary duty that requires coordination across several

TABLE 1: KEY ISSUES IDENTIFIED IN SUPPORT OF A DEPARTMENT OF NATIONAL DEFENCE-WIDE ADDITIVE MANUFACTURING FRAMEWORK	
1. Governance/policy	7. Deployment as far forward as environmental conditions permit
2. Knowledge skills	8. Centre of Excellence / Collaboration
3. Championship/leadership	9. Information Management / Information Technology (IM/IT)
4. Resource availability, budgetary concerns and LCMM	10. Focus on one material and limit what can be deployable
5. Data management	11. Standardization, safety and security
6. Concept of ops, supply chain, interoperability	

different groups or organizations, an arrangement that may lead to a silo effect or differences in prioritization. Given that there is no external factor driving this change to make it a high priority across the organization, and no individual tasked with AM as a primary duty, AM may continue to languish as one of many ideas competing for attention and scarce resources. How can we change that in order to harness AM's full potential?

PART III: DISCUSSION

How Additive Manufacturing Aligns with Close Engagement

With so many challenges facing a top-down approach, it is clear that AM will not be quickly implemented system-wide. The Petawawa case study clearly demonstrates the feasibility of a decentralized, bottom-up approach to implementation. Until formal policy exists, this unconventional, grassroots approach should be used to lay the groundwork for broader implementation—and indeed that is exactly what must be done to ensure that these policies align with strategic intent as we transition to the Future Land Operating Environment (FLOE).

Close Engagement, published by the Army in 2019, is intended to "guide the development of the Canadian land forces for the next 10 to 15 years." It anticipates a FLOE that is "complex, dynamic, volatile, and highly uncertain,"[24] and it will require personnel to be versatile and able to work while dispersed. It paints a future in which a mobile repair team is able to manufacture a part through AM as far forward as possible and maintenance platoons are able to design and engineer in the field—possibly through the rapid prototyping that AM is known for. The governance required to broadly support the data management and quality control aspects of these activities may be complex, but the fundamental soldier-technician skills are not. The success of the ad hoc team in Petawawa is further proof of our members' ingenuity and technical expertise.

Framed another way, Petawawa's experience in responding to an operational requirement in a distributed manner should sound familiar. It could be argued that it was—in the most literal sense possible—the COVID version of an Adaptive Dispersed Operation (ADO). Members worked individually while geographically dispersed, each facing their own specific set of technical or other challenges, yet were networked together to collectively solve a problem. Given a longer-term view of enabling ADOs, it would be in the CAF's interest to take advantage of grassroots-level implementation of AM as a test case to inform the broader strategy. In order to fully harness these many initiatives, a central node should be established to collect and share lessons learned and best practices, without hindering the exploratory efforts.

Other nations are years ahead of Canada in terms of implementing AM. The US Marine Corps recently stood up the Advanced Manufacturing Operations Cell (AMOC) to provide central expertise on manufacturing, including AM, and has tested a deployed capability.[25] The Secretary of the US Army approved a policy on Advanced Manufacturing in October 2019 to guide investment in and adoption of AM,[26] shortly after standing up the AM Centre of Excellence in May 2019.[27] The NATO report *Science & Technology Trends 2020-2040*, released in March 2020, not only highlights the many potential advantages, but also points out that due to its commercial availability, AM is readily accessible to our potential adversaries[28]—further incentive to ensure that we do not fall farther behind.

Canada can learn a great deal from our allies, but we can also start training our personnel with the skills needed at the tactical level today. This is important because the true potential of AM is greater than just the ability to print parts and shorten supply chains. It will also be a tool that enables soldiers and technicians to consider a broader range of solutions to a problem, from helping to build a model, to planning an operation, to prototyping a way to improve the ergonomic fit of their equipment: it is the ultimate tool to enable innovation at all levels. While other countries are testing the limits of the hardware, Canadian soldiers must start thinking and learning about how and where it could be applied. As a smaller military, it is in our interest to leverage

TABLE 2: CHALLENGE AREAS, PROPOSED TIMELINES AND OFFICES OF PRIMARY INTEREST

Category	Now Tactical-level commanders	Soon Central technical POC	Later Strategic-level champion
Tech Skills	CAD trg sponsored by local units; leverage B.Eng. of current Officer corps. Respect Land Expedient Repair directive	Local skills development; contract colleges or leverage RMC for SolidWorks training	Training implemented through various trades and/or as specialty quality for any trade (design – any; QA/QC – tech specialty)
TTP	Tactical-level employment to test when to use AM, how to submit a request, how to access reach-back	Collect lessons learned locally, share with Tech POC	Full implementation – deployed support and reach back
Tech POC	Local expertise developed and shared	Central technical POC for tech questions ("+AM@forces")	Reach back directly to LCMMs for troubleshooting
Policy	Guidance from AM Forum 2019: No use in any safety critical parts or components. Review policies developed by Allies.	Confirm or refine guidance (safety, general applications)	Policy addressing deployed and domestic use cases, technical authority, incorporation into major capital procurement
IP Rights, ILS/ISS	Do not infringe on IP; adhere to guidance from AM Forum 2019	Do not infringe on IP. Identify parts candidates to be added to parts library (through DRMIS historical data, input from field units)	DIDs/CDRLs developed to include IP in procurements. Consider deliberate rollout and inclusion much like SBCA to ensure it is widely adopted
Data Storage, Security	Files locally maintained; only shareable if not a commercially available part and with CoC approval. Extreme care to avoid CTAT.	Continue to maintain locally; find means to share with tech POC	Full DRMIS integration; print files included as part of tech data package of new procurements, and historic parts integrated based on historic usage
Supply Chains	On a case-by-case basis, when not available in time through supply system or purchase – given specific safety arcs.	Select limited number of parts to use as test (i.e. just-in-time production, manufacturing time, location, quality, etc.)	Printer farms (both regional and deployed) to optimize storage space and reduce delivery times.

CAD – Computer-Aided Design
QA/QC – Quality Assurance / Quality Control
AM – Additive Manufacturing
LCMM – Life Cycle Materiel Manager
CoC – Chain of Command
CTAT – Controlled Technology Access and Transfer
ILS/ISS – Integrated Logistics Support/In-Service Support
POC – Point of Contact
IP – Intellectual Property
DIDs/CDRLs – Data Item Descriptions / Contract Data Requirements List
DRMIS – Defence Resource Management Information System

the lessons of our allies from a cost perspective, specifically in terms of the technology that is currently on the market. But where we can truly shine is in developing the technical skills required to take full advantage of AM, as well as in exploring how it may be employed at the tactical level and within the procurement system. The technology itself will continue to evolve, but if our personnel and systems are ready to receive them, we will be able to adapt seamlessly.

Change Is Hard

Achieving meaningful, lasting change is a complex endeavour in large organizations. Further complicating the matter in the case of AM are the many different stakeholders involved. From considering novel employment concepts at the tactical level, to addressing the engineering requirements, procurement and sustainment implications, to incorporating new skills into the training system across each L1, a significant amount of coordination is required in order to synchronize the implementation effort. AM implementation must be an iterative process, with the various challenge areas and organizational needs reviewed and adjusted as it progresses. Lessons learned from grassroots implementation must be incorporated into planning to ensure that the end result is a robust, common-sense policy.

This feedback from the tactical level may include information about the skills required, the practical flow of information from identifying a requirement for an item in the field back through the supply system during an exercise, how a part or item is identified as a candidate to be printed instead of procured, and how they are vetted once complete. All of this will become part of the broader system.

There are several obstacles to navigate before AM's potential might begin to be truly realized. In Table 2 as follows, the most common and most important areas of friction have been categorized. Given the scope and complexity of this endeavour, short-, medium- and long-term goals are proposed in each of these areas. Generally speaking, the "now" goals can be achieved locally, the "soon" goals can be achieved by a formal central authority or even by an informal network, and the "later" goals require coordinated direction across several L1s. The tasks have been organized this way to enable local commanders to foster the culture of innovation promised by AM with minimal further guidance, while understanding where these efforts should fit into the eventual, larger strategy.

The most important aspect in moving toward a long-term solution will be identifying one clear champion for the effort. That champion must be empowered with appropriate resources (in time, personnel and budget) and be able to effectively engage the right points of contact in each of the stakeholder organizations, in order to exert influence. ADM(Mat) is a natural node for this effort due to its integral sustainment and engineering expertise, with a champion in each L1 depending on the priority assigned by the Commander. An iterative approach will enable local commanders to immediately take action and start collecting lessons learned, concurrent with the strategic-level coordination required for long-term implementation.

As *Strong, Secure, Engaged* states, the CAF must "ADAPT proactively to emerging challenges by harnessing new technologies … and leveraging innovation."[29] We must deliberately assign a priority to AM if we are ever to achieve this stated goal.

The Way Ahead

The CAF aspires to be a diverse and forward-thinking organization. Many of our most junior soldier-technicians demonstrate immense creativity and innovation—exactly the traits that the CAF is looking for in the profession of arms. Continuing to strive to implement new technology and develop the associated tactics and procedures will ensure not only that we continue to recruit the best and the brightest, but that they are challenged and employed to their full abilities.

The recent example of Petawawa's small AM community innovating at the grassroots level in order to respond to COVID-19 supply chain challenges proves the benefit of giving units the flexibility to trial new technology. After years of talking about AM's many benefits, and despite widespread implementation by our allies, most notably the USMC, this was the first time it was used to contribute directly to an Army operational requirement. Although significant coordination is required at the strategic level for long-term implementation, this case study proves the value of enabling bottom-up initiatives so that we can start reaping the benefits now and sow the seeds for a culture of innovation. What we need to do now is to designate a champion to collect the lessons learned from this and countless other examples of such grassroots creativity that can be used to build an eventual Canadian Army AM policy and Centre of Excellence. We've spent enough time talking. As Warhol said, you actually have to change things yourself—so let's get on with it.

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FREED BY LIMITS:

The strategic realities of the Canadian Army, *Close Engagement*, and the potential for a new way of thinking about Canadian land power

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I'll define [grand strategy] . . . as the alignment of potentially unlimited aspirations with necessarily limited capabilities.

—John Lewis Gaddis, On Grand Strategy[1]

The goals set out in this document are somewhat [sic] aspirational—they neither presuppose any particular constraint on resources, nor do they assume that resources will be unlimited.

—Close Engagement: Land Power in an Age of Uncertainty[2]

In a previous edition of this publication, Lieutenant-General Wayne Eyre, Commander of the Canadian Army, asked members of the Canadian land operations community to provide their perspectives on the Canadian Army (CA)'s future challenges and operating concepts in the years ahead. In particular, the Commander asked for a critical review of the CA's capstone document, *Close Engagement: Land Power in an Age of Uncertainty*, in light of troubling geopolitical trends.[3] This author came to a startling conclusion: *Close Engagement* did not successfully place future land power development in a Canadian strategic context to begin with, and should therefore be re-examined. *Close Engagement*, like much of the Canadian Army's focus, remains on the tactical level. Analyses of strategic trends are not used to show how the CA could better pursue the Canadian national interest, but rather to justify a force for fighting the kinds of battles that, institutionally, the Army wants to fight.

This article will argue that the CA needs to rethink the employment of land power from a basis of strategic limitations, not institutional aspirations. The word "limitation" might seem essentially negative and even suggest a pessimism or lethargy that will do little to solve structural issues or motivate soldiers. However, the reader is encouraged to abandon that association. Limitations are the basis of creativity and growth in all fields of human activity. Medieval architects, instead of assuming that stone was an inherently awkward material, found ways of building cathedrals with higher walls, creating an airier appearance

than even the Romans had achieved. The Swiss cantons, faced with a relatively small economy and the inability to raise large numbers of horses in the Alps, nevertheless created a fearsome military system that dominated the wars fought in late medieval Europe.[4] In 1942, General Bernard Montgomery, who understood the professional, logistical and material limitations of his citizen army, planned and executed a well-conceived series of operations at Alam el Halfa and El Alamein. Conversely, his German counterpart, Erwin Rommel, failed to acknowledge his logistical limitations, and after his defeat he chose to blame subordinates instead of acknowledging his own hubris.[5] This essay will first discuss the strategic limitations on the employment of land power, and why avoiding a discussion of these limitations weakens the relevance of *Close Engagement*. Then, with these limitations in mind, it will propose some ways of thinking about building a strategically relevant force.

DISTANT ADVERSARIES

Canada's military problems are not, in the nature of things, concerned exclusively with the Dominion's own territory . . . . [T]he initial task of a student approaching these problems is to familiarize himself with the military geography of Canada . . . . Such a student immediately finds that the problem is dominated by three great facts, two natural, one created by man: two oceans and a long land boundary.

—C. P. Stacey, *The Military Problems of Canada*, 1940[6]

C. P. Stacey, writing in the early years of the Second World War, can be forgiven for excluding the Arctic Ocean in his description of Canada's military geography. In 1940, with the Nazis rampaging across Western Europe and Imperial Japan threatening to pursue its brutal expansion campaign beyond China and Korea, the Arctic was not a pressing strategic priority. Despite Stacey's focus on the east and west, his observations still apply to the north. A significant majority of Canada's population lives close to the southern border, and it is much easier for an average Canadian to fly from Canada's biggest city, Toronto, to London or Paris than it is to get to Iqaluit. A battle group (BG) of soldiers deploying to Europe from Petawawa would likely have a much easier time using the abundant air, sea, road and rail infrastructure of the Québec–Windsor corridor and the Operational Support Hub at Bonn than they would dealing with the relatively meagre logistical infrastructure and the harsher environmental conditions of Whitehorse or Yellowknife. These geographical realities mean that every time the Canadian Army intends to deploy for a fight, it will be doing so in an intensely expeditionary manner. Before Canadian soldiers can begin to think about "close engagement," they need to think about "far deployment."

The primary limitations imposed by expeditionary operations are deployment and sustainment. This is a simple deduction to make: an army, however well organized, equipped and led, is useless if it cannot actually reach the battle—and reach it in time to matter. Curiously, the authors of *Close Engagement* spend little time discussing these key factors. Although logistics and deployability are mentioned—specifically, that "vehicles and associated equipment must balance inter- and intra-theatre mobility with the requirement to operate in difficult terrain, including urban centres" and that "the Army will continue to be organized, trained, and equipped in order to be rapidly deployable in scalable packages"—these concepts appear to be a garnish, not the main course. On a very basic level, if the CA is going to *continue* to be rapidly deployable, there is no metric for what "rapidly deployable" currently means. What kinds of missions can the CA mount and sustain an expeditionary force for? Specifically, can the Canadian Armed Forces (CAF) deploy or maintain the ability to deploy "at any level from individual or small team up to brigade group"?[7]

The CAF cannot sustain *Close Engagement's* vision for rapidly deploying nationally autonomous, all-arms formations based around the Empowered Combined Arms Team (ECAT). *Close Engagement* envisions the ECAT as the "primary combat element of Canadian land forces," with three to six ECATs constituting a deployed unit.[8] Given the number of enablers considered for an ECAT—manoeuvre platoons, including troops of heavy armour, combat support elements, Civil-Military Cooperation teams, and electronic warfare capabilities—it is unlikely that a deployment below battalion level would be possible unless the CAF is willing to accept the deployment of BG-level maintenance and administration elements to support it. Given that an ECAT should be capable of "conducting combined arms manoeuvre as part of a unit or brigade operation," it is likely that the kind of operation to which *Close Engagement* aspires is, at minimum, a small BG capable of sustaining at least one "square" combat team of a full company of mechanized infantry wedded to a full squadron of tanks. Indeed, *The Battle of Santa Maria, 2035*, a vignette included in *Close Engagement* to highlight the concept in action, specifically envisions four troops of Leopard 2 tanks, together with an armoured reconnaissance squadron and a company of mechanized infantry, as well as a generous complement of armoured engineering, route clearance and logistical support. In the vignette, this ECAT contains a significant enemy force, presumably a combined arms battle group, despite receiving a heavy dose of enemy electronic warfare attacks. The vignette is a compelling read. But more important than the *Battle of Santa Maria* would be the deployment to Tierra Natal, the host nation that the Canadians would be defending. There is no vignette for that stage of the operation.

It is unlikely that the Canadian BG would arrive in Tierra Natal in time. The CAF's current heavy lift assets are centred around a fleet of five C-177 Globemaster III heavy lift aircraft, seventeen CC-130J aircraft, and five CC-150 Polaris troop transports.[9] Of these aircraft, only the C-177 can carry a Leopard 2 tank. It would thus take four lifts of the Royal Canadian Air Force (RCAF)'s entire inventory just to move the Leopard 2s. The same is true for the LAV 6 infantry fighting vehicle (IFV) and for armoured engineering vehicles. Although the CC-130J fleet would be able to move key stores and equipment, such as ammunition and M777 howitzers, this fleet would soon be fully occupied with simply sustaining the force in theatre, further delaying the deployment of the *Santa Maria* task force. In addition, this scenario assumes a 100% serviceability rate for all of these aircraft fleets, which is unrealistic given that even maintaining current operational commitments requires the extensive use of chartered commercial heavy lift aircraft.[10] As no replacement program for the CC-177 is mentioned in *Strong, Secure, Engaged*,[11] the next heavy lift asset available to deploy elements of Canadian land power will be the Joint Support Ships (JSS), available for sea trials in 2023 or 2025 at the earliest. These ships will be usable with a pontoon system for delivery of heavy vehicles and, theoretically, should be able to supply a BG on land. Crucially, however, there will be only two of these ships, and their primary function will be to support Canadian naval task forces.[12] Ironically, because anti-shipping missiles have proliferated so widely, it is likely that the Royal Canadian Navy (RCN) would have to deploy a naval task force just to protect the ships, thus precluding the JSSs from supporting a land deployment. In 1982, the British task force sent to the

Falklands lost a destroyer and a crucial supply ship, *Atlantic Conveyor*, to an Argentinian Exocet anti-shipping missile, despite the fact that the attacking Super Étendard aircraft were at their maximum range and despite the presence of a robust British naval grouping, including an aircraft carrier and dedicated air defence frigates.[13] Although the ECAT envisioned by *Close Engagement* is tactically impressive, it would likely be too far away and arrive too late to matter.

Even assuming, generously, that the *Santa Maria* task force had time to deploy with the benefit of eight complete round trips of the entire CC-177 fleet, sustaining it during intense combat operations would be difficult. Because the Canadian Army fields Leopard 2 tanks, the BG would not be able to tap into the robust American international logistics pipeline for parts and replacements. Ammunition, too, would be a problem. Indeed, during Operation MEDUSA, an augmented Canadian battle group consumed so much ammunition that stocks nearly ran out.[14] Although an impressive feat of arms, MEDUSA was an operation against insurgents without the benefit of heavy armour or significant indirect fire assets. If that operation, with its relatively light logistical requirements, could burn through combat-vital stocks in a relatively developed theatre with a secure air bridge in such a short time, is it reasonable to assume that the CAF could support the *Santa Maria* task force through a prolonged fight against an enemy that is equipped with armour, indirect fire, electronic warfare and air support?

The reader might mistake this article's emphasis on logistical limits for mere pessimism. If the Canadian Army cannot deploy a battle group and cannot make a difference in future operating environments, does it have a future? This author believes it does. Some promising solutions for ensuring the CA's future relevance lie in its past.

WHAT DO LIMITS LOOK LIKE? A HISTORICAL PERSPECTIVE

Close Engagement describes the future land operating environment (FLOE) as "complex, dynamic, volatile and highly uncertain." The FLOE, replete with proliferating military technologies, social disruption, non-state actors and ungoverned spaces, presents a "considerable challenge" to focusing the development of the CA in a relevant way.[15] Such an environment would have been familiar to an officer studying the post-war world in the early Cold War. Although the Allies had been victorious, the war ended with the destruction of many major German and Japanese cities, two of them with a frightening new technology, atomic bombs. In 1946, the Canadian media reported that a Soviet defector had revealed widespread Soviet penetration of the American nuclear program.[16] The Soviets detonated their first bomb in August 1949, just a month before the proclamation of the People's Republic of China signalled a major Communist victory. In June 1950, troops from Communist North Korea poured over the border into South Korea, pushing back both local troops and the American advisors.

For the leadership of the Canadian Army, planning during this period had been especially difficult in light of budget cuts and the decline of Britain, Canada's traditional military ally. The peak size of Canada's wartime army, 495,804 on 31 March 1944, had declined to 13,985 by July 1947.[17] Britain, once a seen as an ally but also as a key provider of doctrine, staff training and intelligence, was exhausted. It was less a brave new world than a confusing one. Unsurprisingly, the Canadian Army's development between 1945 and 1950 suffered from a lack of ready-made strategic problems. Theoretically, the Army was still based on the ability to mobilize rapidly a permanent core of a single brigade group stationed in disparate bases across Canada. But American, British, Canadian and continental defence plans called for the Canadian Army to rapidly secure potential Soviet forward operating bases in Canada's north in the event of war, so the Army's main effort went into the training and deployment of a brigade-sized, airborne/air-transportable, "come as you are" Mobile Striking Force.[18] In the event of a major war, most of Canada's trained soldiers would be busy defending against Soviet lodgements, and therefore unavailable for training reservists or new recruits.

Despite these limitations, the first post-war Chief of the General Staff, General Charles Foulkes, implemented a successful strategic vision based on continental cooperation and strategic flexibility. Foulkes knew that Canadian defence policy would remain undetermined for some time as Canadian governments reacted to new international developments. Indeed, even if the Cabinet had made clear defence decisions, it is unlikely that they would have remained particularly relevant—no-one in 1945 could have predicted that a limited war in Korea would become such an important part of world politics just five years later. Instead of trying to establish a perfect, "clean" set of doctrinal concepts, Foulkes worked on expanding the military's capacity for technical flexibility. At the army level, he pushed the government to expunge stocks of old British equipment, make purchases of new American equipment, and pursue defence production agreements with Canada's continental neighbour.[19] On a scientific level, Foulkes championed the creation of the Defence Research Board (DRB), which was founded in 1947 as a civilian-led defence body that acted in many ways like a fourth service alongside the CA, the RCN and the RCAF. Besides providing scientific support for Canadian forces, the DRB developed close ties with American and British defence research organizations, enabling the Canadians to avoid duplication. Although national prestige and bureaucratic rivalry often got in the way of the efficient allocation of scarce resources, the DRB was still a dramatic improvement over the scattered research establishments that existed at the end of the war.[20] So although the Canadian Army did not have a clean organizational chart or tidy doctrine when the Korean War broke out, it did have access to a significant base of

wartime experience, relevant expertise, technical knowledge and flexible thinkers. Canadian soldiers would benefit from Foulkes's strategic vision when it came time to expand the force for novel operations.

