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## Wielding Mjolnir: Modernizing Armour in the Canadian Armed Forces

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**WIELDING MJOLNIR: MODERNIZING ARMOUR IN THE  
CANADIAN ARMED FORCES**

By Major Jeffrey W. Brown

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## **ABSTRACT**

Modern battlefields are growing increasingly intricate, introducing entirely new domains of competition to the battlespace. As complexity increases, it implicates a necessary integration of combat power in the modern land force, enabling land maneuver operations across broadly contested domains. As a force of tactical and operational land maneuver, the armoured corps had traditionally organized on principles that have seen little change since the Second World War. In Canada, however, the army struggles to resource a traditional tank based capability, leading to an increasingly marginalized armour corps. This gives rise to an important question, what is the armour corps without tanks? Military doctrine of allied nations and adversaries agree that land maneuver remains a critical component of an army, and within that role it is the armour corps that is the critical force of combined arms maneuver, capable of determining the pace of battle through shock action, firepower and mobility. That doctrine sees an integrated force capable of operating across domains integrating effects throughout a dispersed battlefield. This paper argues that Canadian Army must look beyond the traditional armour regiments and enable the soldiers and commanders of the armour corps as the subject matter experts of combined arms maneuver. Three areas for modernization are considered: considering the armoured trinity of firepower, mobility and protection through new lenses and a systems approach, adopting an armoured battlegroup framework as a baseline organization, and functioning as an early adopter of land maneuver technology. In this way the armour corps can present itself not as three armoured regiments but as a powerhouse of combined arms maneuver excellence.

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## CHAPTER 1 - INTRODUCTION: STEEL BEASTS AND MODERN WAR

*One thing remains clear, that every technical means of combat – tanks included – must be developed to the farthest limit of its potential. It follows that we should not restrict our opportunities out of a regard for tradition. On the contrary, we must take our lead from the new weapons in question. What we carry from the past must be developed farther, and if necessary changed, by the possibilities which now lie before us.*

- General der Panzertruppen Lutz, *Preface, Achtung-Panzer!*

It was a cool and cloudy day, accompanied by a sour drizzle of rain and gusting winds, when the world changed.<sup>1</sup> In the forests of Ardennes, the bass drone of powerful diesel engines, the roar of aircraft overhead and the cries of disciplined soldiers marked the arrival of the main strength of the daunting *Wehrmacht*, the seemingly unstoppable German army that would sweep across Belgium and Northern France as a wave sweeps through the sea; inexorable, unrelenting.

When the *Wehrmacht* burst from the forests of Ardennes on May 14<sup>th</sup>, 1940, led by their newly minted *Panzerkorps*, the Germans succeeded in restoring maneuver to a battlefield that had become mired by the doctrine of attrition warfare. While the German *schwerpunkt*<sup>2</sup> did not mark the first time the integrated doctrine of tank-led all arms formations had been used, indeed the trial run had been two years earlier in Poland, it was to be a culminating point beyond which the way of war irrevocably changed in western militaries, and eventually the world. The German *Panzerkorps* so dominated the battles of the Second World War that the Allies would seek to emulate and improve upon their design.<sup>3</sup>

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<sup>1</sup> "Historical Weather on Wednesday, 14 May 1941 at Brussels Airport, Belgium," Weatherspark, accessed 3 Mar, 2021, <https://weatherspark.com/h/d/147989/1941/5/14/Historical-Weather-on-Wednesday-May-14-1941-at-Brussels-Airport-Belgium#Figures-Temperature>.

<sup>2</sup> German word literally translated to mean the weight of effort but more commonly interpreted as the centre of gravity.

<sup>3</sup> Vincent J. Landry, *Blitzkrieg Masters: Guderian and Patton* (Maxwell AFB: Air Command and Staff College, 1985).

From that day forward, western military design would replace the horse with the tank, cavalry with armour, and grinding attrition with maneuver, or some variation thereof. Without a doubt, Heinz Guderian, widely considered the father of armour, and George S. Patton, also considered a master of armoured combat, would have well recognized the armoured formations blasting across the desert during the Persian Gulf War in January of 1991 some fifty years later. The combination of tanks and mechanized infantry has demonstrated itself to be a resilient and competent force when ably led. Achieving unmatched mobility and speed due to the ability to cross a wide variety of terrain instead of being tied to roads, the armoured units of the modern era have achieved the apex of western conventional capability, unmatched in the state on state conflicts envisioned during the Cold War.

Yet in the intervening years after the fall of the Iron Curtain, and in the absence of continuous direct threat, western militaries have been hard pressed to maintain, much less grow, such armoured capabilities. Tanks are expensive, maintenance and supply intensive beasts whose utility seems to fall in direct proportion to the likelihood of a peer-on-peer land war. Instead, the burgeoning of computer and communications technology has created the appetite for networked conflict, envisioning a god-like understanding of the battlefield and the attendant ability to act and react faster than an enemy could. Coupled with advances in precision guided munitions and sensor capabilities, the turn of the millennium saw the rise of Network Centric Warfare (NCW) as the dominant military theory of conflict.<sup>4</sup> Though it did not purport to replace armoured formations, it did offer

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<sup>4</sup> Doug Richardson, "Network-Centric Warfare: Revolution of Passing Fad?" *Armada International* 28, no. 5 (2004), 62-64,66,68,70,72. <https://search-proquest-com.cafvl.idm.oclc.org/trade-journals/network-centric-warfare-revolution-passing-fad/docview/197092263/se-2?accountid=10524>.

attractive options to senior leadership looking to reduce the number of costly tanks and mechanized infantry formations in favour of stand-off weapons that could destroy their objectives without ever endangering a soldier.

More recently the continued improvement in computing, coupled with significant advances in unmanned drone technology, has led some to suggest that future conflict may well be dominated not by the traditional tank but swarms of unmanned autonomous robots.<sup>5</sup> This school of thought generally envisions a world where the tank and the infantryman are the support elements and follow on forces to the lethal and precise autonomous robotic fleets just over the horizon. Much like NCW, artificial intelligence (AI) and drones offer governments the promise of minimal civilian casualties through ever increasing precision effects, while keeping soldiers safe from harm. In this enticing narrative, further complicated with the rising dominance of information warfare and cyber operations, it is easy to see how land warfare could get overshadowed or in some cases dismissed outright.

This evolving dynamic has been challenging for strategic planners and policy developers alike. After all, there is a finite amount of national resources that can be assigned to any given capability, and these newly emerging domains cannot be ignored. Failure to do so could easily see a modern military force relegated to the past, much as the Polish Army was in the short invasion of Poland in 1939.<sup>6</sup>

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<sup>5</sup> Zachary Kallenborn and Phillip C. Bleek, "Drones of Mass Destruction: Drone Swarms and the Future of Nuclear, Chemical and Biological Weapons," *War on the Rocks*, 14 Feb, 2019. <https://warontherocks.com/2019/02/drones-of-mass-destruction-drone-swarms-and-the-future-of-nuclear-chemical-and-biological-weapons/>; Kenneth Payne, *Strategy, Evolution and War: From Apes to Artificial Intelligence* (Washington, D.C.: Georgetown University Press, 2018).

<sup>6</sup> Heinz Guderian, *Panzer Leader* (London: Penguin Books, 2009).

In the Canadian Armed Forces (CAF), there are few places this competition for scarce resources is more apparent than in the Royal Canadian Armoured Corps (RCAC). Undermanned and under-equipped for the traditional roles outlined in Canadian doctrine, the RCAC and CAF senior leadership has struggled in recent years to advocate effectively for the maintenance of a modern tank-based armoured force. Combat capabilities have dwindled across Canada's three armoured regiments having transitioned largely to wheeled fleets of Coyotes during the 1990's.<sup>7</sup> The remaining traditional tank capacity, consisting of a mixed fleet of used Leopard 2 A4M and A6M's, is sufficient to equip a single regiment but lacks substantial engineer and logistic support. Despite the arrival of new vehicle variants in the form of the Tactical Armoured Patrol Vehicle (TAPV) and a yet to be delivered Light Armoured Vehicle (LAV) 6.0 Reconnaissance variant, the RCAC has been challenged to demonstrate the value of tank-based armoured forces to decision makers. New investments in Canadian Army (CA) capability see greater emphasis on developing new and bespoke capacities such as cyber and information operations, in many ways challenging the RCAC with rear-guard actions to stave off further hemorrhaging of capability.<sup>8</sup>

In this environment of constrained resources and the necessity to demonstrate value for investment in a modern conflict environment, it is appropriate to examine both the purpose of the armoured corps and its role not only within the wider CA but also the CAF as a whole. To put the question more succinctly, what is the role of the armour corps without heavy armour? If the current trend of atrophying traditional armour

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<sup>7</sup> "Canadian Army Equipment," DND Canada, last modified 09 Feb 2021, accessed 3 Mar, 2021, <http://www.army-armee.forces.gc.ca/en/equipment/index.page>.

<sup>8</sup> Canada. Department of Defence, A-PP-106-000/AF-001, *Advancing with Purpose: The Canadian Army Modernization Strategy*, 4th ed. (Ottawa: DND Canada, 2020).



capability is to continue, what does the armour corps do without tanks? Currently CA infantry battalions are equipped with the same LAV 6.0 platform as is intended for the armoured regiments though in greater numbers. This necessarily drives the question of what the armour corps can offer that the infantry corps cannot.

To study this issue effectively it is necessary to examine the problem from first principles and determine if tactical and operational land maneuver as envisioned by the CAF is still relevant, and if so, what is the role of the armour corps in this changing environment? Such an investigation must be agnostic to equipment, focused on the validity and considerations of the role of armour in modern ground maneuver. It must be acknowledged, however, that equipment and capability have a symbiotic relationship. Often one begets the other. Thus this study will not focus on the employment of specific equipment but rather the capabilities that are necessary to achieve land maneuver, which will allow the separate development of equipment requirements.

This paper will demonstrate that the RCAC must become more than three armoured regiments in order to remain relevant on the battlefields of the future. It must embrace capability integration at the lowest levels; focused on enabling the art of maneuver as much or more than the science of destruction, and it must become a leading technology integrator in the CA. In this way the armour corps will grow from three regiments of similarly capable vehicles into a powerhouse of combined arms maneuver excellence.

Any examination of components of military capability must first begin with the study of the relevant doctrine. To this end a brief outline of the origins of armour doctrine will be established to review and contrast Canadian Army, United States Army

and British Army doctrine. This will be complemented by a comparison of the most recent pan-domain doctrine of the three militaries, which will orient the future force in the modern conflict environment. Adversary doctrine is somewhat more difficult to access through open source media however the employment models for armour in Russia will also be briefly touched on to provide a counterpoint to western military thought.

Having established the theory on contemporary employment of armour, both among allies and adversary, the current armour corps environment in the CA will be examined to illustrate where doctrine and reality diverge. This divergence in theory and reality will act as the catalyst to recommend a new way ahead.

Bringing doctrine, reality and capability together, a path for the armour corps to be re-envisioned will be outlined with a view to establishing a narrative that supports the development of a true land maneuver capability based not on a single fleet of vehicles but on the people who operate them. Thus, this paper seeks to shift the narrative away from simply operating the equipment, a perspective that has been unsustainable in the Canadian experience, to equipping the armoured soldier.

It should be clearly stated that though this paper advocates for a stronger and more integrated armour corps, it is beyond the scope of this paper to make specific recommendations for the manner in which such a corps should be equipped. Indeed, the focus of the paper will necessarily be on an examination of land maneuver in the context of future conflict. Capabilities will be addressed and further development suggested as additional areas for research.

The RCAC is a vital component to the CA. Properly enabled, the armoured corps offers the most capable, dynamic and maneuverable land force in the CA's quiver. Yet

the current state and organization of the RCAC reflects a legacy perspective than is perhaps more in keeping with Guderian and Patton's vision of armour than in the realities of a multi-domain battlefield experienced in modern combat. It is incumbent on a self-aware professional military force to re-evaluate tradition and, where it no longer enables or is out of step with reality, modify or replace. In the words of the Commander Canadian Army, Lieutenant General Wayne Eyre, "What we have held as immutable for decades may have to change as we take an honest look at what the future needs. It will set us on a path that postures us for continual change and emerging threats."<sup>9</sup>

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<sup>9</sup> Canada. Department of Defence, A-PP-106-000/AF-001, *Advancing with Purpose: The Canadian Army Modernization Strategy*, 4th ed. (Ottawa: DND Canada, 2020): 3.

## CHAPTER 2 - ESTABLISHING A BASELINE: REVIEWING DOCTRINE

*For all the '4th Generation of War' intellectuals running around today saying that the nature of war has fundamentally changed, the tactics are wholly new, etc., I must respectfully say, 'Not really': Alexander the Great would not be in the least bit perplexed by the enemy that we face right now in Iraq, and our leaders going into this fight do their troops a disservice by not studying — studying, vice just reading — the men who have gone before us. We have been fighting on this planet for 5,000 years and we should take advantage of their experience. 'Winging it' and filling body bags as we sort out what works reminds us of the moral dictates and the cost of incompetence in our profession.*

- General James Mattis

*The British write some of the best doctrine in the world; it is fortunate their officers do not read it.*

- Feldmarschall Erwin Rommel

Understanding how modern doctrine views the employment of armour is a critical start point to any discussion on how to consider the employment of such capabilities in the future. For the purpose of this paper, US Army, UK Army and Canadian Army doctrine will be compared and contrasted. The US and UK are clearly not the only Canadian allies to employ armour capabilities however the parameters were narrowed to enable the best comparison criteria. In terms of employment method and operational mindset, the US, UK and Canada have always maintained close alignment and all three maintain an expeditionary focus on its force employment. While there are a number of other North Atlantic Treaty Organization (NATO) countries that maintain significant armour capabilities, their view of military operations diverges from that of Canada in noteworthy ways. Consider the case of Germany, who is not only a NATO partner but an important ally of Canada in Europe. German armour operations are focused on defence of NATO and of Germany itself from Russian aggression, rather than the comparative expeditionary operations faced by Canada.<sup>10</sup> Even an internal defence of Canadian

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<sup>10</sup> Michael Shurkin, *The Abilities of the British, French, and German Armies to Generate and Sustain Armored Brigades in the Baltics* (Santa Monica: RAND Corporation, 2017).

territory would required the equivalent of an expeditionary operation to move the necessary material to the scene of battle due to the huge internal distances to be managed. This dichotomy is a principle obstacle in any attempt to compare Canadian doctrine to that of an allied European nation. Conversely, both the US and the UK face similar challenges in land force projection and maintain significant expeditionary capabilities accordingly. It was also for this reason that Australian Army doctrine was not included, as its armour operations are not expeditionary focused.

In order to properly establish a line of departure for analysis, it is necessary to first define maneuver for the purpose of this examination. The CAF publication *Brigade Tactics* defines land tactical and operational maneuver as “...seek[ing] to achieve a position of advantage relative to the enemy through the combination of movement and either fire or potential fire.”<sup>11</sup> This echoes the NATO definition of land maneuver. “employment of forces on the battlefield through movement in combination with fire, or fire potential, to achieve a position of advantage in respect to the enemy in order to accomplish the mission.”<sup>12</sup> The key to the definition is the recognition of the intrinsic relationship between mobility, or the ability to move around on the battlefield quickly, and the ability to use firepower, or threat thereof, to dislocate the enemy.

The US Army aligns closely with this definition outlining that maneuver is a warfighting function that seeks to place forces in a position of relative advantage, however the definition also states, “direct fire and close combat are inherent in

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<sup>11</sup> Canada. Department of Defence., B-GL-321-003/FP-001, *Brigade Tactics* (Kingston: DND Canada, 2017): 2-23.

<sup>12</sup> North Atlantic Treaty Alliance, (NATO), *NATO Glossary of Terms and Definitions (English and French)* (Brussels: NATO Standardization Agency, 2013): 2-M-2.

maneuver.”<sup>13</sup> For the US Army, there is a much closer relationship in land maneuver with direct fire and close combat engagement than is necessarily the case for Canada.

The UK largely mirrors this definition but adds some helpful context.

There is an enduring requirement, unchanging in its essential nature, to manoeuvre across ground, with some form of protection and materiel support, to reach a place from which to strike, using a form of firepower, in order to achieve a decisive condition which will often require the occupation and protection of ground.<sup>14</sup>

These combine to paint a cohesive picture of allied maneuver, that of focused movement with the ability to influence the enemy through the threat of kinetic action. Contextually, armour doctrine is derived largely from this foundation.

