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COLD WAR NOSTALGIA OR STRATEGIC CAPABILITY: SHOULD CANADA CONTINUE TO INVEST IN ITS TANKS?

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ABSTRACT

This paper will analyze the contemporary operating environment, the technology that has shaped it, how main battle tanks fit into this new reality and determine if and why Canada should continue to invest in its tank fleet. The analysis will comprise an in-depth examination of the Five Eyes nations' defence policies, how they describe the contemporary operating environment, what policy decisions they have been making with respect to their tanks and how they have been employing them since the end of the Cold War. The rapidly growing global defence industry continues to generate more advanced technologies that have impacted recent conflicts, such as the Nagorno-Karabakh region conflict and the Russo-Ukraine war. These two conflicts will be used as case studies to portray the impacts of drones, loitering munitions, electronic warfare, and advancements in artillery ranges and lethality that have all shaped the battlefield into what French General Guy Hubin, author of *La Guerre: Une vision française* and *Perspectives tactiques*, describes as a strategic 'chess match'. All tactical movement is essentially visible to both of sides of a conflict, meaning strategies for success have become more intellectual. As a result of this analysis, it will be shown that tanks still play a vital role in modern warfare, but it comes at a price. This paper will argue that the threats of the sensor rich battlefield have created a necessity for counter-drone capabilities, increased emphasis on air defence and the need to upgrade tanks with active protection systems. This paper will conclude that the tank is not dead, nor is it a relic from the Cold War, but without investment in these new capabilities, Canada's tank fleet will be left vulnerable in modern warfare.

INTRODUCTION

Victory smiles upon those who anticipate changes in the character of war, not upon those who wait to adapt themselves after the changes occur.
-General Guilio Douhet[1]

In the 2006 James Bond film, *Casino Royale*, the character M states "Christ, I miss the Cold War," in reference to the complexity of intelligence operations in the 2000s. A similar sentiment can be applied when discussing the importance of tanks on the modern-day battlefield, with respect to how the nature of warfare has evolved since the end of the Cold War. The Cold War could be summarized by spy games, a nuclear arms race, military build-up, competition of ideals between East and West, and détente due to mutually assured destruction.[2] The Cold War was not a simple conflict, but in comparison to the contemporary security environment, it had more simplistic characteristics.[3] Modern warfare has evolved in complexity from binary to asymmetric, which has forced governments to ask difficult questions about which capabilities are required to be effective in the contemporary operating environment and to be prepared for the next conflict. The asymmetric contemporary operating environment has evolved to include more non-state actors, cyber warfare, proxy wars and the re-emergence of great power competition. So how do 60 tonne main battle tanks fit in? Have tanks outlived their usefulness in the new asymmetric environment? This paper will address whether Canada should continue to invest in its main battle tank fleet.

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[1] Sean M. Maloney, Scot Robertson. *The revolution in military affairs*. International Journal, Issue 3, Vol 54, (1999): 443.

[2] Jasen Castillo. "The Cold Comfort of Mutually Assured Destruction." War on the Rocks. Last accessed 31 August 2021. https://warontherocks.com/2021/06/revolutionary-thinking-questioning-the-conventional-wisdom-on-nuclear-deterrence/

[3] Warren Chin. *Technology, war and the state: past, present and future*. International Affairs, Vol 95:4, (2019).

Cold War nostalgia has underpinned why some states have maintained large fleets of tanks, while other states have been divesting them and investing in modernized alternative capabilities. For countries such as Canada, up until the new millennium, could state that they bordered with three oceans and its most vital ally and that the shores of combat were nowhere near its borders, but with the evolution of cyber warfare which does not respect borders, this is no longer true. So one must ask, why has Canada maintained a tank fleet? Tanks have a maximum effective range and their influence to project power is limited by their line of sight, so based on this limitation, how useful will tanks be in the decades to come? Chapter 1 will provide a historical analysis on why Canada has leveraged its North Atlantic Treaty Organization (NATO) membership, strategic partnerships, interoperability with allied nations and the likely threats that Canada could face off with to justify maintaining a tank capability. An analysis of Canadian defence policy from the 1971 *Defence in the 70s* to the 2017 *Strong, Secure and Engaged:* Canada's Defence Policy (SSE) will be applied in order to scrutinize why Canada has maintained a tank fleet and thus provide a recommendation on whether Canada should continue to invest in its tanks. In order to make a recommendation, Chapter 2 will conduct a thorough analysis of what policy decisions some of Canada's key allies are making with respect to their tanks.

The first tank, the British Mark I, made its operational debut during the Great War in 1916.[4] Ever since, tanks have been a critical capability for success across the spectrum of conflict as their core purpose has remained unchanged: combine firepower, mobility,

[4] Think Defence. "Obituary for the Main Battle Tank – or its Future." Last accessed 31 Aug 2021. https://www.thinkdefence.co.uk/2013/04/obituary-for-the-main-battle-tank/

and survivability to dominate the close battlefield.[5] The advent of tank warfare during the world wars created a launch pad for the global defence industry to make advancements in tank capabilities which has continued into the 21st Century. The technological advancements in tanks has also forced the defence industry to invent other types of capabilities to combat the effects of large tank fleets, such as more advanced anti-tank weapons, directed energy weapons, drones, loitering munitions, precision guided munitions and electronic warfare (EW) assets. In chapter 3 this paper will analyze these innovative technologies that have been emerging from the defence industry that are being employed to fight against tanks. These new capabilities are providing non-state and state actors with tools that are making warfare increasingly complex and difficult to operate in. This analysis will include two case studies that portray the effectiveness of these modern technologies against tanks in order to address whether tanks are still worth the investment during the age of modern warfare.

A great deal of warfare in the 21st Century has migrated into the gray zone, meaning the majority of warfare has not crossed the threshold into armed conflict, but the advancements in cyber warfare and proxy wars has weaponized gray zone tactics to a point where states and non-state actors can inflict severe economic damages that can be catastrophic to nations. In a RAND Corporation study titled *Gaining Competitive Advantage in the Gray Zone,* a gray zone is defined as:

> The gray zone is an operational space between peace and war, involving coercive actions to change the status quo below a threshold that, in most cases,

[5] Jon Hawkes, Sam Cranny-Evans, and Mark Cazalet. "The Tank Is Dead. Long Live The Tank." Wavell Room. Last accessed 13 July 2021. https://wavellroom.com/2020/10/01/a-critical-analysis-of-the-future-of-the-tank/

> would prompt a conventional military response, often by blurring the line between military and non-military actions and the attribution for events.[6]

The proliferation of gray zone tactics has forced countries to adapt their defence policies and strategies to deal with these unconventional threats. That being said, global powers still maintain large fleets of tanks in the event they need to flex their hard power, deploy capable expeditionary forces to deter adversarial threats and secure their country's sovereignty. Chapter 4 will analyze Canada's future defence requirements and make recommendations on how they should proceed.

There are many variants of main battle tanks, but for the purposes of this paper the standard will be in accordance with the definition provided by the Organization for Security and Co-operation in Europe (OSCE) Treaty on Conventional Armed Forces in Europe:

> The term 'battle tank' means a self-propelled armoured fighting vehicle, capable of heavy firepower, primarily of a high muzzle velocity direct fire main gun necessary to engage armoured and other targets, with high cross-country mobility, with a high level of self-protection, and which is not designed and equipped primarily to transport combat troops.[7]

Having a common understanding of what constitutes a tank is a vital factor in understanding the significance of this analysis. As shown in Figure 1, Nicholas Drummond, a former UK Army officer and now a defence industry analyst and consultant specializing in land warfare has analyzed the number of main battle tanks globally according to the International Institute for Strategic Studies (IISS) Military Balance 2020

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[6] Lyle J. Morris, Michael J. Mazarr, Jeffrey W. Hornung, Stephanie Pezard, Anika Binnendijk, Marta Kepe. "Gaining Competitive Advantage in the Gray Zone." The RAND Corporation. (2019): 8. Last accessed 23 July 2021. https://www.rand.org/pubs/research_reports/RR2942.html

[7] Organization for Security and Co-operation in Europe. "Treaty On Conventional Armed Forces In Europe". Last accessed 13 July 2021. https://www.osce.org/library/14087

data.[8] The data shows that there are over 73,000 tanks that are either in service or storage and approximately 20,000 are owned by adversarial countries to Canada and its allies.[9]

Global MBT numbers by country

	Country	Number		Country	Number		Country	Number
1	Russia	12,950	34	Kuwait	368	67	Armenia	109
2	United States	6,333	35	Uzbekistan	340	68	Bulgaria	90
3	China	5,800	36	Lebanon	334	69	Tunisia	84
4	India	4,665	37	Spain	327	70	Canada	82
5	Egypt	3,620	38	Nigeria	319	71	South Sudan	80
6	N. Korea (DPRK)	3,500	39	Kazahkstan	300	72	Indonesia	79
7	S. Korea (ROK)	2,914	40	Angola	300	73	Kenya	78
8	Pakistan	2,766	41	Bangladesh	276	74	Croatia	75
9	Turkey	2,379	42	Eritrea	270	75	Sri Lanka	62
10	Ukraine	2,076	43	Chile	246	76	Qatar	62
11	Israel	1,610	44	Peru	240	77	Chad	60
12	Iran	1,513	45	Uganda	239	78	Mozambique	60
13	Algeria	1,467	46	Germany	236	79	Australia	59
14	Greece	1,328	47	Argentina	231	80	Austria	56
15	Vietnam	1,315	48	United Kingdom	227	81	Malaysia	48
16	Saudi Arabia	900	49	Serbia	212	82	Slovenia	46
17	Cuba	900	50	France	200	83	Bosnia-Herzegovina	45
18	Morocco	802	51	Italy	200	84	Tanzania	45
19	Japan	667	52	Cambodia	200	85	Hungary	44
20	Turkmenistan	654	53	Myanmar	185	86	Afghanistan	44
21	Poland	637	54	Finland	180	87	Rep. of Congo	40
22	Taiwan	565	55	Bahrain	180	88	Zimbabwe	40
23	Jordan	556	56	Singapore	176	89	Denmark	38
24	Belarus	542	57	DP Congo	174	90	Guinea	38
25	Sudan	465	58	Venezuela	173	91	Portugal	37
26	Ethiopia	461	59	South Africa	157	92	Tajikistan	37
27	Azerbaijan	439	60	Kyrgystan	150	93	Norway	36
28	Mongolia	420	61	Nicaragua	147	94	Rwanda	34
29	Romania	418	62	Cyprus	134	95	Macedonia	31
30	Thailand	410	63	Switzerland	134	96	Czech Republic	30
31	Iraq	393	64	Georgia	123	97	Slovakia	30
32	Brazil	393	65	Sweden	120	98	Zambia	30
33	UAE	385	66	Oman	117	99	Laos	25

Figure 1- Global MBT numbers by country, IISS data 2020[10]

A multitude of factors must be weighed when considering which countries have the most tanks. Military strategists would never look at tank numbers in isolation because there are

[8] Nicholas Drummond. "Twitter". Last accessed 13 July 2021. https://twitter.com/nicholadrummond/status/1272146192189861890.

[9] International Institute for Strategic Studies. *The Military Balance 2020*. Issue 1, Vol 120, (2020). Last accessed 13 July 2021. *https://www.tandfonline.com/toc/tmib20/120/1?nav=tocList*

[10] Nicholas Drummond. "Twitter". Last accessed 13 July 2021. https://twitter.com/nicholadrummond/status/1272146192189861890.

several key factors that are imperative to be considered. For example, there are different variants of tanks illustrating that not all tanks are created equal. Secondly, factors such as air superiority including attack aviation and close air support, anti-tank weapons, precision guided munitions, professional versus conscription armies and the quality of soldiers that are crewing those tanks are just some of the factors that can weigh on the scales of tactical advantage. Tanks are rarely employed without enablers, therefore tanks are only one piece of the combined arms puzzle that are employed in concert to defeat an adversary. Chapter 1 will analyze Canada's evolution of tanks, which will include the Leopard C1 in Germany, the temporary direct fire concept that was nearly adopted known as the Mobile Gun System and gaining practical experience in Afghanistan that proved their utility across the spectrum of conflict. The recent Afghanistan experience and current NATO deployment in Latvia have demonstrated from a practical perspective, vice theoretical concept, that tanks are still a valuable capability to have in the inventory. From a Canadian standpoint, maintaining its smaller tank fleet enables interoperability with allies, sustains a heavy armour capability and the corporate knowledge that comes with it, all while enabling a defence posture that has the potential to react to the modern global security environment; therefore, tanks are still a valuable capability worthy of investment by Canada.

CHAPTER 1: CANADIAN HISTORICAL CONTEXT

This chapter will analyze Canada's defence policies starting with the 1971 *Defence in the 70s* and how it has justified maintaining its tank fleet henceforth. It is important to note that since the 1971 defence policy was issued, there have been two fundamental global events that have shaped the Canadian government's view on tanks. The first major event was the end of the Cold War and the second was the Global War on Terror sparked by the September 11th, 2001 terrorist attacks. As a result, the contemporary global security environment has been shaped by these two events, as Randolph Mank, a former Canadian ambassador stated, into a more fluid environment over the past decade due to an ascendant China, a re-assertive Russia and Britain's withdrawal from the EU: this amongst the remaining global challenges of the COVID-19 pandemic, climate change, failing states, religious conflict and massive refugee movements.[11] Canada's defence policies have already addressed many of these major events and the modern security environment which have highlighted common themes such as the importance of strategic relationships and interoperability with allied nations as to why Canada needs to maintain a tank capability.

End of the Cold War

Canada's 1971 *Defence in the 70s* states: "Defence policy cannot be developed in isolation. It must reflect and serve national interests, and must be closely related to foreign policy, which the Government reviewed concurrently with defence."[12] During the Cold War, Canada's defence policies were clearly

[11] Mitchell Atkinson. "Engagement In Ukraine; In Canada's National Interest?." Joint Command and Staff Program Exercise Solo Flight, Canadian Forces College, 2020.

[12] Canada. Department of National Defence. *White Paper on Defence: Defence in the 70s.* (Ottawa: Information Canada, 1971): 3.

intertwined with the United States (US) based on the nuclear threat posed by the Soviet Union. When the Canadian government issued defence policies during the Cold War, it was imperative to understand the importance of its relationship with the US since they were the only Western global superpower. It was crucial that Canada consider the US while making defence policy decisions. Dr Kenneth Holland, a professor of Political Science at Ball State University and vice-president of the Association for Canadian Studies in the US, described Canada's motivation for membership with NATO as:

> Canada's membership in NATO is motivated primarily by its need to please its giant neighbor rather than concern about its own security. Canada does not want to alienate the United States by spending too little on defense, thereby incurring the charge of being a free rider, relying on its southern neighbor to defend it, and risking retaliation, such as United States restrictions on Canadian exporters' access to the giant United States market.[13]

Canada certainly had numerous reasons for joining NATO, but as Dr Holland pointed out, the Canada-US relationship was very high on that list. Both countries were dependent upon each other for defence cooperation, most notably through the North American Aerospace Defence (NORAD) North Warning System considering the Soviet nuclear threat across the arctic.[14] Dr Frank Maas, a professor at Fanshawe College, elaborates on Canada having tanks in Europe and its commitment to NATO: "DND is arguing that we will be 'letting down the side,' will 'not be paying our dues in the club,' 'will not be meeting our international commitments' if we fail to meet adequately the tasks assigned

[13] Kenneth M. Holland. *How unipolarity impacts Canada's engagement with the North Atlantic Treaty Organization*. Canadian Foreign Policy Journal, Vol 18:1, (2012): 53.

[14] Richard Goette. *Sovereignty and Command in Canada–US Continental Air Defence, 1940–57*. (Vancouver: UBC Press, 2018): 170.

to us by our NATO and NORAD allies."[15] Canada having tanks in Europe was an essential symbol of its NATO commitment and was crucial to support Canada's foreign policy objectives with its key allies. Dr Maas provides further analysis of the importance of Canada having tanks in Europe by way of the local German farmer during the Cold War. When a farmer saw a NATO aircraft flying above his farm, he was not able to immediately identify that it was a NATO aircraft, but when a tank rolled up to his farm with a maple leaf on it, he was provided with the reassurance and confidence that NATO forces were present and would protect his land.[16] This same sentiment can be extended beyond the Cold War, as tanks enable a physical ground presence that has psychological impacts on both the local population and adversaries.

Canada's 1987 *Challenge and Commitment Defence Policy* highlighted its alignment with the US by stating: "Canadian security policy must respond to an international environment dominated by the rivalry between East and West. These two groups of nations, each led by a superpower, are in conflict, a conflict of ideas and values."[17] Canada needed to maintain its interoperability with the US military and make it clear that that if push comes to shove, Canada was able to respond with a combat capable force. Apart from NORAD, during the Cold War as a part of the NATO deterrence strategy against the Soviet Union, Canada also contributed an army brigade and an air division which included its Leopard C1 tanks stationed in Germany. As a contributing nation and a part of NATO collective security, Canada justified having tanks out of

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[15] Frank Maas. *The price of alliance: the politics and procurement of Leopard tanks for Canada's NATO brigade*. (Vancouver: UBC Press, 2017): 89.