The Canadian troops in Korea were part of what might now be called a "one army team." Many in the West, Canadian political and military leaders included, viewed the North Korean invasion as a feint for a general Communist offensive that would likely encompass a massed assault on Europe and potentially an attack on North America.[21] It therefore made sense to raise "special" battalions specifically for Korea, formed as the 25th Canadian Infantry Brigade (25 CIB) while maintaining the standing army at home to act as a potential mobilization base. 25 CIB, under the noted Second World War general John Rockingham, was given outdated British stocks that Foulkes had been unable to get rid of, and it recruited most of its private soldiers from the general population. Recruiting did not go smoothly, as administrative delays led the Defence Minister, Brooke Claxton, to personally visit recruiting stations and loosen administrative requirements—only to have the special battalions inundated with unsuitable recruits.[22] Crucially, however, Rockingham was given a pick of officers from the regular army and retired talent from the previous conflict.[23] Due to a lack of suitable training facilities, the brigade trained at Fort Lewis in Washington, but that turned out to be a blessing in disguise, as the American facilities were more developed than anything in Canada, had ready access to a port and offered mountains to train in.[24] Because an early counter-offensive by American forces launched in September seemed likely to defeat the North Korean army before Canadians would have any role to play, 2nd Battalion, Princess Patricia's Canadian Light Infantry (2 PPCLI), commanded by Lieutenant-Colonel Jim Stone, was quickly despatched in November and arrived in Korea in December, in the midst of serious reverses caused by Chinese intervention. Stone had the sense to refuse to commit his troops to combat before he could finish training them. His accompanying tank commander was authorized to purchase tanks in theatre and chose recently upgraded Shermans over newer Centurions and Pattons—a remarkably devolved procurement.[25] 2 PPCLI famously fought a successful defensive action at Kap'yong in April 1951, and when the rest of 25 CIB arrived in May, Rockingham had an excellent source of knowledge to tap into about the local terrain and operational conditions.[26] The recruiting of the special force had been an administrative mess, but by combining the professional knowledge of seasoned leaders like Stone and Rockingham with the effective use of alliance partnerships, Foulkes was able to deploy a force strong enough to commend itself in the field, deploy it quickly enough to be strategically relevant, and use that force to help guide the Army's expansion in the early 1950s.

While 25 CIB was deploying to Korea, the Canadian Army at home underwent a significant expansion to supply troops to a very different theatre. Besides the commitment of the second battalions to Korea, the Army had to prepare a series of replacement battalions and train a second deployed brigade group, 27 CIB, for despatch to standing North Atlantic Treaty Organization (NATO) forces in Europe. Not all of these efforts were successful. Notably, the first regular force battalions which replaced the second special service battalions in Korea did not perform as well as their predecessors, likely due to deficiencies in work-up training and an institutional inability to transmit lessons learned in theatre back to units preparing for deployment.[27] Regardless of those difficulties, the early deployment of forces to both theatres provided a solid base of operational experience for younger soldiers, and combat veterans from Korea strengthened Canada's brigade in Germany considerably.[28]

Despite the importance of cross-pollination between the Korean and NATO brigades, there were key differences. As Andrew Godefroy points out in his history of Canadian Army combat development, no-one imposed a central operational concept on either force. 25 CIB received significant operational research (OR) support from the DRB. The NATO brigade, in contrast, used existing concepts from the Second World War until 1954, when significant OR resources were devoted to integrating tactical nuclear weapons into doctrine and force structure.[29] Peter Kasurak, writing on the development of the Canadian Army during the Cold War, describes this lack of centralized doctrinal development as the result of a hangover from British tutelage to 1945. In his view, the Canadian Army of the 1950s was a "colonial fragment," which could not "focus on national military strategy or on the development of an 'army of the future.'"[30] But the results of the Army's efforts simply do not confirm that conclusion. By the mid-1950s, the tiny Canadian Army had expanded to take on two different kinds of operations in two vastly separated fields, had leveraged allied supply chains to rapidly despatch and sustain 25 CIB in the Korean theatre while simultaneously working to equip the European brigade, known as 4 Canadian Infantry Brigade Group beginning in 1957, with modern semi-automatic rifles and slow but powerful Centurion tanks that were unsuitable for Korea but perfect for the North German Plain. In fact, the Canadian brigade in Europe was recognized as one of the best land formations in NATO by Field Marshal Bernard Montgomery, Commander-in-Chief of Allied land forces.[31] Although there was little by way of a clean doctrinal integration of these forces into national security strategy, the Canadian Army had provided the Government of Canada with something better: credible, flexible ground forces that could be used as conduits for pursuing national policy and the national interest.

SPEAK IMPERFECTLY AND CARRY A FLEXIBLE STICK: THE DANGER OF SEARCHING FOR THE PERFECT DOCTRINE

Hans Delbrück, a German military historian, noted in his study on the development of pike-and-shot tactics in the early modern period that "progress in this area developed in a manner that no theoretician had proposed, no philosopher had devised, and nobody had foreseen."[32] Although Delbrück was writing about theoreticians of the 17th and 18th centuries, his words are even more relevant today. At the turn of the 18th century, Europeans had been fighting local, dynastic and religious wars at varying levels of intensity, virtually continuously, for centuries. Technological development was important, but not nearly as rapid as it is now. Ideologically, Europe rested comfortably between the bloodletting of the religious wars which ended with the Peace of Westphalia in 1648 and the revolutionary bloodletting that began with the French Revolution in 1789. The European theorists of Delbrück's description thus had far more experience of war and far less change to contend with than military thinkers do today. More than that, a continental European would have been able to frame theory and force development in terms of interests provided by geography. Louis XIV, for example, was able to discuss the Rhine as the "natural" frontier of France, and he unsurprisingly devoted significant resources to conquering France's frontiers and fortifying them.[33]

A Canadian planner has no such luck. As C. P. Stacey pointed out, the one Canadian land frontier is arbitrary. Another Canadian analyst, Dr. R. J. Sutherland, further developed Stacey's ideas, pointing out that Canada's land border with the United States was an important "invariant" in the creation of national strategy, as Canadian political culture and national interest prevented the adoption of an isolationist policy and precluded any obvious size or shape of land forces.[34] Because Canada remains insulated from the threat of invasion by land, the political will to fund and build large, all-arms forces is unlikely to materialize. Yet Canada's land forces are not particularly expeditionary in character either. As demonstrated in the first section of this paper, the CAF has no reliable means of projecting a large, heavy, combined arms team, the core of Canadian doctrine, past Canada's borders. This lack of transportability is a major strategic risk.

Despite this risk, *Close Engagement* frames the discussion of the Canadian Army's capabilities in tactical terms. The section on battlefield geometry, for example, is written from the perspective of a BG area of operations, not in terms of the relative distance from Canada to key logistical nodes. The vignette included assumes away strategic-level sustainment and focuses on close-in, decisive combat. The overriding concerns of *Close Engagement's* authors seem to be the risk to the force on the battlefield and a desire to be decisive. This author thinks that the Canadian Army needs to move beyond thinking about tactical risk and begin thinking in terms of strategic risk. As American general John Galvin notes in his classic critique of military intellectual life, published in 1986,

> We in the military are accused falsely of "preparing to fight not the next war but the last." That criticism is not well placed: we are not, for the most part, obtuse enough to fight yesterday's wars—but we might be doing something worse still. When we think about the possibilities of conflict we tend to invent for ourselves a comfortable vision of war, a theater with battlefields we know, conflict that fits our understanding of strategy and tactics . . .[35]

Galvin accused American military thinkers of his era of wanting to invent an enemy "fightable with resources we have," and today it appears that many in the Canadian Army plan on fighting with resources we once had in the form of Canada's NATO brigade, or perhaps wish to have when we rebuild something similar. But whatever our wishes, without significant changes in areas outside of the Canadian Army's control—namely the size of the defence budget and significant restructuring of the RCAF and the RCN—force planners will need to balance tactical risk with strategic risk. If they do not, the CA might not face defeat, but it could simply become irrelevant.

Yet there are no obvious means to balance these forms of risk. If it is unlikely that current planners will be more likely to predict the shape of a snap deployment of the Canadian Army to Santa Maria in 2035 than it was for Foulkes to predict the deployment of a Canadian brigade group to Korea in 1950, what guidelines should the Canadian Army take to move from these esoteric questions to concrete actions like force planning, acquisitions and training priorities? One way is to look at the successful reaction to the unstable era of the immediate post-war years and plan as for a CA that is not designed around a specific threat, but is able to rapidly deploy a force that can accomplish the following three tasks:

1. Deploy rapidly enough to make a difference.

2. Deploy with enough strength to defend itself and contribute to the stabilization of a wide variety of scenarios, including high-intensity combat, without necessarily being decisive.

3. Bring back enough experience, information and intelligence to rebuild a force to conduct sustained operations against this specific threat.

The idea of creating such a force will undoubtedly be unpopular with many in the Army. Take tanks, for example. Tanks provide important capabilities tactically, but in their current form they are unsustainable strategically and will require serious reconsideration. It may be that the Canadian Army will drop its tank capability, only to re-acquire it later. If that does occur, it should be seen not as a failure, but as

Source: Combat Camera

an important part of rebuilding the force to meet a prospective threat. Perhaps the Canadian Army should treat tanks as a niche capability by integrating a Canadian Leopard 2 squadron into a larger American–European armoured formation (similar to the combined Dutch–German 1 Panzer Division stationed permanently in Europe), with ready access to spare parts direct from Rhinemetall, and train in Europe with primarily non-Canadian NATO formations.[36] This might seem wasteful, but it would be a strategic bargain. In exchange for the alliance benefits of contributing to conventional NATO deterrence, the Army would be able to keep Canada's expertise with tanks "warm" while keeping maintenance and training costs down. Moreover, the ability to train in Europe with other armies as a special tasking with a novel platform would be a significant boost to retention of armoured crew. As a third option, perhaps the Royal Canadian Armoured Corps could switch to the American M1 Abrams, with the potential to draw on forward-deployed US war stocks in a crisis as a way of mitigating the CAF's dearth of strategic lift. None of these options are likely to sit well with an army focused so heavily on the combat team, but in order for the CA to remain strategically relevant it will have to remain mentally flexible.

Rethinking tanks is just one example of how the Canadian Army can re-orient to build on what the Vice-Chief of the Defence Staff, Lieutenant-General Mike Rouleau, calls "ecosystems" of platforms and capabilities.[37] Instead of imagining what a future combat scenario might look like, designing an ideal force based on those projected capabilities, and then aspiring to build that ideal construct, the CA should take an approach which builds on existing capabilities. For example, *Close Engagement* notes that "land forces need to be as easily transportable as possible, and, once in theatre, should be able to move long distances at speed" and that "specific force packages must be designed that can be rapidly supported by air and sealift."[38] The key trait of everything in this ecosystem, then, has to be the ability to move by using the CAF's existing fleet of CC-177s, C-130Js and CH-147s, as well as anticipated JSS capabilities. As the CA prunes unsustainable shoots and grows new capabilities, the new capabilities should be built around the ability to protect and enable this force, and not "toward" a desired force goal like a battle group composed of ECATs. This might mean favouring a better suite of ATGMs over replacing or upgrading the Leopard 2 fleet, in line with recent US Marine Corps (USMC) experiments which replaced the USMC M1 fleet with a suite of precision standoff weapons to enhance strategic mobility.[39] It might mean favouring mobility over survivability in IFVs, or investing in communications capabilities that provide less detailed information on the movements of individual soldiers but smaller, lighter and more secure reach-back capabilities to Canadian Joint Operations Command.

Moving to a new model will require not just a change in procurement philosophy, but a change in the CA's cultural ideal of brigade-level combined arms capable of fighting a high-intensity decisive battle. How deeply this ideal impacts the CA's force generation, doctrine and acquisition processes cannot be emphasized enough. The CA's managed readiness cycle, for example, is based around Exercise MAPLE RESOLVE, an annual brigade-level exercise. This month-long exercise typically takes months of staging and separate work-up exercises, such as Operation UNIFIED RESOLVE. Yet the months of logistical staging required to plan for this highly controlled exercise do not acclimatize soldiers to a force structure that the CAF could reasonably be expected to sustain on operations. In contrast, the French Army builds its training around the rapid deployment of battalion-sized *groupements tactiques interarmes* (GITA) and subunit-sized *sous-groupements tactiques interarmes* (SGITA), with training and doctrine emphasizing the quick accumulation of required capabilities. For example, during Operation SERVAL, the 2013 French intervention in Mali, the French were able to rapidly deploy a 200-strong SGITA into theatre from nearby Chad, then use information gathered from the force on the ground to "pull" relevant enablers from France and elsewhere into the fight, assembling and reassembling GITAs and SGITAs according to what was needed in a given situation.[40] Canadians, in other words, need to get comfortable with an operational art which accepts uncertainty and emphasizes strategic flexibility over tactical decisiveness. Two adaptable companies augmented with a series of specific enablers, well supported, and on the ground at the right time will always have more strategic relevance than a "perfect" brigade in Canada that is unable to move quickly.

CONCLUDING THOUGHTS

The Canadian Army is far better equipped, trained and prepared today than it was in 1950. For a Korea-style deployment, there would be no need for long recruiting queues, and no requests to use Fort Lewis. A Canadian battle group would certainly not be sent to theatre only partially trained, and there is a much deeper pool of Canadian leaders at all levels to avoid the recall of retired veterans and the haphazard intake of recruits during a crisis.

Before 1950, Canada did not have a standing army of note. The soldiers of the Canadian Army in 2021 have inherited seven decades of organizational culture, knowledge and institutional development begun by the pioneers of 1950.

While Foulkes would no doubt find the modern CA impressive, he would likely also notice that key parts of his vision have not been realized. The Canadian Army has pursued the development of a broad spectrum of capabilities, many of which do not support each other, instead of fostering an ecosystem that blends well with Canada's alliances. For example, *Battle Group in Operations* presents an ideal battle group consisting of a headquarters, three battalions of infantry, a squadron of tanks, a squadron of armour, a battery of artillery, a squadron of engineers, and supporting CSS elements.[41] While the publication notes that such a structure might "be tailored to a less robust structure" in order to "achieve strategic responsiveness," such tailoring would result in the "downgrading of some key capabilities."[42] This kind of thinking made sense until 1993, when 4 Canadian Mechanized Brigade Group (4 CMBG) disbanded. Up to that point, the Canadian Army's premier all-arms formation was stationed in the theatre where it was likely to be employed and was lavishly supplied with war stocks of ammunition, fuel and other essential war stores. Since then, however, Canadian soldiers have found themselves on the end of sometimes tenuous airheads in places like Rwanda and Afghanistan, and Canadian sailors and aviators have not received the equipment or the capacity to deploy such an organization outside Canada's borders. Shouldn't the ability to deploy in a relevant timeline be a, if not the, "key capability?" A formation which is logistically impossible is strategically irrelevant, no matter how much we might appreciate its virtues in the field.

Yet implementing a more strategically oriented force would not have to mean permanently abandoning capabilities like heavy armour. Instead, the CA should take a different view of readiness—one based on what this author will call "warmth." A high-readiness unit, such as an infantry battle group with dedicated enablers, whose members have done collective training together, and which has vital deployment stores ready for shipment in CAF-owned platforms, should be considered "hot." The number of "hot" subunits and units in the CAF should be limited by the availability of transport resources available to move and sustain them. "Warm" units and capabilities should be considered as likely augmentation for "hot" units to pull on after some time in theatre, and should be ready to deploy quickly with short, focused work-up training. In addition to "hot" and "warm" capabilities, the CA should become comfortable with "lukewarm" and "cool" options. These are capabilities that would be maintained primarily through alliance partnerships, or where the CA invests in expertise instead of equipment and staffing. For example, the CA has repeatedly expressed interest in multiple-launch rocket systems (MLRS), but has failed to acquire those platforms.[43] However, by posting a number of Canadian officers and non-commissioned members at all levels to an American, French or British MLRS battery, the CA could develop a body of expertise on the operation and employment of MLRSs. If future conditions change and MLRSs take priority over other capabilities, the army would not have to attempt a cold start—a virtue that every soldier who has participated in winter training can attest to.

The reader might be tempted to think of this proposed force based on limits as pessimistic. On the contrary, it is pessimistic to base the Canadian Army's organization and development around rigid and cautious tactical concepts, readiness levels and organizational structures. This is an optimistic proposal, and its optimism is rooted in the author's understanding of Canadian soldiers. Canadian soldiers are inherently innovative and flexible. Very few people could have predicted that a limited conflict on the Korean peninsula would have expanded into such

COOL	LUKEWARM	WARM	HOT
Capabilities maintained as pools of expertise through alliance partnerships. These capabillities will require significant time and training to activate.	Subunits and enablers with most of their equipment, but which require time to be integrated into operational CAF units.	Subunits and enablers, ready to deploy with some additional high-readiness training and access to lift not immediately available.	Subunits and enablers, with BG HQ and CSS element, ready to deploy on available or readily-accessible lift.
Example: A rapidly established MLRS capability, built out of a core of NCMs and officers who have done a series of exchanges with American and European rocket artillery units. MLRS systems and supporting assets acquired as an urgent operational requirement.	Example: A squadron of Leopard 2s serving in a NATO enhanced forward presence role that is redeployed to support the deployed force as the mission evolves.	Example: An additional manoeuvre element or route clearance package to be assembled from non-operational stock. Most soldiers are administratively "green."	Example: A light infantry company with ATGM support, a mechanised infantry company, an engineer squadron, an artillery battery or an armoured reconnaissance squadron, fully staffed, with relevant work-up training, and administratively "green."

Figure 1: An illustration of readiness as "warmth"

geopolitical importance in 1950, yet Canadian soldiers rapidly adapted to the local terrain and made a name for themselves. On 10 September 2001, few could have predicted that Afghanistan would be central to Western and NATO strategy, yet a battalion of Canadian light infantry, whose members had not had extensive work-up training, arrived early and performed well in the demanding conditions there in the first year of the war Canadian soldiers can guess, but can't definitively know, who they will fight next. However, given the key elements of experience, capabilities and flexible organization, when the time comes, they will be able to build the Army to meet the demanding, but unknowable, tasks ahead.

ABOUT THE AUTHOR

Major John Keess joined the CAF in 2005. After graduating from the Royal Military College (RMC) in 2009, he joined Second Battalion, the Royal Canadian Regiment. Since then he has held a number of appointments with 2 Royal Canadian Regiment (RCR), 3 RCR, 2 CMBG Headquarters and Canadian Special Operations Forces Command, including deployments on Op ATTENTION, Op REASSURANCE and Op IMPACT.

He is currently pursuing a sponsored Ph.D. in War Studies at RMC and also lectures in RMC's History Department. His academic publications include work on small state strategy and Canadian strategic thought during the Cold War. His main area of ongoing work is his Ph.D. dissertation, a biography of Canadian strategist R. J. Sutherland.

The author is personally grateful for the insight and critique on this work provided by Lieutenant-Colonel John Summerfield and Major Ben Wong.

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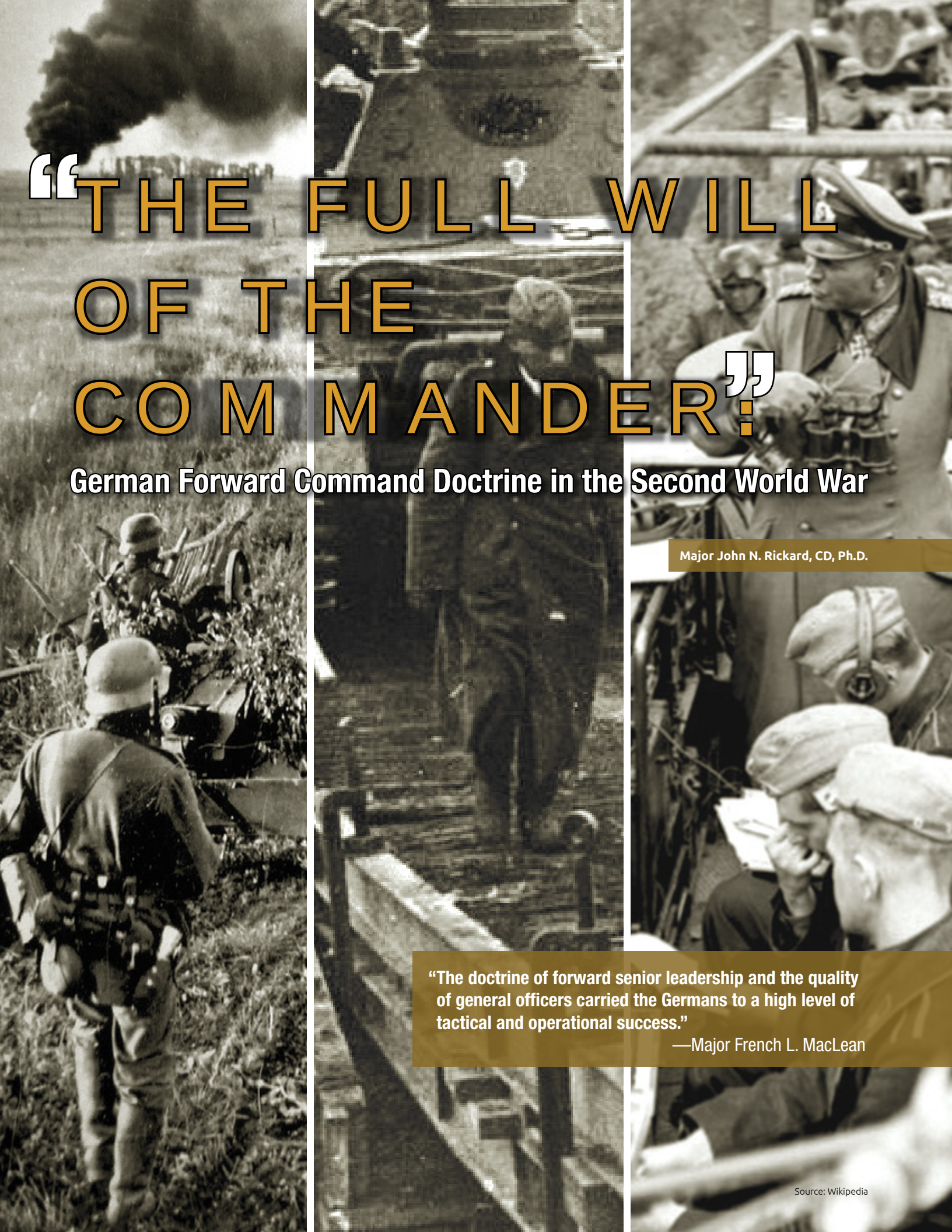
"THE FULL WILL OF THE COMMANDER"

German Forward Command Doctrine in the Second World War

Major John N. Rickard, CD, Ph.D.



