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If the Boot Fits: Considering the Multi-Domain Operations Concept for Adoption by the Canadian Armed Forces

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**IF THE BOOT FITS: CONSIDERING THE MULTI-DOMAIN OPERATIONS
CONCEPT FOR ADOPTION BY THE CANADIAN ARMED FORCES**

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TABLE OF CONTENTS

LIST OF FIGURES

ABSTRACT

This paper considers the development of the multi-domain operations (MDO) concept in the United States Army and identifies characteristics in the Canadian Armed Forces (CAF) that would support a welcome effort to adopt and adapt the concept for Canadian purposes.

CAF officers are taught the operational level of war and other operational concepts at the Canadian Forces College (CFC). Like many professions the military has a language of its own with a lexicon that stretches back to antiquity and is in continuous evolution. CFC promotes critical thinking, which CAF senior leaders are hoping harness in order to answer pressing questions about the future operating environment and what kind of joint force Canada needs.

This paper establishes a common understanding of MDO from doctrinal first principles, and traces the evolution of the concept through the emergence of the Space and Cyber domains, to the publication of *The U.S. Army in Multi-Domain Operations 2028*, in 2018. In parallel, the resurgence of potential adversaries and their advanced technologies is used to provide the sense of importance and urgency in developing operational concepts appropriate to new realities.

The Canadian context is distinct from the United States, its closest partner and ally, so the adoption of American concepts should not be unchallenged. In the present case, the combination of fertile ground in the agile collaborative mindset of the CAF and the natural alignment of the concept to Canada's present requirements and future operational needs will enable CAF officers and their academic colleagues to adapt and

implement the MDO concept as a bespoke, legitimate, and relevant operational model for how we fight.

CHAPTER 1 – INTRODUCTION

The Ukrainian Colonel sat quietly through several days of presentations at the multinational military conference in 2018. Military officers are encouraged to think critically and ask provocative questions – his was as piercing as any I've heard. He began with what is sometimes pejoratively called a "war story", anecdotes that typically paint the narrator in a favourable light to assert credibility or reinforce a subsequent argument. His story did all of those things. His peers from across Europe and North America, most with recent operational experience of their own, fell silent. He proceeded to describe a terrifying experience in multi-domain operations (MDO). As this concept is developed by modern militaries, the Canadian Armed Forces (CAF) must decide to adopt it or adapt it. Ignoring it will invite disaster, as certainly as ignoring the air domain at the turn of the 20th Century or the cyber domain in the 21st Century.

The Colonel had been at Zelenopillya on 11 July 2014, when a Russian attack using cyber, electromagnetic spectrum, unmanned aerial vehicles, and multiple-launch rocket system artillery under a single battlefield commander decimated two Ukrainian battalions by destroying most of their armoured vehicles and killing at least 30 soldiers.[1] Zelenopillya is close to the Russian border in the Donbas region of Ukraine, where pro-

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[1]For operational security, the Colonel's name is omitted and his account as repeated here is drawn from corresponding open source information. Liam Collins, and Harrison Morgan, "King of Battle: Russia Breaks out the Big Guns," Association of the United States Army, 1, last accessed 23 February 2019, https://www.ausa.org/articles/king-battle-russia-breaks-out-big-guns; Thomas Griesemer, "Russian Military Reorganization: A Step Toward Multi-Domain Operations," *Over the Horizon*, 19 November 2018, 4, last accessed 23 February 2019, https://othjournal.com/2018/11/19/russian-military-reorganization-a-step-toward-multi-domain-operations/. For more information on the cyber attack in support of this and other attacks, see Crowdstrike Global Intelligence Team, "Use of FANCY BEAR Android Malware in Tracking of Ukrainian Field Artillery Units," last modified 23 March 2017, https://www.crowdstrike.com/wp-content/.../FancyBearTracksUkrainianArtillery.pdf.

Russian paramilitary rebels aided by Russian military forces were fighting for the separation of the Donetsk and Luhansk provinces from Ukraine. The Ukrainian Army was pushing to the border to cut off the supply lines between the separatists and the Russians when they were targeted and destroyed. The overwhelming multi-domain attack was launched from the Russian side of the border and lasted less than 3 minutes, roughly the time it would take to read this introduction.

The Colonel recounted his experience with softened tones, emphasizing his desperate attempt to maintain command and control of his forces while under fire and react as a team to avoid further destruction and death. In the conference's closing plenary session, after typical enthusiastic remarks from the hosts and keynote speakers, the Colonel stated plainly "I have heard nothing encouraging here."[2] How can Canada avoid this becoming a prescient foreshadowing of a similar tragedy befalling our future Army?

The MDO concept is too consequential to ignore. From an operational perspective, the MDO concept represents a quantum leap in military thought. Great efforts have already been made to modernize western militaries, both in terms of concepts and capabilities. The CAF has embraced joint operations, the operational level of war, and revamped professional military education. New domains such as Space and Cyber are integral components of CAF career courses. New mindsets such as Design Thinking are taught at the Canadian Forces College as adjuncts to the Joint Operational Planning Process on the Joint Command and Staff Programme. Large scale exercises such as the multinational Joint Warfighter Assessment, conducted by the United States (US) Army's

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[2]Author's notes from the conference, available on request.

Joint Modernization Command, have tackled advanced concepts, capability development, and coalition interoperability.

With these changes already institutionalized, and further advances underway, why was the Ukrainian Colonel concerned? Are we not ready to meet a peer adversary capable of MDO? After studying the future security environment and deriving significant lessons learned from recent operational experience in Iraq and Afghanistan, the US Army revamped their decades-old operational force employment concept. The new concept, *The U.S. Army in Multi-Domain Operations 2028*, was published in December 2018 and is the US Army's answer to new and evolving threats. Should Canada, as a trusted neighbour and ally, and frequent partner in coalition operations, adopt the US MDO concept?

Pondering this question, it became clear there is no suitable answer without understanding what is meant by 'multi-domain' operations. Even with this understanding, Canada is not obliged to adopt the concept. So, should it? Two papers, written fifteen years apart give the contextual background to this problem. The first, written by the present Chief of the Defence Staff (CDS) General Jonathan Vance when he was a Lieutenant-Colonel in 2004, examined Canada's adoption of the doctrinal 'operational level of war'. General Vance wrote "If history is any indication, Canada has no chance of exercising pure operational level action external to the country. […] It is worth examining, therefore, why Canada has embraced the doctrine while unable to practice it […]."[3] This challenged an uncontested paradigm shift in the early 1990s, the rapid evolution of which was described by Colonel Howard G. Coombs, then Director of the

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[3]Jonathan Vance, "Canada's Departure from the Classic Doctrine of Operational Art," (Advanced Military Studies Course Paper, Canadian Forces College, 2004), 6.

Joint Command and Staff Programme (Distance Learning) at the Canadian Forces College, as "unquestioning acceptance of American ideas by the Canadian Army."[4] Was Canada correct to adopt new American doctrine even if it wasn't applicable?

The second paper also considered the adoption of new concepts and doctrine and was written in 2019 by the Commander of Canadian Joint Operations Command (CJOC), Lieutenant General Michael Rouleau. His thoughts on "How We Fight" provide a window into CJOC's analysis of a series of questions asked by General Vance as CDS.[5] To the first question, "what kind of Joint Force we need to have" General Rouleau suggests that we need to map "what types of things we need to adapt to prevail."[6] This rethinking of how we fight can only happen "spend[ing] our resources as carefully as possible in order to build the most coherent and jointly capable CAF that we can."[7] In a future security environment where conflict will predominantly take the form of strategic competition below the level of war, the operational level of war is compressed as "tactical actions accrue almost real-time strategic significance."[8] General Rouleau concludes with the expectation that future dialogue will assist the CDS' "military strategic contemplations of the CAF's future […]."[9]

This paper aims to contribute to that dialogue and its three parts can be read in different ways depending on the reader's need. Overall, it will provide the doctrinal foundations for MDO, outline the evolution of the operational concept within the U.S.

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[4]Howard Coombs, "In the Wake of a Paradigm Shift: The Canadian Forces College and the Operational Level of War (1987-1995)," *Canadian Military Journal* 10, no. 2. (2010): 26.
[5]Michael Rouleau, ""How We Fight": Commander CJOC's Thoughts," Monograph emailed to CJOC Staff, 10 February 2019, 1-8.
[6]*Ibid.*, 1.
[7]*Ibid.*, 5.
[8]*Ibid.*, 6.
[9]*Ibid.*, 8.

Army, and argue that the CAF is uniquely positioned as an integrated and unified Joint

Force to adapt and implement the US MDO concept to fit the requirements and future

operations of the CAF. Readers familiar with CAF doctrine and US MDO concepts, and

who consider themselves 'first followers', can skip to Chapter 4 which discusses how

CAF characteristics map well to MDO and support its adaptation. Readers who are

confident that CAF doctrine can evolve to reflect emerging trends, and consider

themselves 'early adopters', will benefit from Chapter 3's explanation of how the U.S.

Army came to realize its MDO concept before proceeding. Most readers are likely

seeking a further appreciation of the problem space before the solution space is explored.

For these readers Chapter 2 begins by answering the question "What is a Domain?" and a

full reading will be more rewarding.

CHAPTER 2 – WHAT IS A DOMAIN?

One of the most common criticisms of the military surrounds its seemingly impenetrable jargon, obscure abbreviations, and infinite acronyms.[10] Even today, many conversations among military officers and academics studying the profession of arms, defence and security, and international relations steadily descend into arguments over terminology.

A common understanding of the lexicon is necessary to have advanced discussions on topical issues, particularly in the profession of arms given its ultimate responsibility for the application of deadly force – in all domains. It is our duty to develop and share our professional knowledge and to do this objectively and effectively we must establish what we mean by what we say. This chapter establishes the basic vocabulary of domain concepts.

'Multi-Domain Operations' (MDO) is a relatively new military term, first appearing around 2015, and its novelty represents an opportunity for true leadership; this is a real initiative to "synergize the joint force [and improve] how the military organizes, trains, equips, and ultimately fights."[11] Critics have disputed the apparent wordsmithing of long-standing and existing concepts to satisfy contemporary constraints. Conversely,

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[10]An oft-cited scene in the 1987 film "Good Morning Vietnam" has the lead, Airman Adrian Cronauer, irreverently spouting a stream of acronyms that will make you laugh or cringe: "Excuse me, sir. Seeing as how the VP is such a VIP, shouldn't we keep the PC on the QT? 'Cause if it leaks to the VC he could end up MIA, and then we'd all be put on KP." Wikiquote, "Good Morning, Vietnam," last modified 7 February 2019, https://en.wikiquote.org/wiki/Good_Morning,_Vietnam. VP = Vice-President, VIP = Very Important Person, PC = Press Conference, QT = quiet, VC = Viet Cong, MIA = Missing in Action, KP = Kitchen Police.

[11]J. Bott, et al, "Multi-Domain Battle: Tactical Implications," *Over the Horizon*, 28 August 2017, 2, last accessed 23 February 2019, https://othjournal.com/2017/08/28/multi-domain-battle-tactical-implications/. Bott and his three fellow authors represent each of the four warfighting services of the United States Department of Defense: United States Air Force, United States Marine Corps, United States Navy, and United States Army.

military leaders at the highest levels recognize the value of the professional discourse and the importance of agreement on the meaning of its key terms. General Stephen Townsend, Commander US Army Training and Doctrine Command, implored the need for "clarity and alignment in how we talk."[12] Yet how can we speak intelligently about multi-domain if we don't understand what we mean simply by 'domain'?

To immediately dispel the idea that existing military doctrine[13] will provide the necessary definitions, neither Canadian, nor American, nor North Atlantic Treaty Organization (NATO) doctrine offer a definition of domain itself though all use the term liberally.[14] All feature a common representation of the traditional geographic areas (land, sea, air) in which military forces operate and conflict is waged – these areas are thus called 'domains'.

Despite this apparent consistency of common usage in military jargon and appearance in doctrine, 'domain' does not have a widely agreed-upon definition in the military lexicon. Jeffery Reilly, a retired military officer and leading academic in the field of modern defence and security, noted the diverse etymology of the word 'domain': "[it] has existed since at least the 15 century when English, French and Latin versions of the word described a physical territory owned or controlled by an individual, federation or confederation of individuals" and defines domain in the online professional journal, *Over*

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[12]Jared Donnelly, and Jon Farley, "Defining the "Domain" in Multi Domain," *Over the Horizon*, 17 September 2018, 1, last accessed 23 February 2019, https://othjournal.com/2018/09/17/defining-the-domain-in-multi-domain/.
[13]Military doctrine is the codified common expression of knowledge acquired through experience pertaining to the application of the profession of arms.
[14]Jared Donnelly, and Jon Farley, "Defining the "Domain" in Multi Domain," *Over the Horizon*, 17 September 2018, 4, last accessed 23 February 2019, https://othjournal.com/2018/09/17/defining-the-domain-in-multi-domain/.

the Horizon, as "a critical sphere of influence whose control or access provides the freedom of action and superiority required by the mission."[15]

Other military sources and academic references share many of the above definition's salient points. Major Sean Atkins, a prior deputy director and instructor in the United States Air Force (USAF) Air Command and Staff College Multi-Domain Operations and Strategy Program, and founding director of *Over the Horizon*, offers a simpler definition of domain as "a characteristically distinct maneuver-space within or through which advantage can be achieved over an adversary."[16]

Among the more concise definitions of domain is the ten-word gem offered by USAF Air University Assistant Professor Lieutenant-Colonel Peter Garretson: "a space in which forces can maneuver to create effects."[17] In its simplicity there is both elegance and risk, particularly with the use of the word 'space' which is itself recognized as a domain and can evoke the corresponding term 'environment'. Of the many definitions, Lieutenant-Colonel Garretson's correlates most closely with the operational realities of the CAF.

Canadian Definition of Domain

The Government of Canada's terminology and linguistic data bank, TERMIUM Plus, recognizes 15 entries for the word 'domain'. The record for defence planning and

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[15]Jeffrey Reilly, "Over the Horizon: The Multi-Domain Operational Strategist (MDOS)," *Over the Horizon*, 5 January 2018, 2, last accessed 23 January 2019, https://othjournal.com/2018/01/05/oth-anniversary-over-the-horizon-the-multi-domain-operational-strategist-mdos/.

[16]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 27.

[17]Peter Garretson, "USAF Strategic Development of a Domain," *Over the Horizon*, 10 July 2017, last accessed 1 May 2019, https://othjournal.com/2017/07/10/strategic-domain-developement/; Jared Donnelly, and Jon Farley, "Defining the "Domain" in Multi Domain," *Over the Horizon*, 17 September 2018, 4, last accessed 23 February 2019, https://othjournal.com/2018/09/17/defining-the-domain-in-multi-domain/.

military doctrine defines domain as: "A sphere of activity, influence or knowledge related to a specific physical or conceptual property."[18] This definition is identical to the Defence Terminology Bank's entry for 'domain' under Military Operations – Joint Operations. The Defence Terminology Bank further defines 'domain' as "within the spectrum of conflict, the activities, infrastructure, people and material that enable military power."[19] This definition is needlessly confined to the spectrum of conflict, and then is broad and vague about its components. It approaches a CAF definition of capability (equipment, people, process, training) and places emphasis on physical things rather than physical spaces. Lieutenant-Colonel Garretson's version is stronger in its simplicity and seems more applicable to the CAF experience by emphasizing manoeuvre and effects vice advantage and adversaries.

The key features of a domain are thus: it is a physical place, comprised of people and things, containing an element of action – people and things exerting power, and is by its nature contested – by other people and things exerting power, so that it can only be dominated or held by force, relinquished by submission, or abandoned by choice.

Isn't Domain Equivalent to Environment?

The words domain and environment should not be used interchangeably. In Canada, the Defence Terminology Bank defines 'environment' as "the surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna,

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[18]TERMIUM Plus, "Domain," last accessed 24 January 2019, https://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=domain&index=alt&codom2nd_wet=1#resultrecs.
[19]Defence Terminology Bank, "Domain," record 34947, last accessed 24 January 2019.

humans, and their interrelations" and for the CAF it adds the dual alternative meaning "either maritime, land or air forces."[20]

Strikingly, the Canadian military recognizes the term 'environment' as both a real physical space and an organizational construct. The organizational meaning for 'environment' came to prominence following the integration and unification of the CAF in 1968 but is less common among today's serving members.

In the CAF today, the word 'environment' is used chiefly to distinguish land, sea, and air due to their relative differences and unique characteristics as geophysical spaces. A member of the land forces would not say they were part of the "land environment", they would proudly proclaim their particular corps or regiment or, more generally, that they were in "the Army". Curiously, the respective domains of the maritime and air forces are defined in the Defence Terminology Bank, but not that of land forces.[21]

Writing about the differences between the three traditional environments, Canadian Army Major Jim Gash explained the functional division as follows: "different technologies—and therefore unique supporting equipment, skill sets, and training—are required to physically operate within these distinct environments."[22] With this

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[20]Defence Terminology Bank, "Environment," last accessed 24 January 2019.

[21]*Ibid*. Air Domain: All areas, entities and activities related to, or affecting, the air environment. Note: The air domain includes infrastructure, people, cargo, aircraft and other conveyances. Maritime Domain: All areas, entities and related activities on, under or adjacent to a sea, an ocean or other navigable waterway. Note: The maritime domain includes infrastructure, people, cargo, vessels and other conveyances.

[22]Jim Gash, "Physical Operating Environments: How the Cyber-Electromagnetic Environment Fits," *Canadian Military Journal* 12, no. 3 (Summer 2012): 28, http://www.journal.forces.gc.ca/vol12/no3/page28-eng.asp.

explanation it is easier to understand how, from a military perspective, a domain can be considered the part of the environment where power and influence can be exercised.[23]

The Traditional Operational or Warfighting Domains

Domains have characteristic physical features and limitations; designating a part of our world as a domain is contentious, even within the world's largest militaries. Most militaries recognize "five interrelated [operational] domains: land, maritime, air, space, and cyberspace."[24] This unity of thought developed over many decades.

The three traditional operational domains are land, sea (maritime), and air, and reflect the evolution of warfare over millennia. Human conflict was first waged on land, and it is almost certain that the first wars were small in scale, fought hand-to-hand between a few men with limited weaponry like sticks and rocks. As men organized into larger groups, and later formed armies, technology nonetheless limited their conflict to the land domain.

Over time, developments as simple as the first rudimentary raft heralded the opening of a new domain for exploration, commerce, and war. As technology advanced, so too did military capabilities in the new maritime domain. "By enabling a projection of power and influence beyond where armies could previously travel, early sea power capabilities provided new ways to gain an advantage on land,"[25] changing the way wars

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[23]Department of National Defence, Chief of Force Development, A-FD-005-002/AF-001, *Integrated Capstone Concept* (Winnipeg, MB: Department of National Defence, 2009), 68.

[24]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, 27 March 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/; Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 27. https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/F-Atkins.pdf.

[25]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 27.

were fought. This linked the two domains, as rivers and oceans could no longer assure security from forces on the other side. Manoeuvre on water provided new flanking opportunities and other tactical movement to posture one's forces and defeat an adversary on land, but by sea. Nations that developed strong armies to seize and defend the land, and navies to rule the waves, sent armies overseas and rose to become global powers.

A vast third dimension to warfare was added at the turn of the 20th Century with the advent of flight. Suddenly, and dramatically, there were "new ways to connect, maneuver, and gain an advantage over both land and sea forces" and the balance of power began to shift in both subtle and more dramatic ways not seen before.[26] Previous concepts of battle were threatened from above as air power "ushered in the opportunity to exploit vulnerabilities on both the land and sea."[27]

The historic trend of technology driving "access to domains that were previously inaccessible" continued in the 1950s with the launch of the first satellites and beginning of the space race.[28] Space affords even more advantages to the warfighter by providing a figurative overarching and literal overwatching set of capabilities affecting the traditional domains. Reilly noted that "as the pace of technology progresses the complexity of domain interrelationships will drastically increase"[29] and this trend is accelerating in the latest domain of Cyber. The pace of technological change, and widespread availability of powerful and inexpensive products, demand a parallel and more sophisticated development of the military's concept of domains. A future operating environment will

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[26]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 27.

[27]Jeffrey Reilly, "Over the Horizon: The Multi-Domain Operational Strategist (MDOS)," *Over the Horizon*, 5 January 2018, 3, last accessed 23 January 2019. https://othjournal.com/2018/01/05/oth-anniversary-over-the-horizon-the-multi-domain-operational-strategist-mdos/.

[28]*Ibid*.

[29]*Ibid*.

be characterized by weaponized technology whose "advancements are far beyond the normal capacity to predict their effects. […] As a result, historical approaches to achieving superiority in the air, land and sea domains may no longer be valid."[30] New thinking is required to account for new technology and new domains.