Canada defines the role of armour as “to defeat the enemy through the aggressive use of firepower and battlefield mobility.”<sup>15</sup> This is contrasted with the doctrinal definition of the role of infantry “to close with and destroy the enemy.”<sup>16</sup> While both definitions are oriented on imposing will on the enemy, we can immediately see the difference between the focus on victory through maneuver and on destruction between the two branches.<sup>17</sup> Canada has been quite deliberate in establishing the role of armour and its employment as separate though complementary to the wider brigade group. Thus Canada’s armour doctrine focuses on the role of the armoured regiment as a part of the mechanized brigade group vice as a composite itself.<sup>18</sup>

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<sup>13</sup> United States. Department of Defense., ADP 3-90, *Offence and Defense* (Washington, D.C.: Department of the Army, 2019): 2-2.

<sup>14</sup> United Kingdom. and Ministry of Defence., AC 71632, *Operations* (Warminster: Crown Printer, 2010): 3-14.

<sup>15</sup> Canada. Department of Defence. and B-GL-305-001/FT-001, *The Armoured Regiment in Battle* (Kingston: DND Canada, 1990): 21.

<sup>16</sup> Canada. Department of Defence., B-GL-309-001/FT-001, *The Infantry Battalion in Battle* (Kingston: DND Canada, 1995): 1-2-1.

<sup>17</sup> Canada. Department of Defence., B-GL-321-005/FP-001, *Battle Group in Operations* (Kingston: DND Canada, 2012).

<sup>18</sup> Canadian and UK armoured regiments and infantry battalions are roughly the same size, about 500 personnel with associated equipment. In the US, battalions are the same size, however a regiment is three battalions, roughly 1500-2000 personnel and equipment depending on the organization. For the

Conversely, it is interesting to note that neither the UK, which does maintain an tank based regimental system, nor the US, which does not maintain tank only units, retain a tank specific doctrine comparative to Canada. Instead both countries focus on the use of tanks in a combined force. In the UK, this doctrine is covered at the battle group (combined regiment/battalion), brigade and divisional levels. While the UK has tank regiments, such as the Royal Tank Regiment and the Queen's Royal Hussar's, the employment models sees such formations working as a part of a combined arms grouping.<sup>19</sup>

In the US the brigade combat team (BCT) is considered to be the smallest tactical combined arms formation and accordingly its doctrine is focused on the use of combined arms at the brigade level. Armoured units are grouped holistically with mechanized infantry at the outset in a combined arms battalion (CAB). Thus in the US Army an armoured brigade combat team (ABCT) would contain several armoured battalions each containing two tank companies and a mechanized infantry company. Just as interestingly the mechanized infantry battalions would contain the inverse, two mechanized infantry companies paired with a tank company. This is a significant divergence from CAF tradition, which views each element as distinct and separate and force generates accordingly. For the US Army this was a fundamental change in the way it conducted business and a recognition not only of the combined arms nature of armour but also of the modularity that is necessary to support modern operations. Unable to get independent

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purpose of this paper a regiment or battalion will be considered as the same size according to Canadian organizational principles. In all contexts a brigade group (or brigade combat team in the US parlance) is a composite grouping of at least three armoured or infantry battalions with associated support, generally about 3000-5000 personnel strong.

<sup>19</sup> United Kingdom. Ministry of Defence., AC 71940, *Land Operations* (Warminster: Crown Printer, 2017).

brigades into operational theatres without support from the US Air Force, Marines and Navy, the US Army completely changed their force structure from a divisional model to a combined arms model based on the BCT in 2002.<sup>20</sup> Thus we see the role of the ABCT, the smallest US Army independent armoured formation: “to close with the enemy using fire and movement to destroy or capture enemy forces, to repel enemy attacks by fire, to engage in close combat, and to counterattack to control land areas including populations and resources.”<sup>21</sup>

These outlines of the national roles of armour is indicative of the primacy of combined arms groupings vice the equipment specific identity of an organization. It should be noted that both armoured and infantry doctrine in Canada have seen little revision since the early to mid 1990’s. Such a failure to keep up even with the pace of technology has implications for the application of doctrine in the modern conflict environment. For example, *The Armoured Regiment in Battle*, writing to a Cold War audience, describes the counter-attack force as being a principally static attack by fire force. “Initially it does not close with the enemy. Elements take up fire positions dominating the KZ [kill zone] and commence the destruction of the enemy.”<sup>22</sup> However the counter-attack force has been more recently replaced with the counter-moves “reinforcing, blocking or counter-attacking on order.”<sup>23</sup> While the counter-moves force can conduct attack by fire from static locations, technology has advanced to allow the same effect to be achieved on the move, adding mass to fire and protecting vehicles

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<sup>20</sup> Adam Davis, "The Brigade Combat Team (BCT): A Revolution in Organizational Structure" University of Southern Maine, 2020), .

<sup>21</sup> United States. Department of Defense., FM-3-96, *Brigade Combat Team* (Washington, D.C.: Department of the Army, 2021): 1-10.

<sup>22</sup> Canada. Department of Defence., *The Armoured Regiment in Battle*: 184.

<sup>23</sup> Canada. Department of Defence., B-GL-321-003/FP-001, *Brigade Tactics*: 4-15.



through mobility. Modern stabilization, ammunition, thermal sights and laser range finders could allow for much more aggressive action leading to greater shock action and controlling the tempo of battle.

Canada's publication of *The Battle Group in Operations*, however, has been updated as of 2012 and speaks considerably more to the nature of combined arms conflict. Indeed, the mission of the battle group (BG) is "close combat and the destruction/disruption of the enemy through manoeuvre."<sup>24</sup> This is noticeably more in line with US and UK doctrinal concepts, though the CAF does not organize along these lines except in operational missions. Unfortunately, as an *ad hoc* organization, the BG, though perhaps the most conventionally powerful regimental or battalion-sized organization in the Canadian context, it is formed only as necessary. Consequently much of its principles for armour and infantry employment are taken directly from armoured and infantry doctrine last updated more than a decade previously.<sup>25</sup> Both the infantry and armour doctrine fail to account for integrating across domains, or for the increasing sensor penetration of the battlefield. This is unfortunate as much of the remaining doctrine contends with a changing battlefield that includes the introduction of joint and multinational roles in operations.

All three nations agree in the principle of armoured operations enabling maneuver on the battlefield, using attrition where necessary in order to enable it, alternately described as aggressive offensive action or destruction of the enemy.<sup>26</sup> Indeed, armoured

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<sup>24</sup> Canada. Department of Defence., B-GL-321-005/FP-001, *Battle Group in Operations*: 3A1-1

<sup>25</sup> Canada. Department of Defence., B-GL-321-005/FP-001, *Battle Group in Operations* (Kingston: DND Canada, 2012): 3A-1-3A2-2.

<sup>26</sup> United Kingdom. Ministry of Defence., *Doctrine Note 19/02 - Warfighting Tactics Part 5A: Armoured and Armoured Infantry Subunit Tactics* (Warminster: HQ Land Warfare Centre, 2019).; Canada. Department of Defence., B-GL-321-005/FP-001, *Battle Group in Operations*; United States. Department of Defense., FM-3-96, *Brigade Combat Team*.

forces are consistently described as the principle force of shock action in land maneuver, enabled in its action through combined operations with infantry and specialist enablers.

Below is a comparison of the three nations perspective on armoured forces and what they bring to the battlefield (emphasis added).

(CAF) Armoured forces consist of those *manoeuvre forces* mounted in armoured fighting vehicles (AFV) that *exploit the characteristics of shock action, protection and firepower*. They include main battle tank units and lighter armoured vehicles that provide the brigade with a dedicated direct fire unit. It provides the brigade's *principal protected, precision shock action capability*.<sup>27</sup>

(US) The ABCT organizes to concentrate overwhelming combat power. *Mobility, protection, and firepower* enable the ABCT to conduct offensive operations with great precision and speed.<sup>28</sup>

(UK) Armoured forces... provide the mounted close combat capability on which dismounted close combat forces usually depend for mutual support particularly to get them onto an objective. Armoured forces can apply *concentrated firepower to achieve shock action, manoeuvre rapidly to exploit it and provide high levels of protection*. They will usually provide the most effective opposition to other armoured forces and are particularly effective in seizing terrain occupied by a determined and well-established adversary.<sup>29</sup>

The employment models of armoured capabilities retain similar fundamentals across all three nations, though perhaps it is the US ABCT that outlines these fundamentals in the simplest reduction: firepower, mobility and protection. The US has taken the alternative approach of force generating combined arms units and formations in line with its stated doctrine, preferring to create BCT's consisting of composite squadrons (a Canadian battalion/regiment size element). Canada and the UK contrawise continue to use a branch/corps based regimental system (tank, infantry, engineer, etc...), reorganizing

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<sup>27</sup> Canada. Department of Defence., B-GL-321-003/FP-001, *Brigade Tactics*: 1-13.

<sup>28</sup> United States. Department of Defense., FM-3-96, *Brigade Combat Team*.

<sup>29</sup> United Kingdom., *Operations*: 4-8.

for each specific mission despite recognition in both Canadian and UK doctrine of the essential nature of combined arms operations.<sup>30</sup>

The alignment of armour doctrine across the allies is clear, though not without caveats. While the specific method of application varies across national capability, each of the allies inherently recognizes that armour forces are the chief organizations of land maneuver. It is important to recognize that each nation has identified combined arms integration as a fundamental element of a successful armour organization.<sup>31</sup> Just as importantly each nation has recognized that success on the battlefield will require the application of a high degree of mobility to enable maneuver operations. Both the UK and US doctrine have seen significant renewal, with the most recent revisions of the UK *Army Field Manual Warfighting Tactics*, refreshed in 2018, and the US comparative doctrine for *Offensive and Defensive Operations* having been revised in 2019 and its *Brigade Combat Team* doctrine in 2021. Comparatively, Canada has not renewed its armoured or infantry doctrine since the 1990's, despite new capabilities and operational environments. As stated above, the Canadian *BG in Operations* goes much further to address how Canadian land power is applied in an operational context, reinforced by the much more recent *Brigade Tactics* released in 2017. At the heart of all of these doctrines is the principle of applying tactical and operational maneuver to the battlefield to defeat an enemy. While it is not solely the armoured formation that can be used in this fashion

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<sup>30</sup> Canada. Department of Defence., *The Armoured Regiment in Battle*; United Kingdom. Ministry of Defence., *Doctrine Note 19/02 - Warfighting Tactics Part 5A: Armoured and Armoured Infantry Subunit Tactics*.

<sup>31</sup> Canada. Department of Defence., B-GL-321-005/FP-001, *Battle Group in Operations*: 2-3; United States. Department of Defense., FM-3-96, *Brigade Combat Team*: xi; United Kingdom. Ministry of Defence., AC 71940, *Land Operations*: 7-7.

there is substantial recognition and consensus that such formations enable maneuver in a way that is otherwise difficult to achieve by other land forces.

The preceding review focused necessarily on perspectives concerning the traditional role of armour, and how it enabled battlefield maneuver effects to be achieved. Yet the discussion does little to orient such organizations in the conflicts of tomorrow, or to illustrate the expansion of the sphere of competition. The next section presents a brief outline on the allied view of the future battlespace and its complexities, and in particular the resource challenges faced by modern armoured forces.

### **Preparing for the Future of Warfare**

*Like the French, we are burdened by the massive investments that gave us the “Big Five.” These machines are now more than a generation old. Let’s accommodate legacy weapons in our doctrine only if they fit. But be aware of the past. A mountain of excess Abrams tanks rusting in the Utah desert should not unduly influence how we prepare to fight tomorrow’s wars.*

- MGen (ret) Robert H. Scales

The wars of the future are famously hard to predict. The ongoing conflict in Afghanistan, the longest war by western nations in modern memory, could hardly have been forecast. No one could have anticipated a multinational conflict in that war-torn country much less that so many western nations would still be grappling with the conflict nearly two decades later. Since the turn of the millennia the international community has been gripped with a series of intractable conflicts, short wars and bursts of violence on the international stage. From conventional combat in Iraq and a targeted air campaign in Libya, to the rise of a terrorist turned pseudo government in Syria in the form of ISIS. The opening years of the twenty-first century have hardly been stable and have seen a substantial rise in operational tempo of Canada’s armed forces. In order to shape the continued discussion on the role of armour in the modern Canadian context, it is

necessary to outline the near future anticipated by modern allied militaries. This future, as will be seen, is one of uncertainty, marked with bursts of violent activity across a spectrum of potential conflict.

Addressing some of these anticipated challenges has been the focus of several doctrinal publications, recently released to guide their respective nations in the coming years. The *Pan-Domain Force Employment Concept*, released in Canada in 2020, outlines a future in which the instruments of national power, the military and security apparatus, is increasingly challenged through coordinated efforts by adversaries. In particular, it recognizes that “our adversaries are challenging us in domains such as cyber, space and information in addition to the traditional domains of land, sea, and air. We must adopt a mindset able to meet this challenge across multiple domains.”<sup>32</sup>

This need to consider an expanded battlefield is a common perspective among the western allied nations. There is a significant recognition that conflict is difficult to define in the strictest sense with adversaries continuing to pursue new areas of competition.

Adversaries, such as China and Russia, have leveraged these trends to expand the battlefield in time (a blurred distinction between peace and war), in domains (space and cyberspace), and in geography (now extended into the Strategic Support Area, including the homeland) to create tactical, operational, and strategic stand-off.<sup>33</sup>

The allies have accepted that combat can no longer be viewed through the lens of pure physical force but must now account of intangibles such as the virtual and cognitive realms. On the part of the UK, the newly revised doctrine of *Land Power* seeks to account for these changes.

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<sup>32</sup> Canada. Department of National Defence., *Pan-Domain Force Employment Concept* (Ottawa: DND Canada, 2020): 13.

<sup>33</sup> United States. Department of Defense., TP 525-3-1, *The U.S. Army in Multi-Domain Operations 2028* (Washington, D.C.: U.S. Army Training and Doctrine Command, 2018): vi.

The land, maritime, air and space environments, as well as cyberspace, are clearly connected to one another, and the force elements associated with each can, and do, routinely create effects in other environments. The wealth of information in the virtual domain must also be exploited; generating understanding depends heavily upon our ability to access and make sense of the rapidly increasing volumes and variety of data available.<sup>34</sup>

It is in this expanded environment of competition that the growth of future military capability will take place. Much greater emphasis is being placed on integrating the effects of one domain with those of another. Traditionally, the various armies would conduct land operations coordinated with but otherwise separate from the other domains of air and maritime, yet in the newest doctrinal revisions, military strategists clearly see this as a model that can no longer continue. Canada states:

...the CAF can no longer view situations as single domain problems with single-domain solutions; our adversaries actions require all-domain consideration leading to converged solutions that are pan-domain from the outset. Effects must be complementary and an integral part of an overall synergistic approach rather than simply additive or tacked on.<sup>35</sup>

This expanded arena creates issues of integration for traditionally formed military units. After all, how does a mechanized brigade leverage the cyberspace and information domain on the offence? Significant work to understand the implications of such changes are already underway and are manifesting in several army modernization efforts. For example, in an effort to establish the conditions to effectively modernize their forces, the UK Ministry of Defence has recently published their *Integrating Operating Concept*. It seeks to address the increasingly complex operational environment through technology,

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<sup>34</sup> United Kingdom. Ministry of Defence., JDP 0-20, *UK Land Power* (Swindon: Crown Printer, 2017): 5.

<sup>35</sup> Canada. Department of National Defence., *Pan-Domain Force Employment Concept*: 17.

capability integration, and significant coordination between all the services, including the new areas of cyber and space.<sup>36</sup>

Among the allies there is a clear consensus on the changing character of conflict in the future, consistently blurring the line between war and peace, between combat and competition.<sup>37</sup> It will take the coordinated response of all elements of national power to respond effectively, combining the effects of all domains.<sup>38</sup> Technology will continue to speed the pace of battle, leading to potentially shorter and sharper conflicts.<sup>39</sup>

The tactical effects of such conflict are still to be completely understood, however modernization efforts, typically slow to start and years in the making, are already underway to try to prepare the future allied armies for this competitive realm. In Canada, the recently released *Advancing with Purpose* outlines the CA modernization plan which includes significant emphasis on greater networking and digitization of information, interoperability across Canadian organizations, and versatility.<sup>40</sup> It further reinforces the future army direction by focusing on Adaptive Disperse Operations (ADO) as the baseline of warfighting. Explained succinctly in *Close Engagement: Land Power in an Age of Uncertainty*, it is a recognition that previous tenets such as concentration of force could potentially make a land force vulnerable in an age of ubiquitous armed drones where the sensor to shooter link is drastically reduced. It directs the creation of a Canadian capability to operate in a land warfare context dispersed until the point of

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<sup>36</sup> United Kingdom. Ministry of Defence., *Integrated Operating Concept* (London: Crown Printer, 2020).

<sup>37</sup> Canada. Department of National Defence., *Pan-Domain Force Employment Concept*: 13

<sup>38</sup> United States. Department of Defense., TP 525-3-1, *The U.S. Army in Multi-Domain Operations* 2028: 17.