"The doctrine of forward senior leadership and the quality of general officers carried the Germans to a high level of tactical and operational success."

—Major French L. MacLean

Source: Wikipedia

The combat effectiveness of the German Army in the Second World War is frequently attributed to a narrow, post-war interpretation of *Auftragstaktik* ("mission-type orders"), a German concept that stressed considerable subordinate freedom to achieve the superior's intent. Decentralized decision-making supported German operations dispersed over the vast frontages of the war, but commanders exercised a greater degree of control over operations and subordinates than the currently accepted interpretation of *Auftragstaktik* would suggest. This article will argue that commanders controlled operations by practising *Führen von vorn* (forward command), a command philosophy that was both a derivative of *Auftragstaktik* and insurance against its weaknesses. Forward command was absolutely essential to achieve the tempo demanded by the German doctrine of manoeuvre and annihilation (*Vernichtungsschlacht*), and it compensated for human weakness in a way that pure *Auftragstaktik* could not. Post-war interpretations of *Auftragstaktik* require revision because they do not accurately capture the degree to which forward command enabled tactical and operational success.

THE PERCEPTION OF *AUFTRAGSTAKTIK*

The modern infatuation with *Auftragstaktik* started with the German commanders following the war. Helmut Ritgen, an officer in Panzer Lehr Division, is just one example. He declared that *Auftragstaktik* "was one of the main reasons for the German success in mobile warfare, even under the severest of stress."[1] The infatuation with *Auftragstaktik*, a philosophy that failed to bring ultimate success, is best expressed by Colonel Trevor N. Dupuy and Israeli military historian Martin van Creveld. Dupuy asserted that "whenever things seemed to go wrong or to deviate from their plans, the Germans called upon *Auftragstaktik* to carry them through to their objectives in dazzling displays of boldness, initiative and imagination" while Martin van Creveld strongly implied that it gave the Germans a significant advantage over the Allies.[2]

The *Auftragstaktik* altar was firmly constructed by the 1980s, and faith in the independence of German commanders during the war was virtually unchallenged. William S. Lind, for example, developed his manoeuvre theory based on the premise that the Wehrmacht operated on trust with *minimal* monitoring.[3] Robert Leonhard pierced the obscuration surrounding the philosophy in his 1991 study *The Art of Maneuver*, observing that the U.S. Army dealt incompletely with the dichotomy between *Auftragstaktik*, which he and the Marine Corps characterized as "reconnaissance pull," and *Befehlstaktik*, which they characterized as "command push," an "outcome" of forward command. The latter, he argued, was seen as all bad and the former as all good, but *Auftragstaktik* ultimately emphasized the role of opportunity "at the expense of unity of effort."[4] Decentralized decision-making with minimal monitoring is simply given too much weight in explaining German performance in both victory and defeat. Commanders generated considerable operational flexibility by making decisions well forward, and that philosophy was articulated in German doctrine well before the Second World War.

SECOND WORLD WAR DOCTRINE

The German Army entered the Second World War with the 1933 manual *Heeresdienstvorschrift* [Army Regulation] *300, Truppenführung* [Unit Command]. The terms *Auftragstaktik* and *Führen von vorn* did not appear in the manual. Indeed, *Auftragstaktik* was not even a basic word in the lexicon of either the Prussian Army or the Wehrmacht.[5] The Germans generally used the phrase *Selbständigkeit der Unterführer* (independence of the subordinate commander). Nevertheless, the spirit of both *Auftragstaktik* and forward command are clearly evident in the 1933 manual.[6]

Truppenführung declared that the division commander's place was "with his troops" and that he should be "well forward." In an advance to contact, his place was with the advance guard of the column, which he had estimated would play the key role because it was there that "he can most quickly exert his influence." It was critical that he position himself "at the decisive point, and as early as possible." The objective, derived from the mission, must be pursued with "the full will of the commander" because victory "often is won by the stronger will."[7] The exercise of will clearly implied intervening if things were not going according to plan.

Truppenführung also clearly stated that the commander "must allow his subordinates freedom of action," and that statement became the source of our understanding of historical *Auftragstaktik* and modern mission command. It suggested that it was the commander's prerogative to determine the degree of "freedom," an idea that ran somewhat counter to General Waldemar Erfurth's, as stated in his 1938 work *Die Überraschung im Kriege*, that modern dispersion tactics gave subordinate leaders "a rather large measure of independence" by default.[8] The caveat in *Truppenführung*, however, was "so long as it does not adversely affect his overall intent." The commander "may not … surrender to his subordinates decisions for which he alone is responsible." Subordinates could deviate from the intent, but it was a serious matter, as evidenced by the fact that they were required to immediately notify their higher commander. The superior commander was therefore the conductor of the orchestra. He assigned missions after considering the relationship between the "necessity for unity of action and the independent action of units." Independent action was expected, of course, but it was the "close coordination" of independent actions that "will influence decisively the success of the advance."[9] Only the superior commander could ensure "close coordination" when subordinates pulled in opposite directions.

It was perhaps because of this perceived need for some degree of inherent superior control that the German Army military science branch concluded in the late 1930s that the utility of *Auftragstaktik* under modern conditions was doubtful.[10] By the time his famous 1937 book *Achtung Panzer!* appeared, Heinz Guderian was comfortable preaching that all panzer commanders must "stay well forward during the assault, so that they can keep their units constantly in view, and bring their personal influence to bear without delay."[11] By personal influence, he meant making decisions that might override subordinates' decisions, not "mentoring."

THE MECHANISM OF FORWARD COMMAND

The Germans required a highly responsive manoeuvre machine to rapidly defeat opponents and avoid broad frontal engagements and attrition. Commanders could not be everywhere at once, nor did they need to be. Forward command was intended to support the *Schwerpunkt* ("weight of effort") at the decisive point. As Leo Freiherr Geyr von Schweppenburg, commander of Panzer Group West in Normandy, put it, the commander had to "command from the front or at the most decisive point of action."[12] *Schwerpunkt* was a unit or a formation, and therefore it logically occupied physical space. *Truppenführung* declared that a point of main effort (our modern term) and a decisive point both equated to a centre of gravity.

With the idea of "decisive point" clearly explained, *Truppenführung* went on to explain that commanders could not plan for it and had to search for it at times:

> If the decisive point cannot be identified from the start, then the decisive action must be planned in uncertainty and shifted later. As a rule every attack passes through a series of crises until it reaches the point of culmination. It is critical that the command recognizes this point, and possesses the ability to make a decision to immediately exploit the success with all available means, or to prevent failure.[13]

Major F. O. Miksche highlighted this potential uncertainty in initially identifying the *Schwerpunkt* in his 1940 study *Blitzkrieg*. He argued that the *Schwerpunkt* is a "constant swaying back and forth to maintain the initiative." This type of fighting "requires attacking teams (*Angriffsgruppen*) that are practically independent and able to fight on their own," and "calls for a large measure of decentralization. Commanding officers must develop and encourage initiative at each stage."[14]

The commander's search for where to apply the *Angriffsschwerpunkt* (weight of effort in the attack) was the imperative in the German operational technique. The *Aufmarschanweisungen* (deployment instructions) were the key guide that identified the initial *Schwerpunkt*. The *Schwerpunktbildung*, the concentration of force at the most advantageous point, was an absolute imperative that had to be achieved within closing windows of opportunity. It had to be identified quickly and with clarity, and only the commander could see it and concentrate his reserves to keep the window open and push through it. The *Aufrollen* was the "immediate and methodical" exploiting of each local success by means of side thrusts to ensure that the commander could reinforce the *Schwerpunkt*. The *Aufrollen* protected the *Schwerpunkt* and were clearly secondary efforts; the commander did not divert his attention to these "side-shows." Subordinates in the *Aufrollen* fight exercised the initiative inherent in their doctrinal independence to create multiple options for the commander should the initial weight of effort culminate.

The commander's confidence in manoeuvring about the battlefield in search of enemy weakness was fuelled more by his on-site perceptions than by reports up the chain of command that may or may not have reflected reality. *Fingerspitzengefühl* ("finger-tip feeling"), the "instinctive sixth sense for terrain and tactics" that the Germans so cherished, was cultivated by forward command.[15] Success or failure in creating and sustaining the weight of effort at the decisive point depended primarily upon the responsiveness of subordinate formations and units to the commander's will. For example, in Normandy, General der Panzertruppen Hans von Funck, commander of XLVII Panzer Corps, continually asked Generalleutnant Count Gerhard von Schwerin, commander of 116 Panzer Division, "When can I count on your Division to somehow execute one of my orders?"[16]

FORWARD COMMAND IN PRACTICE

The ability to practise forward command was obviously greater at the lower levels, but even at the army group level, the urge to control the *Schwerpunkt* was strong. Sometimes senior German commanders felt that responsiveness could be achieved only when they bypassed echelons. In May 1940, Field Marshal Fedor von Bock, commander of Army Group B, declared, declared "I cannot allow any opportunity to whip the matter forward to pass by." At Maastricht he reached down past General Walter von Reichenau, commander of Sixth Army, to stress to General Erich Hoepner, commander of XVI Panzer Corps, the vital importance of achieving a rapid breakthrough toward and through Gembloux. "I knew that I wasn't making myself popular," Bock recorded, "and Hoepner greeted me with the words: 'You don't need to push me!' But I had to demand the most."[17] This was not *Auftragstaktik*.

During the 1940 invasion of France, Guderian consistently ignored orders. When Generaloberst Ewald von Kleist ordered him to halt and make no further extension of the Meuse bridgehead, Guderian recalled, "I neither would nor could agree to these orders, which involved the sacrifice

Source: Wikipedia

of the element of surprise we had gained." Guderian was perfectly willing to interfere with subordinates, but bristled under interference from above.[18] German commanders at all levels clearly squeezed all they could out of the *Selbständigkeit der Unterführer* idea, routinely making decisions both in the absence of orders and in direct violation of orders. During one point in the invasion of France, Josef "Sepp" Dietrich's *Leibstandarte* regiment, serving in Guderian's XIX Army Corps, was ordered to halt on the near bank of the Aa River. When he realized that Mount Watten on the far bank dominated the entire area, he crossed on his own initiative and seized the high feature. Guderian recalled that, in view of Dietrich's success, "I approved the decision … on the spot."[19]

In Italy, Field Marshal Albert Kesselring, Commander-in-Chief of Army Group C, recorded several instances of army, corps and division subordinates trying to fight their own battles at the Hitler Line while he tried to fight a peninsula-wide army group battle. When he ordered General August von Mackensen, commander of Fourteenth Army, to send 29 Panzer Division to close a gap, Mackensen objected, and his lack of responsiveness negatively impacted the larger defence. Kesselring observed that 94 Infantry Division of XIV Panzer Corps, "in disobedience to [his] express orders," assembled its reserves where it felt they should be assembled and produced a situation where gaps created in front of the Petrella massif "could not be closed."[20]

As commander of XIX Army Corps during the Polish campaign, Guderian led from the first wave and controlled the *Schwerpunkt*, 3 Panzer Brigade of 3 Panzer Division. At one point in the Polish campaign, 2 Motorized Division reported that a regiment had been forced to withdraw in the face of Polish cavalry. Incensed, Guderian showed up the next morning, bypassed the division commander, and personally led the regiment in question up to the crossing of the Kamiok River to arrest what he perceived as panic, and to send a message about how to lead. On 13 June 1940 Guderian, commanding Panzer Group Guderian, came across Lieutenant-Colonel Hermann Balck consolidating in a bridgehead near Étrepy and immediately ordered him to press on toward Saint-Dizier. Only later did Guderian inform Balck's division and corps commander of his intervention *three* levels down.[21]

Guderian ultimately credited forward command, and the responsiveness it generated, as the main reason for the successes during the first two years of the war.

> The leader should be well forward. He should be so located that he can himself see what is going on, and receive directly the messages of his reconnaissance units, thus being able to give his orders rapidly. In the case of large units which march in several columns, he must be located with the most important column. He must in any case always be *in front of his reserve*, otherwise he loses all possibility of leadership.[22]

During the initial stages of Operation BARBAROSSA, Erich von Manstein, commander of LVI Army Corps, observed that the endless search for enemy weakness was an ever-present imperative, and he doubted "if there was anything harder to learn than gauging the moment when a slackening of the enemy's resistance offers the attacker his decisive chance." This was why no panzer force

"Rommel perhaps epitomized the forward command philosophy."

Source: Wikipedia

commander, he argued, "could afford to bind himself to a command post any great distance to the rear" under modern conditions. Waiting for subordinates to accurately report conditions at the weight of effort wasted time, resulting in late decisions, and "all kinds of chances would be missed."[23] He acknowledged the value of leaving commanders free to determine the method of execution, but appreciated intuitively and experientially that senior commanders always faced the possibility of having to intervene directly in the operations of subordinates.

Major-General Frederick von Mellenthin, Chief of Staff of Fourth Panzer Army, noted that all commanders in the *Panzerwaffe* were imbued with the spirit of forward command.[24] Curiously, he did not say they were imbued with *Auftragstaktik*. They certainly believed that an accurate perception of enemy vulnerability was possible only through forward command. General Erhard Raus, commander of 6 Panzer Division, recognized the importance of subordinate initiative but stressed that command "must adapt to ever-changing conditions at the front." What "mattered most," he asserted, was "the presence of a commander as the single mind to give orders, make decisions, and take full responsibility."[25]

Generalmajor Hasso von Manteuffel, commander of the Grossdeutschland Division in Russia, believed that

> [a]ll panzer commanders right up to the division commander belong on the battlefield, specifically wherever they have the best view of the terrain and good communications with the armoured core. I was always where I could see and hear what was going on up front, that is to say on the enemy side and all around me. Nothing and no one can replace the personal impression!

As a battalion and regimental commander in 7 Panzer Division in Russia, Manteuffel personally led a quick attack on a village and led 6 Rifle Regiment in an attack at the Dnieper River.[26]

Kurt Meyer, commander of 12 SS Panzer Division "Hitler Youth," believed that the division commander "has to be with the foremost elements of his attacking spearhead so as to be able to take decisions according to the situation and to deliver annihilating hammer blows."[27] Meyer's forward presence in Normandy gave him much better situational awareness than his Canadian Armoured Division (CAD) opponent, Major-General George Kitching, commander of 4 CAD. Frido von Senger und Etterlin, commander of 17 Panzer Division in Russia, routinely led the front wave "at the point of main effort" using his experience and exercising his personal authority. Forward command produced a powerful psychological effect because he was able to watch his subordinates and ensure that his orders were "swiftly executed." This speed of execution, he felt, could be "of decisive importance."[28] Such over-the-shoulder supervision contradicts the modern interpretation of *Auftragstaktik* by Western armies.

Herman Balck's command technique as a panzer division commander was clearly based on forward command. He stated,

> I had made a specific arrangement with my chief of staff regarding leadership. He stayed with the divisional staff at a set location that was a little removed from the immediate battle action, maintaining contact with the higher headquarters and the adjacent units, and directing reinforcements to the front. Simultaneously, I remained mobile, leading from the front by radio or by personal orders. I was always at the respective key spot and could shift my position quickly. I continued that command technique throughout my tenure as a division commander and never regretted doing so.[29]

During Operation BARBAROSSA, General Walter Model commanded 3 Panzer Division under XXIV Panzer Corps in Guderian's Panzer Group 2. According to Steven Netwon, Model was "everywhere—except in division headquarters. He kept turning up … and cursing, at every crisis point, whether it was the Soviet breakthrough southeast of Staryy Bykhow or the heavy tank action at Propriusk—both on 19 July, but more than fifty kilometres apart!" When he assumed command of XLI Panzer Corps, he still aggressively commanded from the point he deemed the *Schwerpunkt* or crisis point. Rumours quickly spread that "even lowly company commanders should always be prepared to have the corps commander materialize at their elbows."[30]

It is apparent that Model's forward presence helped him developed intimate knowledge of his regimental and battalion commanders and actually served to strengthen *Auftragstaktik* because he knew who needed general instructions and who needed greater oversight. However, as Model rose in rank to command corps, armies and army groups, he continued to fight "a corporal's war" and "even issued direct orders to the smallest of units and would sometimes lead them personally into action."[31] Model continually bypassed echelons and often led units personally in order to achieve the degree of responsiveness he felt he required at the time.

Rommel perhaps epitomized the forward command philosophy. As commander of 7 Panzer Division in France, he repeatedly appeared at the decisive point, bypassed subordinates, assumed direct command, and shaped the action according to his will. He took direct command of 2 Battalion / 7 Rifle Regiment "and for some time directed operations [him]self." He strove for a "tight combat control" west of the Meuse and preferred to give direct orders to regimental commanders because the encoding necessary for wireless transmission was too slow for his decision–action cycle. On 15 May he rode with the leading 25 Panzer Regiment "so that [he] could direct the attack from up forward and bring in the artillery and dive-bombers at the decisive moment." Clearly, only he could discern the "decisive moment" for the division. Still, Rommel always stressed that panzer commanders "must learn to think and act independently within the framework of the general plan and not wait until they receive orders."[32]

Forward command remained the core of Rommel's command technique in the desert. His Chief of Staff, Alfred Gause, reflected that he "interfere[d] in the control of individual units if he thought it was necessary," and he "never allowed any slack in the reins of control."[33] Michael Carver, who fought against Rommel in North Africa, felt that Rommel gained considerable advantage by being "permanently present in the forward area" because his influence "was felt directly on the battlefield within a short time and at a small distance from the hour and the place at which he had given his orders."[34] Fritz Bayerlein admitted that when he assumed command of 3 Panzer Division in 1943, he copied the aggressive forward command style of Guderian and Rommel.[35]

Balck commanded the 1 Motorized Infantry Regiment in 1 Panzer Division in May 1940. At Sedan, he recalled later, "my combat leaders told me that they were finished—that they just simply couldn't advance anymore, and I said 'Fine.' Whoever wants to stay here can stay here. I'm leading the attack on the next village', and of course, the entire regiment sprang up as one man to follow me." Of his time as commander of 11 Panzer Division in Russia, Balck reflected, "I commanded from the front by radio and could thus always be at the most critical point of action. … *The result was to give us a fantastic superiority over the divisions facing us* [emphasis added]."[36]

INSURANCE AGAINST HUMAN NATURE

There is no doubt that German commanders regularly bypassed command echelons to push subordinates through psychological culminating points. Rommel and the others constantly sought to mitigate inertia by forward command. Rommel generally trusted the tactical skills of subordinates; what he did not trust was human nature. He firmly believed,

> It is a mistake to assume that every unit officer will make all that there is to be made out of his situation; most of them soon succumb to a certain inertia. Then it is simply reported that for some reason or another this or that cannot be done—reasons are always easy enough to think up. People of this kind must be made to feel the authority of the commander and be shaken out of their apathy. The commander must be the prime mover of the battle and the troops must always have to reckon with his appearance in personal control.[37]

The truth of this statement proved that pure *Auftragstaktik* was simply not enough. If subordinates could not "drive the nail home," the superior had to intervene to maintain momentum.

Source: Wikipedia

THE POSITIVE TENSION OF INDEPENDENCE AND CONTROL

The inherent tension between "freedom" and "control" was unavoidable in the German command method. It has been suggested that *Auftragstaktik* "rejected as counter-productive any attempt to control the type of action initiated during combat," but the superior "obviously" bore the greater burden in accomplishing the mission because he had to "teach, trust, support, and correct well-intentioned but possibly errant actions."[38] Lieutenant-Colonel Walter von Lossow argued that a risk of *Auftragstaktik* was that the higher commander would be "able to exert his will by literally descending upon individual soldiers in their foxholes although his direction might not be appropriate to the tactical situation."[39]

Auftragstaktik, as understood in the Second World War, was actually the opposite. Under forward command doctrine, German commanders did not really "descend"—they were already there to get a first-hand impression of the situation and correct faulty decisions or *indecision*, an implied task for superiors in the *Auftragstaktik* philosophy. Manstein offered that, following a successful action, forward command "was necessary to counteract the only too natural phenomenon of battle fatigue and to instil new life into the men." Forward command also gave Manstein "new life"; the senior commander "not only ... perpetually has demands to make in the accomplishment of his mission," he stated, but he actually "derives fresh energy from these visits to the fighting troops."[40]

WHY FORWARD COMMAND WORKED

Brigadier Richard Simpkin declared that the Wehrmacht "had its share of 'strong' commanders who sought to bend the situation to their will rather than respond to it," and that their obstinacy ultimately "frustrated directive control" (i.e. *Auftragstaktik*).[41] Kesselring reflected on "the drawback of having strong personalities as subordinate

commanders," but *Truppenführung* emphasized that leaders needed strong will and a forceful character.[42] It was the strong will of German commanders who maintained the unity of effort throughout the life cycle of an operation and restrained the negative aspects of *Auftragstaktik* which could manifest as a dissipation of force.

No informed observer will dispute the fact that German commanders frequently stepped on the toes and egos of subordinates. Field Marshal Günther von Kluge routinely flattened the chain of command and drew criticism from his subordinates. Angered at the performance of Paul Hausser's 7 Army against Operation COBRA, the American breakout in Normandy, Kluge dismissed the chief of staff and the CO of LXXXIV Corps and assumed direct command of the army and the corps. He has been described as a "driving force, energetic, almost reckless, even to the point of risk to himself."[43] Although Guderian's command technique of forward control at the *Schwerpunkt* bruised the egos of some senior officers, it improved the chances of success significantly.[44]

Forward command worked because the commander practising it also exploited the independence from his superior granted him by doctrine. Many commanders simultaneously flattened the chain of command to directly control subordinates and resisted attempts by superiors to interfere with their own independence granted them by the *Auftragstaktik* concept. Since the commander reserved the right to intervene and bypass echelons, he understood that his superior reserved the same right. The subordinate understood that intervention was the superior's natural prerogative.[45] If the subordinate was not up to the challenge, the senior commander took command in order to take *decisive* action at the *Schwerpunkt*. Subordinates were not the only ones who were expected to exercise initiative.