The Two Newest Domains: Space and Cyber

Space and Cyber are called the new domains of warfare but they have been used for military operations for decades. Space was first entered in the 1950s and Cyber came to military prominence in the 1990s. It took longer to develop our understanding of these domains as each was distinctly 'unnatural' compared to the three traditional domains of land, sea, and air which have affected the human condition since the dawn of time. Wars have been fought and won by manoeuvre and dominance in each of these three traditional domains, respectively, and in all three domains together. The same will be true for the new domains.

Space and Cyber seem to emerge simply from the application of technology, but "understanding the impact of new technologies on warfare is far from simple."[31] Early assessments of the potential operational impact of technology, usually based on experimentation and exercise, "have often proven to be inaccurate, misleading and prone to bureaucratic influence as established interests defend the status quo."[32] Canada and its allies are developing expertise in these new domains, as are our potential adversaries. "It

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[30]Jeffrey Reilly, "Over the Horizon: The Multi-Domain Operational Strategist (MDOS)," *Over the Horizon*, January 5, 2018, 4, last accessed 23 January 2019. https://othjournal.com/2018/01/05/oth-anniversary-over-the-horizon-the-multi-domain-operational-strategist-mdos/.

[31]Michael Spirtas, "Toward one understanding of multiple domains," 1 May 2018, last accessed 21 February 2019, https://www.c4isrnet.com/opinion/2018/05/01/toward-one-understanding-of-multiple-domains/.

[32]*Ibid*.

often takes actual operational experience, against a live adversary, to understand the impact of a new capability on military operations."[33] We have not yet had a space war, but cyber attacks are increasing in frequency and significance.

Are potential adversaries "actually conducting live fire training events in preparation for attacks on more sensitive targets[?]"[34] Identifying and exploiting vulnerabilities is a strategy towards victory – what do we know about such opportunities and risks in Space and Cyber? A basic piece of equipment in the Space domain, relatively well understood, is the satellite. Everyone understands satellites, or thinks so by having a satellite television or radio, Global Positioning System (GPS) in their car, or maybe even from using a satellite telephone. The military knows that "space assets provide the means to communicate globally; conduct the positioning, navigation, and timing necessary for precision strikes; and empower enhanced intelligence, surveillance, and reconnaissance."[35] With knowledge comes understanding, but do we truly understand the Space domain?

A cursory examination of space asset dependencies, described by Reilly, reveals that we have much to learn:

> A satellite system consists of three basic components: the satellite
> itself, the ground stations used to command and control it, and the
> communication links between the components. All of [these components]

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[33]Michael Spirtas, "Toward one understanding of multiple domains," 1 May 2018, last accessed 21 February 2019, https://www.c4isrnet.com/opinion/2018/05/01/toward-one-understanding-of-multiple-domains/.

[34]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 52, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf. For instance, when North Korea executed offensive cyber campaigns against Sony in 2014, it compromised more than 3,000 computers, 800 servers, and a huge amount of data, including the personal information of employees. In another attack in May of 2017, the ransomware known as WannaCry infected hundreds of thousands of Microsoft Windows operating systems in more than 150 countries.

[35]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 69.

have varying degrees of vulnerabilities.[36] Adversaries can employ a variety of attack options including kinetically attacking the ground stations [including the dishes and phones], jamming or spoofing links, and using directed energy to dazzle or partially blind the satellite.[37]

In the first sentence above we discern an immediate dependency between satellites, in the Space domain, and control systems in the Land and Cyber domains. Evidently the signal from satellite to ground transits the Air, and possibly also the Cyber, domain. The systems are more complicated than we first realize.

The Cyber domain poses equal if not greater challenges. The Defence Terminology Bank defines Cyberspace as "the interdependent networks of information technology structures – including the Internet, telecommunications networks, computer systems, embedded processors and controllers-as well as the software and data that reside within them,"[38] and the Cyber domain as "all infrastructure, entities, users and activities related to, or affecting, cyberspace."[39] Unlike the traditional domains, where the inclusion of equipment as part of the domain itself was disputed, in Cyber the equipment *is* the primary component of the domain and it now covers the globe.

The new domains, Space and Cyber, are largely considered a shared global commons. The Cyber domain in particular does not have the same physical characteristics as the traditional geophysical domains. Beyond the physical differences, the geopolitical divisions that have developed and evolved over time in the Land domain, often through conflict, are not found in Space or Cyber. The absence of these commonly

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[36]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 69.

[37]Jeffrey Reilly, "Over the Horizon: The Multi-Domain Operational Strategist (MDOS)," *Over the Horizon*, 5 January 2018, 6, last accessed 23 January 2019, https://othjournal.com/2018/01/05/oth-anniversary-over-the-horizon-the-multi-domain-operational-strategist-mdos/.

[38]Defence Terminology Bank, "Cyberspace," last accessed 24 January 2019.

[39]Defence Terminology Bank, "Cyber," last accessed 24 January 2019.

understood and internationally recognized boundaries presents a number of challenges to the traditional understanding of sovereignty, and civilian and military control. A sobering assessment of the potential threat posed by the global domains of Space and Cyber warns "the historical barriers of the Atlantic and Pacific oceans are no longer effective means to negate an enemy's operational reach."[40] In the shared global commons, actions can have effects and reverberations that exceed the traditional boundaries of the military and political arenas.

Clearly delineating the temporal and spatial boundaries of operations is useful in providing focus and this importance is amplified in Space and Cyber. An accurate appreciation for the expanse of a given domain can generate a better understanding of the 'seams': the margins, overlaps, and gaps across domains. "Thinking merely in terms of how space and cyber support the land, air, or maritime [domains] creates the potential for vulnerabilities and lost opportunities."[41]

Current Canadian and US defence policy both note the increasing interdependence of domains and their reliance on Cyber. The US National Security Strategy (NSS) of 2018 expresses concern for vulnerabilities along the seams and "the potential that these dependencies could cause catastrophic consequences to US critical infrastructure, military command and control, financial markets, and communication systems."[42] The NSS prioritizes robust cyber defences and expanded cyber offensive

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[40]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 68.

[41]Jim Gash, "Physical Operating Environments: How the Cyber-Electromagnetic Environment Fits," *Canadian Military Journal* 12, no. 3 (Summer 2012): 34, http://www.journal.forces.gc.ca/vol12/no3/page 28-eng.asp.

[42]Brian Willis, "Multi-Domain Operations at the Strategic Level," *Over the Horizon*, 2 March 2018, 5, last accessed 23 January 2019, https://othjournal.com/2018/03/02/multi-domain-operations-at-the-strategic-level/.

capabilities. The subsequent National Defense Strategy (NDS) directs the "continued integration of cyber capabilities into the full spectrum of military operations."[43] Canada's Strong, Secure, Engaged defence policy recognizes the Space and Cyber domains and how threats in the Cyber domain transcend national borders.[44] These and other threats posed by the future security environment have clear implications for Canada's capability development in Space and Cyber.[45] In the Space domain, "Canada will modernize its space capabilities and will take steps to protect these critical assets against sophisticated threats, while continuing to promote the peaceful use of outer space."[46] In the Cyber domain, using language parallel to the American NDS, Canada "will assume a more assertive posture […] by hardening our defences, and by conducting active cyber operations against potential adversaries in the context of government-authorized military missions."[47] Throughout the defence policy, several initiatives are tasked to the Defence Team to develop and institutionalize capabilities in the new domains and better support military operations.

The US military are much further advanced in their space and cyber capabilities which mutually support every military operation. "Space and cyberspace capabilities are so integrated that they function as a multi-domain package unseen and unappreciated by many until something interrupts the advantages they provide."[48] Domain integration

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[43]Brian Willis, "Multi-Domain Operations at the Strategic Level," *Over the Horizon*, 2 March 2018, 5, last accessed 23 January 2019, https://othjournal.com/2018/03/02/multi-domain-operations-at-the-strategic-level/.

[44]Department of National Defence. *Strong, Secure, Engaged. Canada's Defence Policy*. (Ottawa, ON: Minister of National Defence, 2017), 14.

[45]*Ibid*., 57.

[46]*Ibid*., 15.

[47]*Ibid*.

[48]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 49, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf.

gives rise to critiques of the inherent limitations in the very concept of domains – as they converge their identification as separate and distinct spaces become less relevant. Writing on the newest domains and how they fit with the others, Major Gash concluded: a comprehensive understanding of how each domain relates to the others is essential.[49]

Criticisms of Domain Terminology

Domain terminology is not well defined in doctrine and with new domains being proposed and discussed, critics argue "that the categorization of future war by domain […] is neither logical nor practical."[50] Past conflicts have largely been characterized in terms of the unique features of each respective domain, with little consideration for the effects of one domain on another beyond the exploitation of strengths and vulnerabilities in each. Future conflict is expected to be more complex, with increased reliance on domain interdependence and the convergence of technology.

For the land, maritime, and air domains, the operational effects within each domain and their impact across domains are well known. Irrespective of the newest domains of Space and Cyber, critics say the word domain "contains some built-in assumptions regarding how we view warfare that can limit our thinking . . . [and] could actually pose an intractable conceptual threat to an integrated joint force."[51] The potential cognitive restrictions resulting from grouping such distinct spaces together under a single moniker like 'multi-domain' must be recognized so as to be avoided. The integration of

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[49]Jim Gash, "Physical Operating Environments: How the Cyber-Electromagnetic Environment Fits," *Canadian Military Journal* 12, no. 3 (Summer 2012): 34, http://www.journal.forces.gc.ca/vol12/no3/page28-eng.asp.
    [50]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation," *Joint Force Quarterly* 88 (1st Quarter 2018): 15.
    [51]*Ibid*.

joint forces in a multi-domain concept must respect and address the differences across domains which challenge linkages.

Tom Flounders expands on the idea of domain inequality in an article for *Over the Horizon*:

> Each domain has a specific set of governing dynamics with unique advantages and constraints in how they can be used to achieve operational impact. Space, for example, is difficult to operationalize due to orbital mechanics and physical distance. […] The air domain, in turn, can affect large areas of air, land, and sea, but with largely temporary effects. [….] Navies extend a nation's reach and can control major economic arteries, but float at the periphery of an adversary's territory. Operations on land may have the most lasting effects, but are slow to develop and execute, and are accompanied by huge costs in human capital.[52]

These distinctions emphasize rather than diminish the importance of recognizing and understanding the unique characteristics of the domains when they converge and are exploited inter-dependently in times of conflict to achieve military objectives.

To Understand Domain, Understand Dominance

A common goal of all military forces is to prevail in conflict. To prevail against a determined foe, a military must understand the domains in order to effectively wield the capabilities it can bring to bear to dominate its adversaries. A previous Commanding General of the US Army's Training and Doctrine Command (TRADOC), General David Perkins, emphasized the need to understand more than just the words themselves. "Beyond just the framework, integrating space and cyberspace domains and the electromagnetic spectrum for how Army units and joint forces will fight is something the

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[52]Tom Flounders, "Multi-Domain Thinking and the Human Domain," *Over the Horizon*, 3 July 2017, 5, last accessed 23 February 2019, https://othjournal.com/2017/07/03/md-thinking-human-domain/.

Department of Defense is just now beginning to understand."[53] TRADOC's recognition

that earlier concepts of 'how we fight' must be revisited derives from a stronger double

concern; first, that "in the future, we can expect all domains to be contested"[54] and

second, "that the United States will not be the sole proprietor of battlespace dominance in

future conflict."[55]

The assumption of American dominance has existed from at least the end of the

Cold War at the beginning of the 1990s,[56] and persists despite protracted conflicts in

Afghanistan and Iraq. More recent assessments of potential adversaries, to be considered

later in this paper as part of the Future Operating Environment, show their developing

potential to field matching or overmatching capabilities in multiple domains relative to

US and NATO forces.

Writing on 'how we fight', General Perkins noted that the US Army fights for

"temporary windows of localized control to seize, retain, and exploit the initiative."[57] The

rise of peer competitors as potential adversaries means "future wars will likely necessitate

US forces fight for every yard of territory in pursuit of their objective."[58] The implicit

struggle for dominance is also apparent in Canadian general officer briefings on the

importance of developing and employing strategically relevant, operationally focused,

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[53]David Perkins, "Multi-Domain Battle: Driving Change to Win in the Future," *Military Review* 97, no. 4 (July-August 2017): 12.

[54]David Perkins and James Holmes, "Multi-Domain Battle: Converging Concepts Toward a Joint Solution," *Joint Force Quarterly* 88, (1st Quarter 2018): 55.

[55]Amos Fox, "Multi-Domain Battle: A Perspective on the Salient Features of an Emerging Operational Doctrine," *Small Wars Journal,* last accessed 24 January 2019, https://smallwarsjournal.com/jrnl/art/multi-domain-battle-a-perspective-on-the-salient-features-of-an-emerging-operational-doctri.

[56]There were some references to a potential worldwide era of peace and prosperity, secured and governed by the United States, loosely labeled '*Pax Americana*'. This failed to materialize in any tangible way.

[57]Amos Fox, "Multi-Domain Battle: A Perspective on the Salient Features of an Emerging Operational Doctrine," *Small Wars Journal,* last accessed 24 January 2019, https://smallwarsjournal.com/jrnl/art/multi-domain-battle-a-perspective-on-the-salient-features-of-an-emerging-operational-doctri.

[58]*Ibid*.

tactically decisive forces. Many formation and unit-level mission statements include some variation of the obligation to gain and maintain superiority. By understanding "the character of dominance, [we] will be better positioned to manipulate force and resources in the pursuit thereof."[59]

General Perkins is realistic in setting expectations: "It will no longer be possible to maintain total domain dominance in all domains all the time."[60] If dominance is not a condition that can be established in totality or perpetuity, it is by default characterized by resources and time. "Dominance is provisional – it is fleeting, fragile, and prone to shock or surprise."[61] Dominance is also measurable in "degrees, and duration [and these] metrics can be used in forecasting when, where, and for how long a force may, or may not, possess dominance."[62]

The critical factor in understanding the nature of dominance in the future operating environment is the early opportunity it provides military leaders to "to develop feasible, acceptable, and suitable operational approaches and tactical plans for the multi-domain environment."[63] Accordingly, the MDO concept starts with a review of how we think about how we fight.

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[59]Amos Fox, "Multi-Domain Battle: A Perspective on the Salient Features of an Emerging Operational Doctrine," *Small Wars Journal,* last accessed 24 January 2019, https://smallwarsjournal.com/jrnl/art/multi-domain-battle-a-perspective-on-the-salient-features-of-an-emerging-operational-doctri.

[60]David Perkins and James Holmes, "Multi-Domain Battle: Converging Concepts Toward a Joint Solution," *Joint Force Quarterly* 88, (1st Quarter 2018): 55.

[61]Amos Fox, "Multi-Domain Battle: A Perspective on the Salient Features of an Emerging Operational Doctrine," *Small Wars Journal,* last accessed 24 January 2019, https://smallwarsjournal.com/jrnl/art/multi-domain-battle-a-perspective-on-the-salient-features-of-an-emerging-operational-doctri.

[62]*Ibid.*

[63]*Ibid.*

CHAPTER 3 – WHAT IS MULTI-DOMAIN?

The whole is greater than the sum of its parts.
– Often attributed to Aristotle

We know that there is more than one domain; we know they are increasingly linked. What are we to make of this interrelated multitude? Having established a logical and rhetorical comfort with the term domain, and developed awareness of the military's operational domains (Land, Maritime, Air, Space, Cyber), inductive reasoning should lead to multi-domain being an additive function applied to more than one domain. This conclusion is unnecessarily limiting and for the purposes of understanding multi-domain operations (MDO) this chapter will explore the origin, development, and current state of the MDO concept as of its first formally published appearance in late 2018 by the US Army.

Developing the Term 'Multi-Domain'

Building on his earlier definition of domain, Major Atkins proposed "the core thesis [of MDO] is the complementary, vice merely additive, use of capabilities across domains to create moments of superiority that can be leveraged to achieve mission objectives."[64] This was the necessary response to a new reality "characterized by complex problems that defy current approaches and anti-access/area-denial (A2/AD) challenges that require more fluidly integrated capabilities across all domains to overcome."[65] These problems are even more pronounced in Space and Cyber.

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[64]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 28. Atkins' definition for domain appears in Chapter 2, "a characteristically distinct maneuver-space within or through which advantage can be achieved over an adversary."
[65]*Ibid.*, 26.

"To address this," Major Atkins said, "the nascent multi-domain idea aims to make an expression of jointness within and across domains."[66] His complementary joint approach consolidated several descriptions of MDO from contemporary colleagues pointing to "an operational-level concept designed to maneuver friendly forces—and direct their kinetic and nonkinetic fires or effects—simultaneously across five domains."[67] As the concept grew from its origins within the US Army and United States Marine Corps (USMC), each service in succession grappled with new technology and new terminology that for some threatened their traditional alignment to, and mastery of, their 'home' domain. If the distinction of domains was to be supplanted by a multi-domain concept, would the services also lose their uniqueness – both a source of pride and a means to compete for scarce resources?

Major Atkins addressed the issue of discrete, separate domains as follows: "increased domain connectivity and interdependence are pushing the battlespace toward a more fluid continuum of domains."[68] Reilly observed a radical impact of this trend on preconceptions of the whole battlespace and of domains as separate parts in and of themselves. "The consequences of this domain interdependence has forged a complex interrelated continuum of domains that will dominate future military operations."[69] Old paradigms were shifting despite intransigence in some parts of the traditional services.

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[66]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 26.

[67]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation." *Joint Force Quarterly* 88 (1st Quarter 2018): 16.

[68]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 27.

[69]Jeffrey Reilly, "Over the Horizon: The Multi-Domain Operational Strategist (MDOS)," *Over the Horizon*, 5 January 2018, 4, last accessed 23 January 2019, https://othjournal.com/2018/01/05/oth-anniversary-over-the-horizon-the-multi-domain-operational-strategist-mdos/.

The interdependence of domains, in particular between Cyber and the other four, was breaking down the parochialism and inter-service rivalries that are unhealthy for a joint force seeking to achieve effects across domains to counter peer adversary capabilities. Major Atkins observed: "It is more than simply conducting operations in multiple domains – it is about synchronized maneuver between domains to create asymmetric effects at speeds that ultimately complicate and outpace adversaries' OODA [loop]."[70] Applying critical thinking to multi-domain terminology should encourage common understanding and ensuing cooperation.

In the first anniversary issue of *Over the Horizon*, the 'editor's choice article' by Major Aaron Sick examined how we can increase options to win a future fight by overcoming the biases that shape each service's perception of the battlefield. "The bottom line intent of the term is to bring the domains together for unity of effort in mission accomplishment."[71] Multi-domain considers all the domains as interrelated and interdependent spaces.

The multi-domain concept isn't realized just by adding Space or Cyber to one of the traditional domains.[72] For example, well-founded critiques from within the ranks of the USAF noted that its early references to 'multi-domain' were too narrow, "apply[ing]

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[70]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 27. The 'OODA loop' refers to USAF Colonel John Boyd's famous process to describe the cycle of combat actions: Observe, Orient, Decide, Act.

[71]Aaron Sick, "Looking Beyond Your Service for Multi-Domain Success," *Over the Horizon*, 24 December 2018, 3, last accessed 23 January 2019, https://othjournal.com/2018/12/24/oth-anniversary-looking-beyond-your-service-for-multi-domain-success/.

[72]Some tongue-in-cheek comments heard in recent discussions during joint planning activities include *we'll just sprinkle some cyber on this course of action to make it better*.

it only to air, space, and cyberspace."[73] Major Sick reproached his service's self-centred

perspective, reminding the community that "'multi-domain' means all domains, not

simply domains that apply to one Service."[74] He also felt it was important that multi-

domain concepts be developed with a common vocabulary. Not doing so, he warned,

"adds confusion to the term[s], degrades [our] credibility in the joint community, and sets

[us up] for failure in understanding how [we fit] into the multi-domain fight."[75]

Multi-domain is about how we will fight, and it is more than a buzzword. Military

officers must contribute their ideas to forge a common understanding of emerging

concepts but must also exercise caution in casually adopting and dropping terms without

understanding and respecting their meaning once established. This can induce the kind of

professional frustration across the community clearly expressed in an opinion piece

posted on a leading defence industry website:

> Different actors use the buzzword to mean different things, which
> can create confusion among those who make and implement policy. It's a
> trite but true statement that the world is a complex place, and conceptual
> confusion makes everything more difficult. Poorly understood terms waste
> time, money and, potentially, lives. […] Allowing conceptual confusion to
> continue and to grow could jeopardize progress and eventually relegate
> multidomain to the ashheap of buzzwords that may only interest
> historians, retired bureaucrats and defense geeks.[76]

Clarity is important in developing multi-domain concepts. It is prudent to note the

increasing complexity in global security and conduct our analysis in light of emerging

challenges. We can also learn from our past. Readers interested in historical anecdotes of

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[73]Aaron Sick, "Looking Beyond Your Service for Multi-Domain Success," *Over the Horizon*, 24 December 2018, 3, last accessed 23 January 2019, https://othjournal.com/2018/12/24/oth-anniversary-looking-beyond-your-service-for-multi-domain-success/.