<sup>39</sup> United Kingdom. Ministry of Defence., *Integrated Operating Concept*: 6.

<sup>40</sup> Canada. Department of Defence, A-PP-106-000/AF-001, *Advancing with Purpose: The Canadian Army Modernization Strategy*: 27

action, where force is concentrated then dispersed again.<sup>41</sup> These concerns are reflected in the UK:

A mix of crewed, uncrewed and autonomous systems look set to make a step change in lethality and utility. The pervasive nature of data — private, commercial, governmental and military combined — gathered from constellations of sensors and crunched at speed by artificial intelligence, will make it extremely hard to hide today's military signature anywhere on the globe.<sup>42</sup>

In the US, the term *convergence* has been used to organize its land force across the domains and have the intended effect. Outlining the need for rapid and continuous integration of capabilities, the US Army seeks overmatch of its enemies through optimizing the effect of all elements.<sup>43</sup> This requirement for unified action is also echoed in the allies literature, marking at least the convergence of ideas, if not capability.

All of these publications are in alignment in their prognostications, and largely in their prescriptions. All call for new capabilities to be added, and in some cases entirely new elements, such as space, cyber and information in Canada. The call is universal to integrate military forces to function cross-domain as a matter of daily operations. It is clear through this lens that land forces, and armoured forces in particular, can no longer afford to consider its operations as separate though complimentary to the other domains. Instead, an integrated approach must be taken from the outset.

Each nation, however, continues to be challenged to appropriately resource this future of integrated warfare, perhaps excluding the US, whose challenges are on a different scale. Especially in Canada and the United Kingdom, where new capabilities

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<sup>41</sup> Canada. Department of Defence. and Canadian Army Land Warfare Center, *Close Engagement - Land Power in an Age of Uncertainty - Evolving Adaptive Dispersed Operations* (Kingston: Army Publishing Office, 2019): 17.

<sup>42</sup> United Kingdom. Ministry of Defence., *Integrated Operating Concept*: 6.

<sup>43</sup> United States. Department of Defense., TP 525-3-1, *The U.S. Army in Multi-Domain Operations* 2028: 20-23.



come at the cost of existing ones, there are substantial struggles to articulate what is truly necessary and which can be reduced or retired altogether. Conversely, Canada's adversaries, who also face resource constraints, albeit of a different nature, view the problem through a dramatically different lens. In the next section a brief review of Russia's view on the future of conflict and how it pertains to land maneuver forces will be explored.

### CHAPTER 3 - COUNTERPOINT: RUSSIA AND MODERN LAND WARFARE

*The Russian Federation is the most dangerous opponent. Though a far cry from the Red Army of the Cold War, today's Russian military is a formidable opponent that deserves respect. It is combat hardened, well-equipped and offensively-minded. As professional leaders of combat troops, commanders must study this opponent and prepare accordingly for a difficult but winnable fight.*

- Richard D. Hooker

No examination of the employment of ground maneuver forces and their armoured capabilities would be complete without addressing the manner in which Russia views the issue. There can be little doubt that state competition has returned to a central position in the strategic calculus of nations, and it is reflected in the US, UK and Canadian most recent revisions of their defence policies. Each nation has identified Russia and China as significant competitors on the global stage, and while the term adversary and enemy is not generally used explicitly in direct association, the implication is overt and clear.<sup>44</sup>

Neither Russia nor China publish their capability specific doctrine on open source mediums, so in order to draw the necessary comparison it is required to view their perspective through the lens of what official doctrine or policy has been released, which is largely at the strategic level. This will be layered with analysis from respected authorities on both nations including academic and governmental sources. Russia and China view the issue of land warfare through significantly different lenses as a result of their own geopolitical considerations. On the part of Russia, land maneuver is a centerpiece of large Russian military apparatus and has seen significant development in the recent decades. Conversely, China has dedicated a much larger portion of their

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<sup>44</sup> United States. Department of Defense, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Washington, D.C.: U.S. Government Printing Office, 2018).; Canada. Department of Defence., *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: DND Canada, 2017).; United Kingdom. Government of the United Kingdom., *Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy* (London: Crown Printer, 2021).

national resources to the development of a naval capability. Both countries are investing heavily in anti-access and area denial (A2AD) capabilities in response to western superiority in general aerospace capability. Due to the focus of this examination on the conduct of land warfare, Russian doctrine and capability will be reviewed exclusively. China, though a rising and capable competitor, poses a greater threat in the air, sea and cyber domains. While those areas are extremely important and have implications on how western land forces organize and fight, a land war with China featuring armoured formations is unlikely.

### **An Iron-Plated Russian Bear**

Russia has traditionally had a significant focus on its land component capability of its armed forces due to its long and geographically uninterrupted border with Europe. Indeed, these large open spaces have had formative influence in the development of Russian military theory, one that places a premium on depth and maneuver. Difficult lessons, such as that of the German invasion of the Soviet Union in 1941, taught the Soviets the importance of depth on the battlefield. Though the massed conscript armies of the Second World War fought long attritional battles, military theory development post war emphasised the deep battle. Maneuver came to be considered a central tenet of Russian war theory, supporting its partnered element of fires.

Maneuver makes it possible to seize and hold the initiative and prevent enemy success; however, maneuver alone does not accomplish the mission. Fire is an essential partner of maneuver. The long-range fire battle, especially the effective employment of reconnaissance-strike and reconnaissance-fire assets, makes successful maneuver possible.<sup>45</sup>

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<sup>45</sup> Lester W. Grau and Charles K. Bartles, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces* (Fort Leavenworth: Foreign Military Studies Office, 2016): 41.

With this central tenet in mind, the Russian military, and in particular its ground forces, have undergone a significant reformation since the collapse of the Soviet Union. Largely gone are the massed divisions of infantry and tanks that the West thought to see blasting a path down the Fulda Gap during the Cold War. In their place the Russians have nearly universally adopted a combined arms brigade structure that places significant emphasis on its ability to force project into contested zones and operate independently or in cohesion with its peers under the aegis of an army command.<sup>46</sup> These combine arms brigades would be further comprised of battalion tactical groups (BTG) similar in organization to the aforementioned battlegroup in Canada and the UK. This reform was designed to develop a modular combat capability with well-equipped battalions at its heart.<sup>47</sup> Unlike many of its western peers, the Russian military has clearly seen both tank and mechanized infantry as the core element of its land capability and has organized accordingly. Fielding eleven combined arms armies, one tank army and four army corps, its recent experiences in Georgia, Crimea and Ukraine have reinforced the importance of armoured forces.<sup>48</sup> “Since 2013, the proportion of tank forces has grown within the Ground Forces, and the size and capability of maneuver ground forces in Western Russia has expanded, including through the formation of the 1st Guard Tank Army and enlarged tank and motor rifle divisions”<sup>49</sup> It is notable that there are no light elements contained within its military structure. Even its highly trained rapid reaction forces and special

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<sup>46</sup> Lester W. Grau and Charles K. Bartles, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces* (Fort Leavenworth: Foreign Military Studies Office, 2016): 31-35.

<sup>47</sup> Scott Boston and Dara Massicot, *The Russian Way of Warfare: A Primer* (Santa Monica: RAND Corporation, 2017): 5.

<sup>48</sup> Andrew S. Bowen, *Russian Armed Forces: Capabilities* (Washington, D.C.: Congressional Research Service, 2020).

<sup>49</sup> Andrew Radin et al., *The Future of the Russian Military: Russia's Ground Combat Capabilities and Implications for U.S.-Russia Competition* (Santa Monica: RAND Corporation, 2019): 52.

forces are either mechanized or motorized.<sup>50</sup> This clearly demonstrates that in the Russian military mind, maneuver, a central tenet of its military theory, is best achieved through the use of armoured vehicles. Of these vehicles it is further made clear that the Russians considers tank forces as the prime element that enables such land maneuver.

Equally important to the Russian theory of maneuver is the ability to use huge amounts of fire to destroy an enemy quickly and decisively. This use of massed fire was recently demonstrated during the conflict in Ukraine where large amounts of tube and rocket fire reduced entire Ukrainian battalions to irrelevance.<sup>51</sup> Lester Grau, Research Director at the Foreign Military Studies Office at Fort Leavenworth, states “The Russian Army is an artillery army with a lot of combat vehicles. While Western Armies have gravitated to precision fires delivered by fewer systems, the Russians maintain a large artillery park and employ mass fires to destroy hectares of enemy-occupied territory.”<sup>52</sup> While the necessity for defeating the enemy through maneuver remains, the Russian military see it as a symbiotic relationship with the ability to deliver massed destruction.

Russian tactics will continue to heavily emphasize gaining and maintaining fire superiority over an adversary; leveraging improved ISR capabilities and a wide range of fires platforms; and using speed, surprise, and integrated combined arms in maneuver forces to disrupt and overwhelm enemies once encountered.<sup>53</sup>

So where tank forces are the dominant maneuver element, they are critically enabled primarily by land based artillery and rocket forces with weights of fire and range capabilities that generally surpass those of the West. Figure 1 demonstrates the

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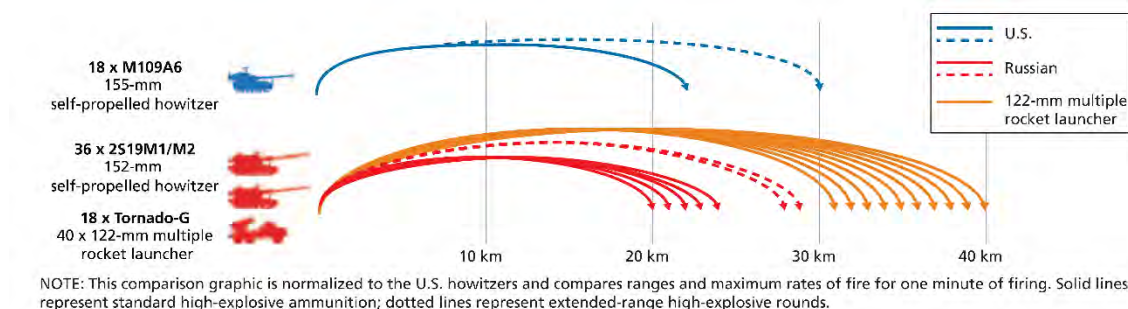
<sup>50</sup> Andrew S. Bowen, *Russian Armed Forces: Military Modernization and Reforms* (Washington, D.C.: Congressional Research Service, 2020).

<sup>51</sup> Maj Amos C. Fox, "On the Employment of Armor," *Armor* CXXXII, no. 1 (Winter, 2019), 5-12. [https://www.benning.army.mil/Armor/eARMOR/content/issues/2019/Winter/ARMOR\\_Winter2019\\_edition.pdf](https://www.benning.army.mil/Armor/eARMOR/content/issues/2019/Winter/ARMOR_Winter2019_edition.pdf).

<sup>52</sup> Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: 143.

<sup>53</sup> Boston, *The Russian Way of Warfare: A Primer*: 8.

overmatch in artillery and rocket forces available to a Russian combined arms brigade, without further reinforcement from army level.



**Figure 1: Indirect Fires US Brigade to Russian Comparison**

Source: Boston, *The Russian Way of Warfare: A Primer*: 8

This integration of land based fires and maneuver marks a significantly different approach as compared with the West. Western forces have largely chosen to reduce the number of tube and rocket artillery in favour of increased integration with air force capabilities offering greater precision and flexibility. Western nations have largely come to rely upon their ability to achieve air dominance in order to enable ground operations. Alternatively, while the Russian military considers the aerospace domain as the most likely primary arena of competition in modern warfare rather than vie with the West in aircraft, it has chosen to develop highly sophisticated air defence systems, integrated with cruise and ballistic missiles as well a conventional indirect fire capabilities.<sup>54</sup> Thus the Russian use of fires could neatly be summarized by Scott Boston and Dara Massicot writing for RAND, stating, “On the ground, Russian tactics will likely reflect a heavy emphasis on massed indirect fires (particularly long-range fires), with the effects of these fires exploited by highly mobile vehicles with substantial direct fire capability.”<sup>55</sup>

<sup>54</sup> Russia. Ministry of Defence., *Russian Defence Ministry Army General Sergey Shoygu Holds Regular Teleconference* (Moscow: Ministry of Defence of the Russian Federation, 2015).; Boston, *The Russian Way of Warfare: A Primer*.

<sup>55</sup> Scott Boston and Dara Massicot, *The Russian Way of Warfare: A Primer* (Santa Monica: RAND Corporation, 2017).

Russian modernization efforts largely adhere to this theory as well. Despite significant effort assigned to attempting to build fifth generation air superiority fighters and modernize its navy, it is in its land forces that the greatest tangible improvements in capabilities can be seen. Constrained by a poor economic situation that has only been made more challenging due to western sanctions over actions in the Ukraine and Crimea, Russia has largely been forced to focus on a retain and adapt strategy. Legacy systems continue to be updated and modernized, grafting western approaches where they see benefit, as is the case for the combined arms brigades. Moreover, Russia will continue to seek asymmetrical methods to counter those capabilities it cannot match.<sup>56</sup> Of this latter approach, two capabilities are immediately clear as responses to perceived Western advantage. The first is in anti-access area denial (A2AD) capabilities, headlined by one of the world's best integrated air defence systems in the S-400, along with the complementary developments of the Iskander-M short range ballistic missile (SRBM) and the pursuit of hypersonic glide vehicles.<sup>57</sup> This suite of strategic and high operational weapons demonstrates Russia's desire to compete in the aerospace domain through other means. While the West generally produce qualitatively better air-breathing fighters and airborne early warning and control systems, Russia counters with robust air defence and the means to destroy airfields, carriers and command and control (C2) nodes without using aircraft.

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<sup>56</sup> Radin, *The Future of the Russian Military: Russia's Ground Combat Capabilities and Implications for U.S.-Russia Competition*.

<sup>57</sup> "Weapons: Strategic - 9K715 Iskander/9K720 Iskander-M/9K720E Iskander-E," Janes, last modified 15 Apr 2020, accessed 3 Apr, 2021, <https://customer-janes-com.cfc.idm.oclc.org/Janes/Display/JSWS0462-JSWS#9K720%20Iskander%E2%80%90M>; "Russia Unveils New Strategic Delivery Systems," Janes, last modified 11 Apr 2020, accessed 3 Apr, 2021, [https://customer-janes-com.cfc.idm.oclc.org/Janes/Display/FG\\_899127-JIR](https://customer-janes-com.cfc.idm.oclc.org/Janes/Display/FG_899127-JIR).

The second asymmetric capability is the incomparable development of advanced electronic warfare (EW) capabilities. Recognizing that western military forces are heavily reliant on the use of various forms of electronic communication, Russia has developed a robust capability to jam, disrupt and subvert such abilities. “Senior Russian military leaders, including Chief of the General Staff Valery Gerasimov, recognize the extent to which adversaries depend on the reliability of electronic command and control systems, and see that EW can “neutralize” adversary advantages.”<sup>58</sup> For a comparative modest investment, Russian ground forces have developed a capability that allows them to disrupt attempts to achieve maneuver by their adversaries, conferring a significant advantage to their own maneuver abilities.

The Russian outlook on the future development of combat capabilities generally looks evolutionary rather than revolutionary, largely investing in making current kinetic capabilities more lethal and survivable.

The Russian General staff envisions less large-scale warfare; the increased use of networked command-and-control systems, robotics, and precision weaponry; greater importance placed on interagency cooperation; more operations in urban terrain; a melding of offense and defense; and a general decrease in the differences between military activities at the strategic, operational, and tactical levels.<sup>59</sup>

While there has been significant work in the information and cyber spheres of operation, these tend to fall outside of the military domain. Often described as “hybrid warfare” it is Russia’s ability to marry conventional, unconventional, information and

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<sup>58</sup> Radin, *The Future of the Russian Military: Russia's Ground Combat Capabilities and Implications for U.S.-Russia Competition*: 55.

<sup>59</sup> Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: xiv.



cyber warfare into a cohesive campaign. Its annexation of Crimea and actions in the Donbass region of Ukraine have demonstrated its ability on a global stage.<sup>60</sup>

More specific to land maneuver forces the Russian defence ministry has been investing in new tank and armoured vehicle prototypes such as the T-14 Armata and the T-15 infantry fighting vehicle built on a common Armata chassis. The T-14 represents an evolutionary development of



**Figure 2 - T-14 Armata**

Source: Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: 224.

armoured warfare, incorporating unmanned turrets for higher survivability and lower profile, sophisticated and integrated C2 system and commonality of vehicle fleets. Even the proposed inclusion of tethered unmanned aerial vehicles (UAV) to enable the T-14's sense capabilities are not unheard of, though there has been little comparable effort in the West.<sup>61</sup> Despite Russia's economic difficulties in being able to afford such high technology assets, its perseverance in development and deployment speaks volumes about the consideration it places on land maneuver based on armoured forces.<sup>62</sup>

<sup>60</sup> Bettina Renz, "Russia and 'hybrid Warfare'," *Contemporary Politics* 22, no. 3 (June, 2016), 283-300. doi:10.1080/13569775.2016.1201316. <https://doi-org.cafvl.idm.oclc.org/10.1080/13569775.2016.1201316>.