As early as 1940, S. L. A. Marshall correctly discerned that the nature of German attacks on narrow fronts and organized in depth "necessitated that command be moved forward to where it could supervise operations in the limited area of decision."[46] By 1942 the German emphasis on responsiveness was well understood by the U.S. military. A War Department study stated,

> The obligation for them [commanding officers] to grasp the situation rapidly in order to exercise effective command requires that they move to the front. Most of the time they are in the midst of battle.... In the course of operations, battle orders adjust the initial missions of subordinate units to the unforeseeable development of events. However, *the rapidity of the reactions of a command is dependent on the presence of the commanding officer at the front* [emphasis added].[47]

This is radically different from the Western interpretation that rapid reaction is driven by decentralized authority.

Some observers have even implied that *Auftragstaktik* empowered the Germans with a superior ability to exploit chaotic conditions. Canadian Army Lieutenant-Colonel Charles Oliviero, for example, has argued that Wehrmacht commanders (and soldiers) "did all they could to INCREASE the amount of confusion and disorder, knowing full well that this would be to their tactical advantage."[48] Such an approach may have had some tactical rewards here and there, but on the contrary, German commanders sought to *reduce* confusion and disorder in the *Schwerpunkt* already identified, or in the general battle conditions so that they could then identify a new *Schwerpunkt* by forward command. Unity of effort is not a chaos-based concept. German commanders, conditioned to question the validity of reports, were also conditioned to maintain positive control and even orchestrate the actions of subordinate units when required.[49]

The German practice of *Auftragstaktik*, stressed Roger Beaumont, "was not the freewheeling model" implied by analysts and historians. Moreover, "it is not at all a surety" that practising *Auftragstaktik* increases tactical response "in every or even most instances."[50] This point should not be overlooked, but Western militaries now cling tenaciously to the idea that *Auftragstaktik* generated faster decision-making during the war and that mission command does so now. Forward command as practised by Guderian enhanced the chances of tactical and operational success because leaders were in a position to exploit unforeseen opportunities.[51] It should be stressed that *Auftragstaktik* generated *perceptions* while forward command generated *perception*, and that the latter was the more important cognitive activity.

CONCLUSION

Auftragstaktik never implied the extent of diminished control that Wehrmacht enthusiasts have accepted. If the Germans truly believed that "the independence of the subordinate" alone was sufficient to achieve dominance over potential adversaries in terms of battlefield responsiveness, the philosophy of forward command would not have been explicitly stated in doctrine. Yet the very fact that forward command was so strongly ingrained suggests that the Germans believed the creativity implied in subordinate independence required the "push" and control inherent in forward command as the unifying moral force to shape the creativity into something useful, something that could be exploited to the limit through the weight of effort and to achieve rapid victory.

Subordinate independence implied considerable hope and trust that proper execution would take place. Forward command was the insurance policy against inevitable misinterpretation of higher intent and moments of weakness

due to fatigue in even the best subordinates, regardless of how well they understood that higher intent. Moreover, subordinates may have understood the higher intent, but without believing in it. Obviously, forward command and *Auftragstaktik* did not mesh perfectly, but the inevitable friction was manageable because of the broad understanding of how both ideas worked in support of the broader German warfighting philosophy. Western armies would be wise to keep this in mind, since manoeuvre warfare demands such a unified philosophy, and it is even more necessary for recent concepts such as multi-domain operations.

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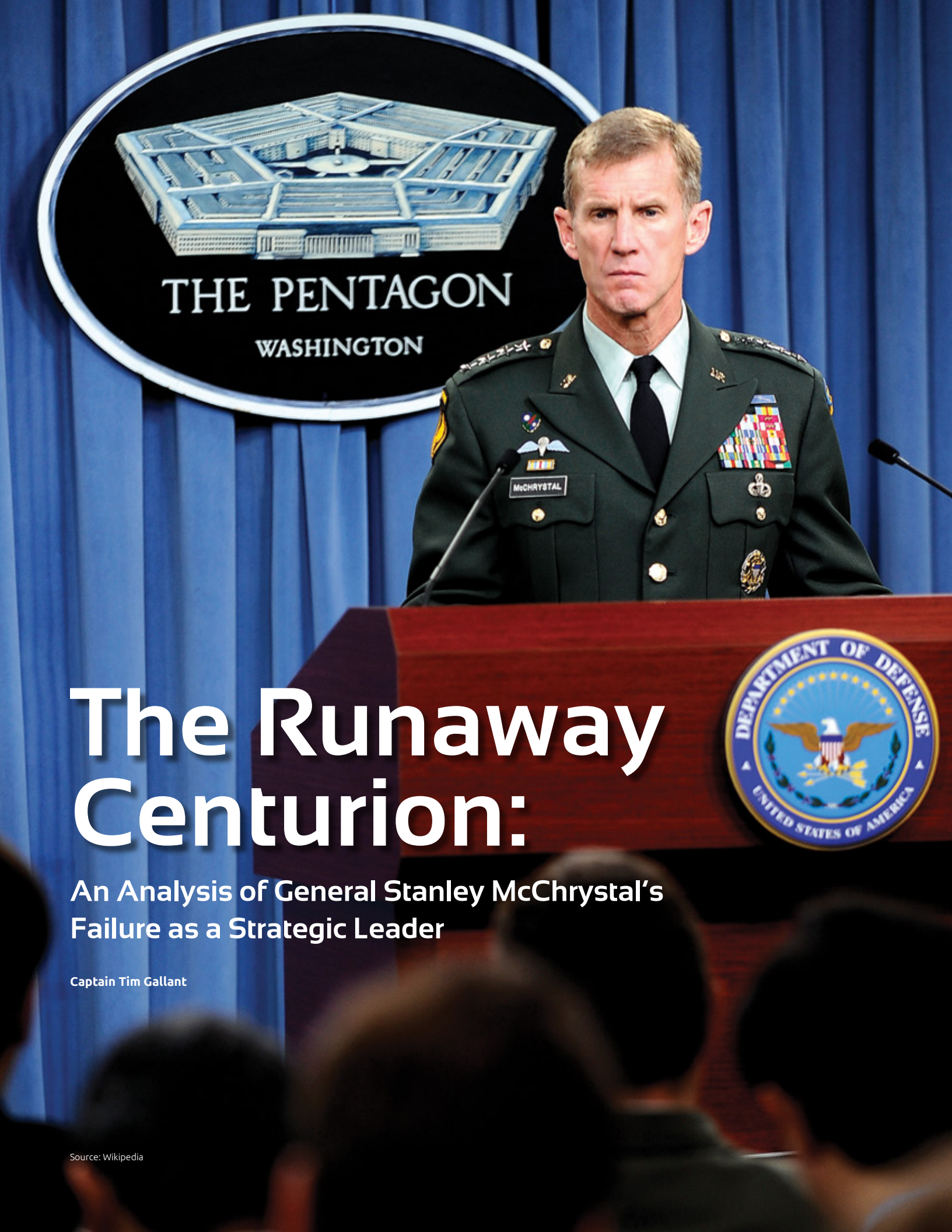

The Runaway Centurion:

An Analysis of General Stanley McChrystal's Failure as a Strategic Leader

Captain Tim Gallant

Source: Wikipedia

INTRODUCTION

General Stanley McChrystal is a respected and highly regarded leader within the international military community. Officers throughout the world honour and idealize his operational concepts, his style of leadership, and his actions as commander of the International Security Assistance Force (ISAF) in Afghanistan.[1] Despite such high praise, General McChrystal was relieved from command by President Barack Obama in June 2010 after *Rolling Stone* published Michael Hastings' article "The Runaway General,"[2] which highlighted disparaging remarks made by McChrystal and his staff about U.S. Ambassador to Afghanistan Karl Eikenberry, Special Representative to Afghanistan Richard Holbrooke, Vice-President Joe Biden and even the President himself.[3] At first glance it would seem that, due to being removed from his position, McChrystal should be considered a failed strategic leader. The release of the movie *War Machine*, which ruthlessly mocks McChrystal, is indicative of his legacy in the eyes of the public. On the one hand, the military community idealizes the fallen general; on the other, the civilian world lambasts him. How can such divergent and contradictory opinions about General McChrystal coexist?

In his announcement of McChrystal's dismissal, the President stressed the principle of "civilian control of the military that is at the core of our democratic system."[4] That the military must ultimately be subordinate to political control is axiomatic for democratic states. Furthermore, as argued by Carl von Clausewitz, the 19th-century Prussian theorist of war, military force must logically be guided by political ends because means are valuable only in relation to their purpose.[5] In short, political control of the military is what makes strategy possible. But was McChrystal threatening this subordination of the military, or were his rude and inappropriate remarks indicative of frustration with what he judged to be a "lack of clear political guidance?"[6] A typical military understanding of the levels of decision making is that they are part of a hierarchical process which structures the levels of war from the strategic, to the operational, and then to the tactical. Each level of war receives its orders and direction from its superior level of command. Atop this hierarchical system stands political intent: without such guidance, military planning becomes meaningless, as the military will not understand the ends it must achieve. How the military understands such political decision making reflects its own institutional culture. Consequently, this article will argue that McChrystal's firing is symbolic of the institutional failure of both military culture and civil–military relations in the American strategic development process.

LITERATURE REVIEW

To understand the subject matter, it is important to understand both the military culture of the United States and the theories and realities of its civil-military relations. It is also essential to accurately describe the series of events that culminated in McChrystal's firing, the actions which McChrystal took as commander of ISAF, and the strategic development process which Obama undertook in the summer and fall of 2009.

This article will therefore follow two lines of argumentation. The first is an overview of the "issue history," which includes all the events which led to McChrystal's firing.[7] This line of argumentation will highlight the disagreements in the strategic development process between Commander ISAF and the President. The second line of argumentation will focus on American civil–military relations, including its impacts on strategy. Critical to this second line of argumentation is the nature of American military culture. It is beyond the scope of this article to determine whether the structure of civil–military relations primarily shapes military culture, or whether military culture primarily shapes civil–military relations. What is understood is that each impacts the other symbiotically, with neither being assigned primacy. Following these lines of argumentation, I will now proceed with a review of the relevant literature.

LITERATURE REVIEW: PRESIDENT OBAMA AND GENERAL MCCHRYSTAL

As previously mentioned, it was Michael Hastings' article "The Runaway General," published in *Rolling Stone*, which set in motion the series of events that culminated in General McChrystal's dismissal.[8] That article is essential to any account of the fall of the ISAF commander and, in truth, is not overly negative in its portrayal of the General. What Hastings does portray is a man who "prides himself on being sharper and ballsier than anyone else."[9] McChrystal appears grim, brash in his opinions, and confident that victory in Afghanistan is possible. Hastings also details the initial clash with Vice-President Joe Biden, who opposed McChrystal's recommendations for counter-insurgency (COIN) operations, when the general publicly dismissed Biden's plan for counter-terrorism as "short-sighted, saying it would lead to a state of 'Chaos-istan.'"[10]

Another work that provides insight into McChrystal's series of unfortunate events is Marybeth P. Ulrich's "The General Stanley McChrystal Affair: A Case Study in Civil–Military Relations." Ulrich's article showcases the frayed relationship between "Team America" (the colloquial name referencing a politically incorrect movie which McChrystal's staff adopted for themselves) and the Obama administration. McChrystal provided Obama with only one course of action, "a population-centred counterinsurgency strategy," and the only possible variations were the number of soldiers deployed.[11] Ulrich also details the public debate about whether McChrystal should be relieved or not. Arguments in favour of relieving McChrystal stress the "appalling violation of norms of civil–military relations."[12] Conversely, the arguments in defence of McChrystal did not excuse his actions but emphasized that he was vital to success and that his dismissal would negatively impact the war.

Apart from the chronology of events which culminated in the general's dismissal, this article's first line of argumentation will also include literature focusing on his actions as commander of ISAF and on Obama's strategic development process during the summer and fall of 2009. In his *Commander's Initial Assessment*, which was leaked to the press and then made public, McChrystal notes that he oversaw a "rigorous multi-disciplinary assessment" of the situation in Afghanistan.[13] Structured as a recommendation to the Obama administration, the assessment places emphasis on redefining the fight, the criticality of time, and the need to change the operational culture of ISAF.[14] Significantly, McChrystal built his proposed plan on four main pillars: "Improve effectiveness through greater partnering with Afghanistan National Security Force – Prioritize responsive and accountable governance – Gain the Initiative – Focus Resources."[15] McChrystal's assessment is a sober judgement that "success is achievable" but that "success" would be a hard-fought and time-consuming affair.[16]

Concurrent with ISAF's initial assessment, the Obama administration was also conducting an ongoing strategic analysis. James Goldgeier's article "Making a Difference? Evaluating the Impact of President Barack Obama" focuses on the numerous political factors which lay at the heart of Obama's decisions regarding Afghanistan. Indeed, the appointment of McChrystal as commander of ISAF was a political decision based upon the election promise to focus on "the right war in Afghanistan" and "highlight the folly of the 'wrong war' in Iraq."[17] The newly elected Democratic administration focused public messaging on the idea that Afghanistan was a "war of necessity" and articulated a "clear mission and defined goals: to disrupt, dismantle, and defeat Al Qaeda and its extremist allies."[18] President Obama wanted to focus on the war in Afghanistan, but his plan was counter-terrorism and not COIN, as McChrystal recommended. The distinction is strategically important, and within it lies the fundamental disagreement between the operational commander and the President. Obama wanted to succeed in Afghanistan to showcase his credentials as commander-in-chief while simultaneously limiting the war due to intense pressures from the Democrat-controlled Congress.[19] Therefore, Obama thought in terms of strengthening America's international standing as well as his domestic political position, while McChrystal, who had studied revolutionary warfare, saw victory in terms of winning hearts and minds, thereby establishing a free and democratic Afghanistan.[20]

Although President Obama sought to emphasize that his dismissal of General McChrystal was "not based on any difference in policy," such disagreement lay at the heart of the entire matter.[21] Confronting Obama was a general determined to succeed who was providing excellent and thorough analysis that did not conform to the President's political priorities. The issue lay with a systemically frayed civil–military relationship.

LITERATURE REVIEW: CIVIL–MILITARY RELATIONS AND MILITARY CULTURE

The second line of argumentation for this literature review explores the nature of America's civil–military relations as well as its military culture, both of which influence it and are influenced by it. William E. Rapp's article "Civil–Military Relations: The Role of Military Leaders in Strategy Making" addresses the inadequacies of the current model of civil–military relations and the tensions between the two, noting that the model stems from Samuel Huntington's influential *The Soldier and the State*. Huntington designed a model of civil–military relations grounded in "objective control": civilian leaders design goals, the military offers options to achieve them and, once a decision is made, the President disengages and allows the military to operate without "political meddling."[22] Rapp argues that Huntingdon's model underestimates how "the omnipresence of chance and the existence of thinking adversaries confound[s] predictions of causality over the longer term."[23] In other words, the environment where strategists decide upon ends, ways and means is characterized by friction and is ever-changing. With such conditions in the strategic environment, Rapp concludes that "one must view policy and strategy formulation as iterative." [24] There is no end state to the making of strategy; statesmen must always have their fingers on the pulse of every operation to ensure that its conduct accords with their political intent. Georges Clemenceau, the French President during the First World War, said it best: "War is too important to be left to the generals."[25]

The culture of the American military, and of militaries throughout NATO, exacerbates this ineffective civil–military relationship. Since the 1980s, the operational level of war has become increasingly crucial for military officers. Disrupting the enemy's Observe – Orient – Decision – Action Loop (OODA Loop) and the operational frameworks which have succeeded it, such as dispersed operations, network-centric warfare, and now hybrid warfare, are what officers focus their entire careers on. These are the conceptual frameworks that generals will often present as solutions when briefing their political leaders. The problem is that "the operational level of war is not strategy—any more than it is policy."[26] Jason W. Warren aptly describes such an institutional and cultural focus upon operational and tactical solutions as "the Centurion Mindset."[27] Centurions were ancient Roman commanders who simple-mindedly followed orders and achieved tactical tasks. Both American military culture and military culture throughout NATO represent this centurion mindset in the idealization of command positions, while the careers of staff officers such as Dwight Eisenhower exemplify "a less flashy archetype."[28]

The dilemma for military culture is that success and experience in such unenviable staff positions is necessary training for successful strategic command. Officers who spend their careers avoiding dealing with civilian administrators and avoiding situations where nuance is necessary will most likely fail as strategic leaders when they are required to interact with politicians and government ministers on a day-to-day basis. Nevertheless, it must always be emphasized that strategy is indeed impotent without tactical success. The solution is not to reverse priorities, but instead to prioritize both at different times during an officer's educational progression. Warren concludes that militaries must demote the centurion back into the legion and that a broad political education must again become influential.[29]

The preceding literature review indicates a civil–military relationship that is disjointed and ineffective. Nowhere is such a dysfunctional strategic decision-making process more apparent than in the strategic review conducted by the Obama administration in 2009. Divergent operational and strategic planning processes were conducted out of synch with each other and came to different conclusions about what was strategically important.

THEORY

In civil–military relations, theory is not a mere academic endeavour. Civil–military relations is not legalistic or normative; it is a pragmatic business that determines success in war. The fundamental theoretical question is "what pattern of civil–military relations best ensures the effectiveness of the military instrument."[30] As Sir Hew Strachan, the renowned British military historian and professor at the University of St Andrews in Scotland, argues, "The principal purpose of effective civil–military relations is national security: its output is strategy."[31] Strategy is a concept which prepares and guides the ship of state through times of tranquility and times of turbulence. Logically, civil–military relations produces strategy which controls the conduct of lethal and non-lethal force through peace and war. For strategy to be appropriate, it must have a thorough understanding of what war is. Therefore, war and strategy must both be defined in order to establish this article's theoretical framework.

Taking its lead from Clausewitz, this article understands war as "nothing but a duel on a larger scale."[32] Neither an art nor a science, although its conduct involves both, war is an essential element of "man's social existence."[33] Due to the confrontational and primordial nature of war, its conduct is chaotic and fundamentally non-linear. Non-linearity is a characterization of systems that "disobey proportionality or additivity… in which the whole is not equal to the sum of the parts."[34] It is within the nature of strategy and war that actions which achieve success are unlikely to achieve the same success over-time due to the adaptability of the enemy. In other words, war, with its non-linear nature, defies certainty in planning. Every military action spawns unknown and unpredictable reactions with corresponding second- and third-order effects. It is due to the ever-persistent fog of war and its inherent friction that "mathematical factors never find a firm basis in military calculations."[35]

What is strategy? There is often much talk of "strategic objectives" or "strategic effects," but such phrases usually use the modifier "strategic" simply as an amplifier, without any understanding of what it means.[36] Civil–military relations produces strategy, and it must guide military actions, but how is it defined? The late Colin S. Gray defined strategy as "the use that is made of force and the threat of force for the ends of policy."[37] Such a definition, however, fails to account for war's non-linearity. Strategy must confront and guide a nation through war's chaos; its formulation should be iterative and redundant. Another standard definition of strategy is the Lykke model, in which strategy is the combination of ends, ways and means.[38] Unfortunately, the Lykke model tends to highlight "the means and the ends while sidelining the ways."[39] The creativity of *how* to accomplish a task is of the utmost importance in the creation of strategy. Furthermore, by formulating strategy in an additive and linear manner, this definition, like Gray's, fails to account for the chaotic essence of war. Proper strategy is based on an understanding of war's complex causal relations and attempts to establish what actions taken can attain the desired end state.

In this article, strategy is understood as a bridge that mediates conceptually between the demands of warfare and the demands of policy. It unites the two through the development of planning guidance and courses of action. As the conduct of a war progresses, its innumerable factors and pressures lead operational commanders to develop dictates and necessities which compete and sometimes contrast with political imperatives; in other words, war is apt to develop its own internal grammar.[40] In war, the political objective is the goal, and the utilization of military force is the means to achieve that goal. The role of strategy is to prevent the internal aims of military means from overcoming their directing political objectives. A proper definition of strategy must emphasize its necessarily iterative and guiding nature. Strategy throughout this article is, therefore, a continuous planning dialogue that attempts to fulfill a theory of political victory.

Both the 2009 strategic review led by President Obama and General McChrystal's planning upon becoming ISAF commander can now be understood in a meaningful light. Applying this understanding of strategy to the case study of Obama and McChrystal allows one to appreciate that what is at fault is not personalities, nor circumstances,

> President Obama wanted to focus on the war in Afghanistan, but his plan was counter-terrorism and not COIN, as McChrystal recommended.

but a systematic failure of strategy caused both by insufficient theories of civil–military relations and by a politically ignorant and narrow-minded military culture.

ANALYSIS: PRESIDENT OBAMA AND GENERAL MCCHRYSTAL

That Afghanistan again became a priority for American foreign policy was due to President Obama's campaign promises. At the heart of the entire matter lies Obama's desire to recreate "a sense of Democratic abilities to manage national security policy."[41] Shifting attention and focus from "the Republicans' war" in Iraq, Obama sought to reemphasize the war in Afghanistan in order to "disrupt, dismantle and defeat al Qaeda in Pakistan and Afghanistan."[42] These comments by the President emphasize the counter-terrorism approach which the administration sought to take in Afghanistan. Secretary of Defense Robert Gates went a step further and denounced the need for a COIN operation, stating that "the objective of creating some sort of Central Asian Valhalla" was foolish and that the primary goal was to "prevent Afghanistan from being used as a base for terrorists and extremists to attack the United States."[43]

It was in this political climate that, in August 2009, Obama replaced General David McKiernan with General McChrystal as Commander ISAF.[44] McChrystal entered into a conflict facing an insurgent enemy which "had gained momentum and held the operational initiative within the theatre and the tactical initiative within contested areas."[45] Making the matter more complicated, Afghanistan's President Hamid Karzai viewed ISAF with distrust, and his government reeked of corruption. As soon as General McChrystal was appointed, The Secretary of Defense tasked McChrystal to provide him with an assessment answering three questions: "(1) Can ISAF achieve the mission? (2) If so, how should ISAF go about achieving the mission? (3) What is required to achieve the mission?"[46] In other words, Obama's administration decentralized the strategic planning process to his operational commander to answer the questions of whether his political ends were feasible, what the ways of the mission should be, and what military means were required. The crucial flaw in the assessment was that it failed to include a dialogue with the President. Instead, McChrystal led his staff in a thorough factors analysis to redefine what the United States of America's Afghan strategy should be.[47]

McChrystal's assessment unapologetically "concluded that success depended on an adequately resourced and integrated civilian–military COIN campaign."[48] He understood that Obama sought to fight a war of counter-terrorism in Afghanistan, but his assessment did not understand that "way" as a suitable long-lasting solution; in fact, his assessment argues that "effective counter-insurgency in Afghanistan could be a route to effective counter-terrorism."[49] Population-focused

Source: Wikipedia

COIN operations, as General McChrystal's assessment advocated, are indeed a specific "way" of solving the problem set which the Afghanistan situation presented. However, COIN is not a "new strategy,"[50] even though the assessment claims that it is. Focusing on the population, as the assessment emphasizes, is a fundamental tenet of COIN, but it was not necessarily fundamental to what President Obama sought to achieve in Afghanistan. Missing from McChrystal's assessment are both a "clearly stated theory of success" and any visible linkage of ISAF efforts to political imperatives.[51] The lack of the former means that there is no detailed analysis of how ISAF's new COIN approach will achieve the defeat of al Qaeda and, apart from a comment describing it as a "long-term fight," there is no appreciation of how lengthy the conflict will be, nor whether the success of the Afghan government is necessary for the success of ISAF.[52] Fundamentally, McChrystal's initial assessment as Commander ISAF is a detailed list of operational imperatives to increase the effectiveness of his organization masquerading as a national strategy.