[16] *Ibid.*, 91.

[17] Canada. Department of National Defence. *Challenge and Commitment: A Defence Policy for Canada.* (Ottawa: Minister of Supply Services Canada, 1987): 5.

necessity in order to deter the Soviet threat and to be viewed by their NATO counterparts, especially the US, as a fair contributor.

Global War on Terror

The post-Cold War era saw a dramatic shift in regard to the temporary end of great power competition. The global security environment most notably had shifted to peacekeeping operations in the Balkans and the conventional 1991 Gulf War to end the Iraqi invasion into Kuwait. The end of the Cold War led Dr Holland to state: "The dramatic change in the attitude of Canada toward active military combat following the collapse of the Soviet Union and the end of the Cold War in 1991 is one of the most remarkable events in recent Canadian foreign policy."[18] The Canadian government's shift in foreign policy resulted in the 1990s being known as the "decade of darkness" for the Canadian Armed Forces (CAF) according to former Chief of Defence Staff General Rick Hillier.[19] This shift was set in motion by budget cuts that saw the defence budget cut from two percent of GDP in 1989 down to 1.1 percent by 1999.[20] As Dr Douglas Bland, a former Lieutenant Colonel in the CAF and defence studies professor at Queen's University has argued in his book titled *Canada Without Armed Forces?*, the Canadian military was in a seemingly irreversible downward spiral towards collapse.[21]

The end of the Cold War and 1990s brought a shift in priorities away from the CAF as the Canadian government sought their Cold War peace dividend and shifted focus from swords to ploughshares. The 1994 *White Paper on Defence* concentrated on the end

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[18] Kenneth M. Holland. *How unipolarity impacts Canada's engagement with the North Atlantic Treaty Organization*. Canadian Foreign Policy Journal, Vol 18:1, (2012): 55.

[19] Alexander Moens. *Afghanistan and the revolution in Canadian foreign policy.* International Journal, Issue 3, Vol 63, (2008): 572.

[20] *Ibid.*, 572.

[21] Douglas Bland. *Canada Without Armed Forces*. (Kingston: McGill-Queens University Press, 2004).

of the Cold War and the break-up of the Soviet Union, and as a result there was more focus on regional instabilities with the global superpower conflict coming to an end.[22] The international security concerns had shifted to ensure safe environments for the protection of refugees, the delivery of food and medical supplies, the provision of essential services in countries where civil society had collapsed, and the emergence of "rogue" states attempting to acquire weapons of mass destruction.[23]

After a decade of being underfunded, the CAF crawled into the new millennium to witness the shocking change in the global security environment initiated by the terrorist attacks on September 11th, 2001. The Minister of National Defence at the time, John McCallum, acknowledged that the CAF needed to be transformed and made crucial announcements in 2003 which included divesting the fleet of Leopard C2 tanks to be replaced with a wheeled Mobile Gun System: "It is part of our commitment to modernize the Canadian Forces by re-investing in capital projects that provide the capabilities Canada needs in the emerging international security environment."[24] This environment ushered in the beginning of nearly a decade of counter insurgency (COIN) operations that would take place in Afghanistan.

In a 2003 interview with Defence Daily, then Chief of the Land Staff, LGen. Rick Hillier stated in remarks prepared for delivery at the acquisition announcement that: "The Leopard, with all its capability, is 'useless' to soldiers in Kabul, Eritrea, Bosnia or elsewhere that direct fire is needed."[25] The decision to divest the tanks had been made

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[22] Canada. Department of National Defence. *1994 White Paper on Defence*. (Ottawa: Her Majesty the Queen in Right of Canada, 1994): 2.

[23] *Ibid.,* 2.

[24] USA. Defense Daily. *Canada To Buy Mobile Gun Systems*. Potomac Vol. 219, Iss. 21, (2003): 1.

[25] *Ibid.,* 1.

prior to the CAF taking command of Kandahar province which saw the Canadian Battle Group (BG) fighting against the Taliban in harsh desert conditions. Ultimately, the tanks had not been divested by 2006 and the intense fighting that ensued in Kandahar resulted in the decision to deploy its 30-year-old Leopard C2 tanks to provide additional armour and direct fire support to the BG. In General Rick Hillier's book, *A Soldier First*, he stated: "We also came to the conclusion that we needed more on the ground to fight. We were not looking to win by a hockey score of 3-2: we wanted to win 100-0 and had to upgrade our equipment and personnel to achieve that."[26] Canada was shocked by the number of casualties that were coming out of Kandahar and Gen Hillier, the Chief of Defence Staff at the time, had to convince Cabinet to allow him to deploy more troops and tanks. He described his deliberations with Cabinet alongside the Minister of National Defence, Gord O'Connor: "While Privy Council Office focused on how many options could dance on the head of one briefing note, we walked out of that meeting with the government's support, approval for everything we'd sought and what the soldiers truly needed."[27] The tank deployment was a welcomed addition to the BG that was sorely in need of additional firepower and armour for their fight against the Taliban.

Dr Sean Maloney, a professor at the Royal Military College, described the immediate effects of the tank deployment: "when Canada deployed Leopard C2 medium tanks to support operations in Zharey district, they were called 'Super Monsters' by Taliban fighters who were unused to the presence of tanks on the battlefield."[28] The Leopard C2s demonstrated their effectiveness immediately upon the Taliban as they were

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[26] Rick Hillier. *A Soldier First*. (Toronto: Harper Collins, 2010): 440.
[27] *Ibid.,* 441.
[28] Sean M. Maloney, *A violent impediment: the evolution of insurgent operations in Kandahar province 2003–07*. Small Wars & Insurgencies, Issue 2, Vol 19, (2008): 213.

incredibly effective in providing direct fire and influence over the battlefield, which had both physical and psychological impacts that the BG needed.

Insurgents firing AK47s and RPGs at the Canadians had to rethink their tactics or suffer the consequences of 105mm sabot darts being fired through their grape huts. Unfortunately, the Leopard 1s were quick to overheat in the desert conditions and lacked protection from Improvised Explosive Devices (IEDs). As a result, the CAF purchased 100 Leopard 2 tanks from the Netherlands to replace the Leopard C2s. According to Jeremy Sales, a spokesperson for Canada's Dept. of National Defence: "Leopard 2A6s have a better firing capability, are newer, faster and have more protection and advanced technologies than Canada's aging Leopard 1 fleet. Additionally, the new tanks will be cooler, generating less heat than the Leopard 1's hydraulic systems."[29] The Government of Canada's decision to purchase new tanks was qualified by the need to protect Canadian soldiers and the 2008 *Canada First Defence Strategy* highlighted the government's mistake to under fund the CAF in the 1990s and committed to properly resource the CAF to deal with future threats:

> Looking back, it is clear that the peace dividend that resulted from the end of the Cold War was relatively short-lived. The 1990s saw the emergence of difficult security challenges, including failed and failing states, civil wars and global terrorism. Many countries, including Canada, were slow to fully appreciate and adjust to these new realities. During this period, governments dramatically under-invested in the Canadian Forces, leaving them seriously unprepared to deal effectively with this increasingly complex global environment.[30]

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[29] Ann Roosevelt. *Canada Cancels Plans For Mobile Gun System, Turns To Tanks.* Defense Daily International, Potomac, Issue 16, Vol 8, (2007): 2.

[30] Canada. Department of National Defence. *Canada First Defence Strategy*. (Ottawa: Her Majesty the Queen in Right of Canada, 2008): 6.

The complex global security environment began to evolve again as Canada closed out its combat mission in Kandahar in 2011. The next decade saw the re-emergence of great power competition, with an ascendant China and a re-assertive Russia as the primary threats that were challenging the rules-based international order.

Return to Great Power Competition

For over a decade, the US and their allies were busy dedicating resources and spending billions of dollars while fighting in Afghanistan and Iraq. Once these conflicts began to subside and the Global War on Terror became less prominent, the US and its allies emerged into a global security environment that had changed once again. Suddenly the US and their allies found themselves simultaneously at odds with insurgencies, Russia again and China who had accelerated pushing their soft and hard power around the world. A re-assertive Russia invaded Georgia in 2008[31], Crimea and the two eastern Oblasts of Ukraine in 2014[32], which displayed President Putin's willingness to push back on NATO countries, forcing them to establish the enhanced Forward Presence (eFP) BGs in the Baltic States and Poland in response.[33] Meanwhile, China had been employing strategies such as the Belt and Road Initiative to expand their sphere of influence and grow their economy to a point where they were now competing with the US as a global superpower.[34] Figure 2 shows an example of China expanding their hard power by

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[31] Mikheil Saakashvili."When Russia Invaded Georgia". The Wall Street Journal. Last accessed 13 July 2021. https://www.wsj.com/articles/when-russia-invaded-georgia-1533682576.

[32] Peter Dickinson. "All Roads Lead To Ukraine In Putin'S Global Hybrid War". Atlantic Council. Last accessed 13 July 2021. https://www.atlanticcouncil.org/blogs/ukrainealert/all-roads-lead-to-ukraine-in-putins-global-hybrid-war/.

[33] North Atlantic Treaty Organization. *NATO's Enhanced Forward Presence Fact Sheet*. (Brussels: NATO Headquarters, 2020). Last accessed 13 July 2021. https://www.nato.int/nato_static_fl2014/assets/pdf/2020/10/pdf/2010-factsheet_efp_en.pdf.

[34] Andrew Chatzky, James McBride. *China's Massive Belt And Road Initiative*. Council on Foreign Relations. Last accessed 13 July 2021. https://www.cfr.org/backgrounder/chinas-massive-belt-and-road-initiative.

continuously growing their defence budget between 2010 and 2019 which now totals $174B USD annually, and has made them the second-largest military spender in the world behind the US.[35]

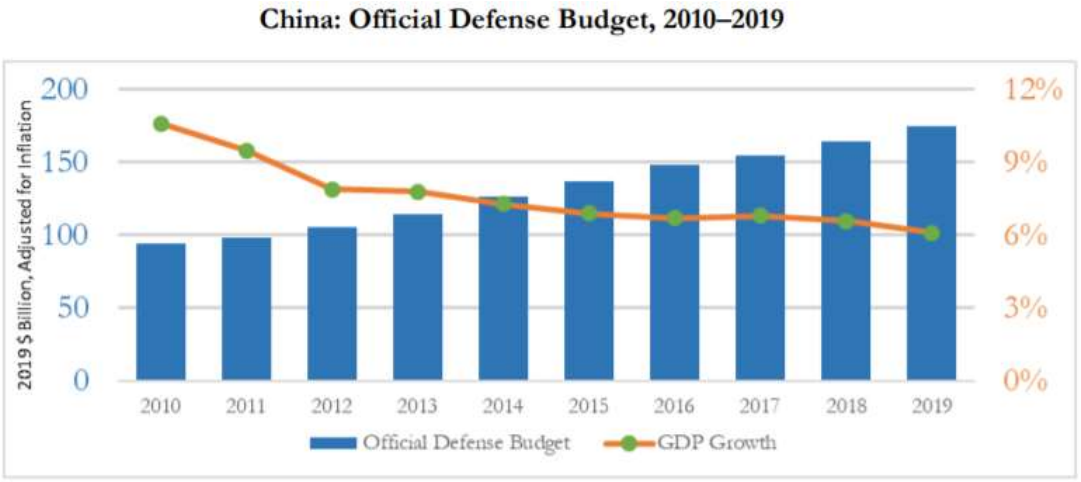

Figure 2 - China: Official Defense Budget, 2010-2019, US DOD, 2020[36]

Following a decade of fighting in two COIN Operations, a sudden need emerged to refocus tactics and strategies for great power competition. Dr Michael Shurkin, a senior political scientist at the RAND Corporation and former history lecturer at Johns Hopkins University, describes this era as a cautionary tale for NATO countries: "No one wants to show up at the next war prepared for the wrong war. The mistake can be catastrophic. In 1940, France went to war having made the wrong bets about what the future would be like."[37] Of course, in his example:

> Germany, in contrast, had bet correctly, giving them a strategic advantage that resulted in one of the greatest military upsets in history. They had grasped better than their opponents the implications of new technology,

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[35] USA. Department of Defense. *Military And Security Developments Involving The People's Republic Of China 2020*. (Washington. 2020): 164. Last accessed 13 July 2021. https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF.

[36] *Ibid.*, 164.

[37] Michael Shurkin. "Kill The Homothetic Army: Gen. Guy Hubin's Vision of the Future Battlefield". War on the Rocks. Last accessed 13 July 2021. https://warontherocks.com/2021/02/kill-the-homothetic-army-gen-guy-hubins-vision-of-the-future-battlefield/.

> adapting how they organized themselves and fought to make the best use of it.[38]

As he indicated, the COIN operations were coming to a close and there was a need to refocus the attention to state competition.

Dr Shurkin highlights the importance of adopting new technology and understanding how to employ it quickly, boldly and in novel ways, otherwise NATO's adversaries could gain a strategic advantage. As Dr Maloney describes it: "Our involvement in Afghanistan and the re-ordering of the (for the time being) post-American world has given us this opportunity to examine who we are, and what we want."[39] The era of a unipolar global superpower is now being threatened and highlights an opportunity for Canada to realign its defence and foreign policies to be better prepared for the future. In Dr Maloney's 2016 article titled *Towards a new national security policy for Canada* he states: "Canada has reached a point in its history where it is time to let go of twentieth century Canadian policies as the foundation of the foreign policies for the twenty-first."[40] The following year, in 2017, the Canadian Government released its new defence policy SSE, its most comprehensive and funded policy to date. SSE effectively addressed what Dr Maloney had highlighted by identifying that the new global security environment had evolved and so must the CAF:

> This policy is grounded in a thorough assessment of the global security environment – one that is marked by the shifting balance of power, the changing nature of conflict, and the rapid evolution of technology. Increasingly, threats, such as global terrorism and those in the cyber

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[38] *Ibid.*

[39] Sean M. Maloney. *Towards a new national security policy for Canada*. Defense & Security Analysis, Issue 2, Vol 32, (2016): 206.

[40] *Ibid.*, 206.

> domain, transcend national borders. These trends undermine the traditional security once provided by Canada's geography.[41]

SSE aptly addresses the capabilities the CAF needs to procure in order to be effective in the modern global security environment. The Canadian Army will specifically pursue procurement of ground based air defence, bridge and gap crossing equipment, anti-tank systems and vehicles that are capable of operating in the arctic.[42] However, for the first time since the 1971 Defence Policy, SSE did not specifically address the CAF's current fleet of Leopard 2 tanks, which begs the question: why? The Canadian Army had been employing tanks in Afghanistan for 6 years and in 2017, took command of the NATO eFP BG in Latvia[43], which also included allied tanks. So why did SSE omit to incorporate tanks while it is still a prominent capability being utilized today? Canada's 2017 national defence policy may not have mentioned its tanks, but the 2020 Canadian Army Modernization Strategy (CAMS) did.

The CAMS was not intended to be an amendment to SSE, it is an internal tactical level CAF policy document designed to clarify the Commander Canadian Army's (CCA) intent for how he saw the army evolving. CAMS filled in the policy gaps left out by SSE down to the tactical level. It identified the combined arms team as the army's vital ground. The ultimate expression of the combined arms team is a combat team, which includes mechanized infantry and tanks at the company or squadron level.[44] As an

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[41] Canada. Department of National Defence. *Strong, Secure, Engaged: Canada's Defence Policy*. (Ottawa: Her Majesty the Queen in Right of Canada, 2017): 14.

[42] *Ibid.*, 36.

[43] North Atlantic Treaty Organization. *NATO's Enhanced Forward Presence Fact Sheet*. (Brussels: NATO Headquarters, 2020). Last accessed 13 July 2021. https://www.nato.int/nato_static_fl2014/assets/pdf/2020/10/pdf/2010-factsheet_efp_en.pdf.

[44] Canada. Department of National Defence. *Advancing With Purpose: The Canadian Army Modernization Strategy*. (Ottawa: Canadian Army HQ, 2020): 19. Last accessed 13 July 2021. http://www.army-armee.forces.gc.ca/en/news-publications/canadian-army-modernization-strategy.page.

essential part of the Canadian Army's vital ground, tanks will likely continue to be prioritized for investment in order to maintain both the breadth of experience and knowledge that comes from having a tank capability, but also based on the future operating environment, they will likely be needed to combat future adversaries. Prudence would dictate that having tanks in the Canadian Army's inventory, ensures that they can address the full spectrum of operations from COIN to near peer engagements.