<sup>61</sup> Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: 224-227.

<sup>62</sup> Viljar Veebel, "Precision Sanctions: Is Moscow in Trouble because of Targeted Sanctions? A Deeper Glance at the Progress of the Russian Military Sector Over the Past Decade," *Journal of Slavic Military Studies* 33, no. 3 (2020), 335-354. doi:<http://dx.doi.org.cafvl.idm.oclc.org/10.1080/13518046.2020.1824105>. <https://search-proquest-com.cafvl.idm.oclc.org/scholarly-journals/precision-sanctions-is-moscow-trouble-because/docview/2469982075/se-2?accountid=10524>.

Similarly, when viewing the development of robotics, Russia appears to be viewing them through the lens of enhancing current capability rather than creating fleets of autonomous vehicles.

The Russian military, as many other militaries, is now seriously considering the role of robotics and artificial intelligence on the modern battlefield. Despite references to the Terminator® franchise, Russia does not appear to see a future, in the near term, where combat is conducted solely by autonomous robots. Instead remote controlled and semi-autonomous robotics will be integrated into conventional units, serving in the most dangerous roles as fire fighters, mine clearers, EOD technicians, armed sentries, and as the accompanying articles describe, cannon fodder for the initial assaults on fortified positions.<sup>63</sup>

This approach to future capability development clearly outlines a model in which high-intensity warfare plays a key role, yet does not foresee a fundamental change to the need to attain operational objectives through the use of traditional land maneuver forces.

In summary, the Russian Federation plainly sees the ability to defeat its enemies in a conventional conflict as intrinsically tied to land maneuver and fires. In turn the Russian military views armoured maneuver elements as the key to achieving the goal of maneuver, supported by huge volumes of indirect and rocket fires to destroy their enemies. Despite the introduction of a number of new technologies and domains, Russia views the armoured vehicle, and particularly the tank, as a key asset to achieving its military goals and has invested accordingly. Its development of future maneuver capabilities, to include robotics and AI, support this central tenet.

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<sup>63</sup> Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: 378.

## CHAPTER 4 - COGNITIVE DISSONANCE: THE CHALLENGE OF WESTERN LAND MANEUVER

*Wars may be fought with weapons, but they are won by men. It is the spirit of men who follow and of the man who leads that gains the victory.*

- Gen. George S. Patton

*Force is not obsolete... but force is more costly and more difficult for most states to use than in the past... Although military force remains an important instrument in international politics, changes in its cost and effectiveness make today's calculations of military power more complex than in the past.*

- Joseph S. Nye, *The Future of Power*

The preceding discussion examined the military thought associated with the use of armoured resources in land warfare through inspecting the doctrine published by the US, UK and Canada. In all cases, land maneuver forms a central component of the doctrine that each nation espouses.<sup>64</sup> This maneuver is predicated on a marriage of tanks and infantry in various forms, relying heavily on combined arms groupings from the sub-unit level through to the corps and supported extensively by indirect fire and in particular air and aviation precision support. The doctrine clearly outlines robust combat organizations balancing weight of armour and direct fire capabilities with threat and enemy resources. This approach is intended to allow allied militaries a comprehensive menu of capabilities to be tailored to the mission required. Furthermore, these allied nations consider land warfare as a component, though not necessarily the central one, of a wider combat enterprise.

As a counterpoint, the Russian military has made a clear commitment to focus on high-intensity land warfare, led by armoured and mechanized formations, and supported

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<sup>64</sup> United Kingdom. Ministry of Defence., JDP 0-20, *UK Land Power*: 53; United States. Department of Defense., ADP 3-0, *Unified Land Operations* (Washington, D.C.: Department of the Army, 2011): 5-6.; Canada. Department of Defence., B-GL-300-001/FP-001, *Land Operations* (Kingston: DND Canada, 2008): 5-64-73.

by huge volumes of massed fires.<sup>65</sup> The Russian military sees little utility in creating a wide variety of resources but rather focus effort narrowly on fully mechanized forces, to include its rapid reaction capabilities. They would rather create highly capable armoured forces that can be tasked to other missions than creating bespoke capabilities employable on a much narrower spectrum. The Russian military also sees its land forces as the central component of its military capability, despite considerable resource and effort assigned to the other domains.

Yet one of the most glaring differences between western doctrine and Russian is that the Russian Federation has invested in its stated doctrinal capability. This is not entirely true in the West, and especially in Canada, where doctrine does not wholly match contemporary reality. This section will offer a brief examination of the reality of western capability, and specifically that of Canada, with the intention of identifying where it differs from what it has said it should do in its doctrine specifically as it relates to land warfare and armoured employment.

### **Doctrine in Disarray: Allies and Reality**

War is expensive. There can be little doubt that it costs a lot of money, time, resources, personnel and effort to wage war. To contend in the challenging arenas of global conflict across the spectrum of modern competition is an effort in prioritization and capital asset management. In recent memory, several new domains have been added to the arena, including space, information and cyber, and depending on the timescale examined, aerospace. In the interval from the First World War to the most recent conflict in Syria and Iraq, nations have seen the introduction of the airplane, space flight,

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<sup>65</sup> Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: 235.

computers, information superhighways, the thinning of national borders, expansion of global trade, connected economies and the list could go on. Each of these new endeavours comes at a cost, and generally a significant one. The price tag on a single launch of a satellite to low earth orbit can cost anywhere between \$3 million for the smallest of payloads, to nearly \$200 million for the largest, and this fails to account for the costs associated with development or operation of the satellite.<sup>66</sup> Fiscal reality tends therefore to clash with doctrinal aspiration.

Since the fall of the Soviet Union and the collapse of the Iron Curtain, western governments, perhaps with the exception of the United States, have been challenged with explaining the need for significant defence spending. In Canada, even the involvement in combat operations in Afghanistan for nearly a decade failed to inspire the government to fund the Department of National Defence to the levels agreed to as per membership in the NATO.<sup>67</sup> Despite numerous calls by its key allies to increase defence spending to agreed upon levels, actual spending has declined dramatically over the years. The current defence policy, hailed as the largest defence budget increase since the Second World War, merely brings Canada's defence spending back in line with the early days of the Afghanistan era at 1.4% gross domestic product (GDP). Even the massive capital

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<sup>66</sup> "Space Launch to Low Earth Orbit: How Much does it Cost?" Centre for Strategic and International Studies, last modified 2 Sep 2020, accessed 5 Apr, 2021, <https://aerospace.csis.org/data/space-launch-to-low-earth-orbit-how-much-does-it-cost/>.

<sup>67</sup> Andrew Richter, "Sharing the Burden? U.S. Allies, Defense Spending, and the Future of NATO," *Comparative Strategy* 35, no. 4 (2016), 298-314. doi:<http://dx.doi.org.cafvl.idm.oclc.org/10.1080/01495933.2016.1222843>. <https://search-proquest-com.cafvl.idm.oclc.org/scholarly-journals/sharing-burden-u-s-allies-defense-spending-future/docview/1835702243/se-2?accountid=10524>.

expenditures that *Strong, Secure, Engaged* visualizes are temporary measures, which will do little to secure consistent long term funding for CA future vehicles.<sup>68</sup>

Though the US, and to a lesser extent the UK, has dedicated a much larger portion of their GDP to defence spending, competing requirements quickly account for large shares of those budgets as well. In both countries significant resources have been spent modernizing naval fleets, improving C4ISR capabilities, and creating new specialties such as the US Space Force and UK National Cyber Force.<sup>69</sup> In US, UK and Canada, there have been little mention about purchasing new fleets of tanks to modernize its armoured forces, preferring instead to focus on lighter multi-mission armoured vehicles. The UK recently announced the reduction in its fleet of Challenger II tanks, reducing the number of tanks that will go into a life-extension upgrade to a mere 148, barely enough to equip two doctrinal armoured regiments.<sup>70</sup> Similarly, the Commander of the Canadian Army, Lieutenant General Wayne Eyre, directed that the current fleet of Canadian tanks will undergo life extension, but no provision is made for developing new armour capability or procurement.<sup>71</sup> Perhaps more ominously he states, “The Canadian Army will make difficult divestment decisions about infrastructure, equipment, structure, and

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<sup>68</sup> David Perry, *Following the Funding in Strong, Secure, Engaged* (Calgary: Canadian Global Affairs Institute, 2018): 3-7.

<sup>69</sup> Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) "Trump Signs Law Establishing U.S. Space Force," US Department of Defense, last modified 20 Dec 2019, accessed 5 Apr, 2021, <https://www.defense.gov/Explore/News/Article/Article/2046035/trump-signs-law-establishing-us-space-force/>; "National Cyber Force Transforms Country's Cyber Capabilities to Protect the UK," Government Communications Headquarters, last modified 19 Nov 2020, accessed 5 Apr, 2021, <https://www.gchq.gov.uk/news/national-cyber-force>.

<sup>70</sup> Andrew Chuter, "Who are the Winners and Losers in Britain's New Defense Review?" *DefenseNews*, 22 Mar, 2021. <https://www.defensenews.com/global/europe/2021/03/22/who-are-the-winners-and-losers-in-britains-new-defense-review/>.

<sup>71</sup> Canada. Department of Defence, A-PP-106-000/AF-001, *Advancing with Purpose: The Canadian Army Modernization Strategy*: 54.

capabilities in order to privilege investment into new projects essential to future operational success.”<sup>72</sup>

Despite a doctrine of mechanized warfare, based on armoured capabilities and mechanized support that enable land maneuver on the battlefield, Canada struggles to allocate the funds necessary to do what it says it wants to do. To illustrate the example, consider a doctrinal armoured (tank) squadron. A doctrinal squadron contains nineteen tanks, an Armoured Recovery Vehicle (ARV), two ambulances, two refuelers, repair teams for vehicle, weapons, communications and fire control systems, trucks for ammunition, trucks for obstacle breaching implements, cargo trucks and a headquarters communications vehicle.<sup>73</sup> An actual armoured (tank) squadron, however, is generally equipped with no more than fifteen tanks. It lacks ambulances, which are now centrally supported from the field ambulance units, dedicated refuelers (due in large part to age and serviceability), and sufficient cargo capacity for ammunition and mine implements.<sup>74</sup> All support vehicles are now based on a wheeled fleet, most of which has comparatively limited offroad capability, making it difficult to remain with the tanks. Furthermore, while a doctrinal armoured regiment is to contain up to four squadrons of tanks, current regiments contain two to three squadrons of light armoured vehicles (LAV), traditionally used as reconnaissance vehicles, and one of tanks.<sup>75</sup> To make the situation even more

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<sup>72</sup> Canada. Department of Defence, A-PP-106-000/AF-001, *Advancing with Purpose: The Canadian Army Modernization Strategy*, 4th ed. (Ottawa: DND Canada, 2020): 45..

<sup>73</sup> Canada. Department of Defence., *The Armoured Regiment in Battle*: 26, 67-68

<sup>74</sup> The CA has a number of projects underway to deliver some or all of these capabilities, however due to capital acquisition constraints they will not be a one for one replacement. Thus, while total lift capacity of an armoured regiment may remain the same, the delivery of fewer, though larger, vehicles over the next decade, it will mean a significant reduction in flexibility. RW.ERROR - Unable to find reference:doc:604faf548f08a74620c57fc8.

<sup>75</sup> Matthew Johns, "Leopard without Claws: The Future of Tanks in the Canadian Army" Service Paper, (Canadian Forces College, Toronto, 2018).

confusing, the contemporary Canadian armoured regiment is equipped with the same vehicle and weapons system as their peer mechanized infantry battalions. Indeed, the Canadian infantry battalion actually has more LAV's than current armoured regiments, and while the roles are different there is a similarity in capability, less the sole squadron of tanks. In light of the comparison between the aforementioned doctrine and the contemporary reality, the only word that could be used to describe the situation is dissonance.

The above should not be taken as a detailed list of faults on the part of the Canadian Army, actually the UK Army faces many of the same challenges, but rather as a comparative examination of what western nations say they want to do and the capability they actually have. In the case of the UK, Canada, and even to an extent the much better funded US Army, soldiers have been making difficult resource realities work for decades.<sup>76</sup> A hallmark of the Canadian Armed Forces has been to excel in the operations it undertakes despite of the resource challenges. Yet this small example should point to a reckoning for western militaries. The inability of western militaries, such as Canada, to articulate the role of an armoured force in a way that results in resource assignment points to a fundamental shift in how these nations are to fight. Funds are tight however published doctrine and the means to execute it are not in alignment, thus the question must be asked, what is land maneuver in the modern context and how does it differ from that of doctrine?

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<sup>76</sup> Daniel Lang and Mobina Jaffer S.B., *Military Underfunded: The Walk Must Match the Talk* (Ottawa: Queen's Printer, 2017).



## **Dangerous Fallacy: Technology Equals Maneuver**

For those born into the western model of combat, there has always been a fascination with using technology to solve problems. That is not to say that other nations around the world did not make their own technological advancements. After all, China invented gunpowder and cannon long before the Europeans. Rather in the West, there has been the pervasive idea that with enough technological overmatch it could defeat any foe, regardless of their own capabilities.<sup>77</sup> This particular penchant has manifested itself in a number of ways over the centuries. In the modern experience it is probably best represented after the Second World War when the United States developed the Pentomic Army. In this era the nuclear bomb had rendered soldiers irrelevant, as a single atom bomb could destroy entire corps of soldiers. Huge sums of money were invested into aircraft, ships and delivery methods to get the penultimate killing weapon to the field to lay waste to their enemies. The Army was reduced to a mere shell of what it had been only a few years before, unnecessary in this new world of warfare.<sup>78</sup> The prophets of technology had found their sword of Damocles in the nuclear bomb and it would hang over the heads of all their enemies.

Yet the Pentomic Army was a failed experiment. Despite the destructive power of the atomic bomb, the reality was that no one actually wanted to use it. It was far too destructive and as their adversaries gained the capability, risked too much to retaliation.<sup>79</sup>

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<sup>77</sup> Max Boot, "The Paradox of Military Technology: On American Power and Vulnerability," *The New Atlantis*, Fall (2006). <https://www.thenewatlantis.com/publications/the-paradox-of-military-technology>.

<sup>78</sup> A. J. Bacevich, *The Pentomic Era: The US Army between Korea and Vietnam* (Washington, D.C.: National Defense University, 1986).

<sup>79</sup> Kalev I. Sepp, "The Pentomic Puzzle: The Influence of Personality and Nuclear Weapons on U.S. Army Organization 1952–1958," *Army History* Winter, no. 51 (2001), 1-13. <http://www.jstor.org/stable/26304920>.

Before long the army found itself back in business, fighting a whole new class of wars, and while these were not clashes of great nations, the violence in each was as real and devastating as either of the world wars. Yet time and time again the advocates of technology would proselytize about ways the conflict could be won without soldiers having to fight. From such theories came Operation Rolling Thunder, the mass bombing of North Vietnam seeking to force Hanoi to capitulate through strategic bombing.<sup>80</sup> The campaign ultimately failed to hamper the North Vietnamese Army (NVA), though millions of tons of explosive, defoliants and incendiaries were dropped. Similarly, the Russian experience in Afghanistan during the 1980's was also a stark reminder that technology does not guarantee success. Invading with advanced tanks and supported by one of the world's most deadly gunships (Mi-24 Hind), the Russian Army and Air Force failed to quell the famously intractable resistance in the country and much like the US in Vietnam, eventually suffered the embarrassment of a total withdrawal.<sup>81</sup> In both cases, the most advanced technologies of the day were unable to prevail against technologically inferior foes.

Neither of these examples can be easily distilled to such simple parallels. Both Afghanistan and Vietnam were famously complex theatres, involving a host of political, strategic, operational and tactical challenges which are not reflected in the simplistic comparison above, however the overall premise remains sound. Both the US and Russia felt strongly that their technological superiority over their comparatively backwards enemies would lend them a decisive edge, and while it helped win a lot of battles, it failed

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<sup>80</sup> Richard P. Hallion, *Rolling Thunder 1965-68: Johnson's Air War Over Vietnam* (London: Bloomsbury, 2018). <http://ebookcentral.proquest.com/lib/cfvlibrary-ebooks/detail.action?docID=5241565>.