Such an assessment could have been a critical element in President Obama's strategic dialogue. However, the assessment was leaked to the public, thereby undermining the foundation of trust that is necessary for the creation of strategy. The President's administration suspected that the Pentagon had leaked the assessment in an attempt to box the President into "McChrystal's conclusion that not sending at least 40,000 more troops ... would result in mission failure."[53] Inappropriately applying political pressure to the President, the strategic dialogue devolved into a question of troop levels—in Lykke's model, the "means." The three courses of action presented to the President were not unique, but rather comprised a "throw-away" course of action involving 10,000 troops for training the Afghan National Army and the preferred "40,000 or 85,000 troops for COIN operations."[54] The crucial strategic dialogue between the administration and the operational commander never occurred. Disparaging any attempt at such a dialogue, McChrystal publicly mocked Vice-President Joe Biden's attempt to articulate a new "counter-terrorism plus" approach.

President Obama was forced, against his political insight, to adapt and employ McChrystal's recommendations—dressed up as a new approach and a new strategy—for a fully resourced COIN operation in Afghanistan. The operational commander forced his bottom-up thinking on the President and the state. The 2009 strategic decision-making process lacked creativity, lacked nuance, and lacked a theory of political success. It was, in essence, an example of how the gospel of COIN operations, following the supposed success of "the surge" in Iraq, was applied dogmatically to Afghanistan. It also showcases how in the American Army "tactics —that is, the carrying out of the 'way'—have utterly eclipsed strategy."[55] There is no indication that McChrystal or his staff ever doubted that a population-centric COIN operation was the only option. The inability to provide the President with multiple courses of action was a failure of creativity within ISAF.

ANALYSIS: CIVIL–MILITARY RELATIONS AND MILITARY CULTURE

The failure of the 2009 strategic dialogue between General McChrystal and President Obama is also fundamentally a failure of civil–military relations and military culture. Both factors combined to create an environment of misunderstanding and mistrust. At fault in the sphere of civil–military relations is Huntington's framework of "objective control" or what Eliot A. Cohen, Dean of the Paul H. Nitze School of Advanced International Studies, redefines as the "normal theory."[56] According to that theory, military professionals are given independent autonomy over the management of violence, and civilian leaders should designate political aims before the commencement of combat, giving the military a free hand to operate the war. Cohen contrasts Huntington's theory with what he refers to as the "unequal dialogue."[57] Statesmen, as leaders of their respective nations, are responsible for national command and for ensuring that strategy and operations adhere to their political vision. Military operations do not occur in a vacuum, and generals do not have the freedom to do what they want. Statesmen have the right and the obligation to ensure effectiveness, interacting with and inspecting every level of warfare. As Clausewitz argues, policy should permeate all military actions, having a continuous influence on them.[58]

To enable civil–military relations, and therefore to enable strategy, military leaders have a vital role to play. As this article has shown, General McChrystal conducted his planning assessment in isolation from the President's administration while overtly and intentionally disagreeing with the President's vision of the path forward. However, the "unequal dialogue" is inappropriately defined: in order to be successful, there needs to be an equality of dialogue, with the corresponding understanding that the authority of decision rests with the civilian leader. Operational necessities do matter, and they matter immensely. Civilian leaders should not be tyrants forcing their wildly imaginative and impractical political visions on situations that are inappropriate for the use of military force. It can be speculated that McChrystal's *Commander's Initial Assessment* could have been one aspect of the continuous dialectic between himself and the President's administration. Instead, it became the only point of conversation, the continuing debate incapable of progressing past a discussion of troop levels. Military leaders need to understand that their operational perspective is subordinate to both the state's entire strategic outlook and its various political imperatives. The strategic dialogue should be a "back and forth" as well as a "give and take." In the words of Rapp, "the military should not think it is civilians alone who must modify their thoughts and positions after receiving military advice."[59]

The inability of military leaders to adhere to the "unequal dialogue" is not a failure of theory or scholarship. There are libraries upon libraries of literature espousing effective frameworks of civil–military relations. The military's inability to adhere to such theories is instead a failure of culture. NATO armies are now dependent upon the operational level of war to ensure victory. Following the American experience in Korea and Vietnam, NATO has focused its discourse upon operational and tactical paradigms with the evaluation of command presence and tactical acumen more heavily valued than staff work and innovative thinking.[60] There is a risk associated with such a "centurion" culture: operational readiness and tactical prowess are undoubtedly necessary for any army, but such skills win battles, not wars. As Brigadier Justin Kelly and Dr. Michael Brennan argue,

> "Operational art is not the entirety of warfare. Operational art is not the design and conduct of campaigns. Operational art is not an interagency problem. Operational art *is* the thoughtful sequencing of tactical actions to defeat a component of the armed forces of the enemy."[61]

A career spent on firing ranges and training exercises does not develop the requisite skills for effective strategic leadership. Most importantly, and perhaps paradoxically, the skills and attributes which enable military leaders to excel at the tactical and operational levels are incompatible with developing a successful civil–military relationship.

Furthering the disconnect and the failure of strategy is the way in which military culture has adapted to Huntington's theory of "objective control." Again, it is beyond the scope of this article to establish the causal links between civil–military theories and a military's culture, that is, whether culture influences the dominant theory of civil–military relations or vice-versa. Nevertheless, the "objective control" theory's insistence on the apolitical nature of the military profession is often an excuse for military leaders to remain politically ignorant and allows a framework for "purely military advice," as if such a thing were possible.[62] The essential flaw of any military culture is a proud political ignorance, along with an institutional inability to consider the linkages between domestic politics and the international use of force. To evaluate and understand how the use of military force bolsters domestic political support seems Machiavellian and beneath the professional dignity of the military. However, such an understanding lies at the heart of what warfare is and drives the thought patterns of civilian leaders. Strategy is incoherent without political vision. For military leaders to be effective in the making of strategy, they need to remedy their lack of political education. Like McChrystal's 2009 command assessment, any military course of action which does not abide by the prevailing political situation is fundamentally unviable.

CONCLUSION

The development of strategy is not a linear and hierarchical decision-making process. It is through the reality and nature of strategy that it exists as a two-way bridge between the nation's capital and the battlefield. Clausewitz's statement stands eternal: "war is not merely an act of policy but a true political instrument, a continuation of political intercourse, carried on with other means."[63]

President Obama was correct to identify civil–military relations as the primary reason why he relieved General McChrystal of his position as commander of ISAF, but not in the manner he intended. Democracies tend to "address civil–military relations not as a means to an end, not as a way of making the state more efficient in its use of military power, but as an end in itself."[64] A failure of strategy is a failure of civil–military relations. Problems began for McChrystal when his swift planning tempo began to dictate theatre strategy; in essence, the general forced decisions upon the President—decisions which were not politically prudent. Contributing to McChrystal's downfall was a systematic lack of discussion exacerbated by his blatant political ignorance. The abilities and experiences of "Team America" are indicative of the centurion mindset, not only in terms of historical analogy but also in comparison with French writer Jean Lartéguy's classic novel *The Centurions*, which focuses on French army officers in the Algerian War.[65] McChrystal and the fictional Colonel Raspéguy are both brilliant, brazen, and utterly devoted to success in an operation in which political leaders have a different vision.

Furthermore, and perhaps most importantly, Huntington's theory of "objective control" influences this mindset by intentionally dividing the military world from the social world, thus isolating them. Fighting "small wars" forces both worlds to become increasingly alienated from each other. More and more politicians do not have combat experience and therefore do not understand the chaos, violence, and non-linearity of war, while the deployed officer's identity becomes intertwined with it. Huntington's model of civil–military relations, together with the centurion mindset, creates a cultural and institutional gap between the political and the operational levels of war where the development of strategy should be. One solution necessary for overcoming this black hole of strategy is to emphasize the political education of military leaders, in order to increase their understanding and effectiveness in the strategic dialogue.

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Born and raised in Newfoundland and Labrador, Capt Gallant has lived in many places throughout Canada, and he and his wife now make their home in the Fredericton area. He holds a B.A. with a joint major in Philosophy and Political Science from Saint Francis Xavier University.

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> The objective is to maintain platform survivability to the levels required to achieve successful operations.

MAXIMIZING SURVIVABILITY

of Canadian Army combat platforms

Jean-François Gravel and Lieutenant-Colonel François Laroche

Source: Rheinmetall AG

INTRODUCTION

Advanced weapon systems have reached a level of lethality that challenges the most advanced passive armours, and they have the ability to target weaker or more vulnerable areas of combat platforms. Since increasing passive armour would severely affect platforms' mobility, autonomy and reliability, novel active and reactive systems are being developed and fielded to supplement and ideally complement passive armours. The objective is to maintain platform survivability to the levels required to achieve successful operations. Furthermore, as adversaries concentrate their efforts on defeating newly deployed protection layers by improving and adapting their tactics, techniques and procedures (TTP), that creates a constantly evolving environment and a challenge for the most advanced combat platforms. As the hope for a revolution in passive armour research is waning and current reactive systems have shown shortcomings, the international survivability community is increasingly focusing on active protection systems (APS) to enhance the survivability of their combat platforms. Considering that APSs will also have limitations, it is generally accepted that the optimum approach to maximizing survivability is to group multiple layers of protection so that they function holistically.

Source: Defence Research and Development Canada

Figure 1: Typical Sensing Hemisphere Surrounding a Combat Platform

ACTIVE PROTECTION SYSTEM CONCEPT

Contrary to passive and reactive armours, where engagement timelines last a few microseconds following threat impact on a platform, engagement timelines for APSs are orders of magnitude longer and may last longer than ten seconds. This is a critical difference in that APS technology buys the platform valuable time to introduce a countermeasure that can eliminate (or reduce) threat lethality before impact. For example, being targeted by a range finder, being designated by a laser or detecting the flashes of enemy weapons followed by fast-flying objects are indications that the platform may be targeted and that a short period of time to increase survivability is available. The APS layer aims to take advantage of this timeline, whereas passive and reactive armours wait for impact. Although APSs appear to extend the timeline from a survivability standpoint, "human-in-the-loop" interactions are undesirable because the APS threat response needs to be automatic to sequence the optimal mechanisms for threat defeat. While it is true that some APSs have the ability to launch effectors to defeat incoming threats in flight, the mechanisms involved in properly performing such actions are numerous and complex.

SENSING CHALLENGE

Being able to discriminate, localize and identify threats from the environment through passive and active sensing is the first step toward achieving APS functionality. The first challenge for a sensing suite is the requirement for high spatial resolution and near-instantaneous threat detection, identification and tracking over a hemispherical area, as shown in Figure 1. The unpredictable APS threat environment and the various mission backgrounds generally create dynamic hemisphere bounds for the sensing suite. A large hemisphere radius is desirable in order to maximize the available timeline for the APS controller to assess the risks and determine the appropriate countermeasure sequence. However, it increases the complexity for the sensing suite in deriving the required threat information from the surrounding backgrounds. Consequently, it may delay the transmission of threat identification to the APS controller.

The second challenge is the likelihood of extremely cluttered battlefields. The sensing suite has the potential to be affected by electromagnetic radiation from friendly platforms, by undesired electronic warfare emissions and by the broadly varying backgrounds encountered during different missions. This adds to the complexity of maintaining proper threat identification and tracking. Moreover, in order to avoid the potential risks of undesired release of energetics, obscurants or laser energy on friendly platforms, APS response should be coordinated over a secure network. The purpose is to ensure adequate "threat filtering" by the APS located in the vicinity.

HARD-KILL COUNTERMEASURES

A hard-kill (HK) countermeasure aims to physically alter the incoming threat or disrupt its penetration ability before it reaches the targeted platform. It is generally performed through a physical attack using explosive-based effectors. These effectors generally produce an environment that includes blast, fragments and the likelihood of a degraded jet initiation when the effector is activated near the incoming threat. Manufacturers are working to mitigate these effects by optimizing the HK countermeasures and improving the sensing suites to achieve physical destruction without jet formation. Two types of HK countermeasures are presented in this article. The first type uses distributed effectors, which wrap around the vehicle and detonate at a precise time to disable the threat, usually close to the platform. This type of HK countermeasure is most useful in protecting the platform and its crew when they are ambushed with smaller anti-tank weapon attacks and during urban operations where buildings facilitate threat concealment and short-range engagements. Having HK effectors wrapped around the platform provides quasi-instantaneous multifaceted protection. However, this technology competes with reactive armour for physical space, therefore a choice would have to be made between the two, as they are not likely to co-exist on the same platform for layered applications. Figure 2 shows an open source example of the distributed HK effectors developed by Rheinmetall AG.

Source: Rheinmetall AG

Figure 2: Distributed Hard-Kill Effectors

Source: Elbit Systems – Land and BAE Systems Land and BAE Systems

Figure 3: Slewed Fly Out Hard-Kill Effectors

The second type of HK countermeasure is the slewed fly out effector. This effector is launched in the direction of the incoming threat to create an interception farther away from the platform. The APS controller determines the exact interception distance after obtaining threat identification from the sensing suite. That increase in distance to the desired threat intercept point reduces the burdens associated with possible residual penetration and damage to on-board systems. In order to achieve a threat intercept, the fly out effector needs to be aimed by a ruggedized gimbal. The gimbal usually requires a large peak current to slew rapidly to the desired orientation, which is generally provided by capacitor banks installed on the platform. The slewed fly out effector has slower reaction times and is less capable of defending in ambush scenarios compared to the distributed effector. However, it has the capability to handle a broader range of threats, including tank rounds, and can be compatible with reactive armour for layered applications. Figure 3 depicts an example of the slewed fly out effector developed by Elbit Systems – Land and integrated by another company, BAE Systems, on a Challenger 2 as a proposed upgrade for the British Army.

SOFT-KILL COUNTERMEASURES

A soft-kill (SK) countermeasure aims to avoid a hit by preventing the operator from tracking the intended target or to hinder the guidance mechanism from functioning as intended while the missile is in flight. The most common SK countermeasure is based on the release of obscurants in combination with a platform manoeuvre. When a warning receiver detects laser energy aimed at the platform, obscuration grenades are then released to create a dense obscuration pattern that impairs the operator's ability to track the platform. Most recent systems have obscuration grenades mounted on gimbals for faster release toward the laser source, instead of relying on turret rotations for directional deployment. The major drawbacks of obscuration systems, when deployed, are toxicity for dismounted personnel and reduced platform situational awareness. Figure 4 shows an open source example of a slewed fly out obscuration grenade launcher developed by SAAB.

Recent advancements in laser-based technologies have introduced new SK capabilities in the form of "dazzling" and "jamming" that can be utilized for the early defeat of guided systems without physical interactions near the platform. A typical application of the SK "dazzling" countermeasure aims to rapidly prevent the threat operator from tracking its target without the common drawbacks associated with the use of obscurants. On the other hand, the SK "jamming" countermeasure aims to prevent proper guidance signals from reaching the missile in flight. Hence, the missile loses its ability to follow the operator's aiming point. The guided threat long engagement timeline allows for the use of laser-based SK countermeasures in the initial portion of the engagement without impairing the use and efficiency of HK effectors near the end of the timeline. Layering SK and HK countermeasures generally does not cause compatibility issues.

Source: SAAB

Figure 4: Slewed Fly Out Soft-Kill effector

ORIGINAL EQUIPMENT MANUFACTURERS' ACTIVE PROTECTION SYSTEMS

APSs developed by original equipment manufacturers (OEM) are offered today and marketed to increase the survivability of combat platforms via soft-kill, hard-kill or layered capabilities. They offer the ability to interface with the battle management system to provide increased situational awareness for the occupants. These OEM APSs have been evaluated in many countries, including Canada, and have shown capabilities to defeat various threats in flight. Currently, some of our North Atlantic Treaty Organization (NATO) partners have fielded or are actively fielding OEM APSs as either a stopgap or long-term solution. The main perceived challenge with OEM APSs is the likelihood of slow adaptability to comply with updated requirements arising from an unexpected military mission or new threat environments. This is an important consideration given that, once the APS technology is fielded, the risk of it being exploited or requiring technical updates is non-negligible. The safety aspects of HK APSs is another area of concern, as these systems fall into the automatic weapon system category. In addition, HK APSs are being fielded in a context that is vastly different and more challenging than what exists for the Navy or the Air Force. Many countries would be reluctant to field a technology that may require lengthy technical updates and safety-recertification processes to regain its full potential. Governments fielding HK APSs for land platforms must fully understand the safety analysis performed by the OEM and the risks associated with the possible unintentional release of energetics. These are important topics that must be addressed before countries like Canada move forward and field HK APSs on their combat platforms.

MODULAR ACTIVE PROTECTION SYSTEM ARCHITECTURES

The United Kingdom (UK) and the United States (US) are pursuing modular APS architectures through the ongoing Modular Integrated Protection System in the UK and the previously transitioned Modular Active Protection System (MAPS) in the US. These approaches reflect a desire for a standardized architecture with common interfaces to facilitate competition and integration at the subsystem level. One objective is to rapidly adapt the capability to cope with evolving environments. NATO is also pursuing APS architecture through its Standardization Agreement (STANAG) 4822.[1] The modular APS architecture is based on

a controller having a standardized communication protocol and interfaces for compliant subsystems. It also includes embedded safety-critical features such as the controlled release of energetics, cyber resilience and friendly-fire awareness. The controller may also require a limited number of additional components to interface with the crew and vehicle electronic architecture to form the APS core. When the core is combined with standardized subsystems, it forms the desired APS capability. The modular APS also supports parallelized sensor and countermeasure suites to facilitate threat prioritization and defeat. The additional sources of information maximize the controller's ability to select the optimum countermeasure sequence as a function of the identified threat type and the available engagement timeline. The MAPS base kit, shown in Figure 5, provides an example of an APS core capability manufactured by Lockheed Martin.

The US and the UK are sharing their competing modular standards with a number of industrial partners to accelerate the development of compatible subsystems. The subsystems are then integrated with the modular APS core to verify compatibility and tested out for performance. This approach offers the benefit of having a number of validated compliant subsystems readily available for both nations' combat platforms and offers the flexibility to modify fielded configurations as required.

DEFENCE RESEARCH AND DEVELOPMENT CANADA'S ACTIVE PROTECTION SYSTEM COLLABORATIONS

Canada has recently updated most of its combat platforms, and these vehicles will likely be active in the Canadian Army (CA) inventory for the next 20–30 years. They were procured through competitive processes and in accordance with strict requirements regarding their passive protection levels. Passive armour is a trusted and reliable foundation upon which to build additional layered capabilities. The first layer with potential enhancements involves the selection of "add-on" or "reactive" armours. The former is well known in Canada and has been utilized frequently to enhance platform survivability without augmenting the risk of injury to dismounted personnel. The latter provides additional survivability against larger threats but, due to its explosive nature, may introduce a non-negligible risk of injury to dismounted personnel. Improved reactive armour designs that generate significantly lower collateral damage are currently being developed and tested to facilitate the utilization of this technology in Canada.