[74]*Ibid*.

[75]*Ibid*.

[76]Michael Spirtas, "Toward one understanding of multiple domains," 1 May 2018, last accessed 21 February 2019, https://www.c4isrnet.com/opinion/2018/05/01/toward-one-understanding-of-multiple-domains/.

operating in, and across, multiple domains to achieve mission success will find two examples in the Appendix. Potential adversaries are applying their own lessons in conducting operations in a continuum of domains. The Russian military reorganization which began in 2008 increased its efficiency and lethality by creating the organizations, equipment and tactics needed to synchronize operations across domains.[77] The necessary response from the US and NATO allies was to improve their own doctrine, starting with the question "what problem are we trying to solve?"

New Threats From Old Adversaries

Over the last twenty years, as the US and its western allies fought in the Middle East and South East Asia, other states and even some non-state actors have steadily acquired advanced capabilities that "offset the US military's strengths across all operating domains."[78] "While the Taliban, Al Qaeda, and other enemies in Iraq and Afghanistan posed a constant danger to soldiers and marines on the ground, they presented little threat to operations in the air and space, at sea, or in cyberspace."[79] Stronger potential adversaries, operating in a complex world, have forced the US military to realize that in future conflicts all domains will be contested.

A 2016 RAND Report entitled *The Challenges of the "Now" and Their Implications for the U.S. Army* found potential adversaries had studied western capabilities and vulnerabilities; they were adapting their forces and developing

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[77]Thomas Griesemer, "Russian Military Reorganization: A Step Toward Multi-Domain Operations," *Over the Horizon*, 19 November 2018, 2, last accessed 23 February 2019, https://othjournal.com/2018/11/19/russian-military-reorganization-a-step-toward-multi-domain-operations/.

[78]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 61.

[79]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, March 27, 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/.

overmatching capabilities that posed great risks.[80] The identification and understanding

of capability gaps would not come easy to "a generation of soldiers who have known no

adversary other than insurgents in Iraq and Afghanistan."[81] Potential adversaries had

gained diverse experience in recent conflicts and developed competencies in all domains

"especially in the middle and high ends of the spectrum of operations."[82] Western forces

needed to understand and prepare for a new range of adversaries and the kind of war that

would most likely be fought. The assumption that America could project conventional

power abroad unchallenged was no longer valid.[83]

Characterizing the modern battlespace, potential adversaries, and their

capabilities, Maj Jerry Gay from US Joint Special Operations Command cited the United

States Military Academy's 'Modern War Institute' that questioned the potential success

of US forces against peer adversaries in future conflict.[84] This was echoed by observers

of recent operations conducted by Russia and China, along with the latter's assessment

"that [future] campaigns will be conducted in all domains simultaneously."[85]

Simultaneous campaigning across all domains is not a feature of today's US

military which tends to take supremacy in space, cyber and maritime domains for

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[80]David Johnson, "The Challenges of the "Now" and Their Implications for the U.S. Army," Santa Monica, California: RAND Corporation, 2016, Report No.: PE-184-A, 2-10, http://www.rand.org/pubs/perspectives/PE184.html.

[81]*Ibid.*

[82]*Ibid*. For a critique of US strategic models for dealing with situations short of armed conflict, termed "gray zone", see Isaiah Wilson, and Scott Smitson, "Are Our Strategic Models Flawed? Solving America's Gray-Zone Puzzle," *The US Army War College Quarterly Parameters* 46, no. 4 (Winter 2016-17): 55-67.

[83]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 61.

[84]Jerry Gay, "Modernizing ISR C2 Part I: Multi-Domain Maneuver as the Foundation," *Over the Horizon*, 21 November 2018, 4, last accessed 23 February 2019, https://othjournal.com/2018/11/21/modernizing-isr-c2-part-i-multi-domain-maneuver-as-the-foundation/.

[85]Jonathan Bott, "Outlining the Multi-Domain Operating Concept," *Over the Horizon*, 8 June 2017, 2, last accessed 23 February 2019, https://othjournal.com/2017/06/08/outlining-the-multi-domain-operating-concept/

granted, establishes air supremacy in regional theatres, then commits large ground forces under these protective shields. If all domains are contested, superiority in one or more domains cannot be taken for granted as opportunities and vulnerabilities in one domain may be linked to another. The relative technological advantage of US forces decreases as powerful and inexpensive technology proliferates, drives multi-domain interdependence, and increases battlespace complexity.[86]

Potential adversaries have recent operational and tactical experience employing advanced capabilities that threaten long-held assumptions of Western superiority. Opportunities to gain and maintain superiority in any domain will be short-lived. The true problem is how to seize upon these narrowing windows of opportunity, especially when all domains are contested.

How is Multi-domain Different than Joint?

Multi-domain concepts address a future operating environment in which no single service can prevail and the basic joint concepts of "deconfliction, supported/supporting relationships, or basic synchronization" are insufficient.[87] Why not adapt and improve joint concepts instead of forging a new path? Would it be better to improve domain integration with a better understanding of the current model or build a new model to develop a better understanding of integration for MDO?

Intending to spark the critical thinking that would lead to a comprehensive understanding about the approaches to joint warfighting and domain superiority in the

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[86]Jonathan Bott, "Outlining the Multi-Domain Operating Concept," *Over the Horizon*, 8 June 2017, 3, last accessed 23 February 2019. https://othjournal.com/2017/06/08/outlining-the-multi-domain-operating-concept/.

[87]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, 27 March 27 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/.

future,[88] General Martin Dempsey, then-Chairman of the Joint Chiefs of Staff, asked the Military Education Coordination Council back in 2011, "what's after joint?"[89]

Staff efforts to meaningfully engage this question paid "increasing attention on the synergistic potential of "jointness" from a multi-domain perspective,"[90] describing an operating concept of seamless application of combat power within and across domains, with greater integration at dramatically lower echelons than existing joint forces could achieve.[91] General Perkins, as Commanding General TRADOC, recognized the effort required to change ingrained service cultures.[92] He advocated an integrated model including command and control, communication, "tailorable and scalable units", and "policies that enable adaptability and innovation."[93]

Earlier joint concepts developed in the 1980s had promised that by "stitching the seams of the individual Services into a military singularity" it could avoid examples of dramatic and deadly failures, from the Iran hostage rescue mission in 1980 to 1983's invasion of Grenada.[94] Joint concept and doctrine development "played a key role in the success of Operation Desert Storm in 1991" but despite improvements in joint interoperability since, true integration at the operational and tactical levels remained

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[88]Mike Benitez, "Multi-Domain Battle: Does it End the Never-Ending Quest for Joint Readiness?" *Over the Horizon*, 2 May 2017, 1, last accessed 9 March 2019, https://othjournal.com/2017/05/02/mdb-joint-readiness/.

[89]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 61.

[90]Jonathan Bott, "Outlining the Multi-Domain Operating Concept Part II: Evolution of an Idea," *Over the Horizon*, 21 June 2017, 2, last accessed 23 February 2019, https://othjournal.com/2017/06/21/outlining-the-multi-domain-operational-concept-part-ii-evolution-of-an-idea/.

[91]*Ibid*.

[92]David Perkins and James Holmes, "Multi-Domain Battle: Converging Concepts Toward a Joint Solution," Joint Force Quarterly 88, (1st Quarter 2018): 57.

[93]*Ibid*.

[94]Mike Benitez, "Multi-Domain Battle: Does it End the Never-Ending Quest for Joint Readiness?" *Over the Horizon*, 2 May 2017, 2, last accessed 9 March 2019, https://othjournal.com/2017/05/02/mdb-joint-readiness/.

tragically elusive as evidenced by examples of fratricide from the Gulf War to Afghanistan.[95]

Many multi-domain proponents are critical of the joint concept for its limited scope. USAF Major Jonathan Bott observed that for the US military "contemporary joint warfare is still essentially coordinating action between [the independent] Services"[96] and there is a lack of ability to "integrate effects across and through domains regardless of Service."[97] Multi-domain advocates "contend the traditional Service-domain alignments are inadequate for coping with the new security environment."[98] Further complicating the development of the new concept was that it wasn't necessarily the DoD's alone. As noted in a 2018 RAND report, "multi-domain operations might require interagency consensus, given the authorities and capabilities for cyber that reside outside the Department of Defense."[99]

Major Mike Benitez, a weapons systems officer with 250 combat missions with the USAF and USMC, did not see an end to 'joint' and answered Gen Dempsey's question with the retort " – nothing."[100] He viewed joint interoperability as "a never-

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[95]Mike Benitez, "Multi-Domain Battle: Does it End the Never-Ending Quest for Joint Readiness?" *Over the Horizon*, 2 May 2017, 1-2, last accessed 9 March 2019, https://othjournal.com/2017/05/02/mdb-joint-readiness/.

[96]Jonathan Bott, "Outlining the Multi-Domain Operating Concept," *Over the Horizon*, 8 June 2017, 3, last accessed 23 February 2019. https://othjournal.com/2017/06/08/outlining-the-multi-domain-operating-concept/.

[97]*Ibid*.

[98]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation." *Joint Force Quarterly* 88 (1st Quarter 2018): 15.

[99]David Johnson, "The Lessons of AirLand Battle and the 31 Initiatives for Multi-Domain Battle," Santa Monica, California: RAND Corporation, 2018, Report No.: PE-301-A/AF, 5-7, https://www.rand.org/pubs/perspectives/PE301.html.

[100]Mike Benitez, "Multi-Domain Battle: Does it End the Never-Ending Quest for Joint Readiness?" *Over the Horizon*, 2 May 2017, 5, last accessed 9 March 2019, https://othjournal.com/2017/05/02/mdb-joint-readiness/.

ending pursuit achieving the profession of arms' equivalent of Maslow's self-actualization."[101]

Michael Spirtas, a senior policy researcher in MDO at RAND Corporation, is also leery of abandoning joint concepts. He underlines the importance of distinguishing multi-domain from joint and finds value in both:

> Joint is about working across services, and the U.S. military services are not neatly aligned to domains. The Army operates primarily on the ground, but flies helicopters and even operates ships. The Air Force operates in air, space and cyber, but bases its aircraft, command centers and other facilities on the ground. The Navy has its own aircraft, and the Marines also combine air and ground forces that often operate from ships.[102]

With capabilities to operate in more than one domain resident in each respective service, Spirtas noted the dichotomy that it is possible to both "collaborate across domains within one service" (a 'single-service/multi-domain' operation) and "to collaborate across services without collaborating across domains" (a 'joint-service/single-domain' operation).[103] Both joint and multi-domain efforts aim to synchronize actions and coordinate effects, each promising to increase interoperability and operational effectiveness.

Multi-domain requirements will be even more demanding of interoperability, capability integration, and devolution of command and control in order to seize limited opportunities for initiative presented across all domains. While joint concepts certainly inform, and likely prescribe, multi-domain concepts, the primary difference remains that

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[101]Mike Benitez, "Multi-Domain Battle: Does it End the Never-Ending Quest for Joint Readiness?" *Over the Horizon*, 2 May 2017, 5, last accessed 9 March 2019, https://othjournal.com/2017/05/02/mdb-joint-readiness/.

[102]Michael Spirtas, "Toward one understanding of multiple domains," last accessed 21 February 2019, https://www.c4isrnet.com/opinion/2018/05/01/toward-one-understanding-of-multiple-domains/.

[103]*Ibid*.

"multi-domain theory improves upon the joint model by emphasizing full integration of actions in and across domains, developing problem-focused solutions, and creating more options for the commander."[104] For a concept to be truly multi-domain, distinctly evolved from a robust joint concept, it should evoke the axiom at the beginning of this chapter: its whole should be greater than the sum of its parts.

US Army – USMC White Paper 2017

The US Army and USMC were the first to offer a comprehensive multi-domain force employment concept. Their jointly staffed *White Paper 2017 – Multi-Domain Battle: Combined Arms for the 21st Century*, began with the dual premise that a land force would not operate alone and that "the contested environment demands forces from all domains to fight as a single complex, adaptive organism."[105]

The *White Paper* was direct and refreshingly blunt in defining the problem: after over a decade of counterinsurgency operations in Afghanistan and Iraq, despite joint, interagency, multinational and partner (JIMP) successes, US forces were not "sufficiently trained, organized, equipped, or postured to deter or defeat capable peer enemies to win in future war."[106]

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[104]Jonathan Bott, "Outlining the Multi-Domain Operational Concept Part III: Moving Toward Practical Application," *Over the Horizon*. 28 June 2017, 1, last accessed 23 February 2019, https://othjournal.com/2017/06/28/outlining-the-multi-domain-operational-concept-part-iii-moving-toward-practical-application/.

[105]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, 27 March 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/.

[106]David Perkins, "Multi-Domain Battle: Driving Change to Win in the Future," *Military Review* 97, no. 4 (July-August 2017): 9.

The proposed land force with augmented capabilities in multiple domains[107] fit within a larger description of the multi-domain battle concept that described "how U.S. and partner forces organize and employ capabilities to project and apply power across domains."[108] Multi-domain battle would enable the combined arms team equipped with advanced capabilities to open "temporary windows of advantage across multiple domains throughout the depth of the battlefield" in order to "seize, retain, and exploit the initiative [….] and achieve military objectives."[109]

The *White Paper* was a catalyst for critical thinking. Positive reviews praised its progression "from the often stated but little realized goal of Service deconfliction to increasing interdependency and, in the optimistic version of [multi-domain battle], seamlessly integrated operations across domains."[110] Within a year of its publication, multi-domain concepts were being introduced to joint and multi-national capability development and experimentation exercises led by the US Army's Joint Modernization Command.

In an endorsement of shared optimism across the services, the concept's name would soon change from 'multi-domain battle' to 'multi-domain operations'. This was more than a simple rebranding – it was a clear visionary message that the US military was well on its way towards a unifying force employment concept.

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[107]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, 27 March 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/.

[108]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation," Joint Force Quarterly 88 (1st Quarter 2018): 16.

[109]Jerry Gay, "Modernizing ISR C2 Part I: Multi-Domain Maneuver as the Foundation," *Over the Horizon*, 21 November 2018, 7, last accessed 23 February 2019. https://othjournal.com/2018/11/21/modernizing-isr-c2-part-i-multi-domain-maneuver-as-the-foundation/.

[110]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation." *Joint Force Quarterly* 88 (1st Quarter 2018): 15.

From Multi-Domain Battle to Multi-Domain Operations

The evolution of the multi-domain battle concept began almost immediately upon its release, under the leadership of the Commanding General of US Army Training and Doctrine Command (TRADOC), General David Perkins.

General Perkins emphasized that military success in the future will depend upon closer coordination and integration of capabilities across domains than ever before.[111] General Perkins defined the emerging "continuum of conflict" as strategic competition (short of conflict), conflict itself, and return to competition.[112] Conflict was envisioned as a cycle of variable tension as nations continuously postured for advantage, shown in Figure 1. Deterrence, if successful, could bring you back to competition but you could not break out of the cycle. "You are either winning or losing, present tense," he wrote.[113] By introducing these changes, General Perkins was beginning to elevate the concept above the level of 'battle'.

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[111]David Perkins, "Preparing for the Fight Tonight: Multi-Domain Battle and Field Manual 3-0," *Military Review* 97, no. 5 (September-October 2017): 11.

[112]David Perkins, "Multi-Domain Battle: The Advent of Twenty-First Century War," *Military Review* 97, no. 6 (November-December 2017): 11.

[113]*Ibid.*

Figure 1 - The Competition-Conflict Cycle

Source: Sydney Freedberg, "Services Wargaming Multi-Domain Consensus: Army 3-Star Futurist," *Breaking Defence*, 10 January 2019, last accessed 25 January 2019, https://breakingdefense.com/2019/01/services-wargaming-multi-domain-consensus-army-3-star-futurist/.

When TRADOC announced a new doctrinal manual (Field Manual 3-0 Operations) in 2017, General Perkins confirmed that two sections would focus on multi-domain to achieve cross-domain synergy as illustrated by Figure 2. "In the multi-domain battle concept, joint forces will employ speed of recognition, speed of decision, and speed of action to exploit windows of domain superiority with force-oriented operations to destroy key enemy capabilities."[114]

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[114]David Perkins, "Preparing for the Fight Tonight: Multi-Domain Battle and Field Manual 3-0," *Military Review* 97, no. 5 (September-October 2017): 12-13.
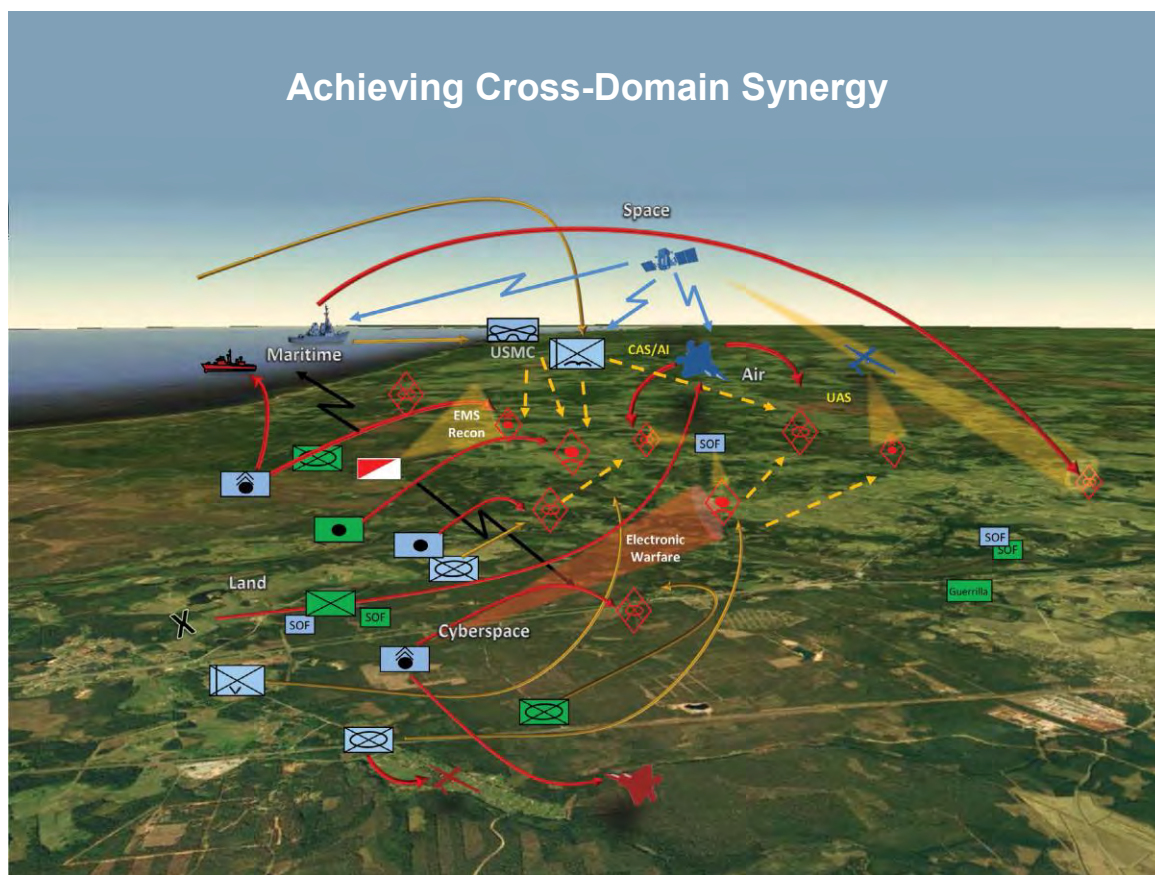
Figure 2 - Joint Forces Applying the Multi-Domain Battle Concept

Source: David Perkins, "Multi Domain Battle: Driving Change to Win in the Future,"
Military Review 97, no. 4 (July-August 2017): 7.