<sup>81</sup> Lester W. Grau and David M. Glantz, *The Bear Went Over the Mountain: Soviet Combat Tactics in Afghanistan [Illustrated Edition]* (n.p.: Tannenberg Publishing, 2014).

to win the wars. The US experience in particular demonstrates how technology, though advancing capability, has often failed to achieve the goal by dint of possession. The more recent experiences in Iraq, Syria, Libya and Afghanistan all attest to the limits of technology to solve combat problems.

It is in this environment, that of seeking a technological solution to the wicked problems of land warfare, the modern western challenges to land maneuver can be found. The lure of technology is its potential to offer solutions to the complex problems of combat that would allow the possessor to gain dominance without the gritty, knockdown fighting that has been the hallmark of land warfare since humans started hitting each other with rocks.

More recently the West has become focused on NCW in various permutations. First seriously proposed by Vice Admiral (ret) Arthur Cebrowski, then Director of the Office of Force Transformation, NCW was the linkage of all combat, command, intelligence and communications systems which was to create a near perfect understanding of the battlefield. This god-like view of enemy and friendly actions and locations would allow for precise responses to actions or direction, ensuring force was applied both in the most efficient manner but also in one that would achieve the effect required and only the effect required.<sup>82</sup> The most recognizable progeny of this theory is effects based operations (EBO). The principle behind EBO is ensuring that the actions a force is taking is actually achieving the results that it was desired to make. It relies

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<sup>82</sup> James R. Blaker, *Transforming Military Force: The Legacy of Arthur Cebrowski and Network Centric Warfare* (Westport, Conn: Greenwood Publishing Group, 2007).

heavily on the application of network combat in order to ensure the flow of information is unimpeded so that the correct action and reaction can be made.<sup>83</sup>

Many western militaries often seek to utilize much of the precepts of NCW. Perhaps the most striking example of this was the invasion of Iraq in 2003. Donald Rumsfeld, then US Secretary of Defence to President George W. Bush, had insisted that advances in aerospace dominance, space capabilities and intelligence gathering would allow a significantly reduced ground force to achieve success. Rumsfeld maintained the position, one which remains well supported in theory, that the US had such dominance across the spectrum of warfare, and in particular its intelligence and targeting capabilities, that it did not need nearly as much land capability to achieve its missions.<sup>84</sup> While the invasion, however dubious the legal premise, was ultimately successful for the coalition, the forces found themselves woefully inadequate for the conflict that followed. US aerospace and information dominance allowed their pared down land forces to overwhelm their under-resourced and poorly trained conventional opponents but could not win the day when it came to actually trying to hold onto what they had achieved. Iraq quickly devolved into protracted urban fights in places like Basra and Fallujah, where US supremacy in the air was largely countered by a low technology insurgency. No amount of airpower was able to take Fallujah back. Instead, it was a combined force of Marine infantry and tanks, a combination of light and armoured forces, which would ultimately grind through the enemy. John Gordon IV and Bruce Pirnie, senior researchers for

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<sup>83</sup> Joshua Ho, "The Dimensions of Effects Based Operations," *Defence Studies* 5, no. 2 (2005), 169-187. doi:10.1080/14702430500336392. <https://doi-org.cafvl.idm.oclc.org/10.1080/14702430500336392>.

<sup>84</sup> Keith L. Shimko, *The Iraq Wars and America's Military Revolution* (New York: Cambridge University Press, 2010): 143-147. <http://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=317647&site=ehost-live&scope=site>.

RAND, analyzed the role of armour during Operation *Iraqi Freedom* and concluded that the presence of heavy mechanized vehicles and their crews were in fact the decisive element of the conflict.

In Iraq, the United States used a full range of land forces – light, medium and heavy – but heavy forces were the most important ground combat element... Light and medium elements also played important roles but generally supported the armoured formations. Until recently, the Army envisioned equipping all its forces with medium-weight combat systems. That concept now appears premature... Trying to prevail with one force type would be difficult and unwise.<sup>85</sup>

The experience of the Israeli's in the 2006 Lebanese War is also instructive in the danger of relying on technology to solve complex combat problems. Reacting to the abduction of Israeli soldiers and the indiscriminate bombardment of Israeli towns by Hezbollah, Israel invaded southern Lebanon on July 12<sup>th</sup>, 2006. Israel had advanced fighter aircraft providing precision fires and a nearly uninterrupted surveillance capability of the battlefield. It outmatched their opponents in nearly every regard, both in number of personnel, armoured vehicles, aircraft and sensors. Yet ultimately it fared very poorly against their non-state foes, who fought from concealed positions with light anti-armour systems and rockets. "...the IDF's operational plans were based on the erroneous assumption that standoff fires, provided principally by air, could either compel a nonstate actor (such as Hezbollah) to stop firing rockets at Israel or force the state (in this case, Lebanon) to make that actor stop the attacks."<sup>86</sup>

Despite sensors pervading the battlefield, the Israeli military was never able to achieve the intelligence dominance that NCW and EBO required, slowing their

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<sup>85</sup> John Gordon IV and Bruce R. Pirnie, "'Everybody Wanted Tanks': Heavy Forces in Operation Iraqi Freedom," *Joint Force Quarterly* 4, no. 39 (2005): 88. <https://search-proquest-com.cafvl.idm.oclc.org/trade-journals/everybody-wanted-tanks-heavy-forces-operation/docview/203661155/se-2?accountid=10524>.

<sup>86</sup> David E. Johnson, *Hard Fighting: Israel in Lebanon and Gaza* (Santa Monica: RAND Corporation, 2011): 81.

operations while they waited for assessments of effects to be completed. In the end, the conflict ended in a stalemate and badly bruised the Israeli military reputation.

General James Mattis, former US Secretary of Defense, was particularly scathing in his rebuke this revisionist theory of military affairs. As commander of US Joint Forces Command he issued guidance on the use of EBO theory after the disaster of the 2006 Israeli-Hezbollah War, effectively eviscerating it as a doctrinal concept in the US.<sup>87</sup> During his tenure as both Commander US Central Command (CENTCOM) and later as US Secretary of Defense (SECDEF), he would be adamant in restating that the nature of conflict has not changed, only the tools used to prosecute it.<sup>88</sup>

More recently the conflict between Azerbaijan and Armenia has often been held up as a demonstration that traditional armoured warfare is fast becoming obsolete. Azerbaijan, well-equipped with munitions capable Turkish drones, conducted a successful targeting campaign of Armenian armour capability. It could be considered successful for two main reasons. First, in that it contributed to the destruction of Armenia's ability to maneuver freely even behind the line of conflict. Secondly, and arguably more importantly, Azerbaijan was very savvy in using the footage of successful strikes to publicize its actions and so imparted a general sense of technological overmatch. This perception, perhaps even more than the reality of any destroyed tank, lent more to the erosion of morale and was defining in shaping international opinion.<sup>89</sup>

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<sup>87</sup> James Mattis, "JFCOM Commander's Guidance on Effects Based Operations," *Parameters* Autumn, no. 51 (2008), 18-25. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a490619.pdf>.

<sup>88</sup> Jim Proser, *No Better Friend, no Worse Enemy: The Life of General James Mattis* (New York: Broadside, 2018).

<sup>89</sup> Shaan Shaikh and Wes Rumbaugh, "The Air and Missile War in Nargorno-Karabakh: Lessons for the Future of Strike and Defence," *Centre for Strategic and International Studies*, 8 Dec, 2020. <https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense>.

The Nagorno-Karabakh conflict is instructive for a number of reasons. Though neither force is quite on the military level of Russia or the United States, both possessed significant traditional military capability including large stocks of missiles, armour (though nothing more recent than Soviet-era) and air defence assets.<sup>90</sup> Layered on top of this was the introduction of lethal drone warfare in a conventional combat setting including loitering munitions. Functionally, rather than demonstrating that maneuver forces, and in particular armour, are ineffective in a modern world, the conflict demonstrated the threat at the seams of battle. Loitering munitions have a radar cross section small enough to reduce the likelihood of detection by even advanced air defence systems like the Armenian S300's, allowing them to get through a net that would have been nigh impossible for a manned aircraft. Further, this difficulty in locating, tracking and destroying UAV's could allow for a level of intelligence collection normally associate with the maintenance of air superiority.<sup>91</sup> Rather than demonstrating the death of land maneuver, it is reinforced the need for revised air defence capabilities at the lowest levels to protect a dispersed land formation. Jack Watling, senior fellow for the Royal United Services Institute (RUSI), insightfully states:

Besides the vulnerability of other kinds of vehicle, the ability to inflict persistent attrition upon an adversary at reach does not change the fact that land warfare is about taking and holding ground, and the ground will still ultimately need to be assaulted...The challenge is to get a combined arms formation within striking distance without it having suffered heavy losses before entering the direct fire zone...Therefore, a broader shift in mindset is required as to how combined arms manoeuvre functions. Infliction of attrition against enemy ISTAR must be

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<sup>90</sup> Shaan Shaikh and Wes Rumbaugh, "The Air and Missile War in Nargorno-Karabakh: Lessons for the Future of Strike and Defence," *Centre for Strategic and International Studies*, 8 Dec, 2020. <https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defence>.

<sup>91</sup> Jack Watling and Sidharth Kaushal, "The Democratization of Precision Strike in the Nagorno-Karabakh Conflict," *Royal United Services Institute* 22 Oct, 2020. <https://rusi.org/commentary/democratisation-precision-strike-nagorno-karabakh-conflict>.

prioritised to degrade the enemy's sensor picture to a point where they will struggle to distinguish decoys from real targets.<sup>92</sup>

The necessity of land maneuver has, by and large, been reinforced by these conflicts. Rather than finding itself obsolete in the face of technology, armoured forces retain a critical role within the land maneuver force, though *how* that role is applied will need to be seriously considered. Modern conflict has demonstrated that the traditional triangle of protection, firepower and mobility may need to be reinterpreted in order to address changes in both approach and adversarial capabilities. This discussion is perhaps even more important to a small military like the CAF, as the resource environment does not allow itself to create a robust broad spectrum of capabilities as the US has done.

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<sup>92</sup> Jack Watling, "The Key to Armenia's Tank Losses: The Sensors, Not the Shooters," *RUSI Defence Systems*, sec. 22, Oct 6, 2020. <https://rusi.org/publication/rusi-defence-systems/key-armenia-tank-losses-sensors-not-shooters?fbclid=IwAR2E6llj5fUGAskBYtL7SGdLxPfusfgvjd6cvZawUZJxtk4sFR1ugGnuW6c>.



## CHAPTER 5 - ARMoured PANTHEON: ENABLING THE FUTURE OF CANADIAN MANEUVER WARFARE

*Battles are won by slaughter and maneuver. The greater the general, the more he contributes in maneuver, the less he demands in slaughter.*

- Winston Churchill, *The World Crisis*, Vol 2.

Tanks do not equal maneuver. Despite the previous examination of doctrine in which tanks clearly feature heavily, tanks themselves do not impart maneuver into a battlefield. A large force of highly capable tanks poorly led can well be defeated by a technically inferior force ably led. Consider the experience of Heinz Guderian during the invasion of northern France in 1940. He faced a foe in the French and British armies who were numerically superior, more familiar with the ground and in the case of the French, possessed the incomparable Char B. The Char was considered by Guderian himself to be a superior tank in both firepower and protection to his own Panzer III and IV's.<sup>93</sup> Furthermore, the French Army of the north had more tanks than the Germans to call on, along with more artillery and supporting infantry.<sup>94</sup> Despite this overmatch in numbers and superiority of armour, they were handily defeated in two weeks. The possession of the highly capable Char B did little to stem the advance of the German *Wehrmacht*, and Guderian would largely brush aside his opposition.

The key to this example is not in the equipment itself but rather in how it is used. The tank alone was not the key, but rather the ability of soldiers like Guderian and his subordinate commanders to understand and apply maneuver, capitalizing on the strengths of their equipment rather than being hindered by their weaknesses. It is in this fashion

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<sup>93</sup> Karl-Heinz Frieser, *The Blitzkrieg Legend: The 1940 Campaign in the West* (Annapolis, Maryland: Naval Institute Press, 2012).

<sup>94</sup> Kenneth Macksey, *Panzer General: Heinz Guderian and the Blitzkrieg Victories of WWII* (New York: Skyhorse Publishing, 2018).

that the future of land maneuver should be considered in Canada. Not by manning the equipment, but instead by equipping the soldier.

In the next pages the renewed role of the armour corps, agnostic to the vehicle it is equipped with, will be examined to demonstrate that what the armour corps offers the CA is the application of land maneuver to the land battlefield. In this aspect it needs to be viewed not through the lens of the few tanks that it can bring to bear on the enemy, but in the ability of its soldiers to apply the principles of maneuver across a variety of systems. Thus the RCAC should be considered the subject matter experts (SME) of combined arms maneuver warfare and employed accordingly. The armour corps must embrace its role as a systems integrator, and in the spirit of Guderian, seek to coordinate the disparate parts into an integrated whole. To this end there are three main areas which must be considered. The first is the corps ability to operate as an integrated system, incorporating distinct capabilities to achieve unified land maneuver. Second, is the employment of the armour corps most valuable assets, its people and organizing to optimize their abilities. Finally, the armour corps must become an early adopter of new technology, viewing the battlefield not through the lens of a single vehicle fleet, but rather the opportunities new advances offers to provide unique solutions in a cost-constrained environment.

### **Uniting Loki, Heimdall and Freya: Land Maneuver Systems Integration<sup>95</sup>**

The previously examined doctrine considers the use of armoured forces in not a dissimilar manner from its Russian counterpart, in that the use of armoured forces allows for maneuver to be achieved on the land battlefield. This declaration is generally

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<sup>95</sup> Loki was the Norse god of deception and trickery. Heimdall was the ever-vigilant guardian of Asgaard, the gods home. Freya was a powerful goddess of divination and magic. "The Aesir Gods and Goddesses," Norse Mythology for Smart People, , accessed 5 Apr, 2021, <https://norse-mythology.org/gods-and-creatures/the-aesir-gods-and-goddesses/>.

undermined by the reality of resources being dedicated to higher priority investments, such as in fifth generation fighters, cyber capabilities, and drone technology. Among the three western countries reviewed, none has undertaken to develop and field a new tank, though significant life extensions have been funded to varying degrees. In all three countries, senior leaders have been further developing medium mechanized infantry capabilities such as the Stryker brigades in the US (based on the General Dynamics LAV), and the most recent Strike concept in the UK (based on the newly acquired ARTEC Boxer). These brigades are built specifically to respond to the numerous low intensity conflicts that have been ignited throughout the Middle East and Africa. Investment in these new, more transportable brigades comes at the acknowledged cost of capability. These medium elements trade protection and firepower for transportability and cost. This largely relegates such a force to reconnaissance and shaping operations in a high-intensity conflict, and relies on other nations to bring the necessary armoured capability. “A Strike brigade would clearly be too light and too small to defeat heavy forces, but if it were able to attrit, delay and disrupt early Russian operations, it could play a significant role in the shaping battle before NATO counterattacked.”<sup>96</sup>

The solution in the US and the UK is to ensure the retention of heavy, medium and light capabilities at the formation level, that is to say divisional and above. While the US is a difficult partner to draw comparisons from due to the drastic difference in size of its forces and defence budget, the UK is much more comparable to Canada. Fiscal realities continue to pose challenges to the UK and this has resulted in its most recent defence

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<sup>96</sup> Jack Watling and Justin Bronk, *Strike: From Concept to Force*, Occasional Papers ed. (Whitehall: Royal United Services Institute for Defence and Security Studies, 2019): 10.

review which will reduce its force size to something slightly larger than Canada's own.<sup>97</sup>

Yet Canada and the UK diverge significantly in their approach. Where the UK has determined to retain a heavy armour capability, replete with tanks and mechanized infantry, in Canada, the preference is to attempt to thread the needle, so to speak, by augmenting a nominally medium weight force with heavy and light capabilities.<sup>98</sup>

Such a combination of medium and heavy forces makes for a challenging relationship in the CAF and in recent years has led to the armour corps being under resourced and largely under utilized. A series of low-intensity conflicts in the past two decades has called into question the value of an armour corps that has significant challenges in demonstrating why it is different than its similarly equipped infantry counterparts.

Medium brigades such as Strike and Stryker are designed with the premise of technological overmatch at heart. They rely on the networked ability to use aviation, aerospace and space assets to illuminate the battlefield, painting a picture of enemy operations and tracking friendly actions. Considerable resources are dedicated to ensuring a robust indirect fire capability (though overmatched by Russia) with shortfalls addressed through superior air-ground integration, both through fixed wing air superiority as well as highly capable rotary wing.

Canada, however, struggles to match this layered approach. Challenged to maintain its limited fighter fleet and with no prospect of growing its helicopter capability, the CAF struggles to dominate the aerospace domain in the manner of its allies. Projects are

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<sup>97</sup> United Kingdom. Government of the United Kingdom., *Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy*.