This chapter has analyzed Canadian defence policy from the 1971 *Defence in the 70s* to the current 2017 SSE as they address their respective global security environments and how Canada has justified maintaining its tank capability. The end of the Cold War, the Global War on Terror and the return to great power competition have all provided the Government of Canada with the justification to maintain its tank fleet in order to contribute to NATO collective security, be interoperable with its strategic partnerships and be prepared to combat state or non-state actors that threaten Canadian interests or values. As warfare evolves, Canada needs to continue to assess what military capabilities it requires, including its tank fleet. It is essential that this assessment factors in what capabilities are needed to contribute to NATO collective security, enable interoperability with their allies and improve strategic relationships in the fluid global security environment. The next chapter will analyze what Canada's allies have undertaken with their tank fleets and why.

CHAPTER 2: SITUATION FRIENDLY - ALLIED INSTITUTIONAL POLICIES

The modern battlefield has evolved from the longstanding naval, air and land domains to now encompass space and cyberspace. This contemporary shift to add these two domains to the battlefield has injected additional complexity and enabled gray zone strategies to be employed by both state and non-state actors. The rate at which warfare and the global security environment is evolving has forced countries to adapt faster in order to avoid being unprepared for war, like France was in 1940.

The rise of terrorism and non-state actors dominated the focus of warfare in the early 2000s. By the 2010s the threat of terrorism still existed, but the world also saw the rise of Daesh, acceleration of cyber warfare, the reintroduction of great power competition, genocides, climate change, massive refugee movements and, of course, a global pandemic. Governments are faced with the challenge of establishing priorities for their militaries to confront all the current threats, while simultaneously modernizing their forces to deal with future threats. The information age has accelerated threats to humanity and in order for governments to provide a safe and secure living environment for their citizens it is crucial to understand future threats and procure capabilities to defeat them. In light of these facts, this chapter will analyze the other four states from the *Five Eyes*[45] alliance including their current defence policies, how they describe the current global security environment and how they are modernizing their forces in order to address these changes. Primarily, this chapter will identify how those allies are modernizing their tank fleets and how they have been employing them. Acknowledging that these defence policies address a much wider scope of modernization across their services, the intent of

[45] Canada. Government of Canada. *Five-Country Ministerial*. (Ottawa: Public Safety Canada, 2021). Last accessed 13 July 2021. https://www.publicsafety.gc.ca/cnt/ntnl-scrt/fv-cntry-mnstrl-en.aspx

this chapter is to show why these governments have recently implemented decisions about their tank capabilities and why.

The United States

As the leader of the democratic free world, it is imperative to begin this analysis by looking at Canada's most important ally, the US. The US government issued its classified National Defense Strategy (NDS) in 2018 and simultaneously released an unclassified summary signed by Secretary of Defence Gen (Ret'd) Jim Mattis. The summary identifies which key capabilities that need to be modernized in order to solidify the US competitive advantage: nuclear forces, space and cyberspace as warfighting domains, C4ISR (command, control, communications, computers and intelligence, surveillance and reconnaissance), missile defense, joint lethality in contested environments, forward presence maneuver and posture resilience, advanced autonomous systems, and resilient and agile logistics.[46] Gen (Ret'd) Mattis proficiently describes the global strategic environment in which he expects the US military to be prepared fight in. He also identified the strategic approach for how the US military will become more lethal, resilient and rapidly innovate in order to sustain American influence and ensure favourable balances of power that protect the free and rules-based international order.[47]

The 2018 NDS described the accelerated tensions due to great power competition with China and Russia, while rogue regimes such as North Korea and Iran attempt to destabilize their regions and seek to acquire weapons of mass destruction.[48] The US

[46] USA. Department of Defense. *Summary of the 2018 National Defense Strategy of the United States of America*. (Washington. 2018): 7. Last accessed 13 July 2021. https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

[47] *Ibid.*, 1.

[48] *Ibid.*, 2.

military's advantage is subsequently challenged by these adversaries across every domain including air, land, sea, space and cyberspace.[49] The IISS *2021 Military Balance*, an annual analysis of armed forces across the globe, described the global security environment as defined in the NDS as: "China and Russia want to shape a world consistent with their authoritarian model – gaining veto authority over other nations' economic, diplomatic, and security decisions."[50] The quagmire that the US finds themselves in is that they describe both China and Russia as competing threats, yet all three countries are members of the United Nations Security Council permanent five members, responsible for the maintenance of international peace and security.[51]

The complexity of conflict is becoming increasingly challenging as these adversaries compete with the US across all dimensions of power.[52] The emergence of focused gray zone tactics has added additional methods in which adversaries are able to challenge the US: "They have increased efforts short of armed conflict by expanding coercion to new fronts, violating principles of sovereignty, exploiting ambiguity, and deliberately blurring the lines between civil and military goals."[53] As a result of these adversarial salami tactics, the US military is modernizing its force designs and employment concepts to counter these threats.

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[49] *Ibid.*, 3.

[50] International Institute for Strategic Studies. *The Military Balance 2021*. Issue 1, Vol 121, (2021): 32. Last accessed 13 July 2021. https://www.tandfonline.com/toc/tmib20/current

[51] United Nations. "Role Of The Security Council". United Nations Peacekeeping. Last accessed 13 July 2021. https://peacekeeping.un.org/en/role-of-security-council

[52] USA. Department of Defense. *Summary of the 2018 National Defense Strategy of the United States of America*. (Washington. 2018): 3. Last accessed 13 July 2021. https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

[53] *Ibid.*, 2.

The number of tanks that the US has is classified, but the IISS estimates that they have 6,333 in various states of readiness.[54] Since the end the Cold War, the US Army and US Marine Corps (USMC) have deployed their tanks in 1991 on Operation Desert Storm[55], in 2003 on Operation Iraqi Freedom,[56] and they have been rotating tanks in and out of Europe as a part of the NATO deterrence strategy against recent Russian aggression called Operation Atlantic Resolve.[57] The USMC also deployed a company of Abrams to Helmand province in southern Afghanistan in 2010.[58] The US Army and USMC have been deploying their tanks in both conventional and COIN operations over the past two decades, but as the NDS described, the global security environment has evolved and the US military must do the same.

In 2020, two significant announcements were released with respect to the US military's Abrams tanks. The first was the March 2020 release of the USMC Force Design 2030 by their Commandant Gen David H. Berger announcing that they would divest their entire tank capability.[59] The second announcement in December 2020 when the US Department of Defense (DoD) awarded a contract to General Dynamics Land

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[54] Nicholas Drummond. "Twitter". Last accessed 13 July 2021. https://twitter.com/nicholadrummond/status/1272146192189861890.

[55] Miguel Ortiz. "5 Iconic US Weapons That Helped Win The Gulf War". Business Insider. Last accessed 13 July 2021. https://www.businessinsider.com/iconic-us-military-weapons-that-helped-win-the-gulf-war-2021-2.

[56] Michael O'Hanlon. "Operation Iraqi Freedom And The Future Of The U.S. Military". The Brookings Institution. Last accessed 13 July 2021. https://www.brookings.edu/research/operation-iraqi-freedom-and-the-future-of-the-u-s-military/

[57] Sebastian Sprenger. "US Army flows fresh tanks, troops into Europe." Defence News. Last accessed 13 July 2021. https://www.defensenews.com/land/2018/05/23/us-army-flows-fresh-tanks-troops-into-europe/

[58] Reuters Staff. "U.S. to deploy tanks in Afghan war: report." Reuters. Last accessed 13 July 2021. https://www.reuters.com/article/us-afghanistan-usa-tanks-idUSTRE6AI0ZZ20101119

[59] USA. Department of Defense. *USMC Force Design 2030*. (Arlington, 2020): 2. Last accessed 13 July 2021. https://www.hqmc.marines.mil/Portals/142/Docs/CMC38%20Force%20Design%202030%20Report%20Phase%20I%20and%20II.pdf?ver=2020-03-26-121328-460

Systems Inc. for $4.62B to produce an unreleased number of the latest version of Abrams M1A2 SEPv3 tanks for the army.[60] In the author's opinion, the USMC announcement was the most shocking considering that the Marines, who had basically been employed like a second US Army, had utilized their tanks so heavily during Operation Desert Storm, Operation Iraqi Freedom and in Afghanistan.

The decision to divest the USMC tanks was just one of the many tenets of Gen Berger's Commandants Planning Guidance he had issued. Gen Berger stated: "That prioritization was the result of my direct participation in five years of naval and global war games while the Commanding General of I MEF, Comd of Marine Corps Forces Pacific, and Deputy Commandant for Combat Development and Integration."[61] His intent is to modernize the force design of the USMC in order to achieve its mandate as the premiere expeditionary force. Gen Berger describes the current state of the USMC as: "Our current force design, optimized for large-scale amphibious forcible entry and sustained operations ashore, has persisted unchanged in its essential inspiration since the 1950s."[62] As Gen Berger aptly described, the USMC needed to make changes to its force design in order to achieve its mandate in the information age, this will ensure they can obtain the strategic advantage that is needed to be successful on the next battlefield or shoreline. The pace at which technology is influencing conflict means that changes to force structures are required more quickly.

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[60] USA. Department of Defense. *Contracts*. (Washington, 2020). Last accessed 13 July 2021. https://www.defense.gov/Newsroom/Contracts/Contract/Article/2452534/

[61] USA. Department of Defense. *USMC Force Design 2030*. (Arlington, 2020): 3. Last accessed 13 July 2021. https://www.hqmc.marines.mil/Portals/142/Docs/CMC38%20Force%20Design%202030%20Report%20Phase%20I%20and%20II.pdf?ver=2020-03-26-121328-460

[62] *Ibid.*, 2.

Gen Berger's guidance for the USMC force design stated: "With the shift in our primary focus to great power competition and a renewed focus on the Indo-Pacific region, the current force has shortfalls in capabilities needed to support emerging joint, naval, and Marine Corps operating concepts."[63] With the USMC gun sights now focussing on China, the corps force design needs to be modernized in order to effectively hit the target. Gen Berger's analysis identified several capabilities that require investment, but also some that require to be divested, and the latter included their heavy ground armour capability: "We have sufficient evidence to conclude that this capability, despite its long and honorable history in the wars of the past, is operationally unsuitable for our highest-priority challenges in the future."[64] The decision to divest the USMC tanks was based on the USMC future force employment, and knowing that heavy ground armour would still be provided by the US Army.[65] The USMC force structure redesign is in response to the current global security environment, the decision to divest their tanks was not made due to tanks no longer being a required capability; it was made because it is no longer a required capability *for them*. The USMC is an expeditionary force that was never designed to fight in a protracted ground campaign, that role belongs to the US Army.[66] The long-term consequences of this decision are still to be determined, but in the event that the USMC needs heavy armour support they will likely need to conduct joint army and USMC operations, since the army will be the sole service that still has tanks.[67]

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[63] *Ibid.*, 2.
[64] *Ibid.*, 8.
[65] *Ibid.*, 8.
[66] Michael J. Rasmussen, Walker D. Mills. "What is the Tank Good For?" Wavell Room. Last accessed 13 Jul 2021. https://wavellroom.com/2021/03/03/what-is-the-tank-good-for/
[67] International Institute for Strategic Studies. *The Military Balance 2021*. Issue 1, Vol 121, (2021): 36. Last accessed 13 July 2021. https://www.tandfonline.com/toc/tmib20/current

The US Army on the other hand is doubling down on their fleet of Abrams tanks. Jared Keller the deputy editor of *Task and Purpose,* wrote an article titled *The Army is going all-in on its souped-up new M1 Abrams tank* where he described the acquisition of the new Abrams tank variant including its new specifications: "Also known as the M1A2C, the new Abrams variant rectifies many of the space, weight and power issues identified during Operation Iraqi Freedom and will be the foundational variant for all future incremental upgrades, according to the Army."[68] Keller explains that the new Abrams variant will include improved power generation and distribution, improved main gun accuracy, EW devices to counter remote-controlled IEDs, ballistic armor upgrades and "the Israeli-developed Trophy hard-kill active protection systems that uses radar to detect incoming missiles and rockets then fires tiny projectiles to intercept them."[69] This foundational variant of the Abrams tank will enable the US Army to add new technologies in a bolt-on fashion in order to keep up with the defense industry's newest innovations. The US Army's continued investment in its tanks suggests that they have no intent on divesting their heavy ground armour capability.

The NDS described a global security environment in which the adversarial threats require the DoD to modernize its force, so they can regain the competitive advantage. The US military is conducting an internal shuffle of capabilities in order to enable the services to focus on their key missions and areas of responsibility. The USMC decision to divest its tanks was based on their force employment models, and they do not foresee a requirement for tanks as the preeminent littoral warfare and expeditionary warfare

[68] Jared Keller. "The Army is going all-in on its souped-up new M1 Abrams tank." Task & Purpose. Last accessed 13 July 2021. https://taskandpurpose.com/military-tech/army-m1-abrams-tank-m1a2c-contract/

[69] *Ibid.*

service.[70] The US Army commitment to invest more money and upgrade their fleet of Abrams tanks was informed by the fact that they would be the sole US service that will provide heavy armour in a conflict involving land forces and based on the likely adversarial threat they would be forced to fight against.

The United Kingdom

The second strategic ally that will be analyzed is the United Kingdom (UK). In comparison to Canada, the UK is considerably further away from the protection afforded to Canada due to its proximity to the US. The UK is also a great deal closer to the military actions and aggressive rhetoric being spewed by Russia's President Putin, except through the arctic, but the scope of this paper will not be able to address the geo-strategic challenges presented by arctic security. In March 2021, the UK released its Integrated Review (IR) title *Defence in a competitive age.* Similar to the 2018 US NDS, the UK conducted an integrated review to assess the major trends of the international security environment going out to 2030 and have identified four trends that will be of particular importance to the UK and the changing international order: the growing importance of China's international assertiveness, systemic competition between democratic and authoritarian governments, rapid technological changes, and transnational challenges such as climate change, biosecurity risks, terrorism and organized crime.[71]

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[70] USA. Department of Defense. *USMC Force Design 2030*. (Arlington, 2020): 3. Last accessed 13 July 2021. https://www.hqmc.marines.mil/Portals/142/Docs/CMC38%20Force%20Design%202030%20Report%20Phase%20I%20and%20II.pdf?ver=2020-03-26-121328-460

[71] UK. Ministry of Defence. *Defence in a competitive age*. (London, 2021): 5. Last accessed 13 July 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974661/CP411_-Defence_Command_Plan.pdf

The IR addresses the changing strategic context and operating environment by stating their armed forces need the tools and capabilities necessary to fight and protect the whole of the UK and its interests in the modern age.[72] The IR also identifies the main threats to the rules-based international order with Russia as the greatest nuclear, conventional military and gray zone threat to European security as well as the ascendant China as the most geopolitical factor.[73] With these threats in mind the IR states: "We cannot afford to stand still while the world changes around us. We must change how we deter our adversaries, defend our nation and our nation's interests."[74] The UK armed forces plan to modernize their force through an Integrated Operating Concept (IOC) with five core elements: leveraging their allies and partners, utilizing their people to exploit rapid technology development, partnering with UK industry to get access to cutting-edge technology, understanding and assessment tools to enable effective decision-making, and finally, permanent and persistent global engagement.[75] The intent of the IOC is to be integrated across all five domains, across government, and to deliver a more dynamic posture through persistent engagement.[76]

Similar to the US' NDS, the IR identifies the need to modernize its force rapidly by exploiting new and emerging technologies in a Whole-of-Country approach which adds industry in the Whole-of-Government approach, which would enable them to gain an operational advantage. The IR plans on executing this by stating: "We will deliver this through increased R&D spending, increased focus on experimentation and by speeding up

[72] *Ibid.*, 11.
[73] *Ibid.*, 5.
[74] *Ibid.*, 10.
[75] *Ibid.*, 12.
[76] *Ibid.*, 39.

our acquisition processes."[77] The IR declares that the UK has been lagging in modernizing its force, but in order for the UK to achieve their desired operational advantage, there is a common theme of increased spending and rapidly acquiring new capabilities. According to Dr Keith Hartley, a professor of economics at the University of York in York, UK, whose research specializes in defence economics, the UK justifies its defence spending because: "UK defence provides security defined to embrace a variety of aspects, including protection of its citizens, their assets, firms and their assets, the country's infrastructure, its institutions, personal freedoms and way of life."[78] Dr Hartley's 2010 defence spending argument was based on his analysis of how the UK protects its national interests, economic and foreign policy benefits, such as its membership in the United Nations Security Council, being a leader in NATO and its special relationship with the US.[79] Considering the current global threat environment, the IR provides the justification for its defence budget and why they are modernizing their force.

The IR also identified that the UK Army is bound to be restructured and reduce their Full Time Trade Trained numbers from 80,400[80] to 72,500 by 2025.[81] In response to this announcement, UK Labour Party shadow defence secretary John Healy stated: "It could seriously limit our forces' capacity to simultaneously deploy overseas, support

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[77] *Ibid.*, 39.

[78] Keith Hartley. *The Case For Defence*. Defence and Peace Economics, Vol 21(5-6), (2010): 416.

[79] *Ibid.*, 419.