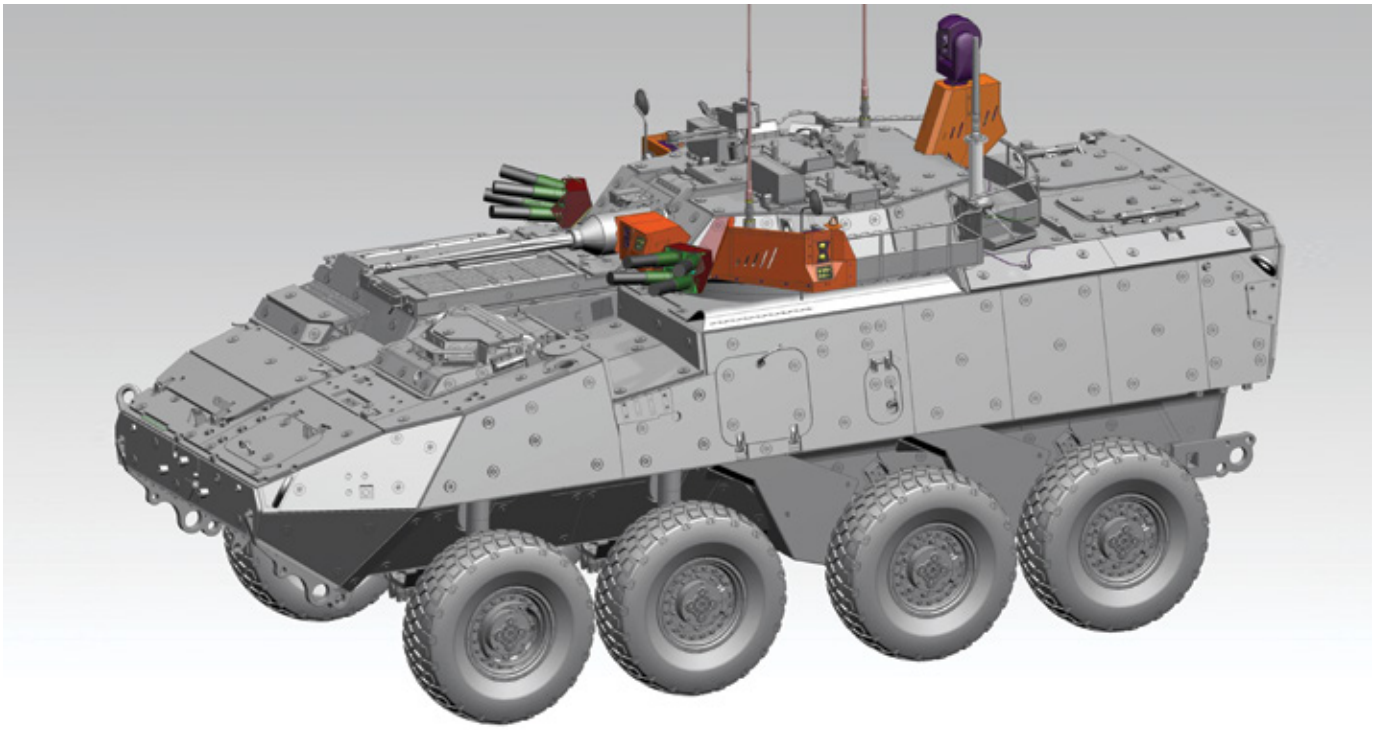
The Department of National Defence, through Defence Research and Development Canada (DRDC), has supported the MAPS program since its debut in 2014 via collaborative agreements. DRDC has provided valuable inputs to the modular architecture and has performed several integration sessions with the US laboratory Ground Vehicle System Center. Through this collaboration, DRDC has developed

Source: Lockheed Martin

Figure 5: Modular Active Protection System Base Kit

government-owned modular software that supports the standardized MAPS protocol. This software enables the utilization of promising non-compliant technologies with the modular architecture. In addition, DRDC research activities have been oriented toward SK countermeasure prototyping and evaluation, which have the ability to increase platform survivability while ensuring manageable collateral effects and reasonable space claim. In this regard, a collaborative research agreement has recently been signed between DRDC and General Dynamics Land Systems – Canada to demonstrate and rate the performance of a MAPS-compliant SK APS on a Light Armoured Vehicle (LAV) 6.0. This activity will inform the CA about the benefits of using a modular APS architecture with SK countermeasures and will help to validate a portion of NATO STANAG 4686.[2] Figure 6 shows the LAV 6.0 model integrated with a preliminary MAPS-compliant SK APS prototype.

If fielded on a limited number of combat vehicles, the modular SK APS would allow the CA to smooth the learning curve associated with the use of APS capability, adapt TTP and prepare for operations. For DRDC, this approach to APSs is seen as a stepping-stone to a more advanced modular layered system that would use SK and HK effectors and operate collaboratively. It is also believed that a modular APS approach opens up the innovation field to a broader industry group, which would otherwise not have been able to compete due to the costly barrier to entry and the intrinsic complexity of APSs. This is expected to drive Canadian industry in developing innovative and compliant subsystems to support a future CA procurement strategy.



Source: General Dynamics Land Systems – Canada

Figure 6: Modular Active Protection System -Compliant Soft-Kill Active Protection System on a Light Armoured Vehicle 6.0

CONCLUSIONS

APSs are a unique technology that aims to optimize the engagement timeline in order to deploy sequential or simultaneous effectors to defeat inbound threats. APSs enhance the odds of platform survivability by eliminating (or reducing) threat lethality, and their use is intended to ensure crew survival, protection of on-board systems and completion of the mission. Since the APS probability of threat defeat is expected to vary as a function of the different missions, threat environments and improved enemy TTP, DRDC recommends a modular rather than an OEM approach. Modular APSs would allow for faster implementation of pre-qualified technologies and offer the benefits of having system safety aspects managed by governments. DRDC continues its involvement in APSs, in concert with our allies, to provide objective advice to the CA on the most efficient way to use this new technology. As the need to enhance land combat platform survivability is essential to maintain an edge over our adversaries in future armed conflicts, a well-established layered capability is required. Layering a modular APS with advanced reactive armour tiles to support current passive protection levels is therefore considered the optimum approach to ensure combat platforms' readiness for the upcoming decades.

ABOUT THE AUTHORS

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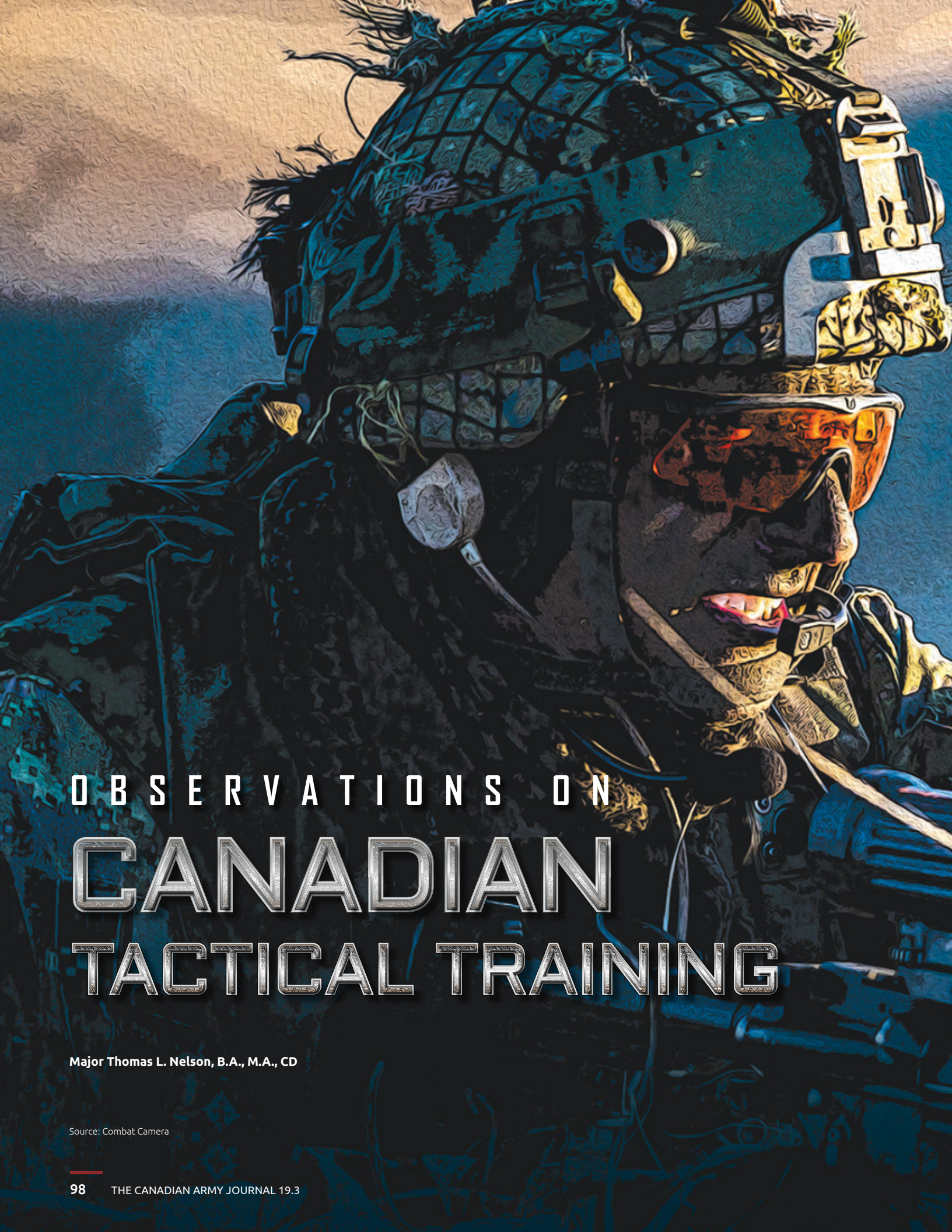
ENDNOTES

1. NATO Standardization Agreement (STANAG) 4822 is a standard, currently in development, which aims to produce a common Defensive Aid Suite (DAS) architecture to ensure interoperability of land systems.

2. NATO Standardization Agreement (STANAG) 4686 (Procedures for the Assessment of Defensive Aid Suites (DAS) for Land Vehicles) is a standard, currently in development, which provides common test methods to assess DAS baseline performances.



OBSERVATIONS ON CANADIAN TACTICAL TRAINING

Major Thomas L. Nelson, B.A., M.A., CD

Source: Combat Camera

INTRODUCTION

Competence in military tactics is a key element of professional soldiering, especially among combat arms officers. Although basic trade training (i.e. phases 3 and 4) for combat arms trades places considerable emphasis upon teaching and applying core tactics, the mid-level officer Developmental Period 2 (DP2) places little emphasis upon formally teaching and perfecting tactical proficiency. This is a bold claim, one which many will likely object to on principle, but regrettably it is true.

Tactics, as defined by Merriam-Webster,[1] is

1. a: the science and art of disposing and maneuvering forces in combat; and

   b: the art or skill of employing available means to accomplish an end.

Tactics guide operational conduct at the ground level. In terms of planning, different tactics are what will be seen during course of action (COA) development and comparison, and the final concept of operations of a plan/order will essentially be an explanation of the tactical conduct of a mission. During hasty attacks and meeting engagements, tactics, as well as battle drills, will determine the options available to the commander.

For combat arms officers, the first career course following DP1 trade-specific training involving tactical planning and execution is the Army Tactics and Operations Course (ATOC). According to its training plan (TP),[2] ATOC is a 20-day course, half of which is taught through distributed learning (DL) methods. Among its Performance Objectives (PO), the two that are most focused upon the subjects connected to the teaching/practice of tactics are PO 202, Apply Army Operations Doctrine at the Sub-Unit Level, and PO 203, Plan Tactical Operations at the Sub-Unit Level.[3] PO 202 is mainly delivered remotely[4] and focuses largely on reviewing the theory and terms within relevant Canadian Army doctrine publications. Students are considered to have demonstrated a sufficient application of knowledge in PO 202 by achieving a score of 70% or higher on a 30-minute, 60-question written test.[5] PO 203 is a more effective practical application of tactical skills, in that it focuses upon the conduct of battle procedure and the combat estimate, which includes COA development and selection. Unfortunately, however, due to the short length of the course, there are only 450 minutes of lesson time on COA formulation and selection.[6] Success on this PO is achieved through a successful evaluation on one formal written estimate.[7] Due to time limitations, neither of these POs provides candidates with deep exposure to the development and application of tactics. Likewise, the PO that addresses the actual conduct and execution of sub-unit operations, PO 204, Conduct and Control in Support of Sub-Unit Operations, focuses more upon the establishment of a command post and acting as a combat team second in command (2IC) rather than making immediate tactical decisions as a commander.[8]

Source: Combat Camera

Soldiers of the 1st Battalion, Princess Patricia's Canadian Light Infantry, secure a village during Exercise MAPLE RESOLVE.

It is also important to note some of what is not taught on the ATOC. According to the qualification standard (QS), tasks such as Execute a linkup, Execute a bypass, Execute a reserved demolition guard, Execute a cordon and search, Execute a guard, Execute a meeting engagement, Execute stability operations, and Execute specific operations (e.g. airmobile, amphibious, airborne, encircled forces) are all non-train tasks because "Trainees do not have a problem learning this task on the job."[9] While it is perfectly understandable that a 20-day course does not have sufficient time to explore these tactical tasks, the idea that they are not taught because they are easily learnt on the job seems ludicrous. Firstly, many officers will leave their battalion prior to serving as a sub-unit 2IC, and so may never see such tasks at a sub-unit level before returning as sub-unit commanders—if ever. Secondly, some of the above-mentioned tasks (bypass, guards, stability ops, meeting engagements) are the riskiest and most complex manoeuvres to conduct during exercises and operations. If these tasks are not formally taught at some point, there is a high probability that an officer may never encounter them until they are being assessed or, worse, on operations.

Similar problems exist for the Army Operations Course (AOC). The AOC QS/TP dictates 102 days of training (35 DL and 67 residence) for the Regular Force course.[10] It covers a broad range of topics, including a brief review of sub-unit operations, but is primarily focused upon the Operations Planning Process (OPP) and preparing officers to serve as staff at the battle group and brigade levels. Like ATOC, two of its POs seem well suited to develop candidates' individual tactical acumen: PO 203, Apply Army Doctrine to Tactical and Operational Plans, and PO 205, Conduct Battlegroup Level Full Spectrum Operations within a Brigade Context.[11]

Unfortunately, AOC suffers from deficiencies similar to those of ATOC. PO 203 is primarily taught through DL and consists of reviewing Canadian Armed Forces (CAF) doctrine and definitions; it culminates in an online multiple-choice test. Due to its practical nature, PO 205, like ATOC's PO 203, is more effective in exposing candidates to tactical thinking. The focus upon the conduct of battle procedure and the estimate (including COA development/comparison), combined with the requirement for students to conduct both a practice and an assessed estimate, provides the candidates with the opportunity to personally conduct tactical planning and receive feedback concerning their plans. Unfortunately, however, there is still only a limited amount of time devoted to the actual tactical planning element of COA development, and much of the testing involves successfully filling out factor/deduction boxes and generating an operation order, rather than an in-depth consideration of the courses of action themselves. This style of thought prioritizes process over substance.

Although the Combat Team Commander Course—a course that is not given to all combat arms officers due to the limited number of combat team commander positions—does place considerable emphasis on tactical planning and execution, this course is normally taken 8–10 years after basic trade training. This is partly compensated for during the officer's time at an operational unit (armoured regiment, infantry battalion, etc.) within their trade, where they will lead a troop/platoon in field exercises and likely be exposed to additional tactical training such as tactical exercises without troops (TEWT) and virtual battle simulators / Joint Conflict and Tactical Simulation. Many officers, however, have the opportunity to command a troop/platoon for only six months to a year between multiple assignments to training centres and their eventual movement to another position within the unit (ideally a sub-unit staff position or specialized combat support role). Even for officers who spend significant periods of time as platoon/troop commanders and sub-unit staff officers, specific circumstances such as deployments and exercise cycles result in varying amounts of tactical and operational experience. An infantry platoon commander who conducted work-up training with a platoon and a combat tour overseas will have far more exposure to tactical decision making than one who commanded for the same amount of time but whose battalion was primarily involved in supporting divisional and brigade tasks while in garrison.

Although additional opportunities exist for those officers lucky enough to be employed as staff in the Tactics School or in one of the trade schools or training centres, the fact is that outside of the above-mentioned courses and the experience obtained in line units, there are no other institutionally programmed opportunities for tactical development. This is why formal tactics training is so important to the development of combat arms officers.

WHAT CAN BE DONE ABOUT THIS?

Better Professional Development. Aside from career courses like ATOC and AOC and deployment on field exercises, there is no uniform or formalized system of professional development in tactics for our junior combat arms officers. If they are lucky, their chain of command will create a professional development plan that includes such training, but the quality of that training, when it occurs, will be based largely on the individual abilities and initiative of their superiors. Otherwise, such officers are left to develop their skills through whatever readings and other resources they can access—something that, once again, is left to individual initiative and ability. For every combat arms officer whose officer commanding or commanding officer put them through intensive tactical development via war games, in-depth discussions and directed readings, there seem to be at least as many whose experience consisted of little more than a few words spoken during an after action review and possibly a written assessment form.

This occurs despite the many available resources focusing on tactical problems, including directed readings about relevant operations, old exercise orders that can be turned into TEWTs, and formalized tabletop war games such as Kriegspiel (a tactical wargame). Multiple sources for tactical learning can be found online. A section of the United States Marine Corps Association Foundation's website[13] is devoted to war game problems. There are American- and British-made videos on sites like YouTube that explain military concepts such as the Military Decision-Making Process and common enemy doctrine (similar to the enemy doctrine we teach on our own courses). Likewise, the Canadian Army has produced numerous publications related to tactical operations, such as the Dispatches series. These can all be used to enrich the professional development of our officers.

An official program that provides suggestions and templates concerning the implementation and execution of a professional development program, and which includes resources and links to related materials, must be created for combat arms officers. Tactical war games like the Kriegspiel should be broadly advertised and funded at the unit level. A culture of friendly competition should be fostered, in which officers compete against each other routinely in such tactical exercises. Tactical planning should be made more common, and more fun—not just something to be done when being evaluated or on exercises.

Separate Career Courses. Combat service support trades are critically important to the Army: literally nothing can be accomplished without them. Their views and experiences must be disseminated throughout the combat arms. However, delivering the exact same career courses to both combat arms and combat service support officers is problematic.

The relatively small number of Army officers, the need to minimize disruption to unit operational flexibility, and the high cost of running national courses make combined courses attractive. Unfortunately, it is simply a fact that the two groups perform very different roles and must focus on very different considerations. Their professional careers expose them to different elements of the military, and by the time they arrive on career courses together there is a major gap in knowledge that must be bridged from both ends.[14] In addition, there often appears to be a distinct difference in the two groups' expectations and performance requirements: in practice, non–combat arms officers are simply not expected to perform at the same tactical level as combat arms officers. This entails not only inherent ethical and standardization problems when courses include unspoken rules dictating that some people will be assessed differently than others, but also a tremendous loss of learning opportunity.

At the beginning of every ATOC and AOC, examples of officers not knowing enough about other army trades, and in some cases their own, are frequently given as the reason for reviewing the basic tactical employment characteristics of army combat elements. But surely there is sufficient difference between the core knowledge of typical combat arms and combat service support officers that such classes can be taught differently for each group—and if there is not, what does that mean for the base level of training of our combat arms officers?

A similar argument is that the primary purpose of such courses is to teach planning, not tactics, and that therefore there is no need to separate combat arms from combat service support. This argument ignores the fact that the problems on courses like ATOC and AOC are practically all combat-related. The current practice of placing the emphasis upon following the steps of the formal estimate processes and filling out boxes of factor deductions, rather than upon the tactical soundness of the resulting plan, minimizes the importance of an actually workable tactical solution—something that is completely unacceptable in a real operational setting. Results matter: whether you think that tactics and strategy are more of an art or more of a science, the value of the effort is in what is produced. If architecture were taught with an almost exclusive emphasis upon theory and minimal emphasis upon workable designs because some of the students lacked technical drawing experience, the quality of such education would be justifiably questioned. Why do we not think in the same way when teaching a subject that is at the core of military operations?

There is a common expectation that people will be grouped into different levels when learning a sport, a skill or an academic subject. If this is not done, those with the highest and the lowest levels of knowledge will receive very little benefit because, respectively, they are not learning anything

Soldiers and light armoured vehicles from 1st Battalion, Princess Patricia's Canadian Light Infantry, conduct an attack during Exercise MAPLE RESOLVE.

> “It is not enough to assume that our officers will acquire the skills they need through natural ability or experience alone: they need continuous opportunity to practise and develop.”

Source: Combat Camera

new or they do not have sufficient basic knowledge to fully grasp what is being taught. Why is this not done in Army career courses? A course like ATOC, which has the word "tactics" in its name, should not be taught in the same way to armour and infantry officers as it is to logistics and electrical and mechanical engineering officers. This should be viewed as common sense. Either we are not training our combat arms officers well enough at what should be one of their unique specialties (combat tactics) prior to such courses, and so they are at a level barely above that of amateurs, or these DP2 courses are not delivering sufficient intermediate tactical training to the combat arms officers.

Change the Way We Teach and Evaluate. Currently, much of our training consists of enormous reading lists of documents to be read prior to, or during, distributed learning classes, followed by a practical session taking place in residency. This can be an effective framework and, due to budget and time constraints, it is oftentimes the only available option. There are, however, some major inefficiencies in the way that we teach and evaluate our officers.

Directed readings can be useful in teaching a subject like tactics. They should be specifically selected for relevance and should be discussed in detail afterwards—ideally as part of a case study that includes other relevant materials such as maps, organization charts and equipment lists—to ensure that they have been read and that the key learning elements have been extracted. This is not what is done on most army courses. Instead, a massive list of readings is assigned, consisting primarily of doctrinal manuals interspersed with only a few other materials. The timeline for reading the materials is short, and the amount of time dedicated to discussing them is shorter. Training that presents gigantic lists of material to read, and then only lightly addresses the readings afterwards—if at all—ensures that most of the students barely do any of the readings, and that those who do often miss key takeaways because they do not have the opportunity to contemplate and discuss what they have read.

Subjects like friendly and enemy doctrine, which are vital to the effective practical application of tactics, must be taught better. Sun-Tzu said, "If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle."[15] Do we follow this maxim? It often does not seem so. When teaching enemy force doctrine, we typically include one or two documents about the enemy among the other required elements of the reading list and then have one or two 50-minute classes on the topic; afterwards, we assume that everyone understands how the enemy operates. As a result, we end up with many officers who can recognize basic terms like "disruption zone," "integrated attack" and "date/time group" and who, if we are lucky, can identify elements of the enemy order of march and vaguely distinguish what they indicate. Similarly, when teaching our own doctrine, we try to cover so much at once that critical subjects are reduced to bland definitions, with little exploration of the substance behind them. When an officer's assessed understanding of offensive operations is largely based upon regurgitating a short paragraph from B-GL-300-002/FP-000, *Land Force Operations Tactical Doctrine*,[16] reproducing endless lists of fundamentals and principles, and choosing the right set of characteristics for combat elements such as the infantry, there is a problem.

Likewise, when planning assessments are based on how well students follow each step of the combat estimate—chiefly defined by the number of relevant factors identified and the completeness of their follow-on deduction and task boxes as opposed to the holistic quality of the final product—there is a problem with the way in which we teach and evaluate. Evaluations should be in-depth and focus upon the actual products of planning, versus the evidence that the students followed the process. If something seems off with a plan, we need to identify it and ask for an explanation. Then, if the explanation makes sense, accept it, if it does not, don't. The process should be the same for an officer's knowledge of relevant doctrine. If this seems impractical or too work-intensive, consider the fact that in our sister element, the Royal Canadian Navy, officers are expected to spend years preparing for boards in which they are questioned in depth about their knowledge of naval procedures and ship functions before they can be promoted or merited to key positions.