<sup>98</sup> Canada. Department of Defence, A-PP-106-000/AF-001, *Advancing with Purpose: The Canadian Army Modernization Strategy*.

already underway to address indirect fire modernization, welcome news indeed, however from the perspective of an armoured BG there are few initiatives that confer the armour corps the traditional capabilities it has relied upon for combined arms maneuver. A tank life extension program has already been initiated, however the Leopard 2 A4M and A6M variants the CA employs have already reached the point of obsolescence and are no longer supported by the original equipment manufacturer.<sup>99</sup>

Canadian combined arms maneuver is therefore challenged to continue to provide the level of capability it has otherwise delivered. While the simplest solution is to purchase more modern tanks, this is clearly not palatable to senior decision makers. Further, the support requirements of the current fleet of tanks is already outstripping the capacity of first, second and third line maintenance, repair and supply capacity of the CA.<sup>100</sup> This has necessitated unusual reallocations of personnel, appropriation of infrastructure and significant revision of supply protocols.<sup>101</sup>

Thus it is clear that equipping the CA's maneuver specialists cannot be an exercise in futile advocating for new tanks, but rather must consider alternate methods to achieve similar effects. In this environment, the armour corps must consider unit and sub-unit capability as a composite of systems, each providing an element to enable combined arms maneuver and ultimately defeat the enemy. Additionally, this systems approach needs to consider the ADO environment as established in by the CA in *Close Engagement* and

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<sup>99</sup> Maj Ted Dossev, *Leopard 2 Family of Vehicles Canadian Armed Forces Working Group* (Ottawa: Canadian Army, 2018).

<sup>100</sup> Johns, "Leopard without Claws: The Future of Tanks in the Canadian Army."

<sup>101</sup> In 2017, Comd 1 CMBG reallocated maintenance personnel from the infantry units under his command to the armoured regiment in order to address critical vehicle repair deficiencies. He further allocated the newly built TAPV repair facility to the armoured regiment as well as used a large portion of his annual funding to purchase tooling for Leopard 2 vehicles. Col Robert Ritchie, *Leopard 2 Family of Vehicles (FoV) 1 Canadian Mechanized Brigade Group Outstanding Integration Concerns 2018-2019* (Edmonton: Headquarters 1 Canadian Mechanized Brigade Group, 18).

confirmed in CA modernizing directive *Advancing with Purpose*. Traditional CA capabilities have reflected a largely two dimensional line of thought, but in the modern environment this is no longer possible. For the armoured BG there are four systems that need to be considered for the modern battlefield: aerospace, sense, electronic warfare and land. The combination of these four systems at the unit level creates the type of dispersion capable force that ADO envisions while concentrating to achieve combined arms maneuver effects.

Further examination of the conflict in Nagorno-Karabakh offers some salient considerations for the modern battlefield and in particular for the aerospace system. Perhaps one of the most significant aspects of the conflict was not the ability of Azerbaijan to defeat Armenia but instead its ability to saturate Armenian airspace with UAV's which would then allow killing blows to be leveled at both armoured and unarmoured forces.<sup>102</sup> Current CAF capabilities fail to address this serious threat and direction from CA leadership is sparse. Air defence resources are necessarily focused on the aircraft, cruise and ballistic missile threats, however if units are to survive in this UAV permeated environment, then counter-UAV capabilities need to be organic. Indeed, the division between theatre, formation and unit air defence capabilities is a significant seam which adversarial nations are already moving to exploit with a variety of unmanned systems. "Strike UAS can also present difficulties. With a range of approximately 10 km on its MAM-L smart micro munitions, the TB2 [Turkish UAV] sits beyond the engagement range of most short-range air defence (SHORAD) systems."<sup>103</sup> In part the solution is to employ dispersion so as to avoid presenting a desirable target, however this

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<sup>102</sup> Watling, "The Key to Armenia's Tank Losses: The Sensors, Not the Shooters."

<sup>103</sup> Watling, "The Democratization of Precision Strike in the Nagorno-Karabakh Conflict".

also increases the area to be protected if such systems remain centralized. Decentralizing simple SHORAD systems down to the sub-unit level will be necessary on the future battlefield.

The other half of the aerospace system is the offensive capability, namely aircraft delivered munitions. Ground to air command and coordination has come a long way in two decades of counterinsurgency and low-intensity conflicts. Notwithstanding these gains, the production of Joint Terminal Attack Controllers (JTAC), the human link between air and ground support, has been stove-piped in the artillery branch. This system does not produce enough JTAC's to support the line units in a centralized model, let alone a decentralized one. In the US, the necessity of air to ground coordination has been recognized as a formal occupation in the US Marines and US Air Force who have long maintained the vital relationship between close air support (CAS) and the ground force, and who provide the air control teams to the US Army.<sup>104</sup> The link between air and ground support has been well established as critical since the Second World War and the most recent experiences in Afghanistan and Iraq only reinforce this necessity. This is especially important for western militaries who face a quantitative and in some cases qualitative disadvantage in comparable indirect fires capabilities.<sup>105</sup> These deltas are addressed through superior western airpower, which lends more criticality to the requirement for greater air to ground integration. In order for the armoured BG to

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<sup>104</sup> G. L. Topper, "Increasing Marine Corps Lethality," *Marine Corps Gazette* 104, no. 5 (2020), 30-32. <https://search-proquest-com.cafvl.idm.oclc.org/trade-journals/increasing-marine-corps-lethality/docview/2397837487/se-2?accountid=10524>.

<sup>105</sup> Radin, *The Future of the Russian Military: Russia's Ground Combat Capabilities and Implications for U.S.-Russia Competition*.

achieve combined arms maneuver in an ADO environment, it must be able to effectively coordinate air assets, manned or unmanned below the unit level.

The sense system is a continually evolving domain, however there are several developments that can be solidified in the near term while preparing for the future. The first of these is better integrating the armoured BG's ability to coordinate and use contemporary sense capabilities. Traditionally the armoured regiment relied heavily on an organic reconnaissance troop but conflicts in the last two decades demonstrate that this two dimensional sense capability will no longer provide sufficient clarity or intelligence to compete on the modern battlefield. Unmanned aircraft, manned airborne early warning aircraft, space based sensors, electronic surveillance and advances in radars all point to the necessity to fuse sense at ever lower levels. Dismissing this reality "suggests a lack of appreciation of just how naked the modern battlefield has become."<sup>106</sup> The future battlefield will be marked by fierce competition for information at all levels. *Close Engagement* indicates that units are already expected to operate surveillance assets; however, such organizational support has not materialized.<sup>107</sup> To date the Canadian armoured regiments maintain a very limited number of small UAV's but they are not institutionalized as a part of the organization, nor resourced for replacements, which continually places the program under threat. The CA has recently purchased the RQ-21A Blackjack, however that is designed as a centralized asset under the artillery branch and is focused at supporting the Canadian Mechanized Brigade Group (CMBG) and not the

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<sup>106</sup> Watling, "The Key to Armenia's Tank Losses: The Sensors, Not the Shooters."

<sup>107</sup> Canada. Department of Defence., *Close Engagement - Land Power in an Age of Uncertainty - Evolving Adaptive Dispersed Operations*: 22.



BG.<sup>108</sup> By way of comparison, Russia is considering development of a tethered UAV (thus resistant to EW) for its new T-14 tank. This would allow an armoured force to remain under cover while providing detailed surveillance of the battlefield out to 10 km. This is in line with Russia's work to decentralize C4ISR assets to create their own version of the networked battlefield.<sup>109</sup>

Given the threat posed by sensor saturation on the battlefield, the armoured BG needs to be able to compete for information without necessarily risking its personnel and manned vehicles. This requires a growth and fusion of sense capabilities, including the institutionalization of mini-UAV at the unit level as a minimum, and other capabilities should be explored. The upcoming addition of LAV 6.0 Long Range Surveillance Suite (LRSS) vehicles will be a welcome addition, however the limited numbers and sensitivity of the systems will make their deployment a unit level or formation level effort. Additional sensor fusion at the sub-unit level is required if the squadron or company is going to survive.

The third system for consideration is that of electronic warfare. This capability is a sensitive one, as it relies on the capabilities of very few specialized personnel and equipment. The EW spectrum in both offence and defence is becoming one of the most contested environments in modern warfare. Both the Russian Armed Force and the People's Liberation Army have invested heavily in EW and cyber capabilities in response to the network superiority demonstrated by coalition operations during the 1991 Persian

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<sup>108</sup> Ken Pole, "Blackjack: Army Hits 21 with New Ace in the Sky," *Canadian Army Today* 4 Dec, 2017. <https://canadianarmytoday.com/blackjack-army-hits-21-with-new-ace-in-the-sky/>.

<sup>109</sup> Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: 227.

Gulf War and the 2003 invasion of Iraq.<sup>110</sup> Western forces have become accustomed to broad access to radio frequency communication as a cornerstone of maneuver yet this also poses a danger as much as it is an enabler. The current model of centralizing EW assets at the brigade and divisional level leaves significant gaps for the units to overcome, if only in terms of spectrum defence. Emissions control is one way to mask a unit's position, however as systems become increasingly networked this is proving an even greater challenge. Alternatively, an active defence posture may be necessary in future battlefields to saturate the spectrum with noise rather than try to simply limit necessary communication and coordination. "Deception, saturating the electromagnetic spectrum, and other active rather than passive means will be needed to protect the force as it moves into direct contact."<sup>111</sup> Considerable experimentation would be required to refine this concept however it is clear that the future battlefield will need to integrate both active and passive EW measures at ever lower levels as ground forces seek to disperse across a wider area. A first step as a minimum would be to include EW defence as a coordinating function within the armoured BG. This component would be able to advise the commanding officer, or the sub-unit commander, about their EW posture and vulnerabilities while working to integrate with higher EW control. Moreover, depending on equipment capabilities, some EW intelligence collection would support the BG sense system. Avoiding communications will become increasingly difficult in an ADO environment making EW a critical asset for the armoured BG.

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<sup>110</sup> Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2020* (Washington, D.C.: Department of Defense, 2020).; Madison Creery, "The Russian Edge in Electronic Warfare," *Georgetown Security Studies Review* 26 June, 2019. <https://georgetownsecuritystudiesreview.org/2019/06/26/the-russian-edge-in-electronic-warfare/>.

<sup>111</sup> Watling, "The Key to Armenia's Tank Losses: The Sensors, Not the Shooters."

The final system is that of the land maneuver capability. There should be little question that the tank remains one of the most fearsome machines on the battlefield, but if no more can be resourced in the CA then different capabilities must be layered to provide similar effects. The tank's advantage rests in its well rounded capabilities in mobility, firepower and protection, yet it comes with the distinct disadvantage of a high maintenance cost, specialized support equipment, and a significant logistical burden.<sup>112</sup> Protection is perhaps the most difficult of the advantages to replicate in other vehicles without the size and mass of the tank. There is little that replaces heavy layers of armour in a knock down fight. Nevertheless, there is significant protection in mobility, speed of action and active defensive measures. In this regard, similar defensive systems as the Trophy active protection system (APS) to defend against ATGM's is a place to start.<sup>113</sup>

Equipping lighter platforms, like the CA LAV 6.0, with an active defensive suite may allow such vehicles to survive in contested environments, as was the case for the Israeli Defence Force (IDF) during Op PROTECTIVE EDGE in 2014.<sup>114</sup> This will provide an immediate capability while active defensive systems continue development with the potential of replacing passive armour to some degree.

Firepower is another matter altogether. One of the most profound advantages the tank possesses is its large calibre cannon which can deliver devastating fire onto targets

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<sup>112</sup> Canada. Department of Defence, A-PP-106-000/AF-001, *Advancing with Purpose: The Canadian Army Modernization Strategy*. 34-36.

<sup>113</sup> "Land Warfare Platforms: Firepower, Survivability & Mobility - Trophy-HV (Heavy Vehicle); Trophy-MV (Medium Vehicle)," Janes, last modified 25 Jan 2021, accessed 29 Apr, 2021, <https://customer-janes-com.cfc.idm.oclc.org/Janes/Display/JAAUA029-JLWU>.

<sup>114</sup> Michael B. Kim, *The Uncertain Role of the Tank in Modern War: Lessons from the Israeli Experience in Hybrid Warfare* (Arlington: The Institute of Land Warfare, AUSA, 2016).

with pinpoint precision out to two kilometers.<sup>115</sup> It is difficult to match this level of capability in a lighter vehicle. The blast, recoil, pressure and weight of the gun system make it challenging to graft onto a wheeled platform, though solutions do exist. A case in point is the US Mobile Gun System (MGS), a variant of the LAV equipped with an unmanned 105mm gun turret. Despite early teething pain the MGS has seen successful use in Afghanistan and Iraq by US forces and performs satisfactorily in a low-intensity conflict environment, but there are necessary questions about its ability in high-intensity battle. The 105mm cannon is simply not powerful enough to assure the destruction of enemy armour. In this case it is necessary to consider other options. A natural fit would be the reintroduction of a mounted anti-armour capability to the CA. While this has traditionally been an infantry resource, under an armoured BG, mounted anti-armour could see considerable use. Advances in anti-armour missiles make the traditional use of mounted anti-armour, that of flank protection, unnecessary. This is due to the lethality new weapons pose with a combination of fire and forget targeting and top attack profiles. Mounting such systems on a highly mobile chassis like that of a LAV 6.0 could offer the firepower profile necessary to defeat an adversaries armoured force in the near term. As noted above, however, with the proliferation of active protection systems, missile attacks will become increasingly difficult, placing emphasis once again on kinetic kill weapons. Advancing development in materials science and ammunition could allow for future combat vehicles to be equipped with lighter but equally or more powerful cannon than is already available.

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<sup>115</sup> "Land Warfare Platforms: Armoured Fighting Vehicles - Leopard 2," Janes, last modified 24 Jan 2021, accessed 26 Apr, 2021, [https://customer-janes-com.cfc.idm.oclc.org/Janes/Display/JAA\\_0021-JAFV#Leopard%20A6A1](https://customer-janes-com.cfc.idm.oclc.org/Janes/Display/JAA_0021-JAFV#Leopard%20A6A1).

As a complement to traditional direct fire systems, the armoured BG should also seek to exploit loitering munitions in order to enhance protection, as they can be fired from behind cover, hiding the point of origin and delay use until commanded or recovered. An excellent example is the Hero-120, which carries a 3.5-kilogram warhead large enough to destroy enemy armour and can loiter up to 60 minutes over a range of nearly 40 kilometers.<sup>116</sup> Use of technologies like these will allow the armoured battlegroup to enhance protection through the use of cover instead armour, while retaining a high degree of destructive power.

This layering of firepower and protective systems could provide a highly effective alternative to the tank enabled force. It does, however, come with sacrifices. Without the significant armour protection of a tank, the method of destroying enemy objectives will need to be re-examined. The current method of tank-infantry cooperation on the objective would no longer be viable as the lightly armoured vehicles would all be considerably more vulnerable to enemy direct fire.<sup>117</sup>

A systems approach alternative to the tank enabled force would retain the armoured BG's freedom of action and offer significant advantages in terms of transportability, maintenance reduction (assuming the use of lighter, more maintenance friendly vehicles) and associated costs. It would require significant experimentation to define tactical responsibilities and optimal troop/platoon, squadron/company and unit/BG organization and limits of control. Care would need to be taken not to grow capability at the cost of

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<sup>116</sup> Jason Sherman, "DOD Eyes Israeli-made Loitering Anti-Tank Munition for Special Ops," *Inside the Pentagon* 35, no. 28 (2019), online. <https://search-proquest-com.cafvl.idm.oclc.org/trade-journals/dod-eyes-israeli-made-loitering-anti-tank/docview/2255364377/se-2?accountid=10524>.

<sup>117</sup> Canada. Department of Defence., B-GL-309-001/FT-001, *The Infantry Battalion in Battle: 9-3-1 - 9-4-6*.

mobility and flexibility. However, if Canada continues to under resource a traditional tank capability, a systems approach may offer the most productive way ahead. One of the greatest advantages is the ability to continually modernize the force through adapting the components rather than revising the whole, as is currently necessary with the tank force. This allows for a more incremental and evolutionary improvement rather than seeking the singular solution to multiple problems.

### **Empowering Thor: The Soldiers of the Armour Corps<sup>118</sup>**

*It is patently absurd to make the conscious decision not to exploit the potential of a weapon to the full.*

- Generaloberst Heinz Guderian, *Achtung-Panzer!*

Mjolnir, the mythical hammer of the Norse god of lightning, was an awesome and fearsome weapon, smiting foes with great smashing blows. Yet without Thor wielding it, Mjolnir was as inert as any tool, no matter the destructive potential held within. This is an appropriate allegory for the armour corps, where equipment, no matter how amazing, amounts to very little without able soldiers and leaders to use it. As has been illustrated above, Canada, the UK and the US all consider armoured forces to be an integral part of land maneuver according to their published literature. This is due to two reasons. The first is the ability to move about the battlefield with a high degree of individual mobility, protected from enemy fire and capable of delivering precise and devastating effects of their own.<sup>119</sup> The second is the fluidity that armour forces, properly employed, can impart to a battlefield. Armoured forces are capable of engaging, disengaging, maneuvering, and then re-engaging in a way that infantry struggles to achieve.