[80] International Institute for Strategic Studies. *The Military Balance 2021*. Issue 1, Vol 121, (2021): 156. Last accessed 13 July 2021. https://www.tandfonline.com/toc/tmib20/current

[81] UK. Ministry of Defence. *Defence in a competitive age*. (London, 2021): 53. Last accessed 13 July 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974661/CP411_-Defence_Command_Plan.pdf

allies and maintain strong national defences and resilience."[82] In response, the UK defence secretary Ben Wallace stated that providing UK soldiers with modern capabilities could make them more effective with smaller numbers as he defended his decision in the British House of Commons.[83] The IR states: "Capability in the future will be less defined by numbers of people and platforms than by information-centric technologies, automation and a culture of innovation and experimentation."[84] This change in mindset comes at a time when great power competition has returned to the forefront of the global security environment. The UK was also hampered by over a decade of engagement in both Afghanistan and Iraq, and are now seeking to modernize their armed forces to deal with the threats of today and the future.

The UK currently has 227 Challenger II tanks, but as the IR states: "As planned, the Army will invest around £1.3bn in our armoured capability by upgrading 148 of our main battle tanks to ensure the Challenger III will become one of the most protected and most lethal in Europe. The remaining fleet will be retired."[85] The Challenger III capability upgrading includes the same Israeli Trophy active protection system that the US acquired for their Abrams tanks.[86] The UK has deployed their tanks on Operation Desert Storm and Operation Iraqi Freedom: "Challengers steam-rolled Iraqi tanks in wars in 1991 and 2003

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[82] Denis Staunton. "British army to be cut to 72,500 troops by 2025." The Irish Times. Last accessed 13 July 2021. https://www.irishtimes.com/news/world/uk/british-army-to-be-cut-to-72-500-troops-by-2025-1.4517175

[83] *Ibid.*

[84] UK. Ministry of Defence. *Defence in a competitive age*. (London, 2021): 39. Last accessed 13 July 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974661/CP411_-Defence_Command_Plan.pdf

[85] *Ibid.*, 54.

[86] Simon Ballinger. "Pioneering new technology for Challenger 3 tank." UK Ministry of Defence. Last accessed 13 July 2021. https://www.army.mod.uk/news-and-events/news/2021/06/pioneering-new-technology-for-challenger-3/

with not a single one being lost to enemy fire."[87] They also have a tank squadron deployed in Estonia as a part of NATOs eFP.[88] Similar to the US, the UK has been employing their smaller tank fleet at a high operational tempo since the end of the Cold War.

As a part of the UK armed forces modernization plan, they will be partially divesting, but also investing in their current fleet of Challenger III tanks. The decision to upgrade and reduce the number of tanks within the UK Army fleet enables their defence budget to reallocate funds to other capabilities. Namely, the UK Army intends to accelerate the delivery of the Boxer armoured vehicle and enhance its capabilities, procure longer range artillery, ground-based air defence, enhanced EW and signal intelligence capability, and finally, invest in a variety of helicopter improvements.[89] This does not even take into account the reallocation of funds into other capabilities for the UK such as the Royal Navy's new aircraft carrier HMS Queen Elizabeth that became operational in early 2021. As an island nation, the UK's decision to keep their tanks is an expeditionary capability based on the threats posed by adversaries such as Russia, who are threatening European security. Maintaining their tank fleet provides another capability that can be contributed to NATO collective security and improves interoperability with their allies.

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[87] Sebastien Roblin. "The UK Invented The First Tanks. Now It May Retire Them For Good." Forbes. Last accessed 13 July 2021. https://www.forbes.com/sites/sebastienroblin/2020/09/01/the-uk-invented-the-first-tanks-now-it-may-retire-them-for-good/?sh=68d8c6443633

[88] International Institute for Strategic Studies. *The Military Balance 2021*. Issue 1, Vol 121, (2021): 160. Last accessed 13 July 2021. https://www.tandfonline.com/toc/tmib20/current

[89] UK. Ministry of Defence. *Defence in a competitive age*. (London, 2021): 54. Last accessed 13 July 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974661/CP411_-Defence_Command_Plan.pdf

Australia

Australia, the third strategic ally that will be analyzed, is also an island nation like the UK. Australia's security environment is unique from the UK due to its geo-strategic location in the Southern Hemisphere. Due to its proximity, Australia is in direct competition with China, which poses a distinct threat from what the UK experiences. In the era of renewed great power competition, Australia is also dependent on strategic partnerships, most notably with the US as the pre-eminent global military power and their relationship with China.[90] Australia's current defence policy, the 2016 White Paper, described the importance of this relationship as: "The roles of the United States and China in our region and the relationship between them will continue to be the most strategically important factors in the security and economic development of the Indo-Pacific to 2035."[91] The security relationship between Australia, New Zealand and the US dates back to the 1951 ANZUS treaty which states that an attack on one is an attack on them all.[92] The Australian defence policy described their strategic environment with great uncertainty due to the distribution of power within the Indo-Pacific, the threat of terrorism, the global modernization of military capabilities, the advent of the cyberspace domain and the proliferation of weapons of mass destruction by rogue nations.[93]

Similar to the UK, Australia was also involved in both conflicts in Afghanistan and Iraq, and they have maintained a high operational tempo both domestically and internationally since then. In light of this tempo, the 2016 defence policy admittedly

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[90] Australia. Department of Defence. *2016 Defence White Paper*. (Canberra, 2016): 15. Last accessed 13 July 2021. https://www.defence.gov.au/whitepaper/Docs/2016-Defence-White-Paper.pdf

[91] *Ibid.,* 41.

[92] *Ibid.,* 121.

[93] *Ibid.,* 32.

states: “While Australia has a range of very effective defence capabilities to draw on to meet current security challenges, significant under-investment and the deferral of decisions about future major capabilities need to be fixed.”[94] In order to add context, this defence policy was being drafted simultaneously to the rise of Daesh in 2014, the 2014 Russian invasion of Ukrainian territory and a few years after the 2013 launch of China’s Belt Road Initiative foreign policy strategy, which all shaped the global security environment in which this policy was based. The decision to modernize the Australian Defence Force (ADF) came on the heels of these events and the ADF and Australian defence industry had some frustrations relieved that these investment decisions had finally been made.[95]

Similar to Canada, Australia’s threat of invasion is relatively low, yet both countries have maintained a tank fleet since the Second World War. However, Australia has not deployed its tanks since the Vietnam War in 1971.[96] As a part of the ADF modernization, they will be upgrading their current fleet of 59[97] Abrams tanks: “The government will replace the Army’s current aging fleet of mobility and recce vehicles with a new generation of armoured combat recce and infantry fighting vehicles, as well as tank upgrades and new combat engineering equipment.”[98] This led to the May 2021 federal budget announcement that they would be acquiring 75 Abrams M1A2 SEPv3

[94] *Ibid.*, 30.
[95] *Ibid.*, 31.
[96] Australia. Department of Defence. *1st Armoured Regiment Association Inc*. Melbourne. Last accessed 13 July 2021. https://www.paratus.org.au/
[97] International Institute for Strategic Studies. *The Military Balance 2021*. Issue 1, Vol 121, (2021): 242. Last accessed 13 July 2021. https://www.tandfonline.com/toc/tmib20/current
[98] Australia. Department of Defence. *2016 Defence White Paper*. (Canberra, 2016): 98. Last accessed 13 July 2021. https://www.defence.gov.au/whitepaper/Docs/2016-Defence-White-Paper.pdf

variants from the US, which includes the Israeli Trophy active protection system.[99] According to their defence policy the Australian army modernization will also include the procurement of a new long range rocket system, a riverine patrol capability, armed medium-altitude drones and armed reconnaissance helicopters.[100] These modernization decisions were influenced by Australia's desire to meet current security challenges, to strengthen their alliance with the US and other international partners and to improve their regional security. For now, Australia will maintain its tank capability.

New Zealand

The final country that will be analyzed is the smaller South Pacific island nation and third member of ANZUS, New Zealand (NZ). NZ released its Strategic Defence Policy (NZSDP) statement in 2018, and it described a very similar strategic threat environment as Australia due to their geographical proximity. However, NZ has a much smaller population, land size and defence force, which provides different aspects to be analyzed from the previous countries. NZ is the first country to be analyzed that does not have a tank fleet, as they have prioritized which capabilities they invest in against financial costs and benefits. NZ has had a geographical isolation advantage as a natural defence barrier against external threats for years, but due to the advancements in technology, cyber warfare and the range of ballistic missiles, this advantage has dissipated over time.[101] As a smaller island nation, NZ has prioritized capabilities that enable them to secure their maritime access and protect their sea lanes of communication

[99] Declan Sullivan. "Australia's new tanks are overkill and overweight." Australian Strategic Policy Institute. Last accessed 13 July 2021. https://www.aspistrategist.org.au/australias-new-tanks-are-overkill-and-overweight/

[100] *Ibid.*, 98.

[101] Keith Hartley. *The Case For Defence*. Defence and Peace Economics, Vol 21(5-6), (2010): 421.

through maritime and air patrolling capabilities. They possess a smaller army that is employed for territorial defence and expeditionary operations.

The 2018 NZSDP acknowledges that in order for them to defend against modern threats, they need to prioritize their strategic partnerships and be interoperable with allied forces. The NZSDP states: "Interoperability with their traditional partnerships is a critical strategic imperative for the NZ Defence Forces."[102] The NZSDP also acknowledges that advancements in technology being adopted by allied nations has been a forcing function upon their defence forces as this has significant interoperability implications on their procurement decisions around which capabilities they invest in.[103] The NZ Ministry of Defence also released a funded defence capability plan which provided significant changes for their defence forces which included: enhanced sealift capabilities to provide improved support to the Pacific Reset, additional maritime surveillance capabilities to improve their maritime domain awareness and increasing the size of their army to 6000 personnel by 2035 to provide greater sustainment for operations.[104] Dr Hartley also analyzed NZ's defence economics and highlighted some key differences between the UK and NZ: "In principle, the basic defence choices issues are common to all nations regardless of their size. However, small nations, such as New Zealand, have to determine whether to use their defence budget to maintain 'balanced' forces or whether to focus on specialisation."[105] From an economic standpoint Dr Hartley's description explains why NZ has prioritized specific capabilities such as maritime patrol vessels and surveillance

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[102] New Zealand. Ministry of Defence. *Strategic Defence Policy Statement 2018.* (Wellington, 2018): 37. Last accessed 13 July 2021. https://www.defence.govt.nz/assets/Uploads/8958486b29/Strategic-Defence-Policy-Statement-2018.pdf

[103] *Ibid.*, 37.

[104] New Zealand. Ministry of Defence. *Defence Capability Plan.* (Wellington, 2019). Last accessed 13 July 2021. https://www.defence.govt.nz/what-we-do/delivering-defence-capability/defence-capability-plan/

[105] Keith Hartley. *The Case For Defence*. Defence and Peace Economics, Vol 21(5-6), (2010): 421.

aircraft, which they require to ensure they can protect their national sovereignty. His analysis described why they have not invested in more expensive capabilities like stealth aircraft or a tank fleet, because they have more incentive to consider joint force solutions, or specialized capabilities that enable interoperability with their allies.[106] In doing so, NZ is able to practice contribution warfare and maintain their strong international reputation as a valued and credible defence partner and ally.[107]

In conclusion, this chapter has analyzed the strategic threat environment through the lens of four of Canada's closest allies by looking at their defence policies, national views, operational tank deployments and policy decisions that have been made with respect to their tank capabilities. Common themes emerge across the defence policies with respect to whom the adversarial threats are and how each country is making decisions to counteract those threats. The need to modernize, grow or in the case of the UK cut the size of their force, is all indicative of the fluid global security environment and the requirement to adapt allied capabilities simultaneously. Interoperability with allied forces is the key factor that must be considered when making defence capability decisions. The decisions to modernize forces and adopt modern technologies into force structures will be crucial in order to thwart the threats of the future. Tanks bestow a specific capability that are still being invested in based on the most likely adversarial threats that were described by Canada's allies defence policies. The defence policy decisions made by the US, UK and Australia to invest in an active protection system for

[106] *Ibid.*, 421.

[107] New Zealand. Ministry of Defence. *Strategic Defence Policy Statement 2018.* (Wellington, 2018): 7. Last accessed 13 July 2021. https://www.defence.govt.nz/assets/Uploads/8958486b29/Strategic-Defence-Policy-Statement-2018.pdf

their tanks, to improve their survivability, is indicative that they have no intent to divest this capability as they are still viewed as a dominant battlefield asset.

CHAPTER 3: SITUATION ENEMY - MODERN TECHNOLOGY VS TANKS

Hollywood has dreamt up of some incredibly fascinating military weapons over the years, such as the laser blasters utilized by Stormtroopers in the *Star Wars* saga. Some of those weapons that are normally only seen in the movies, may actually come to fruition in the not so distant future. According to a Stockholm International Peace Research Institute report published in April 2021, global defence spending nearly surpassed two trillion USD in 2020.[108] Global spending on defence and investment in new technology is evidence of the need to modernize capabilities in order to be prepared for the future battlefield.

Countries can no longer rely on older technologies and tactics if they are going to be successful in modern conflict. According to the US NDS: "New technologies include advanced computing, "big data" analytics, artificial intelligence, autonomy, robotics, directed energy, hypersonics, and biotechnology— the very technologies that ensure we will be able to fight and win the wars of the future."[109] This chapter will analyze some of those new technologies that are being employed as anti-tank weapons or have been used in concert to combat the effectiveness of tanks. The focus of this chapter will be capability centric, not a country analysis, but rather an analysis of modern capabilities as they relate to combatting tanks. For example, the Russian manufactured Orlan-10 drone

[108] Stockholm International Peace Research Institute. "World military spending rises to almost $2 trillion in 2020." Last accessed 23 July 2021. https://www.sipri.org/media/press-release/2021/world-military-spending-rises-almost-2-trillion-2020

[109] USA. Department of Defense. *Summary of the 2018 National Defense Strategy of the United States of America*. (Washington. 2018): 3. Last accessed 13 July 2021. https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

will be used as an example, but the analysis will not include an exhaustive list of the wide spectrum of drones that are available in the industrial market.[110]

The capabilities that will be analyzed will include: drones, loitering munitions, EW, long range artillery/rockets and anti-tank guided munitions (ATGMs). It is acknowledged that air power enthusiasts will argue that attack aviation and attack helicopters possess some of the greatest capabilities to destroy tanks, but the scope of this paper will not focus on the piloted air domain. Instead, the focus will be on land centric capabilities and modern technologies that have evolved over the past few decades that are realistic capabilities that Canada could invest in. It is vital to analyze these emerging technologies as they have begun to level the playing field according the US NDS:

> New commercial technology will change society and, ultimately, the character of war. The fact that many technological developments will come from the commercial sector means that state competitors and non-state actors will also have access to them, a fact that risks eroding the conventional overmatch to which our Nation has grown accustomed.[111]

The technological advantage possessed by the US has been a key characteristic of conflicts over the past few decades. The analysis and discussions surrounding the return of great power competition have overshadowed some recent conflicts, in which modern capabilities that have emerged from the defence industry have been on display. The conflicts that will be analyzed in this chapter have put some of these capabilities, which are also commercially available, on exhibition and there are valuable lessons to be drawn

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[110] Defense-Aerospace. “New UAVs "Orlan-10" Entered Service in the Mountain Motorized Rifle Unit of The Central Military District in Tuva.” Last accessed 13 July 2021. https://www.defense-aerospace.com/articles-view/release/3/214037/new-orlan_10-uavs-enter-russian-army-service-central-military-district.html

[111] USA. Department of Defense. *Summary of the 2018 National Defense Strategy of the United States of America*. (Washington. 2018): 3. Last accessed 13 July 2021. https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

in preparation for future conflicts. Chapter 4 will address these capabilities with Canada's current defence policy SSE in mind.

This analysis will include two case studies of recent conflicts in which these capabilities and tanks were heavily utilized. These conflicts provide a recent forum for examination of these capabilities' effectiveness of combatting tanks. An options analysis will be provided in chapter 4 for alternative capabilities and investment options for modernizing tanks that can provide the strategic effects that some countries are currently investing.