The next Commanding General of US Army TRADOC, General Stephen

Townsend, described the pivot toward operations in *Small Wars Journal* in 2018:

"winning in competition is not accomplished by winning battles but through executing

integrated operations and campaigning."[115] He evoked the future operating environment

by noting "while there are battles within competition, winning them is pointless if they

are in isolation to the larger context of deliberate operations supporting national

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[115]Stephen Townsend, "Accelerating Multi-Domain Operations: Evolution of an Idea," *Small Wars Journal*, last accessed 24 January 2019, https://smallwarsjournal.com/jrnl/art/accelerating-multi-domain-operations-evolution-idea.

strategy."[116] General Townsend succinctly identified "the three concrete reasons why

Multi-Domain Battle evolved to Multi-Domain Operations:"[117]

> First, if the concept is to be truly joint and multi-service, we need clarity and alignment in how we talk. Second, we cannot do this alone. The armed services can win battles and campaigns, but winning wars takes the whole of government. It helps the entire effort if our interagency partners are comfortable with and conversant in our warfighting concepts and doctrine. And third, it is never just about the fight; […] the operating environment is evolving and nation-state–level competition has reemerged, as evidenced by recent actions by both Russia and China.

TRADOC was now deliberately steering the conversation towards persistent competition

– a new reality necessarily involving the whole of government.

The changes in the operating environment had not happened overnight. Russian

belligerent actions in Chechnya in the 1990s, cyber attacks in Estonia in 2007, and

annexation of parts of Georgia in 2008, established a pattern of aggression that later

manifested itself in its annexation of the Crimean Peninsula from Ukraine. Meanwhile

China pursued strategic interests in the South China Sea including an interesting variation

of terraforming by turning slight coral reefs into well-defended islands with maritime port

infrastructure and airfields.

The Association of the United States Army (AUSA) observed "the most striking

difference between AirLand Battle and Multi-Domain Operations is a basic

understanding that competition between nations is the norm; at times, the condition rises

to armed conflict, then reverts to competition."[118] If these and other trends continue they

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[116]Stephen Townsend, "Accelerating Multi-Domain Operations: Evolution of an Idea," *Small Wars Journal*, last accessed 24 January 2019, https://smallwarsjournal.com/jrnl/art/accelerating-multi-domain-operations-evolution-idea.

[117]*Ibid*.

[118]Scott King, and Dennis B. Boykin IV, "Distinctly Different Doctrine: Why Multi-Domain Operations Isn't AirLand Battle 2.0," Association of the United States Army, 20 February 2019, 4. last accessed 23 February 2019, https://www.ausa.org/articles/distinctly-different-doctrine-why-multi-domain-

will redefine the operational environment from counterinsurgency operations and small

wars on terrorism to renewed nation-state competition and a heightened risk of inter-state

conflict.

Future Operating Environment

No one can assert they know the future with certainty. Studying future warfare is

a speculative and continuous process of observation, evaluation, estimation, and revision.

Trends can help guide analysis, as can context, but scholars are challenged to describe the

future operating environment conclusively.[119]

Major Atkins, writing for *Air & Space Power Journal* as a doctoral student in the

Security Studies Program at the Massachusetts Institute of Technology, describes the

emerging battlespace as having three key characteristics based on two new domains, the

opportunities they represent, and their technological connections to all other domains.

The Atkins characteristics trio is comprised of: a Cyber domain and its enabling

possibilities in all domains, having new possibilities for manoeuvre opened in space and

the electromagnetic spectrum, and both intra-domain and inter-domain options created by

increased domain connectivity.[120] "Combined, these three characteristics lead to an

increasingly complex battlespace with exponentially more combinations [in more

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operations-isn%E2%80%99t-airland-battle-20. AirLand Battle is the name of the US Army's previous operating concept; the evolution of operational concepts from AirLand Battle to Multi-Domain Battle, 1982-2017, is summarized in the Appendix.

[119]Jonathan Bott, "Outlining the Multi-Domain Operating Concept," *Over the Horizon*, 8 June 2017, 5, last accessed 23 February 2019, https://othjournal.com/2017/06/08/outlining-the-multi-domain-operating-concept/.

[120]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 30.

domains] of opportunities and risks for war fighters to identify and consider."[121] This

multi-domain complexity changes the way the military develops, trains, and projects

forces – and the speed by which this must all happen.[122]

Drawing from Boyd's *OODA loop*[123], and William Dries, a US Air Force Staff

strategist working on MDO, Atkins proposes "there will be far greater emphasis on

warfighters' ability to first out-observe and out-orient" the adversary in all domains.[124]

Dries notes further challenges to friendly forces in all phases of future conflict.

"Competitors are deliberately seeking and presenting asymmetrical challenges to U.S.

operational access, basing, communications, and freedom of action," rapidly undermining

America's dominance across domains.[125] Traditionally, as historical examples illustrate,

the best way to attack a superior force operating in one domain is with a capability from

another.[126]

Dries offers the striking example of air attacks on ground forces which are

"particularly devastating because of the mismatch in speed of maneuver, the

unpredictability of the direction of attack, and the fact land vehicles like tanks have

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[121]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 30.
    [122]*Ibid*.
    [123]USAF Colonel John Boyd coined the term "OODA loop" to describe a decision-making cycle comprised of observe, orient, decide, and act.
    [124]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 30.
    [125]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, 27 March 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/.
    [126]Two historical examples are offered at the Appendix. The first, from antiquity, concerns using land forces against a superior maritime force. The second, from the Falklands War, considers a maritime engagement's sequential effects across domains.

specific defensive weakness that air attacks exploit."[127] While this doesn't change, the future multi-domain operating environment will offer attacks originating from and transiting through multiple domains simultaneously. "Potential adversaries have only recently achieved this level of complexity and asymmetry,"[128] suggesting the future is now.

"Prospective foes are combining advances in technology with operational concepts and strategies designed to deny the US military asymmetric maneuver in multiple domains."[129] General Perkins picks up on Reilly's idea, but through TRADOC's lens of preparing for the next fight; General Perkins adds "future world events will not allow us the time to synchronize federated solutions […] we must converge and integrate multi-domain solutions and approaches before the battle starts."[130] The concern is that potential adversaries seeking to gain strategic and operational advantage have learned "three macro lessons" which General Perkins describes as follows: first, prevent the enemy (i.e. western militaries) access to an area of operations; second, isolate the domains to prevent mutual support in order to defeat enemy forces in sequence, and finally, fix enemy forces and their leaders to deny their manoeuvre.[131]

General Perkins, Reilly, and other MDO advocates were calling upon the US and allies to take advantage of times of relative peace in order to better prepare for future

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[127]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, 27 March 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/.

[128]*Ibid*.

[129]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 65.

[130]David Perkins, "Multi-Domain Battle: The Advent of Twenty-First Century War," *Military Review* 97, no. 6 (November-December 2017): 11.

[131]*Ibid*.; David Perkins and James Holmes, "Multi-Domain Battle: Converging Concepts Toward a Joint Solution," *Joint Force Quarterly* 88, (1st Quarter 2018): 55.

conflict. The necessary concept, doctrine, and capability development activities take a significant amount of time and money, even with unity of thought, purpose, and action. Since the future operating environment was dawning, the US Army led the effort by updating *Multi-Domain Battle*.

TRADOC Pamphlet 525-3-1: The U.S. Army in Multi-Domain Operations

US Army Training and Doctrine Command published the first MDO concept in December 2018. Entitled *The U.S. Army in Multi-Domain Operations 2028*, it describes how US Army forces will posture against and fight future adversaries. From the foreword as written by General Mark Milley, Chief of Staff U.S. Army:

> "Strategic competitors like Russia and China are synthesizing emerging technologies with their analysis of military doctrine and operations. They are deploying capabilities to fight the US through multiple layers of stand-off in all domains – space, cyber, air, sea, and land. The military problem we face is defeating multiple layers of stand-off in all domains in order to maintain the coherence of our operations.[132]

MDO is a future force employment concept developed by the US Army with input from the USMC (the other provider of US land domain forces). The document is intended to be "a foundation for continued discussion, analysis, and development."[133] The call for a deliberate and inclusive evolution of the concept will challenge assumptions, propel an examination of current warfighting, and deepen the understanding of potential adversaries.

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[132]U.S. Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: TRADOC, 2018), Foreword.
[133]*Ibid.*

The intended outcome of this critical thinking is a stronger US Army to "enable the joint force on the future battlefield."[134] The US Army intends to publish regular updates as feedback is received from across the force, and from specific wargames and exercises designed to test the concept.[135] The Preface written by General Townsend, Commanding General TRADOC, evokes the professional duty of military members to "think deeply and clearly about the problem of armed conflict in the future so that we can build and prepare our Army to deter that conflict and, if necessary, fight and win it."[136]

General Townsend states the three core tents around which the Army must evolve in order to achieve its objectives: calibrated force posture, global positioning and manoeuvre; multi-domain formations, equipped and able to pose "multiple and compounding dilemmas in the adversary"; and convergence, overmatching the adversary using continually integrated domains "across time, space and capabilities."[137] General Townsend asserts that mission command and initiative at all levels underpin these tenets. The insistence on delegated mission command is an important one, particularly for the US Army which has only recently adopted the philosophy of mission command in its doctrine.[138] Mission command principles and their applicability to MDO will be discussed later in this paper.

The MDO concept differentiates operations in competition and conflict, illustrated in Figures 3 and 4. The deterrence of future conflict is said to begin with competition.

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[134]U.S. Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: TRADOC, 2018), Foreword.
[135]*Ibid.*
[136]U.S. Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: TRADOC, 2018), Preface.
[137]*Ibid.*
[138]Headquarters, Department of the Army, ADP 6.0 *Mission Command*, (Washington, DC: ARMY, 2012).

During competition short of conflict, adversaries will seek to achieve strategic aims "by the use of layered stand-off in the political, military and economic realms."[139] During conflict, layered stand-off is multiplied across all domains "to separate U.S. forces and our allies in time, space, and function in order to defeat us."[140]
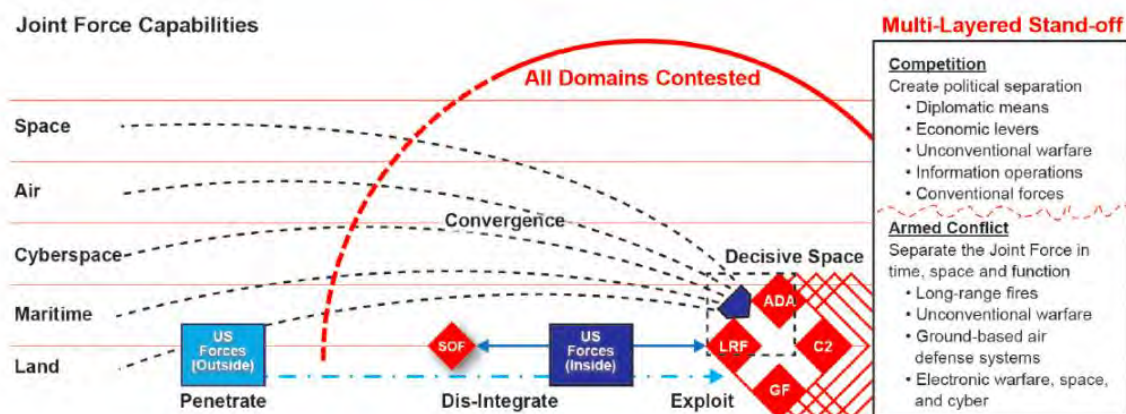
Figure 3 - Army Multi-Domain Operations Concept

Source: U.S. Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: TRADOC, 2018), 26.

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[139]U.S. Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: TRADOC, 2018), Preface.
[140]*Ibid*.
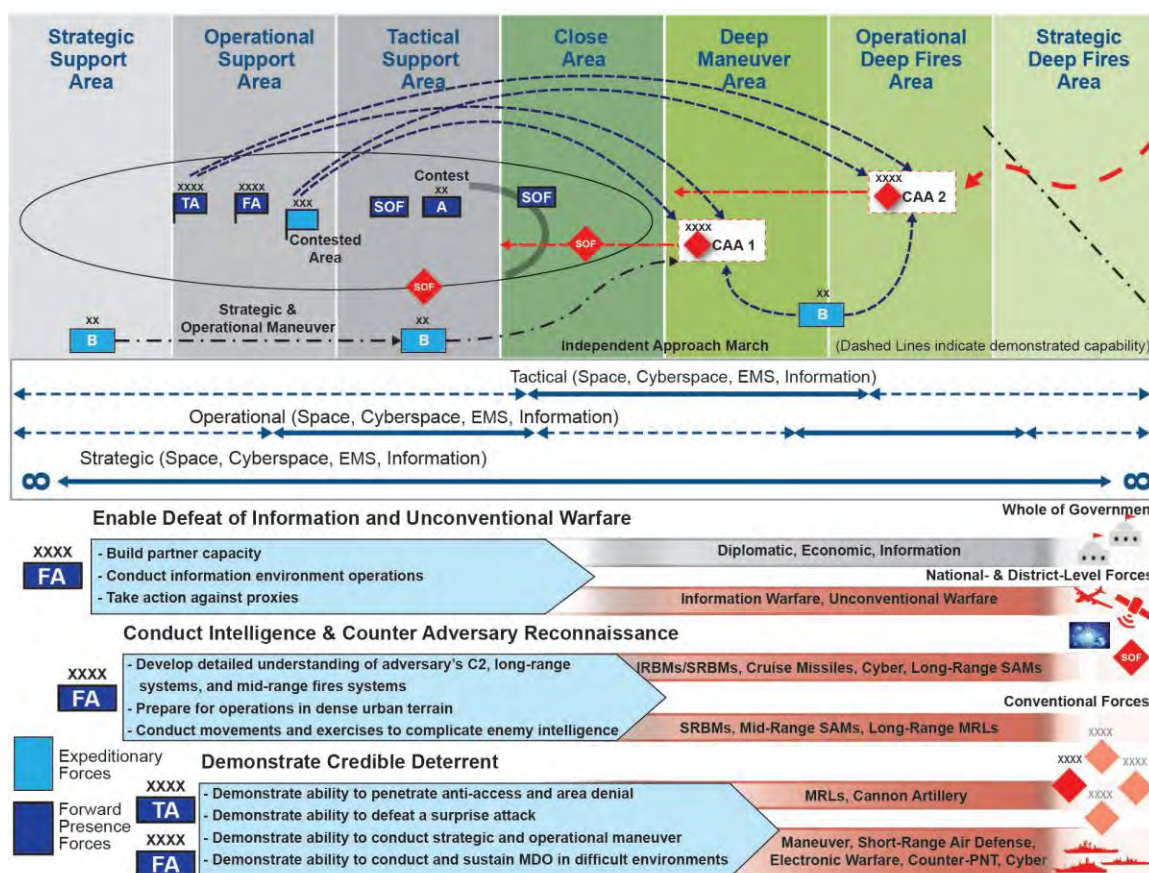
Figure 4 - Competition

Source: U.S. Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: TRADOC, 2018), 27.

It is beyond the scope of this paper to consider the strategic level, particularly of another nation, and the focus is placed on MDO at the *operational* and *tactical* levels. For simplicity, in considering Canada and the CAF, these levels can be taken to be encountered on named operations whether or not the overall state of hostilities is classified as competition or conflict. An example of an operation conducted during competition is Operation UNIFIER, the CAF mission in support of the defence and security forces of Ukraine. With that in mind, it is also not the object of this paper to review the specifics of each chapter of the TRADOC Pamphlet, a declaredly initial attempt at codifying the MDO concept. Rather, a summary of its Chapter 3: *Conducting*

MDO will illustrate how the evolving MDO concept is currently expressed at the operational and tactical levels.

As segue from a description of the operational context, TRADOC identifies the implications for MDO from the future operating environment as described in the previous section. A wide array of problems in both competition and conflict requires solutions that are not yet available to the US Army.[141] "Countering these threats will require an operational concept that integrates capabilities from all domains, the EMS, and the information environment […]."[142] Chapter 3 continues by immediately summarizing the overarching military problem:

> How does the Army enable the Joint Force to compete with China and Russia below armed conflict, penetrate and dis-integrate their anti-access and area denial systems and ultimately defeat them in armed conflict and consolidate gains, and then return to competition?[143]

In answer to the problem statement, the three tenets which are "mutually reinforcing and common to all MDO," are applied, first in the competition phase and subsequently in conflict, later returning to competition under conditions for long-term deterrence.[144]

The pamphlet concludes that "MDO requires the Army to develop or improve capabilities to contribute cross-domain options to the Joint Force […]."[145] The identified capability deficiencies are numerous and wide-spread. They include "building partner capacity and interoperability," capabilities to prepare the operational environment, and

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[141]U.S. Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: TRADOC, 2018), 15.
[142]*Ibid.*
[143]*Ibid.*
[144]*Ibid.*, 17.
[145]*Ibid.*, 47.

"establishing necessary authorities and permissions normally reserved for conflict or to higher echelons to operate in competition [...]."[146] Specifying domain integration, the Army must enable and complement capabilities in all domains "to support the opening of and exploitation of windows of superiority [...] while protecting the ability to conduct friendly operations in degraded, disrupted, and/or denied operational environments."[147]

These concluding aspirations give credence to General Milley's call for action and General Townsend's appeal to the professionalism of the Army to apply the critical thinking, innovative force development, and iterative methodology to prepare for MDO. The concept "drives experimentation; informs capability and doctrine development; and frames organizational trade-offs and force posture decisions that restore the Army's ability as part of the Joint Force to deter adversaries [...]."[148] Already a new operational framework for MDO is being developed. Since the MDO concept proposes the publication of an update in one year, at the end of 2019, it will soon be possible assess the impact of the first round of anticipated feedback.

The New Operational Framework

Through the publication of the MDO concept, TRADOC inspires and focuses critical thinking. An important cognitive tool is the new operational framework.[149] The framework is a construct for organizing thoughts on "the application of combat power in time, space, and purpose" and assignment of resources and capabilities for MDO. In conjunction with the operational concept, the operational framework also guides doctrine

[146]U.S. Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: TRADOC, 2018), 47.
[147]*Ibid*.
[148]*Ibid*., 48.
[149]David Perkins and James Holmes, "Multi-Domain Battle: Converging Concepts Toward a Joint Solution," Joint Force Quarterly 88, (1st Quarter 2018): 55.

and capability development towards military objectives identified in the future operating environment.[150]

TRADOC imposes a sense of urgency in establishing the framework and the integrated capabilities needed to meet the requirements of MDO. "Combat capabilities conceived and procured as disparate packages will be torn apart by peer adversaries, no matter how well they are put together on a future battlefield."[151] Striving for a step beyond interoperability, the insistence on capability integration is also aimed at the challenge for current and future leaders from separate services to adopt a shared vision and common warfighting philosophy.[152] Since domains will be integrated and interdependent, and "failure in one domain has cascading effects in one or more of the others," the services must adopt a unified operational framework.[153]

Future land domain forces working as part of joint, interagency, multinational, and partner (JIMP) teams will provide commanders options across all domains to defeat potential peer adversaries.[154] Without negating the value of critical thinking and iterative

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[150]David Perkins and James Holmes, "Multi-Domain Battle: Converging Concepts Toward a Joint Solution," Joint Force Quarterly 88, (1st Quarter 2018): 55.

[151]*Ibid*., 57.

[152]J. Bott, et al, "Multi-Domain Battle: Tactical Implications," *Over the Horizon*, 28 August 2017, 8, last accessed 23 February 2019, https://othjournal.com/2017/08/28/multi-domain-battle-tactical-implications/.

[153]Jonathan Bott, "Outlining the Multi-Domain Operating Concept Part II: Evolution of an Idea," *Over the Horizon*, 21 June 2017, 4, last accessed 23 February 2019, https://othjournal.com/2017/06/21/outlining-the-multi-domain-operational-concept-part-ii-evolution-of-an-idea/.

[154]Amos Fox, "Multi-Domain Battle: A Perspective on the Salient Features of an Emerging Operational Doctrine," *Small Wars Journal,* last accessed 24 January 2019, https://smallwarsjournal.com/jrnl/art/multi-domain-battle-a-perspective-on-the-salient-features-of-an-emerging-operational-doctri.

improvement of the nascent MDO concept, a failure to align the joint force to MDO and reinforce unity of effort and purpose risks a reversion to service-centric philosophy.[155]

A name for the new operational framework was offered by General Jay Raymond, Commander, USAF Space Command as quoted by Jerry Gay in *Over the Horizon*: "We are moving into a new era of multidomain operations. […] It's **domain on demand** [emphasis added] — what domain do we want to use to achieve the desired effect?"[156] Tim Tormey graphically represented 'domain on demand' as a Venn diagram and with his fellow authors described the operational framework in simple terms in *Military Review*. "Operations occurring in the land domain must consider effects in and through the air, maritime, cyber, and space domains, and vice versa."[157] All domains are expected to be contested, and it will not be possible "to maintain total dominance in all domains all of the time."[158] Friendly forces must seek to freely choose where and when to defeat enemy defences across all domains.