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<sup>118</sup> Thor was the Norse god of thunder and the ideal to which human warriors aspired. "The Aesir Gods and Goddesses,"

<sup>119</sup> Canada. Department of Defence., *The Armoured Regiment in Battle*: 21.

There can be little doubt that in recent history the tank has been the symbol of the armour corps, coming to embody the concept of armoured forces. A balanced vehicle with a high degree of mobility, protection and firepower, the tank has achieved a near mythological status not unlike the battleships of old, before the aircraft carrier stole their throne. It is still the dominant vehicle on the land battlefield. However, it is the crew that ultimately makes the vehicle a force to be reckoned with. Similarly, while individual pieces of equipment may be outmatched by the adversary, it is how those systems are used together that allows success to be achieved on the battlefield. The Israeli experience in the 2006 Lebanese War is illustrative of this point.

As detailed above, the 2006 Israeli invasion of southern Lebanon in response to Hezbollah actions fared poorly. While the Israeli army possessed numerous advantages over its more irregular foe, perhaps the most telling which were its tanks. The Merkava Mk 4 is an outstanding modern tank, equipped with advanced thermal targeting systems, excellent protection against direct fire and anti-tank guided missiles (ATGM) and mobility and a highly precise 120mm cannon.<sup>120</sup> Irrespective of this very capable vehicle, the Israeli army had already moved to

Merkava Mk IV and M1A2 Specifications		
	Merkava Mk IV	M1A2 SEP
<b>Weight</b>	65 tons	69.5 tons
<b>Length</b> <small>(including gun barrel)</small>	29 feet 8 inches	32 feet
<b>Width</b>	12 feet 2 inches	12 feet
<b>Height</b>	8 feet 7 inches	8 feet
<b>Crew</b>	4 <small>(commander, driver, gunner, loader)</small>	4 <small>(commander, driver, gunner, loader)</small>
<b>Passengers</b>	6 maximum	None
<b>Armor</b>	Composite matrix of laminated ceramic-steel-nickel alloy	Depleted uranium mesh-reinforced composite
<b>Main Armament</b>	120mm MG253 smoothbore gun <small>with laser-homing ATGM capability</small>	120mm M256 smoothbore gun
<b>Secondary Armament</b>	One 12.7mm (.50 cal) machine gun Two 7.26mm machine guns One 60mm mortar 12 smoke grenades	One 12.7mm (.50 cal) machine gun Two 7.62mm machine guns 24 smoke grenades
<b>Engine</b>	1,500 horsepower V12 water-cooled diesel	1,500 horsepower multi-fuel turbine engine
<b>Power/Weight</b>	23 horsepower per ton	26.9 horsepower per ton
<b>Payload Capacity</b>	48 rounds, 10 ready in an electrical drum	42 rounds
<b>Operational Range</b>	310 miles	265 miles
<b>Speed</b>	40 miles per hour	42 miles per hour

**Figure 3- Merkava Mk IV vs M1A2 Abrams**

Source: Kim, *The Uncertain Role of the Tank in Modern War*, p 6.

<sup>120</sup> "Land Warfare Platforms: Armoured Fighting Vehicles - Merkava," Janes, last modified 15 Apr 2020, accessed 26 Apr, 2021, [https://customer-janes-com.cfc.idm.oclc.org/Janes/Display/JAA\\_1296-JAFV](https://customer-janes-com.cfc.idm.oclc.org/Janes/Display/JAA_1296-JAFV).

an EBO model that privileged precision aircraft delivered munitions over land forces and allowed combined arms maneuver skills to atrophy significantly.<sup>121</sup> This factor, along with others, allowed a comparatively poorly equipped but ably led foe to fight a war that Israel was ill suited for. It also demonstrates that simply having exceptional equipment is not enough. An armoured force must be competently employed and skilfully commanded.

In the CAF there is no recognized SME for combined arms maneuver. Current armour doctrine is woefully inadequate, which focuses on legacy vehicle employment based on equipment and capabilities that either no longer exist or have been reduced in quantity to the point of ineffectuality. *The Armoured Regiment in Battle* explicitly links the role of the armour corps with the tank, and therefore consistently indicates how the equipment should be employed rather than how to achieve maneuver on the battlefield.<sup>122</sup> Though equipment by nature influences capability to significant degrees, mere possession is insufficient as demonstrated above. Further, the Canadian conundrum is to achieve land maneuver with a dwindling number of old tanks with no future prospect to change this fact.

Rather than tie the concept of armour maneuver to tanks, then, the CA should instead view the armour corps as the primary army organization focused on achieving land maneuver agnostic of the equipment assigned. This is a fundamental difference that needs acknowledgement. Canadian infantry battalions, similarly equipped and more numerous, are on the surface similar capabilities however the employment differs

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<sup>121</sup> Kim, *The Uncertain Role of the Tank in Modern War: Lessons from the Israeli Experience in Hybrid Warfare*.

<sup>122</sup> Canada. Department of Defence., *The Armoured Regiment in Battle*: 21



dramatically. The roles of the infantry and armour were compared previously while examining allied doctrine and the difference in perspective is clear. The infantry, given the same capability, will seek to grab an enemy by the throat and bludgeon him to death. Comparatively armour will seek victory through a combination of firepower and mobility, using land maneuver to best advantage.<sup>123</sup> To make an analogy, armour should operate akin to Mohammed Ali's famous style of boxing. "Float like a butterfly, sting like a bee. The hands can't hit what the eyes can't see."<sup>124</sup> Thus, armoured soldiers and commanders seek to dislocate the enemy through aggressive mobility operations and uses firepower, whether real or only threatened, to bend the enemy to their will. To an armoured commander, defeating the enemy does not necessitate their destruction; the commander must simply render him ineffective, either by position, compromising support or where required, by aggressive use of firepower, in whatever form that may be.

Doctrine is always aspirational, defining a model for the armed forces to operate on to achieve unity of action and purpose, however it must also acknowledge reality. In the case of the RCAC, doctrine, which underpins force employment models and force development structures, does not match either the current operational environment nor the future one. It is of critical importance that this adverse situation be addressed if the armoured corps desires to be successful in organizing for future conflict, to be able to articulate resource requirements, and thus empower its most capable resource, its soldiers.

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<sup>123</sup> Canada. Department of Defence. and B-GL-305-001/FT-001, *The Armoured Regiment in Battle* (Kingston: DND Canada, 1990): 21.; Canada. Department of Defence., B-GL-309-001/FT-001, *The Infantry Battalion in Battle* (Kingston: DND Canada, 1995): 1-2-1.

<sup>124</sup> "‘Float Like a Butterfly, Sting Like a Bee’: Best Quotes from Muhammad Ali," CNN, last modified 4 June 2016, accessed 3 Mar, 2021, <https://www.cnn.com/2016/06/04/sport/best-quotes-muhammad-ali/index.html>.

The first step must be to acknowledge the reality of the modern conflict environment and the CAF's resource environment. The armoured regiment, as prescribed in *The Armoured Regiment in Battle*, simply does not exist anymore. Furthermore, even if traditional armoured regiments were fully equipped with tanks, they still would not see employment as a regiment as envisioned in doctrine. Instead every permutation of force employment sees the armoured regiment employed as a composite unit; a battle group or as a task force. Accordingly, the *Armoured Regiment in Battle* should be superseded by the *Battle Group in Operations* as the unit level armoured doctrine. This change has already been adopted by both the UK and the US who have long acknowledged that armour operations are by nature composite operations.<sup>125</sup>

Yet the *Battle Group in Operations* is not without need of revision itself to account for this revised future. It must transition from an *ad hoc* arrangement into one that finds permanence within the brigade organizational structure in order to optimize its use of combined arms maneuver specialists. In this arrangement, the armoured regiment should transition from a regimental framework to a permanent armoured BG organization. This is not to say that infantry and engineers should find a permanent home in the armoured BG, but rather than the armoured BG structure is adapted from the outset to absorb those elements and is accustomed to supporting them in operations.<sup>126</sup> It would also mean that the armoured BG must be capable of operating across the kinetic domains. Specifically,

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<sup>125</sup> United States. Department of Defense., FM-3-96, *Brigade Combat Team*; United Kingdom. Ministry of Defence., *Doctrine Note 19/02 - Warfighting Tactics Part 5A: Armoured and Armoured Infantry Subunit Tactics*.

<sup>126</sup> Training requirements for each trade preclude maintaining a permanently manned BG structure. This type of organizational structure has been attempted over the years and all have come to the conclusion that below the unit/battalion level, training requires some focus. In particular, this experiment has been extensively explored by the Russians and dismissed, though Russia does employ the BTG as its primary land maneuver unit. Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: 37.

the armoured BG must include the habitual use of aerospace, space and electronic warfare spectrum capabilities. While these capabilities will be examined at greater length in the next section, the armoured commander should be enabled to achieve maneuver not just through the use of vehicles, but through a combination of land, air and space based sensors, ground vehicles, aircraft and indirectly delivered effects such as loitering munitions.

In recent memory the CA attempted to optimize the BG structure through the Land Operations 2021 series of experiments, most notably with 2 RCR in 2008.<sup>127</sup> The optimized BG sought to bring the armour, infantry, engineers and support together in a permanent structure. Though a short-lived venture, the concept revealed a number of important lessons. It identified the need to integrate intelligence and information into the BG above what had normally been assigned. UAV's were also identified as a key enabler.

Unmanned aerial vehicles (UAVs) at the BG level and lower are without a doubt essential...The effect achieved by UAV feeds means that sub-units do not need to go in blind into objectives, and the capability to establish persistent surveillance contributes significantly to the disruption of insurgent activities and effects.<sup>128</sup>

Unfortunately, the experiment was doomed to fail for several reasons. First, and perhaps most significantly, the CA was heavily committed to operations in Afghanistan and a long road to high readiness. At the time there was simply no room to be able to conduct a significant reorganization without impacting operations. Secondly, the experiment was based on an infantry battalion with permanent regroupings of enablers

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<sup>127</sup> Jim Terfry, "The Army of Tomorrow Optimized Battlegroup Experiment," in *Towards Land Operations 2021: Studies in Support of the Army of Tomorrow Force Employment Concept*, eds. Andrew B. Godefroy and Peter Gizewski (Kingston: Army Publishing Office, 2009), 5-10.

<sup>128</sup> Alex Ruff and Alex Godefroy, "Forging Land Forces for the Army of Tomorrow: The Battlegroup 2021 Study," *Canadian Army Journal* 11, no. 3 (2008): 18.  
[http://publications.gc.ca/collections/collection\\_2009/forces/D12-11-11-3E.pdf](http://publications.gc.ca/collections/collection_2009/forces/D12-11-11-3E.pdf).

which poses significant issues for training.<sup>129</sup> While a BG may certainly be formed from an infantry battalion, the infantry has a number of missions which may not necessitate either engineers or more importantly armour. In the US, the recognition that the infantry has roles outside of armoured operations is clear in its organization of Infantry Brigade Combat Teams (IBCT).<sup>130</sup> Conversely, the armoured BG will always require support from the other branches. Moreover, it is not necessary to permanently regroup formed elements beneath a unified command, despite the attraction. Rather it is necessary to be able to absorb such elements with a minimal amount of retraining and rehearsals.

Such a re-imagining of the traditional armour unit faces challenges from CA doctrine. CA modernizing directive states “The brigade group is the lowest level of headquarters that can integrate and synchronize joint effects.”<sup>131</sup> While this is true of synchronizing effects across domains, the uncomfortable reality is a complete Canadian Mechanized Brigade Group has not been deployed on operations since the Korean War, whereas armour and infantry units have seen constant deployment in the last two decades, and always as composite organizations.<sup>132</sup> Given the reality of composite operations it would appear most productive to organize the armoured unit in a manner that allows for quick regrouping with minimal coordination and training. Accordingly, an armoured BG

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<sup>129</sup> D. R. Bobbitt, "The Optimized Battle Group: A Contradiction in Terms?" *Canadian Military Journal* 13, no. 2 (2010), 202-205. [http://publications.gc.ca/collections/collection\\_2011/dn-nd/D12-11-13-2-eng.pdf](http://publications.gc.ca/collections/collection_2011/dn-nd/D12-11-13-2-eng.pdf).

<sup>130</sup> “The IBCT’s dismounted capability in complex terrain separates it from other functional brigades and maneuver BCTs” United States. Department of Defense., FM-3-96, *Brigade Combat Team*. 1-1.

<sup>131</sup> Canada. Department of Defence, A-PP-106-000/AF-001, *Advancing with Purpose: The Canadian Army Modernization Strategy*: 18

<sup>132</sup> A CMBG headquarters and some enablers were deployed to Afghanistan as the core of Task Force Kandahar from 2006-2011 along with an infantry BG. "Operation ATHENA," DND Canada, last modified 11 Nov, accessed 3 Mar, 2021, <https://www.canada.ca/en/department-national-defence/services/operations/military-operations/recently-completed/operation-athena.html>. 4 CMBG was permanently stationed in Lahr, Germany from 1957-1993. Though it was maintained at high readiness, it was never deployed on operations.

construct should see an air control element, fire coordination element and an improved intelligence capability organic to the unit. An EW coordinator should also be considered given the increasing danger electronic emissions pose. There are few other land maneuver units that rely so heavily on radio communication that failure to become more active in EW spectrum defence, as a minimum, could be lethal. Such reorganization would allow for armoured BG's to more effectively achieve decisive combined arms maneuver with minimal friction in absorbing mission specific enablers. It would enhance capability integration and promote the use of not only two dimensional land maneuver but an integrated three dimensional battlefield maneuver. This would also support the armour corps moving to better adopt the Adaptive Dispersed Operations model articulated in *Close Engagement* which advocates for considerably more joint integration at unit level.

Unit headquarters will have a robust intelligence and planning capability and will develop plans for execution by their assigned forces. Units will command and control tactical operations, and access and employ capabilities to shape those operations. Unit headquarters will have sufficient staff capability to simultaneously conduct current operations, plan for subsequent operations, control medical support and some CSS functions, and monitor surveillance and reconnaissance feeds, analyze information and produce both information and intelligence relevant to formation, unit and sub-unit operations. Depending on their mission, unit headquarters may operate surveillance assets, which are likely to be a mix of autonomous unmanned aircraft systems (UAS) and ground systems.<sup>133</sup>

These changes remain focused on enabling the soldiers and commanders of the armour corps to champion land maneuver in the CA, empowering them to more effectively wield the tools of war as Thor does with Mjolnir.

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<sup>133</sup> Canada. Department of Defence., *Close Engagement - Land Power in an Age of Uncertainty - Evolving Adaptive Dispersed Operations*: 22-23.

### **Searching for Odin: Early Adopter of Maneuver Technology<sup>134</sup>**

In the preceding sections the need to reorganize the CA concept of the armoured regiment to better enable the land maneuver SME was presented followed by the alternative of a systems approach to armoured forces. Both of these considerations are reflective of the contemporary operating environment and resources that are already at hand. Though the nature of war remains constant, the face of battle is changing, and it is incumbent upon the maneuver force to ensure it remains looking forward and resists becoming mired in convention. For the armour corps there are two areas where the corps should seek to actively investigate, lending its voice and weight to research and development. Those areas are future mounted armoured combat vehicle and unmanned ground vehicles.

As discussed above, the most potent capability the armour corps has is the maneuver specialists it employs. Organizing them in a manner that optimizes their ability to achieve land maneuver through a systems approach empowers the skilled commanders and crew on the battlefield. Yet there can be little doubt that equipment matters, even if it is not necessarily the defining aspect. The previous examination of doctrine demonstrated that tanks still figure prominently in both allied and adversarial concepts of maneuver. Despite that only Russia has undertaken to develop a third generation combat vehicle in the guise of the T-14 Armata and its partner the T-15 Bagulnik infantry fighting vehicle (IFV) based on the same chassis. These vehicles represent an evolutionary bound in armoured vehicle development, incorporating remote turrets, common armour and hull design, and passive and active protection system both kinetic

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<sup>134</sup> Odin was the leader of the Norse gods famous for wandering and a formidable god of war. "The Aesir Gods and Goddesses,"

and non-kinetic.<sup>135</sup> While there remains considerable debate about whether the Russians will be able to field such vehicles in significant numbers given its poor economic state, their development marks progress that is not being matched in Canada.