Lastly, there seems to be a culture within the Canadian Army that penalizes—or at least is perceived to penalize—mistakes so much that innovation and risk-taking are stifled. We need to create more opportunities for consequence-free exploration of tactics. On course, many candidates are loath to take risks. They automatically make conventional plans and do what is safe, despite recognizing many workable unique courses of action. The author remembers a time during AOC when he noticed that nearly all of the combat arms candidates had the same plan with minor variations. Although it theoretically meant that they had all absorbed the core doctrinal lessons, it also meant that the doctrinal lessons were easily "templatable"— and that can be dangerous. The same issues can occur during exercises. Because commanders do not want to risk receiving poor assessments and possibly being passed over for operational tour positions, they follow what seems to be the conventional wisdom and the standard way of going about things. As a result, the learning opportunities that could be gained from experimentation and innovation are lost.

Core doctrine and standard tactics, technique and procedures exist because they generally lead to success, but there will still be situations that call for innovative and unexpected tactics in order to succeed against a thinking enemy—and

devising those tactics is a skill that requires practice like any other. Sometimes we may need to go off the beaten path in how we do things, and the best way to achieve that is through a culture that rewards, or at least does not penalize, experimentation and unusual solutions. This does not mean that sloppy thinking or blatantly poor plans should be accepted; if a member is unable to explain the logic behind their plan and account for its potential risks, then the plan is clearly deficient. If, however, they can explain logically why their course of action will work and how they will mitigate the potential risks, then due consideration should be given to their thinking. It is important to remember that many of the most notable victories in history were successes at least in part because they were so unusual and went against the grain.

CONCLUSION

To be clear, I am not saying that the CAF does not teach tactics at all—we do. Nor am I saying that our combat arms officers are not good at tactics—many of them are. What I am saying is that during the period of DP2 for combat arms officers, the amount and quality of tactical training that is received varies tremendously and that when tactics come up in formal career courses, it is treated as secondary to other goals. It is not enough to assume that our officers will acquire the skills they need through natural ability or experience alone: they need continuous opportunity to practise and develop. By the time they arrive at their sub-unit and higher commands, their skills should be refined through formalized training which ensures that all combat arms officers, whatever their employment/deployment background, have had sufficient opportunity to hone their tactical acumen. We can do many things to better achieve this aim but, most of all, we need to develop and implement a program of professional development which will ensure that our officers receive continuous practice in the application of tactics throughout their career, regardless of their current employment or posting.

ABOUT THE AUTHOR

Major Thomas L. Nelson joined the Canadian Armed Forces in 2004 and was commissioned as an infantry officer into the Royal 22e Régiment (R22eR) after graduating from the Royal Military College (RMC) in Kingston in 2009. He has served with all three battalions of R22eR as well as the Régiment de Maisonneuve and the Canadian Forces Leadership and Recruit School.

His operational experience includes platoon command during the 2010 humanitarian response mission in Haiti (Op HESTIA) and the domestic response to the 2011 floods in Montérégie, Quebec (Op LOTUS); command of a mentor team during the 2012 training mission in Afghanistan (Op ATTENTION); acting command of the 2nd Battalion R22eR Service Company in Gatineau, Quebec, during the 2019 flood response (Op LENTUS-19); and service as a United Nations staff officer in the Congo in 2020 (Op CROCODILE). He is currently a company commander in 1st Battalion R22eR. He holds a Bachelor of Arts Degree in Honours Economics from RMC and a Master of Arts in Conflict Analysis and Management from Royal Roads University.

ENDNOTES

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4. Training Plan (ATOC), B1-1/2 and B2-4/4.

5. Ibid., 3-4/8.

6. Four 50-minute *Produce Courses of Action* (PO 203.03) and five 50-minute *Select a Course of Action* (PO 203.04) classes according to the ATOC TP, B2-2/4 and B2-3/4.

7. Ibid., 3-6/8.

8. Ibid., and C3-1/1.

9. Qualification Standard (ATOC), 2-204-1/3 and C-1/3.

10. Qualification Standard and Training Plan, Army Operations Course (AOC) [approval date: 18 June 2015; last modified: 18 June 2015], 3-5/6.

11. PO 206, Conduct Full Spectrum Operations within a Brigade Group and Formation Level Task Force Headquarters Context, also exposes students to tactical thinking. However, due to the nature of staff appointments and the OPP, the actual exposure of each individual to tactical planning and execution varies widely.

12. Ibid., 5-15/20.

13. Marine Corps Association Foundation, "Tactical Decision Games," retrieved from https://mca-marines.org/gazette/tactical-decision-games/ on 27 April 2020.

14. The issue of a training gap was discussed and is recorded in the Board Results (Annex D of the ATOC QS).

15. Sun-Tzu, The Art of War, in T. R. Phillips, ed., *Roots of Strategy* (Harrisburg, PA: Stackpole Books, 1985), 28.

16. B-GL-300-002/FP-000, *Land Force Tactical Doctrine* (Ottawa: Department of National Defence, 1997).

TRAINING FOR LETHALITY

Lieutenant-Colonel (ret'd) Dave Banks

In CAJ 18.2, Lieutenant-General Wayne Eyre encourages hot debate and intellectual challenge, and he states that the journal is to be the forum for those things. This, in my opinion, is very much needed. No truly professional army can do without such a forum. Whether it will amount to much of significance is a vital question, and one whose answer will only ever be found in the active engagement of all of us who have an interest in the success of our Army, whether we are in uniform or not.

Lieutenant-General Eyre points out something that has concerned me (and many of the people I work with) when he notes,

> ***"I fear that our lethality has atrophied in comparison to the high-end pacing threats in the Russian and Chinese inventories…"***

How true. Lethality, in a small army such as ours, will never solely be the product of sheer mass, crushing firepower or overwhelming logistics. The Canadian Army last exhibited those traits in the Second World War. Barring the unforeseen (and the unlikely) they will never be seen again to such a degree that they alone can be guarantors of victory.

What underpins lethality in our Army is people, struggling in the ancient contest of human wills that the commander identifies. What enables that lethality is training, a subject several of the contributors to the recent issue have ably addressed from varied perspectives. Unless that training is realistic and demanding and drives home fundamental lessons very clearly, it is merely rote or ritual. Worse, it will teach false lessons which may someday have to be unlearned at a terrible price: a sort of reverse lethality.

In my observation of training at the formation level over the past decade or so, I have come to believe that the Canadian Army suffers from several cultural weaknesses which prevent it from truly training to fight and win at formation level. They are the following:

- the inability or unwillingness to embrace the instructive value of failure;
- the preference for fighting a "dumbed-down" and somewhat predictable template enemy; and
- the minimizing (not to say the ignoring) of unpleasant or bothersome aspects of modern conflict that may fall into the "too hard to do" category.

I address each of these briefly below. I specifically do not refer to field training at the Canadian Manoeuvre Training Centre or that conducted at home station training areas: these are not my recent field of experience, and my comments may not be applicable in those venues. What I suggest below is based on the preceding ten years of helping formation headquarters prepare for operational readiness.

The Instructive Value of Failure. Who has ever learned about a hot stove by burning their fingers? If a plan is weak, or an order badly written, or coordination measures ineffective, then they need to fail in an environment where nobody dies and nothing is lost forever except time. Glossing over these failures—giving them a "pass"—then piously mentioning them in an after-action report or submerging them in a post-exercise report is not doing anybody any good. We often claim to believe in the process of "stop, re-cock, do it again" but, sadly, I have very rarely seen it applied a the level of training I am familiar with. Too often, driven by the need to keep moving down the chock-full timeline of the exercise (driven by an overstuffed list of training objectives), things just keep going—even though in a real situation they probably would have ended in bloody disaster. What, exactly, does that teach anyone?

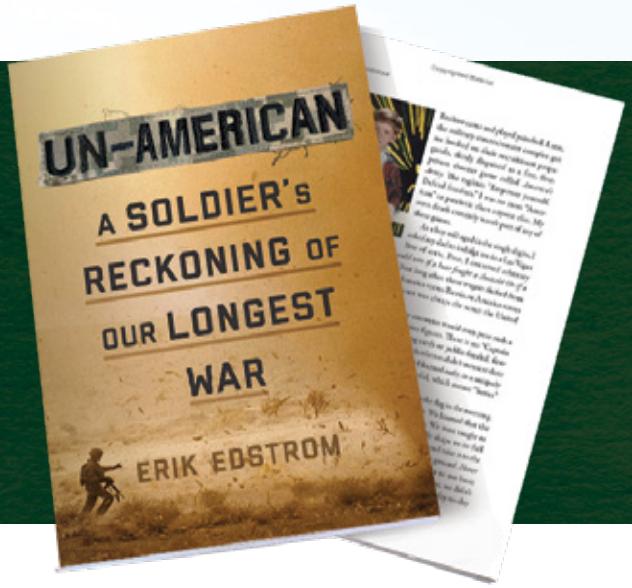
The Dumbed-Down Enemy. Naturally, nobody wants to be utterly thrashed by the opposing forces (OPFOR) in the first hour of an exercise (whether they should be or not). This sentiment is understandable. Where it becomes inexcusable is when the enemy force is watered down, or their actions curtailed, to provide a punching bag rather than a tough sparring partner. The best enemy for training is the most dangerous enemy. Fortunately, some recent direction from Commander Canadian Army Doctrine and Training Centre has indicated that we will soon start to see an agile, thinking and unpredictable OPFOR on formation-level exercises. Some people will not enjoy this, but it is timely if we think back to Lieutenant-General Eyre's comments on our pacing adversaries.

"Too Hard to Do." Sustainment (including handling mass casualties), urban combat, cyber effects, weapons of mass destruction strikes or being attacked during a formation move are some of the things that too often are only paid lip service, or simply not bothered with. For example, the old saying "amateurs talk tactics, professionals talk logistics" is frequently forgotten, as though sustainment somehow occurs by divine intervention despite a weak combat service support plan. If we don't wrestle conscientiously with the hard stuff in training, we will face it, unprepared, in combat.

Since this letter is meant to be a challenge rather than a condemnation, I'll end on a positive note. I'm aware that direction and guidance for the Army's collective training is being issued that, with good will, can counter the three above-mentioned cultural weaknesses and truly respect the ancient maxim "Train hard, fight easy." A small army can be a lethal army if it wants to be.

ABOUT THE AUTHOR

Lieutenant-Colonel (ret'd) Dave Banks is a former Infantry officer. He has served in both the Regular Force and the Army Reserve and has completed deployments in Cyprus, Mozambique, Croatia and Afghanistan. A graduate of the Canadian Army Command and Staff College (CACSC) and of United States Marines Corps Command and Staff College Quantico, he was Chief of the forerunner of today's Formation Training Group when it resided in CACSC. Upon his retirement from the Army in 2012, Dave joined Calian Technologies Limited as an Activity Lead at the CACSC Kingston and is now employed there as the Senior Activity Lead.



UN-AMERICAN: A Soldier's Reckoning of Our Longest War

BIBLIOGRAPHICAL INFORMATION:
EDSTROM, Erik, New York, Bloomsbury, 2020, 290 pages.
ISBN 9781635573749; eBook 9781635573756

Reviewed by Lieutenant-Colonel (Retired) Ron Bell, Kingston, Ontario

This is the personal story of one soldier's conversion—a conversion from one ideology to another. It is also a piece of ideological literature, or propaganda, if you will, though perhaps not with the negative connotations that usually go along with the word. The story is organized around three visions: imagining your own banal death in war; imagining what it is like being on the receiving end of American military power; and imagining the lost potential and possibilities that have come about as a result of the death and damage perpetrated by the American war machine, not just on adversaries, but also on blameless civilians and Americans themselves, especially their soldiers. The author has come to the realization that America's wars are "self-perpetuating, self-defeating, and immoral."[1]

The book details one participant's view of the so-called global war on terror. But the generalities of the story might apply to any number of wars that Western nations have waged in recent decades. Part I of the story begins with a sixteen-year-old schoolboy and the seemingly irresistible nationalistic indoctrination brought about through mundane familial and societal interactions, and it looks at how the Army institution leverages and perpetuates such a worldview to serve its ends. The author's years at West Point, as the beginning of a "long-lasting, high-stakes, commitment"[2] made by a child, are described as something akin to physical and emotional torture amid the tight comradery of the shared experience. The author's ambivalence about his initial training and educational experience at West Point is the beginning of his continuing struggle to personally come to terms with the realities of army life.

Part II of the story details Edstrom's deployment as a platoon leader to various districts in the province of Kandahar in Afghanistan from mid-2009 to mid-2010. The stark detachment from normal human life is a common theme throughout this part's six short chapters. Edstrom begins with a jarring description of a mine strike on a vehicle in the platoon's convoy four days into their deployment. He also recounts other events like it, providing some rather graphic descriptions of the physical destruction he encountered first-hand along the way. As the central section of the book, Part II presents a trajectory of increasing disillusionment with the military mission on which Edstrom had embarked.

> The War on Terror strip-mined my soul. The first few months hollowed me out; the rest extracted my once plucky, puppy like determination and innocence. . . . It was a year defined by the horror of watching good people getting mutilated and dying terrible deaths. I experienced intense moral anguish, gnawing fear, boredom, aggression, hatred, envy, and butt-puckering anxiety. It strained my relationships, destroyed my notion of patriotism, eroded my support for American foreign policy, dissolved whatever faith I may have once had in religion or a god, and made me deeply sad.[3]

The butt of Edstrom's contempt is the obvious futility of the tactics employed by the force. Yet considerable scorn is also directed toward the various levels of leadership above his own. The lack of common sense with respect to estimating the operational situation, and the absence of honesty or accountability, or any kind of charitable attitude toward the Afghan people, is seen as characteristic of every level. Indeed, Edstrom does not shy away from calling out what he sees as "shocking examples of gross incompetence."[4]

Whereas Part II ends with the author's internal reflection on both the mental and moral injury he and many others suffered, the third and final section focuses more broadly on the personal and societal human and economic costs of armed conflict. Edstrom speaks of it in terms of there being a "hole in the universe."[5] He recounts some staggering figures on the amount of death, disability and destruction, and he includes not only what the American forces have

Source: Wikipedia

suffered but also what has been inflicted upon so-called host nations. The perverse and unimaginable disruption to the lives of millions of people is not simply touched on but brought to life in a number of personal stories of loss. He stores up his greatest anger for the politicians— and their corporate enablers and citizen cheerleaders—that he believes have needlessly frittered away resources that could have been used in fighting the existential threat of climate change and addressing the desperate social needs of America and beyond.

This book is an engaging read and tackles many difficult issues head on; it takes a daring, frank and perhaps necessary approach to what are ultimately divisive issues. The book will not find favour with some readers, particularly those committed to the idea of perpetuating overwhelming American military power and the flexing of that power at each opportunity. Yet it takes accurate aim at the high costs of this strategy in terms of the economy, the environment, human lives and injury (physical, emotional and moral) and the lost human intellectual potential and achievement. That said, its confrontational tone—a tone to be expected based on such visceral, life-changing experience—will likely persuade only those already on the verge of agreement with the author's hard-found new worldview.

In spite of a disclaimer that the book is not meant to be academic in nature, the author has clearly done considerable research. However, the book has a number of photos, many of poor quality and without accompanying descriptions of what they represent or signify other than perhaps some reference in the main text on a nearby page. As a result, the reader is left to make the connection. Still, the book is well-organized and edited, and the author does not waste any words. I certainly recommend it as one of the best in its genre for this generation.

ENDNOTES

1. Edstrom, *Un-American*, 5.
2. Edstrom, *Un-American*, 71.
3. Edstrom, *Un-American*, 111.
4. Edstrom, *Un-American*, 149.
5. Edstrom, *Un-American*, 204, 209.

WHY WE FIGHT: New Approaches to the Human Dimension of Warfare

BIBLIOGRAPHICAL INFORMATION:
Edited by ENGEN, Robert C., H. Christian BREEDE, and Allan ENGLISH, Kingston, McGill Queens University Press, 2020, 212 pages. ISBN: 9780228003861

Reviewed by Peter Gizewski, Defence Scientist, Defence Research and Development Canada (DRDC), Centre for Operational Research and Analysis (CORA)

Efforts to understand the human dimension of warfare, in particular why soldiers are motivated to fight in battle and their behaviour once they have decided to do so, have been numerous. Rarely, however, have Canadian scholars and practitioners examined these questions in much depth. In fact, work produced on combat motivation from a Canadian perspective is relatively limited.

Viewed against this backdrop, *Why We Fight: New Approaches to the Human Dimension of Warfare* stands as a noteworthy exception. Based on a workshop held by the Queens University Centre for International and Defence Policy (CIDP) in November 2016, this edited volume brings together the work of a veritable who's who of Canada's military and academic community to focus on a range of key issues relating to military culture, not the least of which is representative of the experience of Canada's military in battle. The result is a highly engaging examination of military culture and what drives soldiers to fight.

The intellectual ground covered is extensive, and the issues raised are both timely and controversial. On the issue of combat motivation, the factors identified are wide ranging, and differences have existed regarding the relative importance of each. As Allan English notes, while traditional thinking has stressed the importance of unit cohesion, *esprit de corps*, the primary group and the regimental system in the development of motivation,[1] more recent work has focused on factors such as dependability, professionalism, and solid training. Indeed, Robert Engen contends that such factors can generate the swift trust required for battle even when the bonds of the primary group nurtured by the regiment are severed.[2] Meanwhile, Ian Hope emphasizes the importance of leadership, teamwork[3] and risk-sharing[4] as important drivers of an effective fighting spirit. Also important in Hope's view is the character of the commander, in particular his "total engagement with the unit he commands."[5] Only then is it likely that he can get the best out of those under him.

Still, other factors involve communication and shared understanding. Both are essential enablers for ensuring that motivation is effectively harnessed to purpose—especially in circumstances involving coalition partners. In their absence, combat effectiveness is unlikely, a fact well illustrated in Robert Williams' account of the breakdown in communications between the first Canadian Army and the Polish Armored Division during a critical attack on the Falaise Gap in the summer of 1944.

There, cultural and language barriers along with time constraints worked to severely impede the development of shared understanding and, ultimately, the conduct of operations. As Williams himself notes, "(s)trangers may be able to work together effectively in a high-pressure combat situation…but when those strangers do not fully understand superior direction and are unable to communicate with their allies with ease, or at all, success is unlikely. Ultimately,…individual motivation is not sufficient without shared intent."[6] Accordingly, in order to succeed, as much time as possible should be devoted to efforts aimed at reducing or eliminating the barriers of language and culture. For Williams, the identification and use of qualified liaison personnel, specific language training and the translation and practice of existing operational procedures represent just some of the components that should characterize such efforts.

A focus on the warrior ethos and the occasional negative impacts that it can produce informs the volume as well. In that regard, English as well as others note that its development is linked to an emphasis on the virtues embodied in the combat arms and characteristics such as masculinity, aggression, loyalty and group homogeneity, all of which have tended to excessively exclude those not emulating it. An Americanization of Canada's military at the beginning of the 21st century and the influence of the works of S. L. A. Marshall have also contributed

to its prominence.[7] This, despite the fact that key aspects of Marshall's work are based on weak empirical grounding—a subject explored in depth by Roger Spiller.

Yet whatever the reason for development of the ethos itself, liabilities have clearly accompanied its benefits with results that have ultimately proven "contrary to the values of the profession of arms and ethical principles of DND/CAF."[8] Most notably, it has bred a sexualized institutional milieu, the results of which have at times been damaging—a fact well detailed in Claire Cookson-Hill's piece examining the lax efforts undertaken by the CAF in both discouraging and punishing cases of rape involving Canadian soldiers in WWII Italy and Germany. Elsewhere in a theoretical analysis of the ethos, H. Christian Breede and Karen Davis note its emphasis on "hegemonic masculinity" and its lack of compatibility with Canada's liberal, democratic and expeditionary traditions and values. For Breede and Davis, while aspects of the warrior ethos cannot be discarded entirely, it is best replaced with an identity that promotes "the soldier as professional." Indeed such an identity is far more socially inclusive and favours qualities and capabilities that are more relevant to the security environment that soldiers increasingly confront today (e.g. ethics, judgement, and service to people).[9]

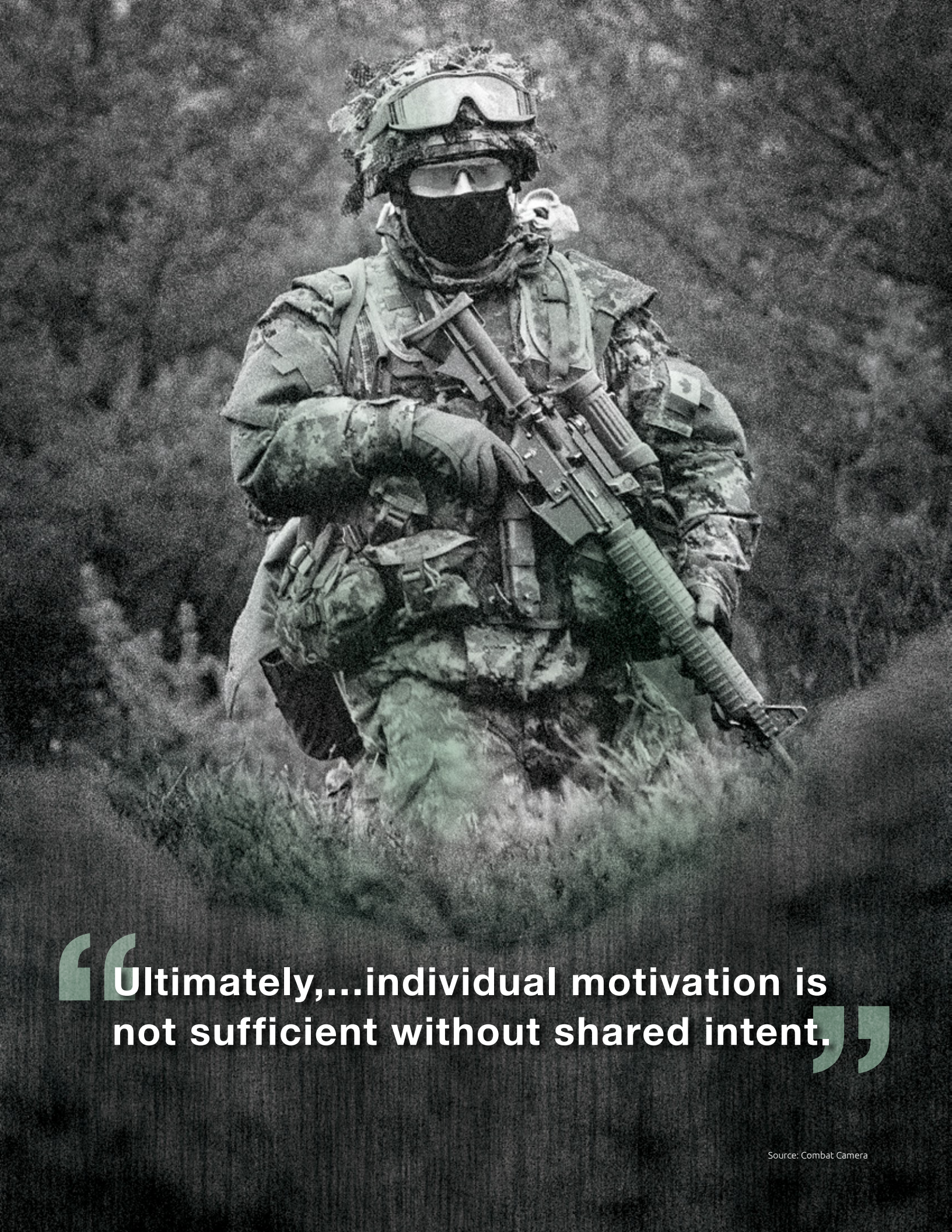
While the volume's chief focus is on the Canadian experience, adversarial motivation for fighting is addressed as well. So too are some of the processes at work to enable it. To that end, Robert Martyn offers a careful and systematic examination of the many factors that underlie radicalization, the insurgencies it can generate and how such violence must be understood by those charged with fighting and defeating it. Such conflict has long been the predominant challenge for Western militaries and will likely remain so in future. In fact, Martyn notes the identification of at least eight distinct types—ranging from revolutionary to non-revolutionary—with the forces animating each often being numerous, complex and context-dependent.