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[155]J. Bott, et al, "Multi-Domain Battle: Tactical Implications," *Over the Horizon*, August 28, 2017, 8, last accessed 23 February 2019. https://othjournal.com/2017/08/28/multi-domain-battle-tactical-implications/.

[156]Jerry Gay, "Modernizing ISR C2 Part I: Multi-Domain Maneuver as the Foundation," *Over the Horizon*, November 21, 2018, 7, last accessed 23 February 2019. https://othjournal.com/2018/11/21/modernizing-isr-c2-part-i-multi-domain-maneuver-as-the-foundation/.

[157]Clay Bartels, Tim Tormey, and Jon Hendrickson, "Multidomain Operations and Close Air Support: A Fresh Perspective," *Military Review* 97, no. 2 (March-April 2017): 72.

[158]David Perkins, "Multi-Domain Battle: The Advent of Twenty-First Century War," *Military Review* 97, no. 6 (November-December 2017): 11.
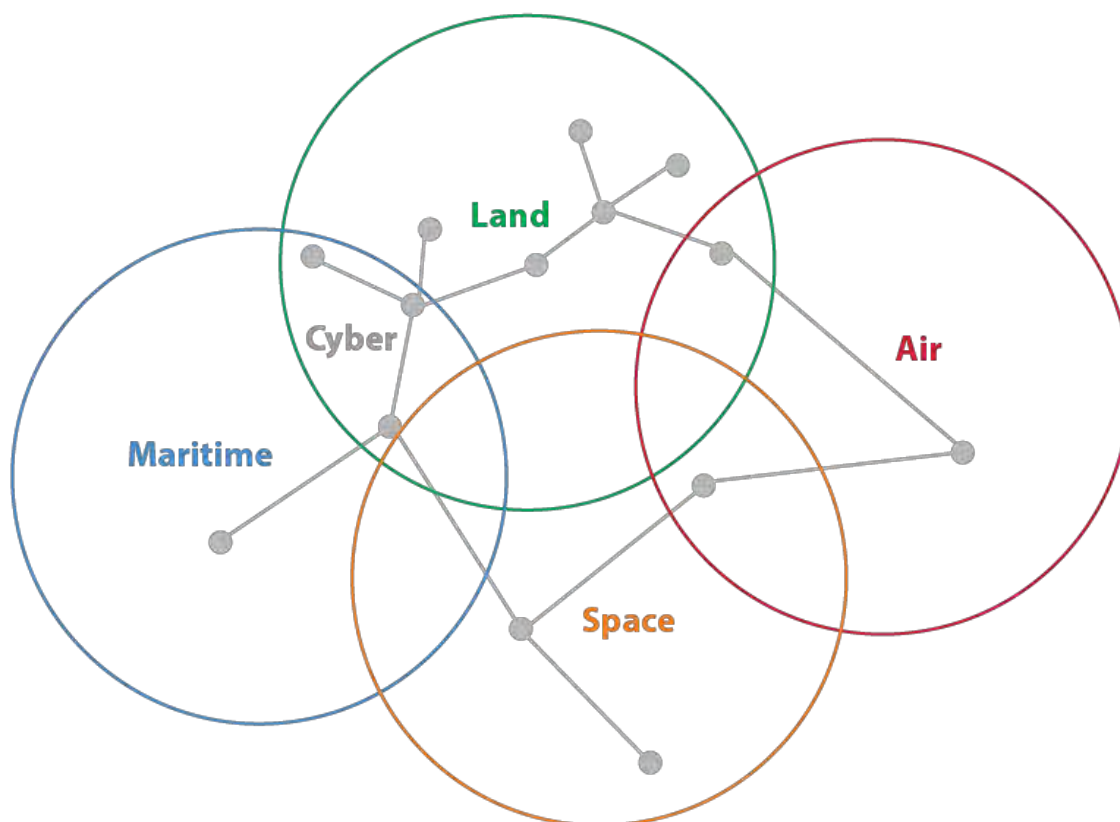
Figure 5 – The Multi-Domain Concept as a New Operational Framework

Source: Tim Tormey, in Clay Bartels, Tim Tormey, and Jon Hendrickson, "Multidomain Operations and Close Air Support: A Fresh Perspective," *Military Review* 97, no. 2 (March-April 2017): 72.

One way to tackle the problem is to open "windows of domain superiority to allow maneuver inside our adversary's integrated defence."[159] These windows may be fleeting but they can represent timely opportunities to employ capabilities in one domain, in combination with other capabilities from the same or other domains, against vulnerabilities appearing in any domain. The operational framework "endeavors to integrate capabilities in such a way that to counteract one, the enemy must become more

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[159]David Perkins and James Holmes, "Multi-Domain Battle: Converging Concepts Toward a Joint Solution," *Joint Force Quarterly* 88, (1st Quarter 2018): 55.

vulnerable to another."[160] These windows of superiority become windows of advantage

when they are exploited, similar to Admiral McRaven's concept of *relative superiority*

for special operations forces.[161] The value of the multi-domain operational framework

was recognized and amplified by complexity theorists whose study of multidisciplinary

systems emphasizes the interactions and relationships between system elements.

Multi-domain Operations and Complexity

Complex systems, such as the conglomeration of the military domains, present

challenges and opportunities. General Perkins wrote that the "Army's dominance on land

has become dependent, if not contingent, on access to the air, cyber and space

domains."[162] He cautioned that as forces no longer have uncontested superiority in one or

more domains, war becomes more complex and the interrelationship of military activities

more problematic "as the number of actors able to employ capabilities in [these] domains

increases."[163] Military forces preparing to operate in the future operational environment

must prepare "to take advantage of [opportunities] rather than attempting to force or

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[160]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation," *Joint Force Quarterly* 88 (1st Quarter 2018): 16.

[161]William McRaven, "The Theory of Special Operations," (Master of Arts in National Security Affairs Thesis Paper, Naval Postgraduate School, 1993), 2-10. McRaven defined relative superiority as "a condition that exists when an attacking force, generally smaller, gains a decisive advantage over a larger or well defended enemy. Once *relative superiority* is achieved, the attacking force is no longer at a disadvantage and has the initiative to exploit the enemy's weaknesses and secure victory. Although gaining *relative superiority* doesn't guarantee success – it is necessary for success. […] *Relative superiority,* as it applies to the theory of special operations, should not be confused with Clausewitz's relative superiority, which is defined by the concentration of superior strength at the geographically decisive point in a battle. […] *Relative superiority is the pivotal moment in an engagement.* […] *Once relative superiority is achieved, it must be sustained in order to guarantee victory.* […] *If relative superiority is lost, it is difficult to regain.*

[162]David Perkins, "Multi-Domain Battle: The Advent of Twenty-First Century War," *Military Review* 97, no. 6 (November-December 2017): 10.

[163]*Ibid.*

predict them."[164] Taking advantage of these opportunities will "require commanders and staffs, at echelon, to account for a diverse set of capabilities provided by each domain" and their successful application will depend on "a joint force's ability to synchronize effects from [all] domains [...]."[165] Leveraging the experiences and capabilities of other government departments, partners, and allies, can provide even more useful options to the military facing increasingly complex situations.[166]

These organizational relationships are key to achieving common goals. No one service or organization will be fully equipped to deal with all eventualities presented by complex systems like MDO. Theorists agree "complexity is about numbers of relationships rather than numbers of things."[167] This cognitive shift has been championed by senior leaders in the Department of National Defence and CAF, who agree that collaboration is essential in congested and contested spaces.[168] They have stated their preference for creativity versus oversight, for taking an outcomes-based approach, and asking ourselves how we maintain an operational advantage so we can be decisive in all domains.[169] Adopting and adapting the MDO concept is an aspirational recommendation for the CAF to better prepare for the complex and uncertain future.

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[164]Jonathan Bott, "Outlining the Multi-Domain Operating Concept Part II: Evolution of an Idea," *Over the Horizon*, 21 June 2017, 4, last accessed 23 February 2019, https://othjournal.com/2017/06/21/outlining-the-multi-domain-operational-concept-part-ii-evolution-of-an-idea/.

[165]David Smith, "Mission Command in Multi-Domain Operations," *Over the Horizon*, 30 October 2017, 2, last accessed 23 January 2019, https://othjournal.com/2017/10/30/mission-command-in-multi-domain-operations/.

[166]Jonathan Bott, "Outlining the Multi-Domain Operating Concept Part II: Evolution of an Idea," *Over the Horizon*, 21 June 2017, 4, last accessed 23 February 2019, https://othjournal.com/2017/06/21/outlining-the-multi-domain-operational-concept-part-ii-evolution-of-an-idea/.

[167]*Ibid*.

[168]Author's notes from JOINTEX Symposium 2019, available upon request.

[169]*Ibid*.

CHAPTER 4 – CANADIAN CONSIDERATIONS FOR MDO

The Canadian Context

The US Army has adopted a new operational concept, *The U.S. Army in Multi-Domain Operations 2028*. There are important reasons why the CAF is well positioned to adopt the MDO concept and adapt it to purpose. The CAF has operated jointly since its inception, champions mission command, fosters critical thinkers, and actively pursues informed concept development and smart transformation initiatives. There are also cautions derived from experience and an appreciation for the Canadian context which preclude the wholesale adoption of US concepts, regardless of their validity.

This chapter will consider that it is natural and appropriate for Canada to adopt and adapt the MDO concept by reviewing the importance the CAF places on joint concepts and mission command. The raw material for developing Canadian MDO already exists in the CAF and essential elements of the concept are expressed in its capstone documents. Finally, a list proposed by USAF Major Albert Harris for tactical leaders to use in shaping their environment for multi-domain command and control will be expanded and elevated so that operational level leaders and concept developers can use it to adapt the MDO concept for the CAF.

Joint Operational Concepts in the Canadian Armed Forces

Canada has developed its own joint concepts since the 1964 *White Paper on Defence* envisioned integrated and unified armed forces for Canada.[170] The CAF was created on 1 February 1968, under Bill C-243, The Canadian Forces Reorganization Act,

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[170]Daniel Gosselin, "Hellyer's Ghosts: Unification of the Canadian Forces is 40 years Old – Part One," *Canadian Military Journal* 9, no. 2 (Spring 2008): 6.

which combined the Royal Canadian Navy, Canadian Army, and Royal Canadian Air Force as a single unified organization.[171] The resulting force operated jointly by design.

The National Defence Act is succinct in describing the new unity of the formerly separate services: "the Canadian Forces are the armed forces of Her Majesty raised by Canada and consist of one Service called the Canadian Armed Forces." [172] Despite significant controversy at the outset, fifty years of unity of thought, purpose and action have contributed to a growing joint mindset across the single-service CAF that slowly decreased the kind of parochial in-fighting still seen in the separate US services to this day. CAF 'jointness' was further reinforced through Canadian Forces Transformation from 2005-2007 under General Rick Hillier and finally in the amalgamation of the joint commands resulting from Transformation (Canada Command, Canadian Expeditionary Forces Command, and Canadian Operational Support Command) [173] under an integrated Canadian Joint Operations Command (CJOC) in 2012.

Canadian Joint Operations Command

CJOC lives up to its name and its role in anticipating, planning, and executing the vast majority of CAF missions and named operations. It is the joint force employer and is a *de facto* model for a multi-domain operational command that many American observers have called for: "force posture, power projection, and presence in all domains will require a yet unseen organization and operational construct that integrates all services and

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[171]Daniel Gosselin, "Hellyer's Ghosts: Unification of the Canadian Forces is 40 years Old – Part One," *Canadian Military Journal* 9, no. 2 (Spring 2008): 6.

[172]National Defence Act (R.S.C., 1985, c. N-5), R.S., c. N-4, s. 14, https://laws-lois.justice.gc.ca/eng/acts/N-5/page-2.html#h-10.

[173]Michael Jeffery, *Inside Canadian Forces Transformation,* Kingston: Canadian Defence Academy Press, 2009, 27-37.

agencies."[174] Beyond its joint headquarters, CJOC integrates all services on operations

and has operational command of several standing units responsible for domain activities:

1st Canadian Division Headquarters (land), the Maritime Component Command (sea),

and the Joint Forces Air Component Commander (air),[175] Joint Operational Support

Group, and the Regional Joint Task Forces. If CJOC were permanently structured to

include partner agencies, and adopt the MDO concept, it would rise to the level of a *de

juro* multi-domain operational headquarters, likely the first in the world.

As CJOC fulfills its role as "the CDS' Joint Force advocate,"[176] more factors will

emerge relevant to the Canadian context. The 2019 monograph from Commander CJOC

calls us to answer the CDS's question, "what kind of Joint Force we need to have."[177]

General Rouleau offers that we need to "put more context, more detail, more substance

into mapping what types of things we need to adapt to prevail."[178] Adapting the MDO

concept to suit the Canadian context would be a substantial first step.

If this places the CAF at what General Rouleau terms "a fundamental

INFLECTION POINT [original emphasis by Rouleau]"[179] then the importance of

spending our resources "as carefully as possible in order to build the most coherent and

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[174]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, 27 March 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/.

[175]Department of National Defence, "Canadian Joint Operations Command (CJOC)," last accessed 23 April 2019, https://www.canada.ca/en/department-national-defence/corporate/organizational-structure/canadian-joint-operations-command.html; Pux Barnes, "The JFACC and the CAOC-centric RCAF: Considerations for the Employment of Air Power in Joint Operations," *The Royal Canadian Air Force Journal* 3, no. 3 (Summer 2014), http://www.rcaf-arc.forces.gc.ca/en/cf-aerospace-warfare-centre/elibrary/journal/2014-vol3-iss3-04-the-jfacc-and-the-caoc-centric-rcaf.page.

[176]Michael Rouleau, ""How We Fight": Commander CJOC's Thoughts," Monograph emailed to CJOC Staff, 10 February 2019, 8.

[177]*Ibid*., 1-8.

[178]*Ibid*., 1.

[179]*Ibid*., 5.

jointly capable CAF that we can"[180] is amplified and given a sense of immediacy. This evokes the attitude that prevailed in the 1960s and resulted in the CAF, or more recently in the transformation of the mid-2000s that saw the establishment of CJOC. The next necessary transformation is not necessarily structural or organizational, though continuous incremental improvements in the force mix, structure and design (FMSD) of the CAF that better align it to the fight are important in their own right. The more important transformation is cognitive: smart leaders and soldiers at all levels need to think about the existing joint command and lead the accelerated adaptation of MDO for the CAF.

Thinking About How To Fight

Officers studying at the Canadian Forces College are taught the joint operational planning process, but several often-heard expressions are telling of the limited degree to which joint operational concepts are understood and embraced: 'Jarmy' (joint in name only, but essentially army dominance in concepts, doctrine, planning, and execution of operations), 'is that really joint?' (does an airforce supply technician working at a navy base really make the Sustain function joint?), and 'there is no operational level' (warfare is either tactics or strategy, the operational level of war introduced in the 1980s being rejected).[181]While each expression may remain debatable, it is worth considering General Rouleau's recommendation to train people "how to think about how to fight"[182] echoing

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[180]Michael Rouleau, ""How We Fight": Commander CJOC's Thoughts," Monograph emailed to CJOC Staff, 10 February 2019, 5.
[181]Author's informal notes of several discussions among students on Joint Command and Staff Programme 45.
[182]Michael Rouleau, ""How We Fight": Commander CJOC's Thoughts," Monograph emailed to CJOC Staff, 10 February 2019, 8.

General Dempsey's question, "what's after joint?"[183] explored in Chapter 3's section 'How is Multi-Domain Different than Joint?', especially if after 50 years of integration and unification the CAF is still struggling with the concept of joint itself.

General Rouleau's monograph outlines a re-imagining of the CAF necessary to position itself as "a competent deterrent as part of a coalition versus states."[184] Equally, recognizing that "the vast preponderance of future conflict" will not be state-on-state wars of set-piece battles as in past major wars, there will also be a need to build capabilities for competition below the threshold of war.[185] It is also important to prepare the CAF generally and CJOC in particular for escalation, to be a credible shaper of missions that will increasingly be preceded by competition and confrontation in the 'below-threshold' grey zone.[186] The MDO concept addresses grey zone complexity. CAF critical thinking will help identify and set conditions for its successful adoption.

As General Rouleau notes, "difficult tradeoffs will be needed."[187] Behind the resource tradeoffs of people, money, and capabilities, is the less tangible difficulty: mindset; the status quo that becomes engrained in militaries over time. The US Army was engaged in a prolonged asymmetrical conflict in the Vietnam War and had to deliberately break its mindset – and create a new operational concept, AirLand Battle – in order to be successful in the next major conflict: the First Gulf War. More recently the counter-insurgency wars in Afghanistan and Iraq gave rise to a new mindset, not unlike that which emerged from the Vietnam War era, which is equally ill-suited to future conflict.

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[183]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 61.

[184]Michael Rouleau, ""How We Fight": Commander CJOC's Thoughts," Monograph emailed to CJOC Staff, 10 February 2019, 5-8.

[185]*Ibid.*, 6.

[186]*Ibid.*

[187]*Ibid.*

A single-domain mindset formed, unintentionally, from the experience of the critical mass of military personnel who enjoyed sea, air, space and cyber domain supremacy and focused on the 'hard fighting' in the land domain alone. This single-domain-focused mindset is one of ignorance, complacency, or overconfidence towards peer adversaries and their potential capabilities in all domains above and below the threshold of war. The US Army is breaking this mindset, and shifting the paradigm, by publishing and discussing the new MDO concept. Basic cooperation between domain-aligned services isn't enough when what is needed is "the requirement to think across domains at increasingly lower levels to generate tempo and seize fleeting opportunities."[188] Two USAF and USMC pilots with similar close air support experiences wrote in *Military Review* "traditional thinking that rigidly aligns domains and components […] will not be effective in the future."[189] In the MDO context, an all-inclusive cognitive approach to gaining and maintaining domain superiority – let alone supremacy – becomes essential.

Canada, too, must rethink how it fights. There will be detractors who through a lack of knowledge or experience, or misplaced priorities, will fail to recognize the value of increasing the jointness of the CAF, its partners, and allies to meet the common threats posed by the future operating environment. Past critics of CAF transformations in the 1960s the 2000s failed to demonstrate through their counter-arguments that change was not necessary, that the old ways of thinking and the old ways of fighting were sufficiently

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[188]Jonathan Bott, "Outlining the Multi-Domain Operating Concept," *Over the Horizon*, 8 June 2017, 3, last accessed 23 February 2019, https://othjournal.com/2017/06/08/outlining-the-multi-domain-operating-concept/.

[189]Clay Bartels, Tim Tormey, and Jon Hendrickson. "Multidomain Operations and Close Air Support: A Fresh Perspective." *Military Review* 97, no. 2 (March-April 2017): 72.

aligned to the new operating environment. Critical thinking provides a proven and inspiring way to innovate and evolve. Canada can learn from its own past transformation initiatives and from allies and their experience applying MDO concepts.

Canadian Armed Forces as a US Ally and International Partner

Canada is a long-standing ally of the US and a powerful partner in the North Atlantic Treaty Organization. Canada's efforts in two World Wars, the Korean War, NATO operations, and UN and coalition missions around the world place it at the top of the list of respected, trusted, and capable security providers. The *Strong, Secure, Engaged* (SSE) Defence Policy of 2017 expresses the privileged relationship Canada maintains with the US and NATO to operate in coalitions to support international peace and security. "*Strong, Secure, Engaged* delivers on the Government of Canada's enduring commitment to defend Canada, work with the US in the shared defence of North America, and be a credible and engaged international actor."[190] Canada's military maintains proficiency in its two official languages, English and French, which helps to bridge the Anglophone nations of North America to the Commonwealth, other allies in Europe, the wider partnership of NATO, and *La Francophonie* in matters of defence.[191] Canada's diversity and experience makes it a valuable partner in multinational coalitions. The CAF has deep experience in agile collaboration.

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[190]Department of National Defence. *Strong, Secure, Engaged. Canada's Defence Policy*. (Ottawa, ON: Minister of National Defence, 2017), 16, 33, 49-50, 61, 89-91.

[191]Global Affairs Canada, "Canada and La Francophonie," last modified 1 November 2018, last accessed 24 April 2019, https://international.gc.ca/world-monde/international_relations-relations_internationales/francophonie/index.aspx?lang=eng. "La Francophonie is a group of 88 member states and governments from five continents sharing French as a common language. These countries collectively have over 1 billion inhabitants spread across five continents, of whom 300 million are Francophones." Former Canadian Governor-General Michaëlle Jean was the Secretary General of the International Organization of La Francophonie from 2015-2018 inclusive.