It would be a mistake to simply ask: "are tanks still effective on the modern battlefield?" Of course they are, as long as militaries require the ability to combine firepower, mobility and survivability to dominate the close battlefield, then tanks remain valuable capabilities to have in their arsenal. The crux of the issue is not whether tanks are still effective, the question is whether tanks are still a good investment. Given the empirical data available from recent conflicts, tanks are still a dominant capability on the modern battlefield, but to analyze the effectiveness of tanks in isolation is not a valid examination. Dr Shurkin states that: "Today's militaries have been struggling since at least as far back as Operation Desert Storm in 1991 to keep up with rapidly evolving technology that most believe has precipitated a 'revolution in military affairs,' even if the term itself has fallen out of fashion."[112] The defense industry has been continuously inventing new or improving old capabilities that enable militaries to engage targets at further distances, without being seen or heard from and do so in a more precise and lethal

[112] Michael Shurkin. "Kill The Homothetic Army: Gen. Guy Hubin'S Vision of the Future Battlefield". War on the Rocks. Last accessed 13 July 2021. https://warontherocks.com/2021/02/kill-the-homothetic-army-gen-guy-hubins-vision-of-the-future-battlefield/.

manner. These advancements in weaponry and the conception of a sensor rich modern battlefield led Dr Shurkin to state: "This does not mean, however, that surprise will be impossible. Hubin uses the analogy of chess players: Both can see exactly where all the pieces are, yet it is still possible to surprise one's opponent. The surprises are intellectual."[113] Dr Shurkin used French General Guy Hubin's analogy to describe that even though there are multiple layers of sensors that monitor battlefields from longer ranges that are synchronized with artillery and EW assets with the ability to locate vehicles with pin point accuracy, it is still possible to achieve the element of surprise. A reality that is true on both sides of a conflict.

One might ask, with persistent observation and long-range fires, how do armies manoeuvre around the modern battlefield without being easily targeted and destroyed? Innovation in warfare is not seconded automatically to capabilities, tactics, and standard operations procedures (SOP). All of these facets need to evolve simultaneously. Similar to Dr Shurkin's assessment of France in 1940, modern militaries need to adapt and forecast capabilities and tactics in order to avoid attrition warfare with less capable adversaries. Sgt. Jonathan Gillis, a USMC infantryman and tactical advisor at the Marine Corps Warfighting Lab in Quantico, Virginia, provides an example from a recent conflict:

> In March 2017, Army Gen. David Perkins revealed a U.S. ally had used a $3 million Patriot missile on a 'quadcopter that cost $200 from Amazon.' Shortly thereafter, it became clear that Houthi rebels in Yemen had employed low-cost drones to disable Patriot missile systems in Saudi Arabia. As Gen. Perkins joked, "I'm not sure that's a good economic exchange ratio."[114]

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[113] *Ibid.*

[114] Jonathan Gillis. "In Over Their Heads: U.S. Ground Forces Are Dangerously Unprepared For Enemy Drones." War on the Rocks. Last accessed 13 July 2021. https://warontherocks.com/2017/05/in-over-their-heads-u-s-ground-forces-are-dangerously-unprepared-for-enemy-drones/

This example provides evidence of the requirement to be able to combat all levels of adversaries. If an insurgent can modify an Amazon drone that threatens high value targets, then there is a need to have capabilities to combat this type of threat that does not involve using assets like Patriot missiles. To avoid employing expensive assets, the US has been running trials on directed energy weapons to counter the drone threat such as the Tactical High Power Operational Responder: "THOR is a prototype directed energy weapon used to disable the electronics in drones, and specifically engineered to counter multiple targets – such as a drone swarm – with rapid results."[115] The US Air Force states that directed energy weapons offer greater range than shooting bullets or nets to counter drone threats.[116] The remainder of this chapter will analyze similar technologies as they relate to combatting tanks.

ATGM and RPG

Anti-tank weapons have basically existed since the introduction of the tank during the First World War.[117] While they are not a new capability, over the past few decades their lethality and ranges, which can reach anywhere from 200 meters out to ten kilometers, have increased dramatically.[118] The most prolific anti-tank weapons are simply ATGMs and rocket propelled grenade launchers (RPG).

There is an array of ATGMs that vary in type, quality and capability, but if employed properly, can all be effective at destroying tanks. There is no expert consensus

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[115] USA. Department of Defense. *Army partners with Air Force's THOR for base defense.* Kirtland AFB. Last accessed 13 July 2021. https://www.af.mil/News/Article-Display/Article/2511792/army-partners-with-air-forces-thor-for-base-defense/

[116] *Ibid.*

[117] Britannica Encyclopedia. "Antitank weapon." Last accessed 13 July 2021. https://www.britannica.com/technology/antitank-weapon

[118] Army Technology. "The world's deadliest anti-tank missiles." Last accessed 13 July 2021. https://www.army-technology.com/features/featurethe-worlds-deadliest-anti-tank-missiles-4159253/

about which country has manufactured the most effective ATGM, but the reality is that they are all lethal and produced around the globe including the US TOW and Javelin, the Russian Kornet, the German Milan, the Chinese HJ-12 or the Israeli Spike to name a few.[119] The majority of these ATGMs can be launched from hand-held systems, ground based on a tripod, vehicle mounted, boat mounted, helicopter mounted or fired from close air support aircraft.[120] The very nature of ATGMs enables them to be fired by individual soldiers or from basically any platform imaginable. These weapons have become so advanced they can be locked on target before being launched, including electro-optical seekers to guide them onto targets.[121] The technology and designs of modern ATGMs have enabled them to both penetrate tanks with explosive reactive armour and attack from above where the majority of tanks have less armour. These factors, along with the fact that they are lethally accurate, make them one of the largest threats to tanks.

A less sophisticated alternative to ATGMs are RPGs. The advantage of RPGs is that they are inexpensive, widely available around the globe and can easily be concealed due to their smaller size. This combination of factors is what makes RPGs incredibly attractive to non-state actors as a weapon of choice to attack tanks. The most common version is the RPG-7, which encompasses numerous models and levels of technology.[122] The RPG-7 is used by over 50 countries worldwide and has been in production since 1961.[123]

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[119] Defence View. "Top 10 best anti-tank missile in the world." Last accessed 13 July 2021. https://defenceview.in/top-10-best-anti-tank-missile-in-the-world/

[120] Army Technology. "The world's deadliest anti-tank missiles." Last accessed 13 July 2021. https://www.army-technology.com/features/featurethe-worlds-deadliest-anti-tank-missiles-4159253/

[121] *Ibid.*

[122] Maxim Popenker. "RPG-7." Modern Firearms. 2018. Last accessed 27 July 2021. https://modernfirearms.net/en/grenade-launchers/russia-grenade-launchers/rpg-7-eng/

[123] *Ibid.*

A 2011 RAND Corporation study analyzed the 2006 Second Lebanon War and provided recommendations to the US Army based on the Israeli Defence Force (IDF) experience. The lessons drawn from this conflict highlight how the IDF were unprepared for this high intensity conflict as they had focused their training and equipment on low intensity conflicts (LIC) and were ill-equipped for adversaries that were armed with effective standoff weapons such as ATGMs and RPGs. In 2011, the US was in a similar situation with respect to their training and equipment, as they had been fully immersed in both the Afghanistan and Iraq LICs for nearly a decade. The difficult lessons learned by the IDF need to be heeded by NATO countries since ATGMs and RPGs will likely be used by state and non-state actors in future conflicts. The study also stressed the role of tanks in hybrid conflicts:

> Armored forces based on tanks and armored personnel carriers are key elements of any force that will fight hybrid enemies with a modicum of training, organization, effective standoff weapons (e.g., ATGMs, MANPADS), IEDs, and mines. Light and medium forces (e.g., Stryker brigade combat teams in the U.S. Army) can complement armored forces, particularly in urban and other complex terrain, but they do not provide the survivability, lethality, or mobility inherent in armored forces. Quite simply, armored forces reduce operational risks and minimize friendly casualties. Information cannot replace armor.[124]

Low, high and hybrid intensity conflicts will likely see an assortment of standoff weapons and NATO countries need to be prepared to deal with this threat. Even though some RPGs are not as accurate and lethal, nor do they have the range of modern ATGMs, they can still be effective at disabling tanks if they are employed properly. ATGMs and RPGs provide a significant threat to tanks and as was discussed in chapter 2, this has influenced

[124] David E. Johnson. "Hard Fighting: Israel in Lebanon and Gaza." The RAND Corporation. (2011): XXVII. Last accessed 27 July 2021. https://www.rand.org/content/dam/rand/pubs/monographs/2011/RAND_MG1085.sum.pdf

the US, UK and Australia to make investments in their tanks to upgrade their survivability by adding on active protection systems and ballistic armour.

Drones, Loitering Munitions and EW

The battle proven drones that were used at the beginning of the post 9/11 wars such as the US MQ1 Predator that were so vital in protecting American troops already seem antiquated when being compared to modern drones.[125] Over the past decade, modernization and availability of drones and loitering munitions has increased dramatically. A military drone is defined as an: "aircraft that is guided autonomously, by remote control, or both and that carries sensors, target designators, offensive ordnance, or electronic transmitters designed to interfere with or destroy enemy targets."[126] The term loitering munition may seem foreign as this capability is often categorized under drones, which is why they received the nickname *kamikaze or suicide drones.*[127] Loitering munitions play a less sophisticated but still important role on the battlefield, and as their nickname suggests, they are a one-shot deal. They are primarily designed for asymmetric warfare as some are even armed with facial recognition software capable of carrying out assassinations autonomously, and they are capable of operating in swarms in order to overcome air defence systems.[128] Some more advanced loitering munitions are actually able to carry a payload capable of destroying tanks as will be shown in chapter 3.1.

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[125] Air Force Technology. "Predator RQ-1 / MQ-1 / MQ-9 Reaper UAV." Last accessed 13 July 2021. https://www.airforce-technology.com/projects/predator-uav/

[126] John F. Guilmartin. "Unmanned aerial vehicle." Britannica Encyclopedia. Last accessed 26 July 2021. https://www.britannica.com/technology/unmanned-aerial-vehicle

[127] Paul Iddon. "Turkey, Israel And Iran Have Built Some Very Lethal Loitering Munitions." Forbes. Last accessed 13 July 2021. https://www.forbes.com/sites/pauliddon/2020/07/19/turkey-israel-and-iran-have-built-some-very-lethal-loitering-munitions/?sh=34ed385359de

[128] *Ibid.*

The effect of drones and loitering munitions on the battlefield has become increasingly more complex, as there is a wide spectrum available at varying levels of cost. Drones can range from $200 commercially available off the shelf quad copter versions to multi-million dollar high altitude, stealth, air-to-air fighting capable, precision munition armed and EW capable assets such as the UKs BAE manufactured Taranis concept drone[129] or the recently upgraded US General Atomics manufactured MQ-9 Reaper with an anti-jamming system among other upgrades.[130]

At the lowest levels of conflicts, insurgents are capable of purchasing cheap drones and modifying them to carry small payloads such as grenades that are capable of wreaking havoc on unprepared forces. Non-state actors have even transformed drones into portable IEDs, according to *Defence One,* a news outlet specializing in US defence and national security: "In early October, an ISIS drone appeared to have crash-landed near a Peshmerga position outside Mosul. But when the Pesh took it apart, the 'battery pack' – an IED in disguise – suddenly detonated."[131] The ingenuity of non-state actors to utilize cheap off the shelf drones as weapons is still in its infancy. Unfortunately, for conventional forces operating in a COIN conflict, this provides an additional layer of complexity to an already complicated task. Dr T.X. Hammes, a Senior Research Fellow at the Institute for National Strategic Studies at the National Defense University in Washington, DC states that: "Rather than using drones as Western militaries do, non-state actors can adopt the concepts of "bringing the detonator" or attacking critical targets. In

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[129] BAE Systems. "Taranis." Last accessed 13 July 2021. https://www.baesystems.com/en/product/taranis

[130] John A Tirpak. "Air Force to Upgrade MQ-9's Mission and Capabilities for Near-Peer Fight." Air Force Magazine. Last accessed 13 July 2021. https://www.airforcemag.com/air-force-to-upgrade-mq-9s-mission-and-capabilities-for-near-peer-fight/

[131] Ben Watson. "The Drones of ISIS." Defense One. Last accessed 13 July 2021. https://www.defenseone.com/technology/2017/01/drones-isis/134542/

the first, the drone delivers a small amount of high explosive that ignites the explosive potential provided by the target." [132] Non-state actors can now target logistics hubs, fuel stations or forward operating bases at night, through the air without a ground-based operator ever having to go close to the target and cause significant damage.

Every base now needs to have counter-drone and radar capabilities in order to avoid being easily targeted by these entities. Dr Hammes argues that these "flying IEDs" will inflate the costs of conflict as countries will be forced to procure capabilities that are able to defeat this new threat.[133] Flying IEDs could also be used to attack logistics convoys, dismounted patrols, or even attack a tank crew from above by targeting the turret and attempting to fly the IED into the hatches.

Undermining the impacts of this new reality due to the size of some of these drones could have detrimental effects on foreign bases and lines of communication.[134] However, in a peer-level conflict where more persistent defensive capabilities would be deployed, the overall impact of these types of drones would be severely downgraded. According to a *Janes Defence* article, in March 2020 the conflict along the Turkish and Syrian border escalated after Turkish soldiers were killed by an airstrike in southern Idlib.[135] The escalation included extensive use of drones and loitering munitions that had varied results as the Turkish Ministry of National Defence stated they had destroyed dozens of tanks, armoured vehicles, and artillery pieces.[136] The article subsequently stated:

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[132] T.X. Hammes. "The Democratization of Airpower: The Insurgent and the Drone." War on the Rocks. Last accessed 13 July 2021. https://warontherocks.com/2016/10/the-democratization-of-airpower-the-insurgent-and-the-drone/

[133] *Ibid.*

[134] *Ibid.*

[135] Tim Ripley. "Turkish UAVs played leading role in Idlib battle." Janes Defence. Last accessed 13 July 2021. https://www.janes.com/defence-news/news-detail/turkish-uavs-played-leading-role-in-idlib-battle_11408

[136] *Ibid.*

> While the initial round of Turkish UAV attacks appeared to be largely unopposed, Syrian air defence assets began to engage the aircraft from 1 March. Two days later, Al-Masdar News cited Syrian military sources as saying as many as seven UAVs had been shot down. On 4 March, the Izvestia newspaper cited Russia military sources as saying five Anka and seven Bayraktar TB2 UAVs had been shot down by Syrian Buk and Pantsir air defence systems.[137]

There are numerous deductions that can be drawn from this recent event, including the effectiveness of air defence assets in combatting drones, which portrays how delicate these assets really are. However, it also depicts how effective they are at engaging targets of opportunity. While persistent surveillance and payload carrying abilities are sought after characteristics, there are more advanced capabilities built into some drones. For example, the Russian manufactured Orlan-10 is equipped with electronic countermeasures, an electronic jamming system and can suppress cellular communications.[138]

EW, stealth capabilities, speed and air-to-air fighting abilities are all likely characteristics of future drones. Some of these capabilities as shown with the UKs Taranis and Russia's Orlan-10 are already in existence. Conflicts involving these advanced drones are becoming more common as they can provide significant impacts on the battlefield, especially when adversaries are not equipped, nor trained to eliminate them. Unfortunately, from a research perspective only, the majority of recent conflicts have not involved the most advanced drones that are on the market. Instead, the most recent conflicts have included Turkish, Russian or lower end models of Israeli drones and

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[137] *Ibid.*

[138] Army Recognition. "More Orlan-10 drones for Russian army in May." Last accessed 13 July 2021. https://www.armyrecognition.com/may_2018_global_defense_security_army_news_industry/more_orlan-10_drones_for_russian_army_in_may.html

loitering munitions. The true war tested capabilities of the more advanced drones is still yet to be seen.

According to their declared characteristics, more advanced drones will be more difficult to target and harder to identify, which will make them vital in the targeting process. The targeting network, that is enabled by drones to connect sensors to shooters, has made the span of time between identification to destruction very short, thus showing how lethal they can be in enabling the destruction of tanks. But, drones can only carry a finite amount of munitions in their payload. Therefore, as it will be shown in chapter 3.2, one of the most critical roles that drones play is the synchronization of effects on the battlefield by identifying targets for the seemingly infinite amount of shells able to be provided by artillery and rockets. While artillery and rocket systems have made some advancements in their abilities, the drone is a key enabler to extend the identification and marking ranges of targets for them to strike.

Flying IEDs, EW jamming and precision guided munitions are all important attributes of modern drones that assist in the destruction of tanks, but there are other non-kinetic factors that also need to be considered. Aaron Stein, the director of research at the Foreign Policy Research Institute and PhD candidate at King's College London states that: "The more salient lesson for the United States is how propaganda can shape narratives about conflict and how high-definition, drone-captured videos can shape the way in which the social-media generation understands combat."[139] The information operations campaign by either state or non-state actors has been given another tool. The

[139] Aaron Stein. "Say Hello to Turkey's Little Friend: How Drones Help Level the Playing Field." War on the Rocks. Last accessed 13 July 2021. https://warontherocks.com/2021/06/say-hello-to-turkeys-little-friend-how-drones-help-level-the-playing-field/?fbclid=IwAR1Qr-jbJWyvuEt-XoEzdWt3YVIAFsi0_gMN4_Zjx_IMqaIuuHQaPV5XC4c

social-media generation is susceptible to being influenced by drone footage posted online and this can have dire consequences for public perception and support towards a conflict. This may not have a salient impact directly on tanks per se, but is a relevant deduction about the impacts of smaller drones on warfare. Mr Stein also states:

> The United States would be wise to update its assumptions about how middle-sized powers can now project force abroad and shape narrative in easy and straightforward ways. This lesson is far more critical than thinking a small drone is a revolutionary game-changer, capable of threatening a larger power.[140]

Controlling the narrative of a conflict is a vital factor across the spectrum of modern warfare. Regardless of the number of tanks a country may have, if they are not able to maintain public support for their war efforts, then the war will be lost at home which may be more costly.