That a new manned armoured vehicle that support combined arms maneuver is necessary for the CA should not come as a surprise. As outlined, the current fleet of Leopard 2 tanks are already reaching obsolescence with no plans to replace them. The armoured regiments of today are equipped with a LAV 6.0 LRSS that is so few in numbers it must be protected as a high value resource, and the TAPV, an armoured patrol vehicle designed to run convoys in an improvised explosive device (IED) threat environment, not fight Russian tanks, or even BMP's for that matter.<sup>136</sup> It is difficult to understand how the CA could expect the currently equipped armoured regiment to conduct operations in a high intensity environment in line with doctrine.

The armour corps must similarly recognize that while tanks may appear to be the solution, there is no appetite to fund such a venture. So in line with the systems approach, the future armoured combat vehicle must approach mobility, protection and firepower from a different perspective. Such progressive research and development is well underway in the US under the Optionally Manned Fighting Vehicle Program. Designed as a replacement for the M2 Bradley IFV, the OMFV seeks challenge industry to present innovative ideas about how to build a modern fighting vehicle with an open

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<sup>135</sup> "Land Warfare Platforms: Armoured Fighting Vehicles - Armata T-14; T-15; T-16," Janes, last modified 27 Jan 2020, accessed 26 Apr, 2021, <https://customer-janes-com.cafvl.idm.oclc.org/Janes/Display/JAFV0063-JAFV>.

<sup>136</sup> The CA TAPV (also called Commando Elite) is a highly mobile 4x4 armoured vehicle with good blast protection but poor protection against direct fire weapons systems. It is armed with a 40mm automatic grenade launcher in a remote weapons turret that provides good close anti-personnel firepower but has little effect against other armoured vehicles. "Land Warfare Platforms: Armoured Fighting Vehicles - M1117; Commando Select; Commando Elite," Janes, last modified 22 Jan 2021, accessed 27 Apr, 2021, [https://customer-janes-com.cafvl.idm.oclc.org/Janes/Display/JAA\\_0357-JAFV](https://customer-janes-com.cafvl.idm.oclc.org/Janes/Display/JAA_0357-JAFV).

competition.<sup>137</sup> Acknowledging that the military doesn't entirely know for certain what is in the realm of the possible, US Army Futures Command has requested that manufacturers provide submissions based on nine characteristics which will help define requirements. Those characteristics are, "ranked in descending importance: survivability, mobility, growth, lethality, weight, logistics, transportability, manning, and training."<sup>138</sup> While the program is designed as an IFV replacement it also will investigate a number of advances that could equally apply to an future armoured combat vehicle. A similar approach in Canada could net innovative solutions to otherwise challenging problems. Advances in weapons design, incorporation of beyond line of sight missile technology, UAV munitions, active and passive protection capabilities could all be investigated to develop a vehicle with a common chassis with the wider CA but offer the armour corps the firepower and protection it requires in order to better achieve the maneuver objectives. While the CA continues to be significantly challenged to fund such an endeavour, migrating the armoured BG to a common vehicle chassis with the rest of the CA would achieve significant cost savings over the medium to long term. Further the development and implementation of a future armoured combat vehicle will be critical for the armoured BG to provide the depth of maneuver support doctrine and operations require.

The other area that the armour corps should act as a champion is that of unmanned ground vehicles (UGV). Conceptually, UGV's could offer the CA economical methods of increasing force capability without a similar expansion of cost or risk. The US

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<sup>137</sup> Andrew Feickert, *The Army's Optionally Manned Fighting Vehicle (OMFV) Program: Background and Issues for Congress* (Washington, D.C.: Congressional Research Service, 2021).

<sup>138</sup> Ashley Roque, "US Army Begins Evaluating OMFV Proposals," *Janes Defence Weekly*, 21 Apr, 2021. [https://customer-janes-com.cafvl.idm.oclc.org/Janes/Display/FG\\_3953206-JDW](https://customer-janes-com.cafvl.idm.oclc.org/Janes/Display/FG_3953206-JDW).



Robotic Combat Vehicle (RCV) program is a good example of possibilities. Designed with three vehicle capabilities in mind, simply named light, medium and heavy, the RCV program is designed to capitalize in the advances in robotics to support the ground combat team. The US envisions a fleet of RCV's providing layered support to the armoured formation with RCV-L's conducting reconnaissance, RCV-M's stripping the enemy's sense capabilities and RCV-H's acting as wingman to the tank enabled force.<sup>139</sup> Similarly, Australia has been experimenting with unmanned UGV's along side their M1 enabled tank force.<sup>140</sup> While the US program is ambitious in the way only the US has the funding to achieve, there are lessons that the CA should heed.

Fighting for information has always been an aspect of reconnaissance operations, though it is always preferable to avoid it. With the CA's current fleet of vehicles, TAPV's and LAV 6.0's would be expected to maneuver to the point of contact with the enemy, working to define the size and position of the adversary to enable their destruction. But this tactic places thin skinned vehicles at a disadvantage against their more heavily armoured foes. Further, if Russian doctrine is to be considered, "the Russians prefer having freedom of maneuver, and the meeting battle is an optimum tactic for achieving that freedom... The Russian Army fights to be able to move, not moves in order to fight."<sup>141</sup> The current fleet of vehicles would be unable to withstand such an assault given their limited protection and direct fire capabilities. If, however, the ground

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<sup>139</sup> Sydney J. Freedberg Jr, "Meet the Army's Future Family of Robot Tanks: RCV," *Breaking Defense*, 9 Nov, 2020. <https://breakingdefense.com/2020/11/meet-the-armys-future-family-of-robot-tanks-rcv/>.

<sup>140</sup> "Heavy Armour: Developing the Future Infantry Fighting Vehicles," Janes International Defence Review, last modified 21 Apr 2021, accessed 27 Apr, 2021, [https://customer-janes-com.cafvl.idm.oclc.org/Janes/Display/FG\\_3942043-IDR](https://customer-janes-com.cafvl.idm.oclc.org/Janes/Display/FG_3942043-IDR).

<sup>141</sup> Grau, *The Russian Way of War: Force Structure, Tactics and Modernization of the Russian Ground Forces*: 155.

sense function was enabled by a fleet of expendable UGV's like the RCV-L, capable of conducting autonomous intelligence collection and feeding that picture back to the parent sub-unit, such meeting engagements become much less of a concern. Instead, the destruction of a RCV-L, though a loss of resource, gains valuable intelligence without the cost of life.

In a 2020 wargaming exercise led by RAND on behalf of US Army Futures Command, the use of RCV's with manned vehicles was explored. Though the observations were preliminary, it was clear that RCV's could be used as armed reconnaissance to draw enemy fire, exposing his positions, without having to risk friendly forces.<sup>142</sup>

Two significant considerations can be drawn from this early conclusion. The first is that, as the experiment indicated, autonomous vehicle control is necessary to keep the pace of battle moving. Remote operation of such vehicles remains too limiting with current technology to rely on it and therefore employment of UGV's should heavily explore the use of artificial intelligence for autonomous control. Second, the cost of such systems must be kept low allowing them to be considered expendable and therefore undertake actions that may see their destruction, but in turn gain valuable intelligence.<sup>143</sup>

A significant amount of effort is being directed to unmanned and autonomous drone research, as many nations recognize the value of such systems in future combat. Already there are trial concepts of robotic swarming such as the US Navy's Low Cost Unmanned Swarming Technology (LOCUST) and the Estonian ADDER weaponized ground

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<sup>142</sup> Danielle C. Tarraf et al., *An Experiment in Tactical Wargaming with Platforms Enabled by Artificial Intelligence* (Santa Monica: RAND Corporation, 2020).

<sup>143</sup> Danielle C. Tarraf et al., *An Experiment in Tactical Wargaming with Platforms Enabled by Artificial Intelligence* (Santa Monica: RAND Corporation, 2020): 15-16.

vehicle.<sup>144</sup> While the use of unmanned vehicle and autonomous systems has a number of technical and ethical challenges, it is apparent that they will become a part of the modern battlefield. The UK *Integrated Operating Concept* only further reinforces this need.

Expensive, crewed platforms that we cannot replace and can ill afford to lose will be increasingly vulnerable to swarms of self-coordinating smart munitions — perhaps arriving at hypersonic speeds or ballistically from space — designed to swamp defences already weakened by pre-emptive cyber-attack.... Integrated Operating Concept 2030 for this force, trend analysis suggests that it will involve an intense competition between hiding and finding.<sup>145</sup>

Focus on lengthening the life of traditional capabilities is an important interim measure but effort needs to be applied to adapting to this new battlefield reality. Drone warfare, whether remotely operated or autonomous, will only expand in the years to come. Accordingly, the armour corps should lead the CA in developing the capability to ensure that combined arms maneuver remains enabled by technology and not undermined by complexity or tradition.

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<sup>144</sup> Jules Hurst, "Robotic Swarms in Offensive Maneuver," *Joint Force Quarterly* 4, no. 87 (4th Quarter, 2017), 105-111. <https://search-proquest-com.cafvl.idm.oclc.org/trade-journals/robotic-swarms-offensive-maneuver/docview/1952059112/se-2?accountid=10524>.

<sup>145</sup> United Kingdom. Ministry of Defence., *Integrated Operating Concept*: 6, 15.

## CHAPTER 6 - CONCLUSION: THOR, MJOLNIR AND THE FUTURE OF ARMoured LAND WARFARE

*It cannot be too often repeated that in modern war...the chief factor in achieving triumph is what has been done in the way of preparation and training before the beginning of the war.*

- Theodore Roosevelt

*It is this flexibility both in the minds of the Armed Forces and in their organisation, that needs above all to be developed in peacetime... This is the aspect of military science which needs to be studied above all others in the Armed Forces: the capacity to adapt oneself to the utterly unpredictable, the entirely unknown.*

- Professor Sir Michael Howard

The CAF faces a plethora of challenges in the coming years. The competition environment is changing every day, and the world is seeing the rise of state on state competition in a way that many had thought would not happen again. Russia has been knocking on Europe's door with an ever increasing heavy hand. It has deployed its most modern armies to its borders with Ukraine, conducted extensive war games with Belarus and moved to blockade Ukraine's access to the Black Sea while denouncing NATO and western motives.<sup>146</sup> It has engaged in extensive information warfare in the west, including influencing democratic elections.<sup>147</sup> In the Middle East, western nations struggle to remove themselves from long counter-insurgency campaigns in Iraq and Afghanistan, and in Africa strive to prevent the collapse of nations as they in turn struggle with growing terrorism and internal strife. In Asia, China continues to push the boundaries of accepted international standards of behaviour, threatening the invasion of Taiwan, to annex of the South China Sea, as well as waging a deliberate and corrosive cyber and

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<sup>146</sup> Laurence Peter, "Is Russia Going to War with Ukraine and Other Questions," *BBC News*, 13 Apr, 2021. <https://www.bbc.com/news/world-europe-56720589>; "Russia's Intention to Restrict Navigation in Parts of the Black Sea," United States Department of State, last modified 19 Apr 2021, accessed May 4, 2021, <https://www.state.gov/russias-intention-to-restrict-navigation-in-parts-of-the-black-sea/>.

<sup>147</sup> Connor Cunningham, *A Russian Federation Information Warfare Primer* (Washington, D.C.: University of Washington, 2020). <https://jsis.washington.edu/news/a-russian-federation-information-warfare-primer/>.

information campaign.<sup>148</sup> On top of these conflict areas, Canada is facing its worst public health crisis in the form of COVID-19.

Yet while all of these challenges are real and pressing, the fundamental role of the military is to be prepared to enforce the will of its government in defence of the nation. For the military, it is the unique application of violence that sets it apart from any other institution in government, and within the military, it is only the army that can take and hold ground. As has been painfully learned repeatedly over the last two decades, land forces are critical to any conflict, and combined arms maneuver is one of the primary mechanisms to achieve those decisive aims.

The doctrine on the use of armoured forces is aligned and clear between the US, UK and Canada, mapping out the requirement for mobile, armoured forces who can impose will on the battlefield. These forces cannot be a singular fleet approach, but instead must combine the merits of the combat arms branches into a unified whole. Whether it is through the use of battlegroups in Canada or the UK, or with combined arms battalions in the US, tactical and operational land maneuver depends largely on armoured forces.

Armoured forces themselves must also adapt to this era of pan-domain conflict. As new technology increasingly influences the tools of war, the armoured force must be adapted to address them. To be effective today it must be a three-dimensional force, but must also look to the future and the possibilities and threats that other domains impose.

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<sup>148</sup> "To Understand China's Aggressive Foreign Policy, Look at its Domestic Politics," Council on Foreign Relations, last modified 8 October 2020, accessed May 4, 2021, <https://www.cfr.org/blog/understand-chinas-aggressive-foreign-policy-look-its-domestic-politics>.

While the brigade remains the joint integrator for the CA, the modern combat unit must also be enabled with pan-domain capabilities if it is to survive.

In this regard, Russia is perhaps more forward leaning than is the west. By taking an evolutionary approach to modernization, with iterative improvements instead of whole force revolutions, Russia continues to be on the edge of land force employment. It continues to invest in asymmetrical advantages that the west, and the CAF in particular, have struggled to address. While it works to counter western dominance in some areas, Russia has doubled down on strengthening its armoured forces, clearly seeing them, in combination with its artillery, as the decisive land component. While the CAF and the rest of the NATO nations work to avoid open conflict, it must be prepared for it nonetheless. After all, highly skilled and equipped soldiers cannot be hurriedly manufactured after a crisis.

Despite the burgeoning threat and the CAF's recognition of the return of state competition, the armour corps has been unable to reconcile its theory and its reality. This dissonance creates confusion both within the ranks as well as in messaging outside the corps. Rather than seeking to bolster capability within the modern framework, the corps instead has largely focused on what little remaining tank capability there is and who gets it. Unable to make traditional arguments resonate in a resource constrained environment, armoured regiments have found themselves under-funded and under-resourced. Missions and personnel are instead being assigned to the infantry battalions who have been highly successful in positioning themselves as the backbone of a deployable task force.

The global environment of intense competition is an opportunity for the armour corps to re-envision itself and create a narrative to inspire action at the senior leadership levels. No longer can the corps continue to point to outdated doctrine as its rationale for

manning and equipment. It is clear that line of reasoning no longer holds any weight with decision makers. Instead the corps must present itself as an integrated combat system that offers the ability to conduct decisive maneuver on the battlefield in a way that no other capability can match. To do this the corps must examine new methodologies to achieve similar effects, acknowledging that resources for tanks is not forthcoming. It must better integrate the domains into its operations, such that they become a part of the whole and not just additive capabilities at the point of departure.

Enabling this integrated combat system is the armoured battlegroup, manned by the CA's land maneuver specialists, armoured soldiers and commanders. The armoured BG need not be a monolithic organization that strives to do everything at all times but rather must be a flexible one that incorporates capabilities in daily operations. It must see the battlefield as a three dimensional competition space rather than a planar one and seek capability accordingly, such as UAV and air control. Improving the armoured BG command and control capabilities with air support, fire support, EW, and intelligence functions which can be grown for operations would be critical. As the CA's maneuver specialists, the armoured BG can greatly increase its effectiveness when its people are enabled to synchronize and integrate.

Lastly, the cost-constrained environment will continue to challenge the resource intensive equipment procurement cycle. The corps must then focus on orienting investment in future capabilities that remain supportable without undue stress on the CA support system as the current tank fleet does. The future mounted armoured combat vehicle must be inherently expeditionary and consider paradigm shifts in how the triangle of mobility, firepower and protection are achieved. In the same vein, unmanned ground vehicles offer the corps a potentially resource appropriate method to achieve goals such

as reconnaissance support. Greater examination of autonomous collection and support vehicles merits considerable effort in development. Given the unity of purpose the US, UK and other close allies have on these initiative, coordination and collaboration would appear mutually beneficial.

Change in the military is always difficult, and institutional momentum is a real challenge that will need to be overcome. Entire generations have been brought up to a specific understanding of what armour is, and what it isn't. Recent conflicts have challenged many of these assumptions, from armours ability to be effective in built up areas, as in Fallujah, Iraq, to its utility in defeating hybrid and insurgent threats in Lebanon and Afghanistan. Land maneuver is as important now as in the days of Alexander the Great at the battle of Issus.<sup>149</sup> By adapting to an integrated modern battlefield, and positioning the armoured corps as the SME of combined arms maneuver prepared to adapt and change, the corps can truly become a powerhouse of land maneuver excellence.

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<sup>149</sup> "The Battle of Issus (333 BC)." *Hampton Roads Military History (Online)* 1, no. 1 (2007), 10-11. <https://search-proquest-com.cafv1.idm.oclc.org/scholarly-journals/battle-issus-333-bc/docview/191712213/se-2?accountid=10524>.



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