Canada is also a founding partner of the Five Eyes, the intelligence-sharing alliance of the five English-speaking militaries (Australia, Canada, New Zealand, United Kingdom, United States) and interoperability partnerships like the ABCANZ Armies Program (so named from the initials of the same five countries).[192] Canada participates in ABCANZ to establish interoperability standards and develop common statements of operational requirements.[193] These close ties enable significant information sharing, force development, and interoperability – accelerating the adoption of new concepts proposed by one nation and validated among like-minded partners. The CAF should use these integrated discussion forums to guide its adoption of MDO and more readily determine both which parts need adaptation and how best to do so with trusted input from interested parties.

Canadian Armed Forces Integrated Capstone Concept

Seeking to guide innovative concept, capability, and force development to meet the challenges of the future security environment, the CAF Integrated Capstone Concept of 2009 described strategically relevant considerations and the four necessary attributes (comprehensive, integrated, adaptive, networked) of future development.[194]

The Capstone is still a useful tool to prepare for a future operating environment where adversarial effects could be projected from multiple domains and CAF commanders at all levels will have to generate effects across all domains simultaneously,

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[192]Department of National Defence. *Strong, Secure, Engaged. Canada's Defence Policy*. (Ottawa, ON: Minister of National Defence, 2017), 91.

[193]Chad Johannes, "Achieving Multinational Tactical Radio Interoperability," (Joint Command and Staff Programme Service Paper, Canadian Forces College, 2018).

[194]Department of National Defence, Chief of Force Development, A-FD-005-002/AF-001, *Integrated Capstone Concept* (Winnipeg, MB: Department of National Defence, 2009), 2, http://publications.gc.ca/collections/collection_2012/dn-nd/D2-265-2010-eng.pdf.

"in an integrated and comprehensive manner."[195] The precursory language of MDO

concepts can be discerned throughout the document: "our ability to be strategically

relevant, operationally responsive, and tactically decisive within the entire spectrum of

future conflict is fundamentally dependent upon our ability to project or to deny effects in

all these domains."[196] The Capstone also espouses an ambition towards a future unifying

concept, one that we should now develop based on *The U.S. Army in Multi-Domain*

Operations 2028 which can capably serve as the model "singular and shared construct"

the Capstone calls for:

> A singular and shared construct governing the relationship
> amongst condition sets, domains, and functions is fundamental to unity of
> thought, purpose, and action for integrated force development, force
> generation, and force employment. The capstone construct allows
> decision-makers to set levels of ambition and to conduct risk analysis.[197]

The CAF has not set its level of ambition nor has it conducted a risk analysis.

While it is clear that Canada will never achieve the level of force generation and force

projection capabilities of the US military, a suitable level of ambition can be determined

from five strategic insights (5, 6, 9, 10, 11) chosen from the Capstone. Selected strategic

impacts aligned with each of these five insights indicate a level of ambition that was

considered appropriate to the CAF as far back as 2009. These are shown in Table 1 and

could be used by concept developers to consider the ways MDO can be adapted to suit

the CAF.

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[195]Department of National Defence, Chief of Force Development, A-FD-005-002/AF-001, *Integrated Capstone Concept* (Winnipeg, MB: Department of National Defence, 2009), 37, http://publications.gc.ca/collections/collection_2012/dn-nd/D2-265-2010-eng.pdf.

[196]*Ibid.*

[197]*Ibid.*, 52.

Table 1 – Selected CAF Strategic Insights and Impacts

Insight 5: Integration	Strategic Impact 5:
Integration within a multi-disciplinary approach will provide a greater chance of resolving the complex issues of the future security environment than will working independently.[198]	Integration of DND and the CF must evolve from organizational silos to processes, networks, relationships, and capabilities that enable integrated operations; and The entire institution will need to integrate as required with other agencies or actors.[199]
Insight 6: Adaptation Adaptation is imperative to coping with unpredictable and uncertain complex challenges, situations, and relationships. The CF must be adaptive or risk failure.[200]	Strategic Impact 6: To be adaptive, the CF needs: Leaders who can discern the consequences of emerging trends and react to strategic shocks; Commanders who are not afraid to pursue innovative and unconventional solutions; Individuals who, like our adversaries, can envision the use of equipment in new and innovative ways; and Soldiers, sailors, and air personnel who can sense a change in the adversary's course of action and exploit it to the benefit of the mission.[201]
Insight 9: The strategic environment has expanded beyond the traditional domains (maritime, land, and air) and now must include space [and] cyberspace. [the original text includes "human", which is no longer considered a	Strategic Impact 9: States no longer have exclusive dominion over the domains in the strategic environment; Current and future adversaries, whether

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[198]Department of National Defence, Chief of Force Development, A-FD-005-002/AF-001, *Integrated Capstone Concept* (Winnipeg, MB: Department of National Defence, 2009), 54, http://publications.gc.ca/collections/collection_2012/dn-nd/D2-265-2010-eng.pdf.
[199]*Ibid*.
[200]*Ibid*.
[201]*Ibid*.

domain in Canada]. The strategic environment will continue to expand, which will place an even greater emphasis on issues of complexity and the need for being comprehensive, integrated, adaptive, and networked.[202]	state or non-state, have the power to create strategic effects directed against Canadian national interests; Strategic failure in any particular domain could result in national strategic failure; The CF must understand friendly, adversarial, and neutral actors as well as the underlying factors motivating human behaviour; These new domains do not imply ownership, but they rather demand leadership; Commanders at all levels must be prepared to have adversarial effects projected at them from all six domains, perhaps simultaneously; Commanders at all levels, depending upon the nature of the mission, will have to be prepared to generate effects in all six domains simultaneously, in an integrated and comprehensive manner; and Our ability to be strategically relevant, operationally responsive, and tactically decisive within the entire spectrum of future conflict is fundamentally dependent upon our ability to project or to deny effects in all these domains.[203]
Insight 10: The current view of the strategic functions is governed by our historical experiences and knowledge of the traditional domains. The future view of the strategic functions must be governed by the attributes of being	Strategic Impact 10: Failure to understand the similarities and differences of the functions in relation to the expanding domains and dynamic condition sets will result in planning for yesterday's conflicts;

[202]Department of National Defence, Chief of Force Development, A-FD-005-002/AF-001, *Integrated Capstone Concept* (Winnipeg, MB: Department of National Defence, 2009), 54, http://publications.gc.ca/collections/collection_2012/dn-nd/D2-265-2010-eng.pdf.

[203]*Ibid*., 56.

comprehensive, adaptive, integrated, and networked across all domains.[204]	Future function concepts (Command, Sense, Act, Sustain, Shield, and Generate) should describe comprehensive, integrated, adaptive, and networked capabilities; The future Command concept must understand the effectiveness of a multi-disciplined approach to solve, manage, or contain many types of problems and to integrate forces into the larger comprehensive organization; and In order to remain strategically relevant, operationally responsive, and tactically decisive in the complex strategic environment, a fundamental understanding of the effects required by each of these functions in each discrete condition set and domain is essential.[205]
Insight 11: Only by having a comprehensive view of the relationships between the condition sets, domains, and functions can we determine the requirements for being comprehensive, integrated, adaptive, and networked.[206]	Strategic Impact 11: A singular and shared construct governing the relationship amongst condition sets, domains, and functions is fundamental to unity of thought, purpose, and action for integrated force development, force generation, and force employment; The capstone construct allows decision makers to set levels of ambition and to conduct risk analysis.[207]

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[204]Department of National Defence, Chief of Force Development, A-FD-005-002/AF-001, *Integrated Capstone Concept* (Winnipeg, MB: Department of National Defence, 2009), 56, http://publications.gc.ca/collections/collection_2012/dn-nd/D2-265-2010-eng.pdf.
[205]*Ibid*.
[206]Department of National Defence, Chief of Force Development, A-FD-005-002/AF-001, *Integrated Capstone Concept* (Winnipeg, MB: Department of National Defence, 2009), 58, http://publications.gc.ca/collections/collection_2012/dn-nd/D2-265-2010-eng.pdf.
[207]*Ibid*.

Canadian Army's Capstone Operating Concept – Close Engagement

The Canadian Army's *Close Engagement: Land Power in an Age of Uncertainty – The Capstone Operating Concept for the Army of Tomorrow* is the most recent expression of ongoing analysis in the Future Land Operating Environment and is scheduled for release in 2019.[208] It evolved from a previous concept from 2007, known as Adaptive Dispersed Operations, and will be the Army's Capstone conceptual model for land operations in the coming decade. Nested within Canada's defence policy *Strong, Secure, Engaged*, and the CAF Integrated Capstone Concept, *Close Engagement* provides guidance for capability development and the integrated development of the operational functions (Command, Sense, Act, Shield and Sustain) and concepts into a "cohesive operating system" for the land domain.[209] The definitive linkage to joint forces, and joint force concepts, is stated plainly: "All forces deployed by Canada will be joint forces, so this concept will nest within and inform any Canadian Armed Forces (CAF) joint operating concept."[210] Many essential elements of MDO are already present, although in 'joint' form.

Like the US Army's MDO Concept, *Close Engagement* proposes a configuration, equipment, and training plan for the Canadian Army to meet the challenges of the future operating environment that is compatible with MDO but falls short of MDO specifics and language.[211] The key principles are consistent with MDO, particularly maintaining a combat-effective, "scalable, agile, and responsive," multipurpose force that continues to

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[208]Brandon Kew, "190207_U_Close Engagement Brief to Army Council," Presentation to Army Council 13 February 2019, last accessed 25 February 2019, https://acims.mil.ca/190207_U_Close_Engagement_Brief_to_Army_Council.pptx.

[209]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 3-5.

[210]*Ibid*., 5.

[211]*Ibid*.

work with allies and partners.[212] The future operating environment is characterized as

uncertain, volatile and lethal, commensurate with the allied general consensus.[213] *Close*

Engagement echoes limitations identified by the US Army about its own forces, that

"Canadian land forces will not be able to have dominance in all the relevant domains."[214]

Adversaries will field advanced capabilities that "create significant effects in unforeseen

ways" and "the Army must retain the agility to be able to respond effectively to those

emerging threats."[215] A primary implication for Canada's capability development is to

"judge the correct balance of investment against uncertain risks.[216] A conclusion shared

with our major allies is that "agility, versatility and the ability to rapidly adapt are the

most important defences against the unpredictable shape of future conflict."[217]

There appears to be a contradiction in developing a close engagement concept and

its particular capabilities in light of a broader MDO future and that challenge is

represented by the stand-off problem. Potential future adversaries are investing heavily in

A2/AD in order to preclude a decisive 'close engagement' by keeping opposing forces at

bay and eroding "the capacity of alliance and coalition forces to achieve military

overmatch and confound multinational efforts to effectively operate in theatres of

interest."[218] This stand-off does not eliminate the need for robust forces that can prevail

in contact with a potential peer adversary, particularly one with advanced MDO

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[212]Brandon Kew, "190207_U_Close Engagement Brief to Army Council," Presentation to Army Council 13 February 2019, last accessed 25 February 2019, https://acims.mil.ca/190207_U_Close_Engagement_Brief_to_Army_Council.pptx.

[213]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 3, 6-7.

[214]*Ibid.*, 17.

[215]*Ibid.*

[216]*Ibid.*, 9.

[217]*Ibid.*

[218]*Ibid.*, 8.

capabilities. *Close Engagement* draws from *Canada's Future Army Volume 2: Force Employment Implications* in describing that "focusing on close engagement underscores the necessity of being able to create a broader range of effects within the operating environment to ensure operational and strategic objectives."[219] These broader effects can easily be understood as the cross-domain effects of MDO.

Canada is well postured for close engagement within a MDO context. The Canadian Army has a proud tradition of successful, if often brutal, close combat that dates to the battles of World War One, including the Battle of Vimy Ridge and more so the battles of the War known as "Canada's 100 Days", when the Canadian Expeditionary Force spearheaded the push from Amiens to Mons to end the War.[220] Future conflict is expected to be far more complex, but this traditional role brought forward to the 21st Century may be well suited to the force that Canada can project, and sustain, and the security challenges it will face in the modern world.

Close Engagement identifies key tenets for Canadian land forces: "a conventional, combat effective, multi-purpose, medium force augmented by light and heavy forces […]."[221] This is already consistent with MDO fundamentals, and *Close Engagement* continues by calling for capability enhancements in key areas which will support MDO requirements such as:

> • Connectivity–across land forces: networked communications and an integrated and pervasive data environment that will facilitate near real-time shared situational awareness for distributed planning and timely execution;

[219]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 12.

[220]https://www.thecanadianencyclopedia.ca/en/collection/canadas-hundred-days.

[221]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 12-13.

• Agility–rapidly respond to changes;

• Adaptability–effectively adjust to those changes;

• Integration–seamlessly partner with military and non-military elements;

• Robustness–effectively operate across the full spectrum of operations.[222]

These tenets parallel many of the strategic insights of the CAF Integrated Capstone Concept, and reflect the ways that Canada is ready to prepare for MDO. *Close Engagement* elaborates several concepts for the land domain that are in line with the foundations of MDO: building partnerships and increasing interoperability, expanding leader and soldier competencies, advancing capabilities to command deployed forces, and land power dependencies on other CAF capabilities.[223] With extant concepts already capturing the essential elements of MDO, it will be easy for Canadian concept and doctrine writers to evolve naturally to MDO without experiencing what comic writer Scott Adams sardonically called "a paradigm shifting without a clutch."[224] A more challenging idea for MDO, but nonetheless supported by the Canadian Army's Capstone, is mission command. Since successful mission command can enable success throughout the preparation for MDO it will be discussed first.

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[222]Brandon Kew, "190207_U_Close Engagement Brief to Army Council," Presentation to Army Council 13 February 2019, last accessed 25 February 2019, https://acims.mil.ca/190207_U_Close_Engagement_Brief_to_Army_Council.pptx; Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 12-13.

[223]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 15-23.

[224]Scott Adams, "Dilbert," 25 August 1995, https://dilbert.com/strip/1995-08-25, last accessed 22 April 2019.

Mission Command

MDO commanders will have to "leverage the effects in each of the domains to create windows of dominance."[225] Opportunities to seize the initiative will present themselves across the battlespace and only through "mutual trust, shared understanding, and prudent risk-taking" will joint forces be able to act upon them in time.[226] These windows, as discussed in Chapter 3, may not appear in the native domain of the observer or their local or even superior commander. This places a premium on trust and risk in order for the joint force to take advantage of them at the speed and location they appear. This is a command paradigm that Canadian military leaders are already familiar with, and to some degree has reached caricature – witness the term 'strategic corporal' to describe the impact that junior leaders can have at levels far above their apparent station.

Command is central to the directed application of force and Canadian doctrine shares the NATO definition of command as "the authority vested in an individual of the armed forces for the direction, coordination and control of military forces."[227] Commanders exercise their command through the creative expression of their will – they describe a desired end state to their assigned mission and what they want done to achieve it. Avoiding describing 'how' they want things done is recognized as a hallmark of a strong commander and effective leader, who trusts trained and competent subordinates to determine the most effective way to do what is required of them based on expressed intent.

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[225]David Smith, "Mission Command in Multi-Domain Operations," *Over the Horizon*, 30 October 2017, 3, last accessed 23 January 2019, https://othjournal.com/2017/10/30/mission-command-in-multi-domain-operations/.
[226]*Ibid*., 4.
[227]Department of National Defence, B-GL-310-000/FP-001, *Command: The Operational Function,* (Kingston: Canadian Defence Academy – Canadian Forces Leadership Institute, 2018): 9.

Canada adopted this method of command, whose roots are recognized to be in the Prussian *Auftragstaktik,* following its experiences in the First World War.[228] It is now called "mission command" and advocates of MDO see it as a critical methodology for success in the complex future operating environment. Mission command figures prominently in Canadian command doctrine[229] and it is therefore possible to describe the natural – desirable – evolution towards MDO in the Canadian context by starting with mission command.

Mission command is a command philosophy emphasizing the importance of favouring a subordinate's initiative and freedom of action in achieving the commander's intent.[230] The Canadian Army includes mission command within its Command doctrine publication, defined as "a philosophy of command that promotes unity of effort by means of a clear expression of the higher and superior commanders' intents, and the delegation of authority to subordinate commanders to use their initiative in accordance with these intents."[231] Command is also the operational function "that integrates all the operational functions into a single, comprehensive strategic-, operational- or tactical-level concept."[232] CAF doctrine should be updated to elaborate its command philosophy in a MDO concept, including considerations for command and control across domains.[233]

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[228]Youri Cormier, "C/DS545/CPT/LE-2: Land Power Theorists" (lecture, Canadian Forces College, Toronto, ON, 11 September 2018), with permission. *Auftragstaktik* translates as mission tactics.

[229]Department of National Defence, B-GL-310-000/FP-001, *Command: The Operational Function,* (Kingston: Canadian Defence Academy – Canadian Forces Leadership Institute, 2018): 23-26.

[230]*Ibid.*, 14.

[231]*Ibid.*, 21.

[232]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 26-27. Canada recognizes five operational functions: Command, Sense, Act, Shield, Sustain.

[233]Canadian command doctrine is heavily influenced by Pigeau and McCann, and their comparison is used to summarize the command and control relationship: "Command is the expression of creativity and will of the commander to accomplish the mission, while effective control involves structures and processes that are created to enable command and manage risk." Department of National Defence, B-GL-310-

Reilly notes that thinking far beyond one's present state will become the norm in MDO: "the requirement to think across domains is occurring at increasingly lower levels and will be essential in the future to generating the tempo critical to exploiting fleeting local opportunities for disrupting an enemy system."[234] This imperative was picked up by several other leading MDO authors who published articles on mission command in MDO as the concept developed. The strong consensus was that mission command is more difficult in MDO.

Commanders at all levels will have to be prepared to deal with ambiguous and incomplete information despite additional, likely automated, decision-support tools and it will become correspondingly more important to devolve "decision-making authority – based on the commander's intent – to the lowest practical levels."[235] Bott calls this the greatest challenge of mission command, that the authority to execute a mission in accordance with the commander's intent will be delegated beyond the reach or ability of the higher command to exercise control and provide guidance.[236] The payoff for assuming this high risk, however, is in the resulting operational and strategic outcomes.[237] "Using the principles of mission command, operational agility and integration are increased by pushing decision making down to the lowest level."[238] As the

000/FP-001, *Command: The Operational Function,* (Kingston: Canadian Defence Academy – Canadian Forces Leadership Institute, 2018): 10.

[234]Jeffrey Reilly, "Multidomain Operations: A Subtle but Significant Transition in Military Thought," *Air & Space Power Journal* 30, no. 1 (Spring 2016): 61.

[235]William Dries, "Some New, Some Old, All Necessary: The Multi-Domain Imperative," *War on the Rocks*, 27 March 2017, last accessed 31 January 2019, https://warontherocks.com/2017/03/some-new-some-old-all-necessary-the-multi-domain-imperative/.

[236]J. Bott, et al, "Multi-Domain Battle: Tactical Implications," *Over the Horizon*, 28 August 2017, 9, last accessed 23 February 2019, https://othjournal.com/2017/08/28/multi-domain-battle-tactical-implications/.

[237]*Ibid*.

[238]Clay Bartels, Tim Tormey, and Jon Hendrickson. "Multidomain Operations and Close Air Support: A Fresh Perspective." *Military Review* 97, no. 2 (March-April 2017): 76.

CAF strives to develop itself towards an outcomes-based decision-making organization, these rewards seem perfectly aligned to the degree of risk we are willing and able to take at the organizational level.

In order to manage the increased volume of information that future networked capabilities will collect, process, and distribute, "commanders must be empowered through mission command philosophy,"[239] have access to joint enablers, and be more broadly educated in order to better understand the future operational context. The joint enablers that have traditionally been held at higher echelons are likely to be pushed forward, and down, where their application can be directed by those who can create windows of domain opportunities for timely exploitation.

Several initiatives are considering restructuring manoeuvre formations within the US Army, to regroup capabilities once held at Division and Corps-level and provide them at the Brigade-level so that these small, manoeuvrable formations can operate with greater agility in MDO using mission command.[240] The Canadian Army has made a similar move, though presently for force development and generation activities only, by regrouping its five joint enabler units (4 Artillery Regiment (General Support), 4 Engineer Support Regiment, 21 Electronic Warfare Regiment, Canadian Army Intelligence Regiment, Influence Activities Task Force) into the Canadian Combat Support Brigade (CCSB).[241]

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[239]Brandon Kew, "190207_U_Close Engagement Brief to Army Council," Presentation to Army Council 13 February 2019, last accessed 25 February 2019, https://acims.mil.ca/190207_U_Close_Engagement_Brief_to_Army_Council.pptx.