Drones and loitering munitions add a psychological effect to the battlefield. A 2017 Current Psychology journal article titled *Psychological Dimensions of Drone Warfare* described the traumatic effects of drones and loitering munitions on soldiers as collective torture: “He explained that both involve: "(a) prolonged exposure to (b) unpredictable and (c) uncontrollable stressors in an (d) inescapable environment leading to (e) intense fear-induced helplessness responses."[141] Loitering munition engines make a last second loud noise as they dive bomb towards their targets right before detonation, while the majority of modern drones are capable of flying undetected at high altitudes as they designate targets for destructions by strike assets or artillery. The impact of both of these capabilities provide a level of terror that is detrimental to soldier’s morale.

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[140] *Ibid.*

[141] Alaa Hijazi, Christopher J. Ferguson, F. Richard Ferraro, Harold Hall, Mark Hovee, and Sherrie Wilcox. *Psychological Dimensions Of Drone Warfare*. Current Psychology, Vol 38, Issue 5, (2017): 1292. Last accessed 26 July 2021. https://christopherjferguson.com/Drones.pdf

The impacts of small drones on modern warfare are far-reaching, but they are not revolutionizing the battlefield. However, they need to be taken into account when procuring capabilities and developing tactics to overcome this threat. The modern sensor rich battlefield is an obstacle that can be overcome by tactics as Dr Shurkin describes: "On the modern battlefield, proximity is dangerous, and, in fact, the situation in many ways is reversed: The better a force can operate physically scattered and mixed up with the adversary, the more likely it is to succeed."[142] Scatter tactics are not a new concept as dispersion is often utilized to protect tanks from artillery and rocket attacks. However, tanks are most effective when armour can be massed together to provide overwhelming shock action and firepower, therefore the need to be dispersed and only mass prior to specific tasks is crucial to their survivability. The addition of mass drones and loitering munitions to the battlefield highlights the requirement for air defence and counter-drone capabilities in order to protect tanks. Adapting tactics due to technology is not a new phenomenon, as soon as a new weapon is introduced on the battlefield and soldiers start dying in droves, then tactics evolve to protect soldiers. The modernization of drones is no different. Drones will never make tanks obsolete, but they will force militaries to adopt new tactics and procure capabilities that are effective at combatting these aerial weapons.

[142] Michael Shurkin. "Kill The Homothetic Army: Gen. Guy Hubin'S Vision of the Future Battlefield". War on the Rocks. Last accessed 13 July 2021. https://warontherocks.com/2021/02/kill-the-homothetic-army-gen-guy-hubins-vision-of-the-future-battlefield/.

CHAPTER 3.1: CASE STUDY – NAGORNO-KARABAKH

The Nagorno-Karabakh region has been a disputed area between Armenia and Azerbaijan for decades. Dating back to the 1920s, the Soviet Union established Nagorno-Karabakh as an autonomous region that contained 95% ethnic Armenians within Azerbaijan's borders.[143] The collapse of the Soviet Union resulted in numerous clashes between the two countries and most recently in September 2020, the protracted conflict escalated into a full-scale war.[144] The Nagorno-Karabakh conflict provides an excellent opportunity for analysis as it showcased the effects of modern capabilities being employed in a David versus Goliath scenario.

The Azerbaijanis were newly armed with modern Turkish and Israeli equipment such as drones, loitering munitions and multiple launch rocket systems (MLRS).[145] According to a Reuters article: "The figures compiled by the Turkish Exporters' Assembly, which groups more than 95,000 exporting companies in 61 sectors, show Azerbaijan bought $123 million in defence and aviation equipment from Turkey in the first nine months of 2020."[146] Azerbaijan bought themselves a technological advantage over Armenia in hopes of being able to swiftly recapture the region. What made this particular conflict stand out in the eyes of defence experts was the relentless twitter battle, as depicted in figure 3, between both countries as they were incessantly tweeting kill

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[143] Philip H. Gordon, Charles A. Kupchan, Stephen Sestanovich. "Nagorno-Karabakh Conflict." Council on Foreign Relations. Last accessed 13 July 2021. https://www.cfr.org/global-conflict-tracker/conflict/nagorno-karabakh-conflict

[144] Scott F. Abramson, David B. Carter. *Systemic Instability and the Emergence of Border Disputes.* International Organization. Vol 75 (2021): 114.

[145] Shaan Shaikh, Wes Rumbaugh. "The Air and Missile War in Nagorno-Karabakh: Lessons for the Future of Strike and Defense." Centre for Strategic & International Studies. Last accessed 13 July 2021. https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense

[146] Ece Toksabay. "Turkish arms sales to Azerbaijan surged before Nagorno-Karabakh fighting." Reuters. Last accessed 13 July 2021. https://www.reuters.com/article/armenia-azerbaijan-turkey-arms-int-idUSKBN26Z230

statistics and posting drone footage on social media of armoured vehicles being destroyed. The social media exhibition of destruction seemed like arrogant grandstanding to display their military prowess over each other. The statistics that were being tweeted was intelligence that is normally kept classified inside command posts, not spewed online in a twitter battle.

Figure 3 - Twitter Battle Nagorno-Karabakh Conflict[147]

The key deduction from these social media escapades is that a lot of tanks were destroyed during this conflict. The real question is why? Have tanks been rendered less effective now that the sensor to shooter link has become nearly instantaneous? Did filling the skies with drones and loitering munitions enable Azerbaijan to not only penetrate but completely dismantle Armenia's decision making cycle? Did the Armenian military employ poor tactics with Soviet-era equipment that resulted in their quick demise? Or was it the synchronization of modern capabilities against a less prepared adversary that

[147] Jared Morgan. "Armor attrition in Nagorno-Karabakh battle not a sign US should give up on tanks, experts say." Military Times. Last accessed 13 July 2021. https://www.militarytimes.com/news/your-military/2020/09/30/armor-attrition-in-nagorno-karabakh-battle-not-a-sign-us-should-give-up-on-tanks-experts-say/

enabled Azerbaijan's victory? In the wake of this conflict, as was discussed in chapter 2, countries such as the UK have been forced to analyze the results of this conflict and conduct a cost benefit analysis of their tanks versus investing in other capabilities such as more armed drones.[148]

There are critical lessons that need to be drawn from this conflict. Shaan Shaikh, a research associate with the Missile Defense Project (MDP) at the Center for Strategic and International Studies (CSIS) and Wes Rumbaugh, an associate fellow with the CSIS MDP stated: "The Nagorno-Karabakh conflict also illustrates that while individual weapons systems will not revolutionize the nature of warfare, the synchronization of new weapons makes the modern battlefield more lethal."[149] The battlefield has evolved over centuries of conflict and become more lethal over the few past decades as can be seen by the extensive drone footage that the Azerbaijan Ministry of Defence has posted online.[150]

Depending on what countries are involved, one aspect of modern warfare that has evolved is that countries no longer need to spend billions of dollars' on aircraft in order to achieve air superiority. Azerbaijan proved this as they were able to fill the airspace over the battlefield with sensors capable of detecting all the Armenian forces movements and were able to target and engage them from a distance. This is an important factor because drone availability is not a capability with exclusive membership. Drones are being built in

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[148] Dan Sabbagh. "UK wants new drones in wake of Azerbaijan military success." The Guardian. Last accessed 13 July 2021. https://www.theguardian.com/world/2020/dec/29/uk-defence-secretary-hails-azerbaijans-use-of-drones-in-conflict

[149] Shaan Shaikh, Wes Rumbaugh. "The Air and Missile War in Nagorno-Karabakh: Lessons for the Future of Strike and Defense." Centre for Strategic & International Studies. Last accessed 13 July 2021. https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense

[150] YouTube. Ministry of Defence Azerbaijan. Last accessed 13 July 2021. https://youtu.be/raaYRlri4J0

people's garages[151], can be purchased from Amazon[152] and can be modified to drop small ordnances like rifle grenades.[153] Dr Robert Bateman, a former professor of military history at the US Military Academy, West Point, argues that: "The drones in this conflict are not exactly stealth aircraft or ones dropping munitions from 50,000 feet up. They can be shot down, relatively easily, with the right equipment and training."[154] Without proper equipment and training, the Armenian army suffered catastrophic tank losses due to their inability to properly employ air defence weapons and shoot down Azerbaijani drones. The IISS *2021 Military Balance* further described this aspect of the conflict:

> Operations in Libya and Nagorno-Karabakh highlight the importance of providing effective mobile air and missile defence. The continuing proliferation of relatively cheap armed uninhabited aerial vehicles (UAVs) and loitering munitions has prompted a hasty re-investment in short-range air defence (SHORAD) capabilities by armed forces that had reduced this capability in previous years.[155]

The requirement to invest in SHORAD has resurfaced with the emergence of cheap drones and loitering munitions. This was a costly lesson for Armenia as they did possess some Russian made air defence assets including the advanced S-300[156], but they were quickly targeted by Azerbaijan and this severely degraded their ability to combat the

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[151] Peter Finn. "Rise of the drone: From Calif. garage to multibillion-dollar defense industry." The Washington Post. Last accessed 13 July 2021. https://www.washingtonpost.com/national/national-security/rise-of-the-drone-from-calif-garage-to-multibillion-dollar-defense-industry/2011/12/22/gIQACG8UEP_story.html

[152] Amazon. "Drones". Last accessed 13 July 2021. https://www.amazon.ca/s?k=drone&ref=nb_sb_noss

[153] Ben Watson. "The Drones of ISIS." Defense One. Last accessed 13 July 2021. https://www.defenseone.com/technology/2017/01/drones-isis/134542/

[154] Robert Bateman. "No, Drones Haven't Made Tanks Obsolete." Foreign Policy. Last accessed 13 July 2021. https://foreignpolicy.com/2020/10/15/drones-tanks-obsolete-nagorno-karabakh-azerbaijan-armenia/

[155] International Institute for Strategic Studies. *The Military Balance 2021*. Issue 1, Vol 121, (2021): 7. Last accessed 13 July 2021. https://www.tandfonline.com/toc/tmib20/current

[156] Shaan Shaikh, Wes Rumbaugh. "The Air and Missile War in Nagorno-Karabakh: Lessons for the Future of Strike and Defense." Centre for Strategic & International Studies. Last accessed 13 July 2021. https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense

drone and loitering munition threat. Mr Jason Crabtree, CEO of QOMPLX, a global leader in commercial cybersecurity and risk analytics and, a former Special Assistant to senior leadership in US Cyber Command stated: "Fairly inexpensive unmanned aerial vehicle swarms were sent in advance of attacks and drew anti-aircraft fire. Armenia did not field an advanced counter-drone system, which then allowed Azerbaijan to identify the location of hidden Armenian air defense artillery."[157] Mr Crabtree describes the tactic used by Azerbaijan as a dual-drone search and destroy method that has not been seen before in modern warfare.[158]

Azerbaijan was not exactly using drones purchased from Amazon, as their primary drone of choice was actually manufactured and purchased from Turkey and cost a fraction of what the UK paid for their armed drones: "the TB2 drones cost as little as $1m to $2m each according to analyst estimates, far less than the near $20m per drone paid by the British military for a fleet of 16 high-end, next-generation Protector drones manufactured by US specialist General Atomics."[159] The key lesson learned is that having capabilities that out match your adversary and the knowledge of how to properly synchronize their effects provides a tactical advantage. In Azerbaijan's case, they had more modern capabilities than Armenia, and they were able to synchronize the effects of those capabilities, which enabled them to rapidly defeat Armenia.

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[157] Jason Crabtree. "Gaza and Nagorno-Karabakh Were Glimpses of the Future of Conflict." Foreign Policy. Last accessed 13 July 2021. https://foreignpolicy.com/2021/06/21/gaza-nagorno-karabakh-future-conflict-drones/

[158] *Ibid.*

[159] Dan Sabbagh. "UK wants new drones in wake of Azerbaijan military success." The Guardian. Last accessed 13 July 2021. https://www.theguardian.com/world/2020/dec/29/uk-defence-secretary-hails-azerbaijans-use-of-drones-in-conflict

A secondary deduction from Azerbaijan's modernized arsenal is that depending on the capabilities of your adversary, countries do not always need the most expensive capabilities to provide the effects that are required to attain a tactical advantage. This is of course true in the context of a COIN operation or conflict with a less capable force. Mr Crabtree argues that NATO countries should not put too much weight behind these drone wars: "as Armenia's air defense strategy and its lack of a common air defense architecture made Azerbaijan's task relatively painless. Achieving suppression of enemy air defenses in Russian territory would be much less decisive."[160] In the event of a conflict between near-peer or a peer force, there is a requirement to have more than just modernized capabilities, without the knowledge and training on how to employ these assets, a well-trained adversary would be capable of defeating these capabilities relatively easily using properly employed tactics.

The second lesson learned is that you need to have an effective countermeasures capability and training to defend a force in order to minimize the tactical advantage provided by modernized capabilities. Shaan Shaikh and Wes Rumbaugh argue that: "Soldiers should train to limit their electronic and thermal signatures for longer distances and times. The video and imagery available online suggest that neither Armenian nor Azerbaijani forces had adequate resources or training on passive defense."[161] A professional force that has trained to operate in a sensor rich environment should be able to defeat or as a minimum make it more challenging for an adversary to target them.

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[160] Jason Crabtree. "Gaza and Nagorno-Karabakh Were Glimpses of the Future of Conflict." Foreign Policy. Last accessed 13 July 2021. https://foreignpolicy.com/2021/06/21/gaza-nagorno-karabakh-future-conflict-drones/

[161] Shaan Shaikh, Wes Rumbaugh. "The Air and Missile War in Nagorno-Karabakh: Lessons for the Future of Strike and Defense." Centre for Strategic & International Studies. Last accessed 13 July 2021. https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense

Having modernized capabilities is a crucial factor to attaining a tactical advantage, but an advantage does not always guarantee victory. Dr Jack Watling, a Research Fellow for Land Warfare at the Royal United Services Institute, the UK's leading defence and security think tank, argues that: "Despite the heavy Armenian armoured losses, the key lessons from the videos Azerbaijan has published online are not about armour. Rather, they reflect how the density of sensors on the modern battlefield is changing the balance in combined arms warfare."[162] Dr Watlings assessment of the drone footage provides additional validation about the importance of training and tactics in preparation for a conflict. His assessment of the modern battlefield depicts how vital sensors have become and the fact that they have had an impact on land warfare.

Although the footage shows tanks and infantry fighting vehicles (IFV) being repeatedly destroyed, the footage does not tell a tale about the death of armour. Dr Bateman also weighs in with his analysis of the footage stating: "But in almost every video shown by both Armenia and Azerbaijan, the opposing forces were behaving like amateurs, clumped together, not using combined arms tactics, and leaving themselves vulnerable to attacks from the air."[163] Dr Bateman argues that the footage did not depict professional tank crews utilizing effective tactics to avoid being targeted by drones. He undercuts the professionalism of both forces and identifies this fact as the reason so many tanks and IFVs were destroyed during this conflict. He also argues that: "Neither seems to have grasped the idea that even the most high-tech tank (or armored fighting vehicle) is

[162] Jack Watling. "The Key to Armenia's Tank Losses: The Sensors, Not the Shooters." Royal United Services Institute. Last accessed 13 July 2021. https://rusi.org/explore-our-research/publications/rusi-defence-systems/the-key-to-armenia%E2%80%99s-tank-losses-the-sensors-not-the-shooters

[163] Robert Bateman. "No, Drones Haven't Made Tanks Obsolete." Foreign Policy. Last accessed 13 July 2021. https://foreignpolicy.com/2020/10/15/drones-tanks-obsolete-nagorno-karabakh-azerbaijan-armenia/

only so much scrap metal if you do not have a trained and disciplined fighting force inside those vehicles."[164] This underscores this particular lesson learned from this conflict: just because a country has the most advanced vehicles and weaponry, does not make them invincible.

Proper training and tactics combined with modern capabilities is the recipe for success. Neither Armenia nor Azerbaijan properly employed effective defensive measures to counter the threats that were being employed by their adversaries. Dr Watling cautiously argues that dismissing some evidence from the drone footage is a lack of a recognition for how exposed the modern battlefield has become:

> Against a peer adversary it is entirely reasonable to expect the battlefield to be swept by ground-moving target indicator (GMTI) radars, with tactical units able to scan terrain out to 150 km. Night or day, unusual cross-terrain movements, coordinated spacing, and lack of adherence to civilian roads, all make military vehicles highly distinct to trained operators.[165]

Dr Watling's argument is premised on the fact that the use of tactics to attempt to camouflage or deceive an adversary against modern capabilities is highly optimistic.[166] What Dr Watling has stated is a reality of the modern battlefield and highlights how crucial air superiority and defensive countermeasures such as air defence weapons have become.