Not surprisingly, countering such conflict is exceedingly difficult, and careful study of a range of variables (politics, demography, social groups, religion, economics, etc.) is essential for fashioning an effective response. Yet also critical is an avoidance of mirror imaging (i.e. presuming that the adversary thinks as we do). Insurgents, their supporters and the group and individual motivations driving their use of violence are diverse and thus rarely amenable to template solutions and strategies.[10] As such, each must be approached as a unique situation driven by its own distinct grievances and aims and informed by the combatant's individual and group motivations.[11] Indeed, failure to do so will more often than not impede success.

Still, while each radical movement and the forces motivating it to resort to violence may be unique, the increasing use of the internet and social media as vehicles for enabling radicalization represents a general trend that is hard to deny. So too are the challenges that poses. Indeed, as Victoria Tait, Joshua Clark, and Lena Saleh observe, "…communities in cyberspace cannot be attacked with bullets and bombs."[12] Yet they do serve as an effective means of spreading extremist messages and drawing adherents to their cause—a fact that their case study of Daesh-supportive women's networks demonstrates.

Overall, contributions reflect the fact that the study of combat motivation is both an endeavor that is highly complex as well as multifaceted in nature. Indeed, universal statements regarding what drives it are unlikely to withstand scrutiny. Societal norms, traditions, and culture all represent critical determinants of the manner in which it will manifest. So too will the particular circumstances encountered when in battle.

Source: Adobe



“Ultimately,...individual motivation is not sufficient without shared intent.”

Source: Combat Camera

That said, and as a number of contributors note in the concluding chapter, further study and work on combat motivation is clearly required. Such work should not only focus more attention on the nature of combat itself but also on how to prepare to conduct it. In that regard, more attention to learning from past experiences (e.g. Afghanistan) will be essential.[13] So, too, will ensuring that officers possess the training and education needed to understand the cultural nuances that often arise in the conduct of operations overseas.[14] And it will also require that soldiers be well treated and compensated for their service and appropriately recognized when warranted.[15]

At the same time, more effort might also be directed toward analyzing the role that a belief in national objectives plays in generating motivation.[16] Indeed, as recent events in Afghanistan demonstrate, while belief in a cause may run counter to the need for soldiers to maintain the apolitical stance expected of the professional soldier, the degree to which such overall goals can matter in motivating troops to fight cannot be ignored.

Still, while some gaps continue to exist in the exploration of combat motivation, *Why We Fight* nevertheless offers a useful first step in addressing, and asking, key questions surrounding the subject. Overall, this is a well written, well researched collection of essays on an area of study that is not only timely but also too rarely addressed by the Canadian academic and defence communities. While some topics covered involve the use of considerable academic jargon, each piece is well organized and well argued. As such, this edited volume should be of considerable interest to specialists and general readers alike.

ABOUT THE AUTHOR

Peter Gizewski is an expert-level defence scientist with DRDC CORA and an associate editor of the Canadian Military Journal.

ENDNOTES

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4. Ibid., 109.

5. Ibid., 110.

6. Robert Williams, "Different Language, Common Intent: Mutual Understanding Between Poles and Canadians, 1944," in *Why We Fight: New Approaches to the Human Dimension of Warfare*, eds. Robert C. Engen, H. Christian Breede and Allan English (Kingston: McGill-Queens University Press, 2020), 45.

7. Ibid., 47.

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11. Ibid.

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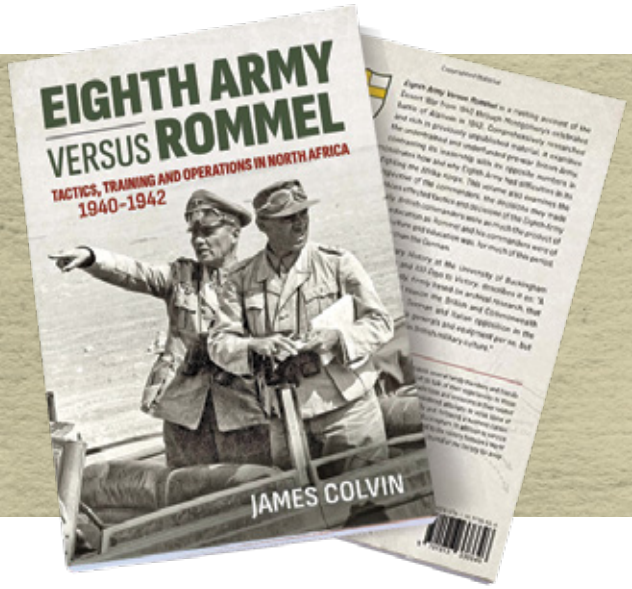
13. Sonia Dussault and Robert C. Engen, "We're Going to Afghanistan So That We Get a Decent Deal on Softwood Lumber: The CIDP Combat Motivation Workshop Concluding Roundtable," in *Why We Fight: New Approaches to the Human Dimension of Warfare*, eds. Robert C. Engen, H. Christian Breede and Allan English (Kingston: McGill-Queens University Press, 2020), 190–91.

14. Ibid., 192.

15. Ibid., 197.

16. Ibid., 195–96.



EIGHTH ARMY VERSUS ROMMEL: Tactics, Training and Operations in North Africa 1940–1942

BIBLIOGRAPHICAL INFORMATION:
COLVIN, James. Warwick, UK: Helion and Company, 2020, 261 pages, photos/maps: 30/11.
ISBN: 9781913336646

Reviewed by Chris Buckham

The characteristics that define individuals as military warriors and leaders (integrity, bravery, self-sacrifice, etc.) are not the same as those that characterize members of the profession of arms. Like doctors, lawyers, architects or members of any other field that identifies itself by a professional standard, the profession of arms requires serious study, development, mentorship and expertise (in addition to the characteristics of the warrior). In his work, James Colvin approaches his analysis of the adversaries in the North African campaign through their respective attitudes towards the development of their military leadership and how that attitude influenced the execution of operations. It is a unique and interesting study, as it encompasses not only the pure military elements of the African conflict itself but also looks at the cultural/societal influences under which the respective antagonists developed and how that affected their conduct and approach to military operations. The author chooses a unique focus, concentrating not on the most senior levels of command but on the corps and divisional leaders.

Colvin opens his book with an overarching review of the cultural environments that most heavily influenced the development of the German and British leadership. The British approach, based predominantly within the public school system, emphasized fair play, team effort and loyalty to one's peers. This style manifested itself in the primacy of the regiment and a sense of loyalty to it and its associated traditions. A directive and structured style of leadership and execution was often undermined by subordinates' loyalty being primarily to a peer or commander from the same school (Eton, etc.) or regiment, as opposed to the appointed one. Conversely, a British commander would often support a weak subordinate from a common background all the while refraining from being seen as too "directive."

The Germans, on the other hand, took a much more serious approach to the "art and science" of military command. The German command schoolhouse had

Source: Wikipedia

A Bofors 40-mm anti-aircraft gun being dug in near a squadron of Crusader tanks, 29 October 1942.

Source: Wikipedia

Rommel in North Africa (1942).

Source: Wikipedia

Tunesien, Panzer VI (Tiger I).

much higher standards and expectations than its British counterpart. Officers and senior non-commissioned officers were actively challenged to adapt to differing situations and to assume higher levels of command without hesitation. The Germans developed a common doctrine and ensured that it was clearly understood and adhered to across its forces. Colvin's analysis of this critical area is both insightful and thought-provoking.

The author then segues this into a discussion of the doctrine and equipment-development of the respective adversaries. Central to that was the use of "combined arms" units by the Germans and the resistance to that by the British. The stove-piping of British combat elements enabled smaller German forces to overcome larger Allied forces by being able to call upon a variety of means to counter UK forces. Combining that with a well established doctrine that enabled the fluid and transparent transitions of command (requiring little to no formal "orders") meant that the Germans were far more flexible in their approach and response. By contrast, British command was characterized by micro-management, misplaced loyalty, inconsistent doctrine and a more collegial and inclusive (as opposed to directive) leadership style. The author, to be clear, casts no aspersions on the bravery, loyalty and effort of British commanders as individuals, but he does draw attention to the cumulative impact of treating warfare as a "Great Game" as opposed to a deadly serious profession.

Additionally, Colvin includes within his discussions a detailed comparison of the weapons that each side utilized and how they adjusted their equipment and tactics to account for changes in their opposition. Thus it was that, while the Allies tended to have higher numbers of tanks, German tanks were of higher overall quality and were more survivable. When faced, for example, with the British 2-pounder anti-tank gun, the Germans were able to counter with hardened frontal "spaced" armour that enabled them to neutralize the penetrating power of the 2-pounder round. Furthermore, the Germans adjusted their doctrine to utilize the famous 88-mm in an anti-tank role. Colvin's discussion highlights the difference between the more ad hoc approach of the Allies compared with the more structured and deliberate approach of the Germans in their respective responses to the challenges of warfare in the desert.

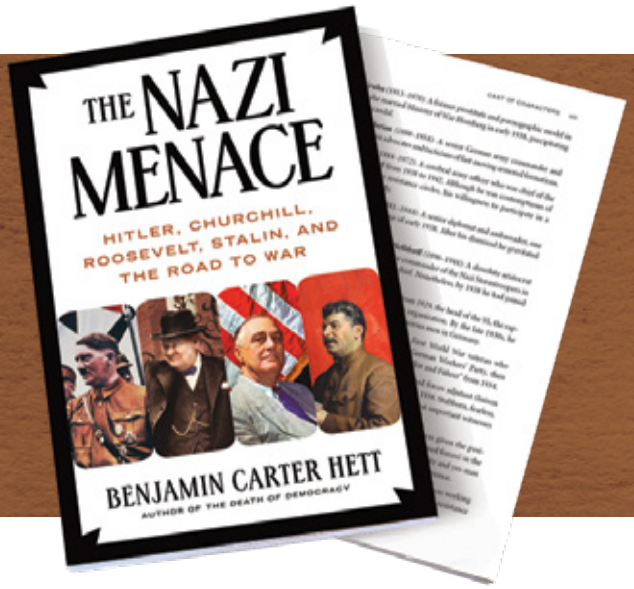
The author then follows with several chapters discussing and analyzing the performance of the adversaries in a series of key offensives and battles leading up to the Second Battle of El Alamein. Each highlights the respective competencies and shortcomings of the commanders and the methods by which they utilized their forces. While not all goes the Germans' way, the Allies are seen to continue to struggle with effective command and control over their assets. Colvin sets the tone by looking at the effects of the "Crusader" battles and the lessons that the respective combatants gleaned from them. He then goes on to look at how those lessons were correspondingly applied to the training and doctrine of the forces involved. Ultimately, it is the Allies who continue to struggle in the subsequent battles of Tobruk and Gazala, their commanders not having been able to discern their doctrinal shortcomings (shortcomings that were able to continue to be exploited by the Afrika Korps).

Source: Wikipedia

A soldier inspects a dug-in German 88-mm anti-tank gun abandoned during the enemy retreat in the Western Desert, 24 July 1942.

Colvin closes his book with the arrival of Montgomery and the changes that he brings in terms of command, presence and leadership to the Allied side. His approach is much more in line with the Germans' and he breaks the mold of the traditional "fair play, public school chum" view of his predecessors. Commanders are not forgiven their shortfalls and a far tighter grip and focus is instilled.

Colvin has written an excellent analysis of a level of command and control that is not often addressed but that is critical to the effective execution of the vision of the theatre commander: that of the divisional and corps commanders. His incorporation of the societal influences on the personality and professional development of the respective officer corps of the German and Allied forces is extremely instructive in comprehending the foundation upon which those leaders developed. A comprehensive bibliography and footnote compendium as well as a superior-quality publication from Helion round out this stellar work. This is a book that should be read more than once.



THE NAZI MENACE: Hitler, Churchill, Roosevelt, Stalin, and the Road to War

BIBLIOGRAPHICAL INFORMATION:
HETT, Benjamin Carter. New York: Henry Holt and Company, 2020, 389 pages. ISBN 9781250205230

Reviewed by Robert Addinall, Ph.D., RMC

The Nazi Menace by historian Benjamin Carter Hett is primarily a grand geostrategic history incorporating the subsidiary themes of diplomatic history, political history and military history. The work also offers insight into the emergence and early evolution of other aspects of business and culture that affected larger historical patterns.[1] Throughout, the author weaves these themes together in a narrative historical approach, providing the reader with the sense of an unfolding story spanning the period from 1933 to 1941.

Several core theses emerge from Hett's narrative. He attempts to present a balanced discussion, at times highlighting redeeming features of the policies and efforts of Neville Chamberlain and other "appeasers," as well as failings and weaknesses in the policies and attitudes of leaders generally seen as the architects of Allied success in World War II, in particular Winston Churchill and Franklin Delano Roosevelt.[2] Stalin and his regime come in for harsh criticism, including discussions of Stalin's purges and his designs on smaller eastern and central European states bordering the Soviet Union. Nonetheless, Hett ultimately concurs with the widely held historical interpretation of the war that credits Churchill and Roosevelt as key figures in the defence of democracy. Aided by certain key technological innovations and some good fortune, those leaders were able to find the strategic and political pathway for democracy to eventually defeat totalitarianism.[3] Hett also concurs with a number of interpretations of the war which contend that "if the Allies could manage not to lose a short war, their superior resources and control of the seas would make German victory in a long war unlikely."

These arguments lead Hett to conclude that it was during the period from the mid-1930s to the announcement of the Atlantic Charter in 1941 that the goals of the western democracies and of Nazism evolved into the forms they retained over the later years of the war. Although he mentions some events from the early years of Nazi rule, he uses the so-called "Hossbach Conference" of 5 November 1937 as a key historical reference point around which to build other parts of his narrative. It was during this conference, Hett notes, that Hitler fully articulated his plans to reorient German policies toward the conquest of *Lebensraum* or "living space" to three senior German military officers and two German cabinet ministers, which resulted in an accelerating path toward war during 1938 and 1939.[4]

Although *The Nazi Menace* could be more extensively reviewed in terms of diplomatic or political history, Hett's treatment of military history naturally attracts more attention here. Hett contends that a "uniquely Anglo-American conception of modern war"[5] emerged in part from the longer-term tradition of the British way of warfare and in part from the politics and technological change of the 1930s. Part of this argument includes the corollary that German political and military actions—including the German Army's failure to overthrow Hitler in 1938–39—emerged from the fusion of the traditional Prussian military ethos and way of war with technological change and the Nazi radicalization of German politics.

Some of Hett's discussion includes accounts of inter-service rivalry and rivalries between cliques within services in the countries involved, and the ways in which those rivalries led to various decisions about how certain types of weapon systems were developed technologically and deployed doctrinally. He touches on well-known events of the period, such as British Prime Minister Stanley Baldwin's interpretation of the air power theory of the 1920s and 1930s as being that "the bomber will always get through." He also provides an interesting account of British aircraft designer R. J. Mitchell's development of the Spitfire and Air Marshall Hugh Dowding's advocacy for developing a strong fighter branch in Britain's Royal Air Force, at times competing with bomber branch advocates for resources.

Source: Wikipedia

President Roosevelt and Winston Churchill seated on the quarterdeck of HMS PRINCE OF WALES for a Sunday service during the Atlantic Conference, 10 August 1941.

Source: Wikipedia

Adolf Hitler during a speech on the Nazi Party Congress, 1934. Adolf Hitler speaks in the "Stadium of the Hitler Youth" on the Nazi Party Congress.

These various accounts, however, feed into a more unified discussion of the traditional British way of warfare that Hett defines as primarily a peripheral one: using naval, and eventually also air, power to contain enemies and support allies, rather than deploying large land armies. In this context, he states that the extensive British Army operations in Europe during the First World War were an aberration from the British way of warfare,[6] and he views Basil Liddell Hart as the primary figure attempting to publicly update the British way of warfare for the 20th century during the 1920s and 1930s.

Hett states, "It was because of the new individualism and the revulsion against war [following World War I] that Liddell Hart struggled to devise a low-casualty strategy for democratic war-fighting, and why British and American planners were particularly keen on using strategic bombers instead of ground troops to win a war. And it was why the Spitfire and other weapons of defense assumed paramount importance in British thinking about war."[7] More generally, he argues that "The sophisticated air defenses that people such as R. J. Mitchell, Hugh Dowding, and Neville Chamberlain had created allowed Britain to escape an early defeat. Britain's survival in 1940 in turn allowed Roosevelt the time he needed to prepare the United States for war—and to prepare American opinion to join the war."[8] Hett notes that German generals who were armoured warfare theorists, such as Heinz Guderian, were in part inspired by Liddell Hart.

However, he contrasts the Spitfire, supported by chains of radar ground stations that enabled early detection of incoming enemy aircraft formations, as a classically British defensive set of weapons that lent themselves to a peripheral strategy to the tank, which, although originally invented by the British during World War I, became a classically German offensive weapon.[9]

As for the United States, Roosevelt came to follow a "hyper version" of the British way of war, with an emphasis on the U.S. Navy and the U.S. Army Air Corps, rooted in American as well as British historical and cultural patterns and the logic of the world of the 1930s.[10] Interweaving kinetic and psychological warfare, Hett also argues that Roosevelt introduced the concept of a synthesis of Christianity and democracy in opposition to totalitarianism into Anglo-American discourse during this period, an approach that continued throughout World War II and the early Cold War.[11]

As for the German military, Hett notes that German Army leaders, such as Chief of Staff Franz Halder and Commander in Chief of the Army Walther von Brauchitsch, presented cautious and pessimistic plans to Hitler as late as early 1940 as a means to deter him from an attack in the west altogether. This was, in Hett's estimation, not only because many on the German general staff calculated that Germany lacked the resources for a long-term war, but also due to their views that Germany should desist from taking actions that would cement an image of it as an aggressor in the eyes of the western countries. However, Hitler, with the support of other generals such as Guderian, chose military options that "reflected the radicalism of his regime."[12] In effect, internal political differences and differences over military strategy were inseparable in steering Germany's conduct of the war.

Similarly, Hett's concluding statements regarding the Allies intermesh military history with international relations and political history. For him, "The defeat of France marked a revolution in world affairs. It was the point of transition from one world order to another, from the European and imperial system of the last four centuries to a more globally diverse order in which non-European powers—above all, the United States and the Soviet Union—would be the anchors. France's army had been a key to the defense strategies of both Britain and the United States. With France gone, the English-speaking democracies had to carry out a quick rethinking."[13]

Hett also compares the events of the 1930s with those of the 2010s and 2020s. Indeed, in a preface titled "The Crisis of Democracy," he notes many parallels in terms of politics and radicalization, international relations and crises, public relations and propaganda, emergence of new technologies and so on. Such comparisons can be carried too far. Hett does not belabour the point in his main text, yet many of his examples are suggestive, such as an increase in the popularity of anti-intellectualism in certain political factions during both periods. Another good example is the successful use of the Spitfire and the radar stations during the Battle of Britain, a development which has been more recently referred to as an early example of network-centric warfare.[14]

Notably, some of Hett's statements about military history can be disputed. For example: "Apart from the successful air defense in the Battle of Britain in the summer and fall of 1940—in which Mitchell's Spitfire and Hugh Dowding's sophisticated air defense system saved the country and much else—Britain experienced nothing but defeat… until it routed Erwin Rommel's Afrika Korps at the Battle of El Alamein in October 1942."[15] In fact, British and Imperial forces not only suffered costly defeats from 1940 to 1942, but also won major victories, such as in Operation Compass from December 1940 to February 1941, during which British forces wiped out an entire Italian army. Such victories, though sporadic, may have had an impact on the greater course of the war. The Operation COMPASS victory, for example, forced the Germans to divert an armoured corps (which became the Afrika Korps) to North Africa to prevent a complete Italian collapse. Even a single armoured corps may have been quite useful to them in some near-run battles in the Soviet Union in late 1941 and 1942, and the Afrika Korps in fact received many more replacement tanks and trucks than the typical German armoured corps on the eastern front during that period.

Nonetheless, as a work that does a good job of integrating military history with a broader historical narrative, Benjamin Carter Hett's *The Nazi Menace* provides the reader with much in the way of relevant ideas to consider.

ENDNOTES

1. Benjamin Carter Hett, *The Nazi Menace: Hitler, Churchill, Roosevelt, Stalin, and the Road to War* (New York: Henry Holt and Company, 2020), 229–34.
2. This approach is evident throughout the book.
3. See, for example, 311.
4. See, for example, 9–26.
5. See 211.
6. See 104.
7. See 113.
8. See 306.
9. See 141–42.
10. See, for example, 208.
11. See 211–13.
12. See 288.
13. See 305.
14. See, for example, David S. Alberts, John J. Garstka and Frederick P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 2nd ed., rev. (DoD C4ISR Cooperative Research Program, August 1999 / Second printing February 2000).
15. Hett, *The Nazi Menace*, 309–10.