[240]Sydney Freedberg, "New Army Unit To Test Tactics: Meet The Multi-Domain Task Force," *Breaking Defence*, 21 March 2017, last accessed 3 March 2019, https://breakingdefense.com/2017/03/new-army-unit-to-test-tactics-meet-the-multi-domain-task-force/.

[241]Steven Fouchard, "New Canadian Combat Support Brigade is 'champion of Army enablers'," *Maple Leaf,* 6 April 2018 / Project number: 18-0120, https://ml-fd.caf-fac.ca/en/2018/04/12086.

This reorganization, a centralization of enabling capabilities, may appear to be conceptually at odds with *Close Engagement*, which advocates balanced, agile and adaptive formations and states "enabling capabilities should be, to the extent possible, decentralized to encourage the low-level interaction that can lead to innovative thinking."[242] However, the CCSB is presently an administrative formation only. For force employment tasks it decentralizes and provides the enabler units or their sub-units to the deployed Joint Task Force. Further development of mission command and restructuring for MDO will be necessary.

Critical Thinking and Agility

> *Intellect is our foremost capability.*[243]
>
> – Lieutenant-General Stephen Bowes

Earlier in this paper a different axiom, the whole is greater than the sum of its parts, introduced the idea that MDO were not an arithmetic sum of the operations conducted in each domain. Now, ahead of a final section on how Canada can prepare to adopt and adapt the multi-domain operational concept, we are reminded that people are our greatest asset and their intellect our greatest capability. This idea is expressed in a revisited slogan, a reworking of the traditional "mission, men, self" credo[244] of transformational leaders that is now stated by Canada's CDS and other senior officers as "People First, Mission Always."[245] An officer in the CAF is said to be especially trusted

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[242]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 22.

[243]Stephen Bowes, "Joint Operational Battlespace" (lecture, Canadian Forces College, Toronto, ON, 18 September 2018), with permission.

[244]Rory Kilburn, "Transformational Leadership: *Part* of a Warrior's Arsenal," *Canadian Military Journal* 6, no. 2 (Summer 2005): 81.

[245]Department of National Defence. "News Release: Chief of the Defence Staff announces Canadian Armed Forces General and Flag Officer senior appointments, promotions, and retirements," last modified 31 January 2017, last accessed 24 April 2019, https://www.canada.ca/en/department-national-

for their loyalty, courage and integrity.[246] Selected officers are chosen for command

appointments. Their agile mindset and capacity for critical thinking is crucial for mission

command in the MDO concept.

A paragraph from David Smith's article in *Over the Horizon Journal* captures the

logical evolution of critical thinking through mission command to seizing initiative – all

factors of MDO – with such clarity that it merits a full citation:

> Organizations should strive to implement Mission Command through the development of agile and adaptive leaders, or more precisely, leaders who think critically. While Mission Command allows for subordinate leaders to accept risk, it remains prudent that leaders focus on critical thinking. Critical thinking focuses leaders on the details of the problem on hand and keeps solutions within the commander's intent. Critical thinking focuses on anticipating how the enemy and terrain will affect the delivery of effects, maneuver, and how best to achieve the unit's purpose within the commander's intent and allows for subordinates to recognize that there is an opportunity to seize the initiative.[247]

If an agile mindset can be developed across all ranks and services, CAF personnel

will not only succeed in mastering the tactics, techniques, and procedures of their

respective trades and domains, but will be intellectually armed to consider other domains.

Leading American researchers on command and control, Dr David Alberts and Dr

Richard Hayes, developed a command model called "Power to the Edge" whose

principles parallel those of mission command, linking individual mental agility to

organizational outcomes like success in MDO.

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defence/news/2017/01/chief-defence-staff-announces-canadian-armed-forces-general-flag-officer-senior-appointments-promotions-retirements.html. The origins of the phrase "People First, Mission Always" are unclear but it has been repeated by Gen Vance on occasions such as the General and Flag Officer senior appointments, promotions, and retirements announced for 2017.

[246]Canadian Forces Officer's Commissioning Scroll.

[247]David Smith, "Mission Command in Multi-Domain Operations," *Over the Horizon*, 30 October 2017, 4, last accessed 23 January 2019, https://othjournal.com/2017/10/30/mission-command-in-multi-domain-operations/.

General Rouleau describes the need for the CAF to push power to the edge based on three functions: "expertise (the best information is generally known lower), outcomes (every relay doubles the noise and cuts the message in half) and necessity (in the worst case, most comms will be denied so we ought to build confidence and resiliency early)."[248] He is implicitly describing the challenges of command in MDO. Employing the 'Power to the Edge' model will help the CAF overcome these challenges.

"Power to the Edge" describes the mechanisms by which an organization can increase its potential (means and opportunity) to "bring *all* of its information and *all* of its assets to bear" and "recognize and take advantage of fleeting opportunities."[249] Alberts and Hayes use a cube to illustrate the idea of 'pushing power to the edge'. The cube has three axes: allocation of decision rights, interactions among individuals, and distribution of information.

[248]Michael Rouleau, ""How We Fight": Commander CJOC's Thoughts," Monograph emailed to CJOC Staff, 10 February 2019, 7.

[249]David Alberts and R. Hayes, *Power to the Edge: Command and Control in the Information Age* (Washington, DC: CCRP Publication Series. 2003), 165-177, 213-221. Power is defined as the potential to make something happen and the edge is defined as the maximum reach of decision rights, freedom of interaction, and information dissemination.
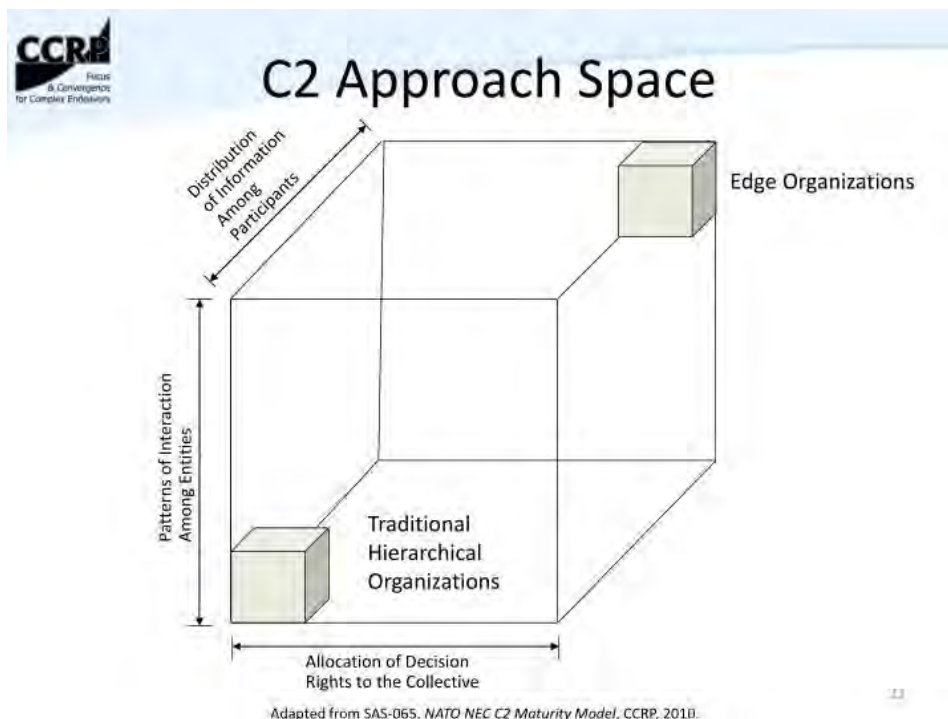
Figure 6 – The Command and Control (C2) Approach Space

Source: Richard Hayes, "Thoughts on The Agility Imperative. Knowledge Futures: The Agility Imperative," Evidence Based Research, Inc, 18 March 2011, Slide 23, last accessed 25 April 2019, https://www.slideserve.com/jamil/thoughts-on-the-agility-imperative.

A traditional organization concentrates decisions in senior members, has a strict hierarchy of relationships, and restricts the flow of information to predetermined and prescribed channels. Edge organizations are more agile; they delegate decisions, encourage unconstrained interactions, and disseminate information broadly.

Agility is increasingly recognized as the most critical characteristic of a transformed force.[250] "Power to the Edge" supports an agile mindset, a strong trust relationship with subordinates, a rich shared understanding of the situation, and taking prudent risks in keeping with the commander's intent which are the primary factors of

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[250]David Alberts and R. Hayes, *Power to the Edge: Command and Control in the Information Age* (Washington, DC: CCRP Publication Series. 2003), 123-159.

mission command. These calculated shifts in agile thinking and planning will help the CAF embrace the multi-domain operational concept.[251]

Preparing for Multi-domain Operations

In an article for *Air & Space Power Journal*, USAF Major Albert Harris answered the question "how do we prepare our military to meet the challenges of [an] evolved adversary?" by proposing a series of five steps that tactical leaders "should consider employing [….] in shaping their environment for multidomain command and control."[252] These steps can be expanded and elevated (original steps are repeated in quotes, additions or modifications are in *italics*) so that operational level leaders can use them to prepare for MDO:

1. "Know your domain, and know it well."

2. "Identify and collaborate with tactical [*and operational*] mission partners in other domains."

3. "Train and exercise multidomain [*concepts*]."

4. *Educate and Develop Professionally along Multi-domain Lines*.

5. "Document lessons learned."

6. "Apply multidomain lessons [*from Allies*] in [*concept and doctrine development*]."

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[251]Jonathan Bott, "Outlining the Multi-Domain Operational Concept Part III: Moving Toward Practical Application," *Over the Horizon*, 28 June 2017, 2, last accessed 23 February 2019, https://othjournal.com/2017/06/28/outlining-the-multi-domain-operational-concept-part-iii-moving-toward-practical-application/. https://othjournal.com/2017/06/28/outlining-the-multi-domain-operational-concept-part-iii-moving-toward-practical-application/.

[252]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 45-46, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf.

Harris used his model effectively at the tactical level. Upgrading to the operational level, considering evolving MDO concepts, and adding professional military education will allow CAF operational leaders to transpose the MDO concept to Canadian constructs. Matching CAF characteristics, initiatives, and aspirations to these newly formulated six steps will reveal extant and emerging opportunities for the CAF to adopt and adapt the MDO concept to fit the anticipated purpose and role of the CAF in the future operating environment.

Know Your Domain and Know It Well

Major Harris reminds us that "before one can consider synchronized tactical actions from multiple domains, we must first be experts in our primary domain."[253] Domain expertise is developed over many years of training and it goes beyond tactical acumen and operational proficiency. CAF members are highly trained in their respective occupations and many receive advanced training and education in their fields. Domain knowledge is typically captured in doctrine publications.

Doctrine is an authoritative compilation of knowledge comprised of the "fundamental principles and proven practices by which military forces guide their actions in support of objectives"[254] and is the basis for instruction at CAF training establishments.[255] But doctrine is based on past experience and training based on doctrine will only prepare military forces for what they have already experienced. This is

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[253]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 54, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf.
[254]TERMIUM Plus, "Doctrine," last accessed 27 April 2019, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=doctrine&index=alt&codom2nd_wet=1#resultrecs.
[255]Department of National Defence, Chief of Force Development, B-GJ-005-000/FP-001, *Canadian Military Doctrine*, (Ottawa, ON: Chief of Force Development, 2009): 1-1.

valuable, as it provides a foundation of proven tactics, techniques and procedures that can be applied when domain circumstances and situations match closely to those encountered before. Faced with the unfamiliar, soldiers need their basic drills, the intellect to improvise, adapt and overcome, and the initiative to act.

To be prepared for MDO, which are conceptually evolved from past paradigms, the CAF needs to develop and maintain a body of concepts and doctrine that inform not only the present characteristics of conflict in each domain, but the changes anticipated in each domain and the interactions across domains that are prevalent in the MDO concept. The CAF also needs to know what capabilities it has, and more importantly what capabilities it needs, to meet new requirements across the domain in the future operating environment. Significant capital investment is required in order to be prepared for MDO.

Knowing a domain well informs capability development and the CAF recognizes that significant investments are required across all domains in order to be a credible and capable force. The 2017 *Strong, Secure, Engaged* defence policy announced $48.9 billion of new spending on defence priorities, including new equipment, infrastructure, personnel, and operations, over a 20-year period.[256] Likewise, the Army's *Close Engagement* concept describes advanced capabilities to command deployed forces, including "effective and agile command and command support systems that can rapidly adapt to diverse situations within a comprehensive approach."[257] The Government of

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[256]Department of National Defence, *Strong, Secure, Engaged. Canada's Defence Policy,* (Ottawa, ON: Minister of National Defence, 2017), 11, 13, 45, 96-100, 101-103. Expressions of costing of a defence policy are challenging and often criticized. Annex A to *Strong Secure, Engaged* attempts to provide transparent overview of fiscal modeling while Annex B provides an overview of long-term funding. For example, Annex B lists $93.8 billion in capital funding commitments over the next 20 years, with $33.8 billion being for new equipment projects.

[257]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 25.

Canada and the CAF must follow through on these commitments in order to deliver the multi-domain capabilities it needs.

The newer domains, like space and cyber, will also benefit from significant investment and the CAF has established the Cyber Operator occupation within the Cyber Component Command to better build a cohesive and highly specialized group of operators in the cyber domain.[258] The CAF, like all western militaries, is structured along the traditional domains of land, sea, and air and its components (Canadian Army, Royal Canadian Navy, Royal Canadian Air Force) are aligned to these domains. Military personnel develop expertise in their domain and while there are not yet separate CAF organizations aligned to the space and cyber domains, the assignment of the space domain to the RCAF and establishment of the Cyber Component Command will enable concentrated development of the space and cyber domains. Domain expertise forms the basis for more advanced appreciation of the other domains. Bott warns that a "critical barrier for leading in a multi-domain environment is a weak understanding of maneuver in other domains."[259] At the operational level, the jointness of the CAF suggests that the introduction of new domains, developing expertise, and building knowledge between them, can be accomplished effectively.

Identify and Collaborate with Partners in Other Domains

MDO concepts demand that all participating forces have to become highly aware of, and competent in, the other domains. Knowing who is operating in the other domains,

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[258]Department of National Defence, "Cyber Operator," last accessed 27 April 2019, https://forces.ca/en/career/cyber-operator/.

[259]Jonathan Bott, "Outlining the Multi-Domain Operating Concept Part II: Evolution of an Idea," *Over the Horizon*, 21 June 2017, 6, last accessed 23 February 2019, https://othjournal.com/2017/06/21/outlining-the-multi-domain-operational-concept-part-ii-evolution-of-an-idea/.

and how they operate therein, is a capability onto itself and one that the CAF encourages

through professional military education. For example, all students on the Joint Command

and Staff Programme are exposed to lectures, participate in discussions, review case

studies, and engage in seminars presenting component capabilities from across the

environmental and operational commands and domains. This embodies Harris'

observation: "at this level, planners and operators of one domain must have not only the

skills to perform their own missions, but they must also understand how planners and

operators of other domains assure or even challenge their mission accomplishment."[260]

Collaboration among domain partners becomes increasingly important as effects within

and across domains must be synchronized to prevail in future conflict.

Close Engagement describes the increases in joint, interagency, multinational and

partner (JIMP) interoperability that are needed to counter the growing instability and

complexity of the future security environment. Among the stated priorities are the

following, which have been considered elsewhere in this paper:

> -   Military power is joint power, set within an inter-organizational and multinational context, requiring an integrated or comprehensive approach;
>
> -   The CAF should also strive to foster a collaborative mindset among our leaders;
>
> -   Land forces must engage to influence mission outcomes within the broadest possible context of shared goals.[261]

Pursuing these priorities will develop collaborative opportunities, support critical

thinking and mission command, and guide operational leaders to identify common goals

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[260]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 53, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf.

[261]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 21.

during the joint operational planning process. As the force employer, CJOC needs to

identify the cross-domain dependencies that force developers and generators must deliver

and support. Recent discussions have considered harnessing these activities under a new

unified command with responsibilities for the development and generation of joint

enablers, perhaps a Joint Forces Command. *Close Engagement* hints at this possible

reorganization:

> The Canadian Army is the proponent for, and a major contributor to, land
> power, but other CAF capabilities will play a pivotal role in generating
> effective land power. The capability development goals of the Army must
> therefore remain aligned with those of the RCAF, RCN and other CAF
> components.[262]

A Joint Forces Command would be a significant organizational enabler of joint

collaboration and force alignment although it could be said that the existing integrated

and unified structure of the Department of National Defence and the CAF already

provides for this cohesion. For example, capital projects and national procurement for all

three services are conducted by the Assistant Deputy Minister (Materiel), and similarly

most strategic and administrative command, control, and information systems are the

responsibility of Assistant Deputy Minister (Information Management) and their

respective subordinate structures. In almost all respects, these national organizations are

in a supporting relationship to deployed forces.

At the joint operational level, interoperability and deconfliction are just the

beginning of the challenge.[263] Multi-domain operators must recognize that successful

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[262]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 29-33.
   [263]Brian Willis, "Multi-Domain Operations at the Strategic Level," *Over the Horizon*, 2 March 2018, 5, last accessed 23 January 2019, https://othjournal.com/2018/03/02/multi-domain-operations-at-the-strategic-level/.

manoeuvre and delivering intended effects in one domain are dependent on and influenced by friendly and adversary manoeuvre and effects in other domains.[264]

Train and Exercise Multi-domain Concepts

In a presciently-named article, "Looking Beyond Your Service for Multi-Domain Success", USAF Major Aaron Sick writes "the current supported and supporting command structure must also be agile enough to switch roles (and switch again) as the fight evolves."[265] These and other multi-domain concepts are sufficiently new, and complex, that the CAF must invest significantly in training and exercising in multi-domain approaches. The US Joint Modernization Command began introducing multi-domain operational concepts to their Joint Warfighting Assessment (JWA) exercise series in 2017. CAF participation in the JWA series has been increasing, and must be sustained, as it provides a 'triple-payoff' for the CAF of joint capability integration and interoperability, joint concept development, and experimentation.

Training and exercising multi-domain concepts requires taking risks. Many electromagnetic spectrum activities that are part of cyber domain tactics are disruptive to command and control networks. These activities have commonly been precluded from full participation in training events because the training authority did not want to disturb the outcomes. However, these outcomes are false indicators of success if they have not been challenged by domain capabilities that adversaries can field. The slow introduction of a Cyber Red Team to Exercise MAPLE RESOLVE, the Canadian Army's annual

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[264]Brian Willis, "Multi-Domain Operations at the Strategic Level," *Over the Horizon*, 2 March 2018, 5, last accessed 23 January 2019, https://othjournal.com/2018/03/02/multi-domain-operations-at-the-strategic-level/.

[265]Aaron Sick, "Looking Beyond Your Service for Multi-Domain Success," *Over the Horizon*, 24 December 2018, 4, last accessed 23 January 2019, https://othjournal.com/2018/12/24/oth-anniversary-looking-beyond-your-service-for-multi-domain-success/.

battle group validation exercise, highlights the reluctance of the chain of command to introduce capabilities from new domains into the training environment. This is particularly true when these capabilities are used effectively by the training event opposing force, and disrupt the flow of the exercise events or prevent the reasonable achievement of predetermined training objectives (and arguably embarrass the primary training audience or planners).[266]

Close Engagement rejects timid training, seeking instead to use these opportunities to "expand leader and solider competencies to meet complex challenges […]."[267] Advanced training and education "provide more and better opportunities for leaders to make decisions in a stressful and uncertain environment and offer better consolidation and exploitation of those experiences" which results in "a more versatile and adaptable force that can survive and win on the battlefields of the future."[268] This means increasing the cognitive and physical demands of soldiers and officers in carefully constructed training events where certain variables remain under control, certain risks are mitigated, but are generally accepted to favour safe but rewarding experiential learning.

Understanding one's own domain, collaborating with partners, and training hard in challenging but chosen circumstances will lead the CAF towards a 'new normal' where integrated multi-domain capabilities are habitually wielded for devastating effect just as familiar small arms are handled today. That goal may presently seem too lofty, exceeding the cognitive capacity of a single soldier or commander. Can they be expected

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[266]In one odd coincidence, a preparation exercise for the military response to anticipated 'Y2K' outages was cancelled shortly after it began because of an unplanned power outage on the base. The lack of imagination on the part of exercise staff in not pushing on with the exercise in these 'ideal' circumstances was not lost on the participants.

[267]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 20.