In the Nagorno-Karabakh region conflict this was particularly true as the region was mountainous and had minimal vegetation to provide camouflage to manoeuvring combined armed units. Forces that possess modern capabilities such as drones, loitering

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[164] *Ibid.*

[165] Jack Watling. "The Key to Armenia's Tank Losses: The Sensors, Not the Shooters." Royal United Services Institute. Last accessed 13 July 2021. https://rusi.org/explore-our-research/publications/rusi-defence-systems/the-key-to-armenia%E2%80%99s-tank-losses-the-sensors-not-the-shooters

[166] *Ibid.*

munitions and EW assets in this type of terrain and are able to operate autonomously will certainly dominate the battlefield, especially if the opposing force is not well-trained. However, the lesson learned from Dr Bateman's viewpoint is that the key component remains having a well-trained professional force:

> Drones will be an increasing threat—but cheap drones are cheap to shoot down as well. Competent modern combined arms combat forces, even without air dominance, can sweep that threat from the sky. Faced with parade-ground forces that have not devoted the majority of their budgets to training, but instead to buying the newest toys, any modern professional force will prevail.[167]

Dr Bateman's analysis of the conflict emphasized the importance of a well-trained professional fighting force that is equipped with modern capabilities and the knowledge of how to properly synchronize their effects. The drone footage and mountainous terrain did not characterize an optimal operating environment for tanks to thrive in. However, it also didn't provide any evidence of tanks no longer being worthy of investment. Azerbaijan purchased a tactical advantage over Armenia that left their Soviet-era armour in smoking hulls being broadcasted around the internet.

The results from the Nagorno-Karabakh region conflict identified a number of lessons for external reviewers to analyze. Having a shiny and new parade ready force to fight against archaic equipment in suboptimal tank terrain may enable you to achieve success, but the key lesson from this conflict was not viewed on Twitter or YouTube. The tank carnage that was spewed all over the internet was not the key deduction from this battlefield. There is evidence of the social-media generation and misinformed defence critics making assumptions about the effectiveness of tanks on the modern battlefield,

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[167] Robert Bateman. "No, Drones Haven't Made Tanks Obsolete." Foreign Policy. Last accessed 13 July 2021. https://foreignpolicy.com/2020/10/15/drones-tanks-obsolete-nagorno-karabakh-azerbaijan-armenia/

which is why Dr Bateman wrote an article titled *No, Drones Haven't Made Tanks Obsolete* and Jon Hawkes, the head of Land Warfare at Janes, wrote an article titled *The Tank Is Dead. Long Live The Tank,* in a rhetorical fashion. As credible defence authors, they were quick to point out that the tank is still effective on the modern battlefield and stating otherwise would demonstrate a writer's lack of understanding of combat in the contemporary operating environment.

The synchronization of modern capabilities combined with a well-trained professional force was the most important outcome for defence analysts to review. Secondly, the possession and proper employment of modern capabilities that can be used as countermeasures to defend against drones, loitering munitions and EW assets provides a tactical advantage that is required to be successful on the modern battlefield. And finally, just like the emperor in his new clothes,[168] the battlefield has become exposed and lost a lot of its secret manoeuvre space. The sensor-enriched battlefield has become even more lethal, especially for countries that do not possess the capabilities required to defeat inexpensive modern technologies. The Nagorno-Karabakh region conflict is a very recent representation of the effects modern technology can have on tanks. The analysis conducted in this chapter highlights the importance of having capabilities that can protect tanks and enable them to perform their primary function of combining firepower, mobility, and survivability to dominate the close battlefield.[169]

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[168] Jean Hersholt. "The Emperor's New Clothes." The Hans Christian Anderson Center. Last accessed 13 July 2021. https://andersen.sdu.dk/vaerk/hersholt/TheEmperorsNewClothes_e.html

[169] Jon Hawkes, Sam Cranny-Evans, and Mark Cazalet. "The Tank Is Dead. Long Live The Tank." Wavell Room. Last accessed 13 July 2021. https://wavellroom.com/2020/10/01/a-critical-analysis-of-the-future-of-the-tank/

CHAPTER 3.2: CASE STUDY – RUSSO-UKRAINE WAR

Ukraine's 2014 Euromaidan Revolution descended the entire country into anarchy. Fed up with their corrupt pro-Russian oligarch president, Victor Yanukovych, a large portion of the country rose up and protested against their government in an attempt to promote democracy and reduce corruption in their country.[170] According to Steven Pifer, a former US ambassador to Ukraine and Senior Fellow at the Brookings Institution in the Arms Control and Non-Proliferation Initiative, the unexpected result of the revolution was the subsequent annexation of Crimea by Russian soldiers that were not wearing any insignia who became known as the *little green men* and the Russian backing of the separatist's movements in the eastern region known as the Donbas.[171] These events instigated the Russo-Ukraine war that continues to this day. According to Dr Phillip Karber, president of the Potomac Foundation, adjunct assistant professor at Georgetown University and former strategy adviser to former Secretary of Defense Caspar Weinberger, with the country in complete disarray the Ukrainian military still managed to conduct the largest mobilization in Central and Eastern Europe since the end of the Second World War in response to the Russian invasion.[172] The mobilization of the nearly defunct Ukrainian military and uprising of volunteer militias in response to the Russian invasion provided a conventional clash of forces worthy of analysis. Dr Karber compared the Russo-Ukraine War to the 1970s Yom Kippur War in that they were both foretelling

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[170] Steven Pifer. *Ukraine: Six years after the Maidan*. Brookings Institution. Last accessed 13 Jul 2021. https://www.brookings.edu/blog/order-from-chaos/2020/02/21/ukraine-six-years-after-the-maidan/

[171] *Ibid.*

[172] Philip A. Karber. "Lessons Learned from the Russo-Ukrainian War." The Potomac Foundation: 31. Last accessed 13 July 2021. https://www.researchgate.net/publication/316122469_Karber_RUS-UKR_War_Lessons_Learned

what future warfare would resemble.[173] However, there are several caveats that must be declared before analysing this conflict for the purpose of tank investment.

Russia had no intention of defeating Ukraine in the traditional connotation of war. In a RAND Corporation study titled *The Russian Way of Warfare*, they describe Russia's view of their actions as strategically defensive, to keep Ukraine as a buffer between themselves and NATO and diminish Ukraine's potential for EU and NATO membership.[174] Russia did not employ their air force to achieve air supremacy or use mass ground forces to overwhelm their adversary with fire superiority as their traditional doctrine would dictate.[175] Instead, the study elaborates on the tactics used by Russia at the commencement of the conflict and stated that this could be viewed as a likely indicator of how they could start a future conflict in a conventional setting: "The use of paramilitaries, SOF, and unmarked units may be seen in the early stages of a conventional attack as well. *Spetsnaz* could perform their traditional strategic recce and direct action missions as part of deliberate preparations for an offensive operation."[176] These factors portray the important caveats for this analysis as Russia did not employ their traditional conventional assets or tactics that would have been expected after an analysis of their other frozen conflict involvements in Georgia and Moldova over the past few decades.[177] According to Dr Samuel Charap, a Senior Political Scientist at the RAND Corporation and former

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[173] Philip A. Karber, Joshua Thibeault. "Russia's New-Generation Warfare." Association Of The United States Army. Last accessed 13 July 2021. https://www.ausa.org/articles/russia%E2%80%99s-new-generation-warfare

[174] Scott Boston, Dara Massicot. "The Russian Way of Warfare." The RAND Corporation. (2017): 3. Last accessed 13 July 2021. https://www.rand.org/pubs/perspectives/PE231.html

[175] *Ibid.,* 9.

[176] *Ibid.,* 9.

[177] Samuel Charap. "Moscow's Calibrated Coercion in Ukraine and Russian Strategic Culture." George C. Marshall European Center for Security Studies. Last accessed 13 July 2021. https://www.marshallcenter.org/en/publications/security-insights/moscows-calibrated-coercion-ukraine-and-russian-strategic-culture-0

senior advisor to the undersecretary for Arms Control and International Security and the Secretary's Policy Planning Staff at the U.S. Department of State, Russia has been employing a simmering strategy in order to protract their conflict with Ukraine.[178]

Regular Russian forces have been used sparingly in the conflict, however, there were periods of time during the initial stages of the war in 2014 when the Russian backed separatists were at risk of being overwhelmed and Russia did intervene with their conventional forces.[179] In line with Dr Charap's analysis, Dr Karber stated that: "To date, the Russian side has not employed its Air Force, but if it did, the small number of Ukrainian airbases, their lack of integrated air defense early warning system, and the absence of shelters for their aircraft, will likely produce decisive results."[180] Dr Karber argues that it is crucial that NATO countries pay particular attention to this fact. There are many lessons that can be drawn from this conflict but Dr Karber argues that there were no *silver bullets* or technological advancements that can be drawn from this war that have brought in a revolution in modern warfare.[181] The key lesson for NATO countries is that Ukraine lacked some essential capabilities that would have been required if Russia were to have been more involved at the early stages of the conflict. The caveats identified in this analysis include Russia's desire to engage in a simmering conflict, vice a decisive offensive action that would normally include air and fire superiority and the inferiority of capabilities possessed by Ukraine. Having acknowledged these factors, there were still

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[178] *Ibid.*

[179] Scott Boston, Dara Massicot. "The Russian Way of Warfare." The RAND Corporation. (2017): 9. Last accessed 13 July 2021. https://www.rand.org/pubs/perspectives/PE231.html

[180] Philip A. Karber. "Lessons Learned from the Russo-Ukrainian War." The Potomac Foundation: 44. Last accessed 13 July 2021. https://www.researchgate.net/publication/316122469_Karber_RUS-UKR_War_Lessons_Learned

[181] *Ibid.*, 29.

conventional battles that included tank warfare that provide a modern example for analysis.

The conventional warfare period in the Donbas essentially ceased and the line of contact between the two sides has mostly remained unchanged since the February 2015 signing of the Minsk II ceasefire agreement, but according to OSCE reports, there are still ceasefire violations occurring on a daily basis.[182] This analysis will focus on the early stages of the war, vice the latter stages that mostly involve drone, sniper, and artillery violations across the agreed upon ceasefire line. The data from the start of the conflict led Dr Karber to conclude that nearly 80 percent of all the casualties were being inflicted by artillery.[183] He also stated: "The increased availability of overhead surveillance combined with massed area fires of artillery and the Multiple Launch Rocket System have produced a new level of intensity in modern conventional combat."[184] The synchronization of drones and artillery effects reached a new level during this conflict and this has become a critical lesson from this theatre of war. Dr Lester W. Grau, Senior analyst and Research Director for the Foreign Military Studies Office (FMSO) at Fort Leavenworth, Kansas and Maj Charles K. Bortles, a junior analyst at FMSO stated that the Russians have been improving their reconnaissance strike system, the cycle of identifying targets and striking them, and have deployed and battle tested it in conflicts such as this to get practical experience and decrease their engagement cycle down to 10 seconds.[185]

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[182] Organization for Security and Co-operation in Europe. "OSCE Special Monitoring Mission to Ukraine." Last Accessed 13 July 2021. https://www.osce.org/ukraine-smm/reports

[183] Philip A. Karber, Joshua Thibeault. "Russia's New-Generation Warfare." Association Of The United States Army. Last accessed 13 July 2021. https://www.ausa.org/articles/russia%E2%80%99s-new-generation-warfare

[184] *Ibid.*

[185] Lester W. Grau, Charles K. Bartles. "The Russian Reconnaissance Fire Complex Comes Of Age." The University of Oxford Changing Character of War Centre. Last accessed 13 July 2021. http://www.ccw.ox.ac.uk/blog/2018/5/30/the-russian-reconnaissance-fire-complex-comes-of-age

The Ukrainians were severely outmatched due to decades of neglect and corruption. Their conventional forces were unprepared for the initial onslaught of capabilities that were provided to the separatists by the Russians. In fact, at the start of the war, Russian-backed separatists shot down an old Tu-143 Soviet reconnaissance drone that was introduced by the Soviets in the 1970s, but little did they know, this was the Ukrainian military's only drone at the start of the conflict.[186] The drone was so large and archaic looking, that the separatists believed it was a failed missile.[187]

The effectiveness and lethality that drones provided to the Russian-backed separatists was so considerable that it drove the local Ukrainian population to develop drones of their own using their own funding in order to save Ukrainian soldiers' lives. According to a Ukrainian news outlet: "Just after Russian aggression commenced in spring 2014, groups of people started collecting money to produce drones for the army. Many of these groups were working in parallel, having no idea about the others, while the situation demanded rapid action."[188] The drones being manufactured by the local population were of course no match for the Russian drones, but this capability gap needed to be filled in order to save lives. This was an important factor in this conflict because as time went on, Dr Karber states:

> Ukraine is the first conflict in which unmanned aerial vehicles have been present on both sides in significant numbers. Russia employs UAVs for intelligence, surveillance and reconnaissance; target acquisition and real-time engagement for massed artillery fires; and, most recently, as minibombers

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[186] Jonathan Gillis. "In Over Their Heads: U.S. Ground Forces Are Dangerously Unprepared For Enemy Drones." War on the Rocks. Last accessed 13 July 2021. https://warontherocks.com/2017/05/in-over-their-heads-u-s-ground-forces-are-dangerously-unprepared-for-enemy-drones/

[187] *Ibid.*

[188] Olena Makarenko. "Volunteers are creating a drone revolution for Ukraine's army." Euromaidan Press. Last accessed 13 July 2021. http://euromaidanpress.com/2016/11/30/volunteers-air-recconnaisance-donbas-ukraine/

> carrying incendiary explosives targeting ammunition and fuel storage areas.[189]

The contrast between how the Russian backed separatists and Ukrainian Security Forces were employing drones highlights the crucial tactical advantage that drones provide.

The Russian reconnaissance strike system is not dependent on drones as they are able to collect intelligence data from other sources, but drones have augmented the systems range, accuracy and lethality.[190] From a tank destroying perspective, Dr Karber describes Russia's current artillery projectile arsenal as: "Russia employs a combination of dual-purpose improved conventional munitions, scatterable mines, top-attack munitions and thermobaric warheads that have catastrophic consequences when used in preplanned, massed fire strikes."[191] The Russian reconnaissance strike system possesses some reminiscent German neo-Blitzkrieg like qualities as they are able to use the element of surprise to engage targets at longer ranges with munitions capable of destroying tanks if they are not equipped with active protection systems. Since Russian military thinking employs artillery like maneuver units and they have extensive amounts of artillery assets within their arsenal, this posed a very high threat to Ukrainian tanks.[192] The destruction of Ukrainian tanks and casualties that resulted from Russian artillery was so effective, that

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[189] Philip A. Karber, Joshua Thibeault. "Russia's New-Generation Warfare." Association Of The United States Army. Last accessed 13 July 2021. https://www.ausa.org/articles/russia%E2%80%99s-new-generation-warfare

[190] Lester W. Grau, Charles K. Bartles. "The Russian Reconnaissance Fire Complex Comes Of Age." The University of Oxford Changing Character of War Centre. Last accessed 13 July 2021. http://www.ccw.ox.ac.uk/blog/2018/5/30/the-russian-reconnaissance-fire-complex-comes-of-age

[191] Philip A. Karber, Joshua Thibeault. "Russia's New-Generation Warfare." Association Of The United States Army. Last accessed 13 July 2021. https://www.ausa.org/articles/russia%E2%80%99s-new-generation-warfare

[192] Lester W. Grau, Charles K. Bartles. "The Russian Reconnaissance Fire Complex Comes Of Age." The University of Oxford Changing Character of War Centre. Last accessed 13 July 2021. http://www.ccw.ox.ac.uk/blog/2018/5/30/the-russian-reconnaissance-fire-complex-comes-of-age

according Dr Karber, Ukrainian soldiers preferred riding on top of tanks and IFVs as shown in Figure 4, instead of inside them in order to improve their survivability.[193]

Figure 1- Ukrainian soldiers mounting an IFV[194]

As a secondary result: "Assaults tend to be conducted with dismounted rather than mounted infantry; and the vehicles mounting the automatic cannon tend to be used in an over-watch suppressive fire role rather than exposed forward."[195] Due to the Ukrainian tanks and IFVs not having active protection systems nor sufficient air defence, their assaults became less effective due to their vehicles being so accurately targeted and them being unable to mass firepower to close in and destroy their adversaries, as typical

[193] Philip A. Karber. "Lessons Learned from the Russo-Ukrainian War." The Potomac Foundation. Last accessed 13 July 2021. https://www.researchgate.net/publication/316122469_Karber_RUS-UKR_War_Lessons_Learned

[194] Philip A. Karber, Joshua Thibeault. "Russia's New-Generation Warfare." Association Of The United States Army. Last accessed 13 July 2021. https://www.ausa.org/articles/russia%E2%80%99s-new-generation-warfare

[195] Philip A. Karber. "Lessons Learned from the Russo-Ukrainian War." The Potomac Foundation. Last accessed 13 July 2021. https://www.researchgate.net/publication/316122469_Karber_RUS-UKR_War_Lessons_Learned

Western doctrine would dictate.[196] As Dr Karber describes, the important lesson to draw from these factors is that tanks are still decisive on the modern battlefield, if they are equipped to defeat ATGMs and anti-tank rockets.[197] He also reiterates that light infantry are extremely vulnerable in modern warfare and that advanced munitions are worthy of investment:

> In some areas this experience merely underscores the tried and true wisdom that professional military should already know by instinct – the Main Battle Tank is not dead, light infantry in light armor die in droves, top attack is the way to go for anti-tank defense. [198]

There are several lessons to be drawn from this conflict for NATO countries. The sensor-rich modern battlefield has added additional complexities, but these can be overcome with the procurement of the right capabilities and training. Dr Karber contends that older tactics still have value and they may need to be retaught to modern forces: "The Army must relearn the importance of camouflage, concealment and deception; and must train with opposing forces utilizing drone technology and assuming they are under constant, real-time aerial surveillance."[199] Training for modern warfare requires analysis of recent conflicts, especially conflicts that involve the next potential adversary.

The Russo-Ukraine war identifies numerous lessons that need to be heeded by NATO countries. The capabilities and tactics being used by Russia are not new nor are

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[196] Canada. Department of National Defence. B-GL-300-001/FP-001 *Land Operations*. (Ottawa: Department of National Defence, 2008): 1-5. Last accessed 13 July 2021. https://acims.mil.ca/sp/CADTC_DAD_AEL/DoctrineLibrary/B-GL-300-001-FP-001.pdf

[197] Philip A. Karber, Joshua Thibeault. "Russia's New-Generation Warfare." Association Of The United States Army. Last accessed 13 July 2021. https://www.ausa.org/articles/russia%E2%80%99s-new-generation-warfare

[198] Philip A. Karber. "Lessons Learned from the Russo-Ukrainian War." The Potomac Foundation. Last accessed 13 July 2021. https://www.researchgate.net/publication/316122469_Karber_RUS-UKR_War_Lessons_Learned

[199] Philip A. Karber, Joshua Thibeault. "Russia's New-Generation Warfare." Association Of The United States Army. Last accessed 13 July 2021. https://www.ausa.org/articles/russia%E2%80%99s-new-generation-warfare

they revolutionary, but they have been employing them in recent conflicts, which has led senior leadership in the US Army to take notice. In a 2016 interview with CSIS, Lieutenant General McMaster, director of Army Capabilities Integration Center and deputy commanding general of futures, U.S. Army Training and Doctrine Command, discussed Russia's military modernization and its implications for the US military. He stated: "They've invested in advanced protective systems - active protective systems. They've advanced in improved lethality, robotic and autonomy-enabled systems,"[200] General McMaster argued that this needs to be viewed as a catalyst for the US to train and procure the ways and means to contend with Russian forces technological advancements. Russia has been employing the Drozd active protection system since the early 1980s and continues to make improvements to its "magic shield" as the Ukrainian Armed Forces describe it.[201]

This chapter analyzed some new technologies and two conflicts in which these capabilities were being employed as anti-tank weapons. Modern warfare is a game of chess, not checkers. As Dr Shurkin extrapolated upon General Hubin's analogy, in order for militaries to achieve surprise on the modern battlefield, they require an intellectual pedigree and be armed with the right capabilities to do so.[202] No chess player could win a match with only pawns, there is a requirement for rooks and knights to play a role in achieving victory. The modern technologies discussed in this chapter represent the rooks

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[200] Kathleen Hicks. "Harbingers of Future War: Implications for the Army with Lieutenant General H.R. McMaster." Centre for Strategic & International Studies. Last accessed 13 July 2021. https://www.csis.org/analysis/harbingers-future-war-implications-army-lieutenant-general-hr-mcmaster

[201] Sydney J. Freedberg Jr. "Rheinmetall Rolls Out 'Safer' Active Protection For Tanks." Breaking Defense. Last accessed 27 July 2021. https://breakingdefense.com/2018/01/rheinmetall-rolls-out-safer-active-protection-for-tanks/

[202] Michael Shurkin. "Kill The Homothetic Army: Gen. Guy Hubin'S Vision of the Future Battlefield". War on the Rocks. Last accessed 13 July 2021. https://warontherocks.com/2021/02/kill-the-homothetic-army-gen-guy-hubins-vision-of-the-future-battlefield/.

and knights in this analogy. The synchronization and employment of EW assets, drones and long range artillery or rockets in both case studies portrayed the importance of an integrated air defence early warning system, active protection systems for tanks and the proper training required to be effective on the modern battlefield. When an effective strike system is employed by a well-trained force, they are able to find, fix and strike targets at long ranges and not be detected. This is especially threatening towards high value targets such as command posts, air defence assets and logistics nodes in both conventional and COIN operations. This chapter has shown that tanks are still valuable assets on the modern battlefield, but they need to be employed in conjunction with other capabilities that enable them.

CHAPTER 4: CANADIAN DEFENCE POLICY- FUTURE

As a NATO member, there are several factors that Canada must consider when making defence procurement and investment decisions. This chapter will make evidence based recommendations on which capabilities and investment options that Canada should make in order to contribute strategic effects that are required by a NATO partner nation. Unlike the US and UK who are permanent members of the United Nations Security Council, Canada does not have as significant of a role in maintaining the global rules based order or promoting Western democracy. As a smaller nation like Australia and NZ, Canada should continue to look at coalition operations with its allied nations when making defence capability decisions in order to maintain its interoperability with their Allies. Does Canada need a larger tank fleet? No. Canada needs to maintain capabilities that enable them to provide combat capable forces that assist with collective security, and tanks enable Canada to do that. Having a smaller tank fleet still provides the knowledge and capability to other arms of the Canadian Army to improve their interoperability with allied armies.

SSE

Canada's 2017 defence policy aptly identified some of the other capabilities that are needed to be procured to enable tanks to be effective on the future battlefield. This included:

- SSE Initiative 34 – Acquire ground-based air defence systems and associated munitions capable of protecting all land-based force elements from enemy airborne weapons;
- SSE Initiative 36 – Replace the family of armoured combat support vehicles, which includes command vehicles, ambulances and mobile repair teams;
- SSE Initiative 50 – Invest in medium altitude remotely piloted systems;

- SSE Initiative 67 – Invest in Joint Intelligence, Surveillance and Reconnaissance platforms, including next generation surveillance aircraft, remotely piloted systems, and space-based surveillance assets; and

- SSE Initiative 91 – Invest in a range of remotely piloted systems, including an armed aerial system capable of conducting surveillance and precision strikes.[203]

The addition of air defence, new maintenance platforms and a variety of drones will all enable a tank modernization plan that makes sense, but without the addition of an active protection system, Canada's tanks are still vulnerable to modern ATGMs, artillery, drones and loitering munitions. There are additional pressures from Canada's allies to modernize their force. The US NDS stated their expectations of their allies: "We will uphold our commitments and we expect allies and partners to contribute an equitable share to our mutually beneficial collective security, including effective investment in modernizing their defense capabilities."[204] Canada is actively modernizing its forces in many respects, but the SSE omission of tank modernization is a glaring oversight.

The US, UK and Australia are leading the tank modernization efforts that Canada should seek to emulate. From a technical perspective, the German Bundeswehr has now ordered the Israeli Trophy active protection system that will be outfitted on their fleet of Leopard 2 tanks, which means this modernization investment is possible for Canada.[205] SSE did not address tank modernization, unlike the US, UK and Australian defence strategies, but as was shown in Chapter 1, the CAMS identified tanks as a part of the

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[203] Canada. Department of National Defence. *Strong, Secure, Engaged: Canada's Defence Policy*. (Ottawa: Her Majesty the Queen in Right of Canada, 2017): 109.

[204] USA. Department of Defense. *Summary of the 2018 National Defense Strategy of the United States of America*. (Washington. 2018): 9. Last accessed 13 July 2021. https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

[205] Sebastian Sprenger. "Germany orders Israel's Trophy active protection system for its Leopard 2 tanks." Defense News. Last accessed 13 Jul 2021. https://www.defensenews.com/global/europe/2021/02/23/germany-orders-israels-trophy-active-protection-system-for-its-leopard-2-tanks/

Canadian Army's vital ground and thus this investment should be viewed as a requirement. As examined in Chapter 2, the US, UK and Australia have identified that modernizing their tank fleets is a requirement in order for them to remain effective on the modern battlefield, which highlights how crucial these investment decisions are for Canada.

The US, UK and Australian examples are enlightening for Canada to follow. Maintaining its current fleet of Leopard 2 tanks enables interoperability with its allies through the corporate knowledge of how to employ tanks and solidifies CCAs vital ground. Alternatively, as a contribution nation, Canada could also look at the NZ example and invest in specialized capabilities that augment territorial security and contribute specialized forces to expeditionary operations. However, this option is not optimal for Canada, based on its proximity to the US and its NATO membership commitments. Canada has leveraged its NATO membership and strategic partnerships in order to justify maintaining its tank fleet for good reason. But, if Canada is going to continue to invest in their tanks, than modernizing its current fleet of Leopard 2 tanks with an active protection systems is basically a requirement in order for them to be effective on the modern battlefield. This recommendation is applicable to both COIN and conventional conflicts against a near peer/peer adversary. The threat environment has evolved in both types of conflicts that would make Canadian tanks vulnerable to top-attack thermobaric munitions, ATGMs and drones without the addition of an integrated air defence system, anti-drone capability and an active protection system. Finally, it seems all too often that acquiring modernized maintenance assets are overlooked. SSE appropriately identified this capability gap and is working on procuring new platforms. Without effective and

modernized maintenance capabilities, tanks can become expensive monuments very quickly.

Allied Considerations

Canada faces a number of challenges when procuring capabilities while being compared to its allies that were discussed in Chapter 2. Similar to NZ and Australia, there are additional logistical burdens due to their geographical locations that require air and sea transportation to get vehicles and personnel to battlefields, especially when being compared to the proximity to Europe afforded to the UK or the superpower status and seemingly endless funding enjoyed by the US. As was discussed in the introduction, Canada's security environment is unique because it borders with three oceans and their most important ally, the US. Canada also needs to consider the most likely types of missions that it will deploy the CAF. Historically, since the end of the Korean War up until the new millennium and the closure of Canada's 4th Canadian Mechanized Brigade Group in Germany, the CAF had primarily been deployed on peacekeeping missions or foreign and domestic humanitarian operations that did not require tanks, but the war in Afghanistan, the NATO deterrence mission in Latvia and the resurgence of great power competition have changed that dynamic. According Dr Nicole Jackson, an Associate Professor at the School for International Studies at Simon Fraser University, Vancouver:

> As a key member of NATO, Canada is playing an active role in responding to Russia's often aggressive rhetoric, military build-up, and other actions which have a direct impact on Canada's allies in Europe and the Baltic states, as well as on Canada's sovereignty in the Arctic. [206]

[206] Nicole J. Jackson. *Canada, NATO, and Global Russia*. International Journal. Issue 2, Vol 73, (2018): 318.

Dr Jackson highlighted how crucial Canada's international relations are with its allies and how they need to be perceived as a nation that takes an active role in NATO collective security. As a contribution nation with membership in NATO, Canada always needs to take into account that they will not likely enter into a conflict alone. These factors must all be taken into consideration when procuring new capabilities.

Considering the global pandemic and finite government defence spending, Canada is not likely to start spending more on defence. Procurement of new capabilities is often a zero-sum game, in order to gain new capabilities it often requires something else to be divested. Either way there is a significant cost to maintaining tanks. Canada's current fleet of Leopard 2 tanks either need to be upgraded, based on the analysis in chapter 3, in order to be effective on the modern battlefield or divested and therefore invest in other capabilities that can provide similar effects for the Canadian military. This has been the crux of this paper, if Canada is going to maintain its current tank fleet, than additional modernization investments are required and other capabilities need to be procured in order to make that decision make sense with the new realities of the modern battlefield.

The decision on whether to make further investments in tanks is not a unique challenge for Canada. There are several other factors that weigh in on this decision. Jon Hawkes describes the UK's current political atmosphere as:

> The key problem is not just that the battlefield has changed, but society and economies have changed also. The UK no longer commands a globe-spanning empire enabling an expensive technologically advanced standing army, instead it spends around 2% of a gradually shrinking GDP on defence.[207]

[207] Jon Hawkes, Sam Cranny-Evans, and Mark Cazalet. "The Tank Is Dead. Long Live The Tank." Wavell Room. Last accessed 13 July 2021. https://wavellroom.com/2020/10/01/a-critical-analysis-of-the-future-of-the-tank/

The global pandemic, resurgence of great power competition and increased emphasis on the cyber and space domains are additional factors that make government decisions difficult when evaluating whether to continue to invest in their tanks. Recent conflicts have sparked more conversations about whether tanks are archaic and cold war nostalgic assets and if they are still worthy of investment. The case studies in chapter 3 portrayed the effectiveness of modern technologies against tanks, but the key deduction highlighted that they are still valuable assets on the modern battlefield as long as they are accompanied by the aforementioned capabilities.

In conclusion Canada's defence policy aptly identified some of the capabilities that will be required for the CAF to remain an effective contribution nation towards collective security. These capabilities need to be acquired post-haste, in order to avoid being unprepared for the next conflict. The omission of a tank modernization strategy and counter-drone capability was an oversight that can still be rectified through the procurement process. It has been shown that tanks are still effective on the modern battlefield and worthy of investment. The purchase of an active protection system and counter-drone assets along with the capabilities identified in SSE will enable the CAF to improve tank and soldier survivability against modern technologies. Without this upgrade, Canada's tank fleet will likely suffer catastrophic losses in a future conflict, as was shown in both case studies in chapter 3.

CONCLUSION AND RECOMMENDATIONS

As Gen Hubin described, modern warfare has evolved into a game of chess in which nearly all battlefield manoeuvre is visible to an adversary. This sensor rich environment has forced militaries to adopt new tactics, procure modern capabilities and evolve training to this new reality, or they will suffer the same consequences as France in circa 1940. The rate at which advancements in technology will impact the modern battlefield will continue to increase exponentially over the next few decades. Artificial intelligence, facial recognition, autonomy, data analytics and directed energy weapons are but a few of the characteristics that will continue to define innovations that are emerging from the defence industry. Increased lethality, stealth, range and efficiency of synchronization of capabilities are all coming to the forefront of requirements for modern warfare. These characteristics and capability requirements are shared by both allies and adversaries from either state or non-state entities. The superior technological advantages enjoyed by the US and their allies has been dramatically shrinking due to the vast availability and reduced costs of these modern assets.

These facts are not lost on Canadian defence strategies, but there is a finite timeframe to procure and adopt these technologies into training and operations prior to the next certain conflict. Canada's defence policies have leveraged its NATO partnership, strategic relationships and interoperability with allies in order to justify maintaining a tank capability. The resurgence of great power competition and the information age has accelerated the requirement to procure new technologies in order to attain strategic parity with adversaries and enable a defence posture capable of reacting to the global security environment in a collective security context. While it is highly unlikely that Canada will

go to war alone, it must procure capabilities that will allow it to fight alongside its allies. The US, UK and Australian defence policies have outlined their modernization strategies and expectations of their allies. SSE addressed a comprehensive amount of initiatives that need to be undertaken by the CAF, but as this policy is already four years old, there are additional capabilities that need to be considered. The rapidly evolving global security environment emphasizes the requirement for allies to adopt modern capabilities simultaneously for collective security.

Tanks continue to be employed in both COIN and conventional conflicts by both allies and adversaries around the globe. In 2020, there were still 73,000 tanks in various states of repair around the world.[208] The tank is not dead, nor is it a relic from the Cold War. Advancements in tank technology have increased their lethality and survivability in modern combat, which has only elevated their ability to combine firepower, armour and mobility to dominate the land warfare. The US, UK, Australia and now German defence procurement decisions to invest in the Israeli Trophy active protection systems are all indications of how vital this investment has become. The German decision to outfit their fleet of Leopard 2 tanks provides additional technical justification that Canada could follow suit with its current fleet of tanks. Tanks are habitually employed as a part of a combined arms team and as was outlined in CAMS, this is part of the Canadian Army's vital ground. Without modernizing, Canada's tank fleet would be vulnerable in a modern conflict, and this would break down an essential element of the combined arms team. The addition of an active protection system for tanks and a counter-drone capability along with the SSE initiatives already identified for procurement, will enable Canada's

[208] International Institute for Strategic Studies. *The Military Balance 2020*. Issue 1, Vol 120, (2020). Last accessed 13 July 2021. *https://www.tandfonline.com/toc/tmib20/120/1?nav=tocList*

interoperability with allies and add strategic value to Canada's contribution to collective security. Tanks are still a valuable capability and are worthy of investment for Canada.

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