[268]*Ibid.*, 24.

to master multiple domains including cyber? Not immediately and certainly not without deliberate training, but "a common lexicon and basic understanding to effectively communicate across these domains" will set them up for eventual success.[269]

Educate and Develop Professionally Along Multi-domain Lines

Beyond training for MDO, it is essential that the CAF incorporate the tenets of the MDO concept on advanced soldier courses and throughout officer professional military education. Successful MDO will require critically-thinking agile leaders who can execute mission command and identify and take advantage of fleeting multi-domain opportunities to achieve effects across domains.[270] From General Rouleau's monograph, "the cognitive leader will carry the day."[271] It is important to develop multi-domain leaders by educating them about "how to think about how to fight."[272] These cognitive abilities take a long time to develop, but the CAF has a clear advantage by virtue of its long experience and significant expertise in running joint and partner development programs and courses such as those taught at the Canadian Forces College (CFC).

CFC's Joint Command and Staff Programme (JCSP) prepares "selected senior officers of the Defence Team for command and/or staff appointments in a contemporary operating environment across the continuum of operations in national and international

[269]George Hart, "Bridge Builders to Make Multi-Domain Operations Work," *Over the Horizon*, 31 August 2017, 3, last accessed 23 February 2019, https://othjournal.com/2017/08/31/bridge-builders-to-make-multi-domain-operations-work/.

[270]J. Bott, et al, "Multi-Domain Battle: Tactical Implications," *Over the Horizon*, 28 August 2017, 7, last accessed 23 February 2019, https://othjournal.com/2017/08/28/multi-domain-battle-tactical-implications/.

[271]Michael Rouleau, ""How We Fight": Commander CJOC's Thoughts," Monograph emailed to CJOC Staff, 10 February 2019, 8.

[272]*Ibid*.

settings."[273] Canadian JCSP students come from all three environments, and Canadian Special Operations Forces Command, making the course truly joint. International students add a valuable perspective from their home nations' military forces. JCSP already incorporates the joint operational planning process and design thinking and should adopt MDO practices from allied programs like the Multi-Domain Operational Strategist concentration at the USAF Air Command and Staff College to explore domain integration beyond joint.

Canada will likely remain a middle power and the CAF will likely remain a strong, but middle-weight military force that provides specific domain capabilities in coalitions. While it is not clear if the CAF is to provide multi-domain capabilities, however limited, it is certain to participate in allied coalition operations in a MDO context. In this regard, the ability to develop multi-domain leaders and practitioners is fundamental to our continued credibility in waging modern warfare.

The senior course at CFC, the National Security Programme, "is designed to prepare selected military, public service, international and private sector leaders for future strategic responsibilities within a complex and ambiguous global security environment."[274] This addresses the first of two advanced requirements identified by *Close Engagement*, and will assist the CAF and Canada's allies in preparing for MDO, with the second leading to the next preparatory step to be examined:

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[273]Canadian Forces College, "Syllabus – Canadian Forces College (CFC) Joint Command and Staff Programme Residential (JCSP RESID) and Joint Command and Staff Programme Distance Learning (JCSP DL)", (Canadian Forces College, 2017), 1-1/20, last accessed 27 April 2019, https://www.cfc.forces.gc.ca/118/401/cfc300-44-eng.pdf.

[274]Canadian Forces College, "Syllabus – Canadian Forces College (CFC) National Security Programme (NSP)", (Canadian Forces College, 2017), last accessed 27 April 2019, https://www.cfc.forces.gc.ca/119/187/322/331-eng.pdf.

-        A broader engagement with government departments, academia and other relevant stakeholders is needed to enhance sharing of differing perspectives and information sources;

-        Canadian land forces need to enhance their ability to adapt in contact through a more rapid and comprehensive process of identifying, sharing and institutionalizing lessons learned.[275]

If we don't take note of lessons as they are learned, capture best practices for future consideration, and do so more quickly than before, we will only ever get good at fighting the last war.

Document Lessons Learned

One of the best ways to inform doctrine development is through the lessons learned process, whereby observations from across the force are captured, analyzed, and incorporated into existing doctrine. A positive and collaborative mindset is required for the lessons learned process to have its intended effect of improving doctrine from experiences in the 'real world', good and bad. Sometimes this feedback, particularly when sourced from training failures, "will expose units to scrutiny that might naturally undermine transparency and collaboration. […]. The humility to highlight lessons created from failures should be lauded."[276]

Lessons from operations are even more valuable, as they are the closest to the conditions that may be experienced in future engagements. Two anecdotal examples will serve to illustrate the importance of documenting and applying joint and multi-domain

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[275]Department of National Defence, B-GL-310-001/AG-001, *Close Engagement: Land Power in an Age of Uncertainty. Evolving Adaptive Dispersed Operations*, (Approval Draft, 15 February 2019), 21.

[276]J. Bott, et al, "Multi-Domain Battle: Tactical Implications," *Over the Horizon*, 28 August 2017, 9, last accessed 23 February 2019, https://othjournal.com/2017/08/28/multi-domain-battle-tactical-implications/.

concepts in operational planning and tactical action. The first, a failure in planning, is from Operation ANACONDA, Afghanistan, March 2002.

Operation ANACONDA's land forces commander, US Army Major General Hagenbeck, did not involve the air component commander and the combined air operations center in the planning process. During the ensuing battle, the Taliban resistance was far stronger than expected and the ground forces required urgent Close Air Support (CAS) – provided by those same air organizations that had not been involved in the planning. Despite a slow start, the CAS effort "rapidly improved and ultimately became the key to winning the battle."[277] Op ANACONDA's planners needed to consider the multi-domain perspective, so that effects from other domains – in this case the air domain – could have been integrated at the outset and the component responsible for the delivery of effects could have engaged early in the synchronization efforts.[278]

Apply Lessons to Concepts and Doctrine Development

Applying lessons learned from the operations of a potential adversary against an ally can be a sobering but valuable effort to avoid possible similar consequences from befalling other allies or ourselves. Russian success in MDO in Ukraine serves as an example for Western allies' concept development.

Russian tactics in Ukraine relied on several key interdependencies, largely in the cyber, air, and land domains. Cyber attacks against Ukrainian command and control systems disrupted decision-making ahead of nearly all kinetic land or air attacks. Land domain targets were acquired through the air domain using unmanned aerial vehicles

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[277]Clay Bartels, Tim Tormey, and Jon Hendrickson. "Multidomain Operations and Close Air Support: A Fresh Perspective." Military Review 97, no. 2 (March-April 2017): 74.
[278]*Ibid*.

(UAVs). Rapid sensor-to-shooter links enabled manoeuvre decisions for the adversary to gain a positional and information advantage over Ukrainian forces. Agility in the electromagnetic spectrum supported rapid artillery engagement as land targets were identified, fixed and then destroyed.[279]

Allied militaries will be studying these engagements closely to derive any and all possible lessons from the Ukrainian experience. One observation is that the adversary's use of the cyber and air domains, and freedom of action in the electromagnetic spectrum, contributed greatly to the success of the attacks, especially at Zelenopillya. Defensive cyber operations capabilities, or denying the adversary's use of the spectrum, could have provided a sufficient defensive shield for force protection and mitigated the success of the attack.[280]

A lesson learned from several MDO exercises and training events is that coordinating across domains by linking domain-focused command and control systems in a joint architecture "will greatly improve joint force decision making and enable the level of operational agility future threats require."[281]

The CAF must now decide how best to develop its joint force agility in applying the operational functions while contemplating a complex future.

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[279]Thomas Griesemer, "Russian Military Reorganization: A Step Toward Multi-Domain Operations," *Over the Horizon*, 19 November 2018, 6, last accessed 23 February 2019, https://othjournal.com/2018/11/19/russian-military-reorganization-a-step-toward-multi-domain-operations/.
[280]*Ibid*.
[281]Clay Bartels, Tim Tormey, and Jon Hendrickson. "Multidomain Operations and Close Air Support: A Fresh Perspective." *Military Review* 97, no. 2 (March-April 2017): 76.

CHAPTER 5 – CONCLUSION

To think theoretically one must be tolerant of ambiguity, concerned about probabilities, and distrustful of absolutes.[282]

– James Rosenau

Would the CAF officers who listened to the Ukrainian Colonel bemoan a lack of encouraging developments at the defence conference in 2018 be reassured by the MDO concept and choose to advocate for its adoption? If they reflected on their own operational experience, it is likely they would welcome an operational concept that addressed capability deficiencies and better prepared them for the complex future operating environment heralded by attacks such as the multi-domain engagement at Zelenopillya.

The evolution of MDO concepts in the US Army can be summarized plainly by three important drivers: 'words matter', 'we're in this together', and 'the fight has evolved'. General Perkins described the proactive change he led as "change by choice, made by anticipating problems and evolving to prevent failure."[283] The US Army recognized after many years of conducting counterinsurgency operations that their old operational concepts including domain supremacy were being overcome by events, revisited its assumptions, and revised its appreciation of potential peer adversaries and their advanced capability development.

Important and timely lessons were learned from adversary activities and engagements in the Baltics, Ukraine and the South China Sea. Accordingly, the MDO concept was conceived and implemented by the US Army. It is too consequential to

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[282]Jonathan Bott, "Outlining the Multi-Domain Operating Concept," *Over the Horizon*, 8 June 2017, 4, last accessed 23 February 2019, https://othjournal.com/2017/06/08/outlining-the-multi-domain-operating-concept/.

[283]David Perkins, "Multi-Domain Battle: Driving Change to Win in the Future," *Military Review* 97, no. 4 (July-August 2017): 8.

ignore, and too substantial to reject. The choice for the CAF is to adopt the MDO concept as developed or adapt it for Canada's purposes.

The analysis herein strongly suggests that the MDO concept can, and must, be adapted by the CAF. Canadian realities demand a prudently-designed series of adaptations so that it will best fit the CAF in achieving the defence and security obligations and aspirations expressed in the *Strong, Secure, Engaged* defence policy. The CAF joint experience has created the necessary conditions for increasing domain interoperability and cross-domain operational effectiveness but Canada also has a strong diplomatic character and reputation as a democratic middle power respected the world over.

The intent of this paper was to kickstart a vigorous MDO dialogue among military officers and academics studying the operational art and the operational level of war. Inspired by the writings of two prominent Canadian generals, and informed by the wealth of conceptual and doctrinal information on domains, interoperability, jointness, the operating environment, the way we fight, and mission command, this paper is a humble offering: one perspective among many. As the conversations continue, there will be important concerns raised and valuable contributions by other critical thinkers.

The MDO concept as presently defined is inherently and overtly bellicose, and its practical use by a middle power favouring diplomacy and contribution warfare may depend heavily on how the concept is adapted. For example, will the CAF adaptation suffice to respond to ominous challenges that former UN Secretary General Kofi Annan called problems without passports? These problems may affect international defence and security in ways an MDO concept simply isn't designed to resolve.

The future operating environment also presents a significant human factors problem to the military: cognitive overload. It is not clear when the increase in information from all domains provided through digitized mission command support systems will exceed human cognitive abilities but it is certain that the soldier and commander of the future will face more information and more stressors affecting the mind. We haven't concluded if the stressed human brain can handle all this information and still command and control effectively – in one domain let alone multiple.

The underlying advantage of the MDO concept is its premium on thought, trust, and responsibility. Harnessing critical thinking and mission command principles, the MDO concept has at its foundation the essential ingredients to face complexity and complex problems unflinchingly. Canadian interests, supported by a CAF that has embraced and adjusted the MDO concept to fit its frame, are best achieved by an agile collaborative mindset across the military, its partners and allies, and the whole-of-government.

General Vance's 2004 paper on operational art questioned why Canada sometimes chose to embrace doctrine it cannot practice, and demonstrated that operational thought evolved to belong exclusively to major powers. CAF officers would have to recognize and practice it when serving in a coalition headquarters, but would have few other occasions to do so. Fifteen years hence, the future operating environment changed as described in Chapter 3 and the occasions to exercise a Canadian operational concept are plentiful. General Rouleau asks what changes to the joint force, and how it fights, are needed, guided by General Vance's discussions as CDS.

Some things have not changed since 2004. General Vance's conclusion that CAF operational concepts and doctrine must be consistent with national policies and "must have legitimate relevance to the nation's needs"[284] remains valid. The changes in the complex future operating environment likewise validate the dual emphasis in this paper on ensuring that everyone understand the meaning of the terms used to construct operational concepts, and promoting the effective development of a multi-domain mindset built on a culture of agile collaboration that defines the CAF today.

The CAF is a Joint Force that is uniquely positioned to adapt and contribute to the development of MDO concepts. CAF leaders must shape the multi-domain culture that is best suited for its requirements and future operations. Critical thinkers joining the conversation to develop the Canadian MDO concept have an impressive body of knowledge to draw inspiration from and should take full advantage of these sources. Beyond these fundamentals, consider different perspectives from across the professional community as you look beyond yourselves for shared success – further work comparing Canada to other Allies like Australia and the United Kingdom will contribute valuable insight to the continued evolution of MDO.

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[284]Jonathan Vance, "Canada's Departure from the Classic Doctrine of Operational Art," (Advanced Military Studies Course Paper, Canadian Forces College, 2004), 29.

APPENDIX

Historical Context and Evolution of the MDO Concept

Although the roles of domain-specific forces and their interaction with mission partners in a joint force have evolved over time, "historically, military services focused on defeating enemies operating in their domain"[285] and historians have taken interest in multi-domain concepts to inform their ongoing analysis of the historical record. This appendix provides interested readers with anecdotes from past MDO and an account of the evolution of MDO from its roots in AirLand Battle published in 1982, through to 2017.

Historical Context

Two brief case studies, one from antiquity with land-maritime domain interdependence and one from the late 20th century with maritime-air interdependence, will serve as bookends to illustrate the historical compass of MDO.

The Egyptian Pharaoh Ramesses III conducted one of the earliest known examples of MDO in the 12th Century BC. His kingdom was threatened by the superior naval forces of an adversary known appropriately as the Sea Peoples. Facing overmatch in the maritime domain, both in vessels and tactics, Ramesses instead chose to use a small naval force to lure the Sea Peoples' superior navy to a favoured position in the Nile River delta, within range of his secretly-positioned superior land forces. From the shores of the Nile River Ramesses' archers launched devastating volleys upon the enemy ships while the remaining Egyptian ships blocked the retreat and destroyed the Sea Peoples'

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[285]Jonathan Bott, "Outlining the Multi-Domain Operating Concept," *Over the Horizon*, 8 June 2017, 5, last accessed 23 February 2019, https://othjournal.com/2017/06/08/outlining-the-multi-domain-operating-concept/

fleet.[286] The strategy Ramesses employed qualifies as multi-domain because he chose to use his land power to create effects 'at sea' while employing maritime power both to create the conditions necessary for the adversary to enter the kill zone and subsequently to fix and destroy them within the kill zone by both land and maritime power.

Over three thousand years later, many similar MDO took place during the 1982 Falklands War between the United Kingdom (UK) and Argentina "and the multiplier effects these actions had on the campaign's outcome were significant."[287] The most significant event in the maritime domain created effects in both it and the air domains. The Argentine cruiser *General Belgrano* was sunk by a UK submarine – allowing near full freedom of manoeuvre for the Royal Navy. This in turn allowed them more time to linger in the littoral waters "to visually detect Argentine aircraft being launched from the mainland" and provide early warnings to the British Task Force.[288] Thus a dual effect was achieved in the interconnected maritime and air domains. The sinking of this major warship also allowed further exploitation of the maritime domain by enabling close naval support to UK Special Operations Forces who, supported by relatively unopposed naval gunfire, conducted an amphibious raid on an island airfield – an effect in the interconnected land and air domains. The loss of this forward location "forced Argentina to withdraw most of its high-performance aircraft 400 miles back to the mainland."[289] The net effect in the air domain was that "Argentine aircraft were required to fight at their

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[286]Sean Atkins, "Multidomain Observing and Orienting: ISR to Meet the Emerging Battlespace," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 28; Jeffrey Reilly, "Over the Horizon: The Multi-Domain Operational Strategist (MDOS)," *Over the Horizon*, 5 January 2018, 2, last accessed 23 January 2019. https://othjournal.com/2018/01/05/oth-anniversary-over-the-horizon-the-multi-domain-operational-strategist-mdos/.

[287]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation," *Joint Force Quarterly* 88 (1st Quarter 2018): 17-18.

[288]*Ibid.*

[289]*Ibid.*

maximum operating radius, which greatly reduced their time on station."[290] From a first

effect in the maritime domain thus enchained a series of acts and resultant effects in the

maritime, land, and air domains.

The ability to generate and project combat power in any known domain has been

sought by military forces throughout history. In this respect, the multi-domain concept is

not new – but it is increasingly important. Recently, the combat abilities of Western

military forces have been focused on projecting power to conduct counterinsurgency

operations in Afghanistan and Iraq. Meanwhile, potential future adversaries developed

capabilities to competently oppose this – or preferably to prevent it altogether. "Their

efforts to counter American military effectiveness seemed deceptively simple: deny

America's ability to project power to the battlefield."[291] Presently, among other

deployments of military forces, the North Atlantic Treaty Organization (NATO) is

conducting a training mission in Iraq to develop Iraqi security forces and has positioned

four multinational battlegroups (including one led by Canada) in the Baltic States to

demonstrate NATO's resolve for common defence.[292]

The ability to project power and prevail in conflict abroad is required to protect

other friendly countries from aggression, defeat forces of tyranny, limit the destructive

effects on one's own country, and preserve sovereignty. History guides us to consider

how best to prepare our forces for future conflicts. At the time of the Falklands War in

the early 1980s, the US was reconstituting its military from strategic defeat in the

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[290]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation," *Joint Force Quarterly* 88 (1st Quarter 2018): 17-18.

[291]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 49, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf.

[292]North Atlantic Treaty Organization, Public Diplomacy Division, Factsheet: NATO's Enhanced Forward Presence, August 2018, https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2018_09/20180910_1809-factsheet_efp_en.pdf.

Vietnam War. The short-lived period of Détente during the Cold War was over as the then-Soviet Union threatened European peace and security and had invaded Afghanistan in 1979. A new operational concept was needed to account for the contemporary security environment with multiple warfighting domains contested around the globe.

Evolution of the Operational Concept from AirLand Battle, 1982-2017

> *They will think this was their victory. So this will become an American war. And the end will be the same ... except for the numbers who will die before we get there.*
>
> – *North Vietnamese Army Lieutenant Colonel, to his staff officer*

The epigraph above is from the 2002 movie 'We Were Soldiers", which dramatized the helicopter airmobile assault of the US 7th Cavalry Regiment on North Vietnamese Army Regiments in the Ia Drang Valley in 1965 at the beginning of the Vietnam War. The battle was the first major engagement, and first of only a few set-piece battles, of the war. Despite overwhelming technology and firepower, the US Army fought to a draw, with each side declaring victory.

The Vietnam War ended without the decisive American military victory that had been anticipated at its outset. It is worth considering implicit biases, including "Western military study tends to elevate the idea of "decisive battle" without examining what makes battles decisive."[293] The US Army and USAF emerged from Vietnam facing a new reality, a new adversary, and a corresponding lack of doctrine – but a common resolve to develop it.

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[293]Wilford Garvin, "Multi-Domain Strategic Thinking: What Problem Are We Trying to Solve?" *Over the Horizon*, 18 December 2017, 3, last accessed 23 February 2019, https://othjournal.com/2017/12/18/oth-anniversarymulti-domain-strategic-thinking-what-problem-are-we-trying-to-solve/.

Foreshadowing later expressions of multi-domain as a term for unifying vision,[294] "the close collaboration between the Army and the Air Force from 1973 to 1990 […] was a product of a specific unifying problem" for the NATO Alliance: "the ability to defeat a Warsaw Pact invasion of western Europe below the nuclear threshold."[295] With "a shared understanding of the problem set […] and the need to develop a new warfighting doctrine," the US Army-USAF concept was an expression of the requirement for a joint approach to conflict, force projection, and force employment in the new battlespace, appropriately named AirLand Battle.[296] Developed over nearly a decade of conceptualization and experimentation, AirLand Battle was first published in Field Manual (FM) 100-5, *Operations*, in 1982.[297]

AirLand Battle was explicit in driving collaboration in its two namesake domains. The next high-water mark for joint force operations in multiple domains was the 1991 Gulf War which is "considered the first major conflict in which space played a vital role."[298] Space warfighters proved their mastery of their domain and US and coalition forces "employed a new strategic attack strategy […] that visualized the enemy as a

[294]Aaron Sick, "Looking Beyond Your Service for Multi-Domain Success," *Over the Horizon*, 24 December 2018, 3, last accessed 23 January 2019, https://othjournal.com/2018/12/24/oth-anniversary-looking-beyond-your-service-for-multi-domain-success/.

[295]David Johnson, "The Lessons of AirLand Battle and the 31 Initiatives for Multi-Domain Battle," Santa Monica, California: RAND Corporation, 2018, Report No.: PE-301-A/AF, 2, https://www.rand.org/pubs/perspectives/PE301.html.

[296]David Perkins and James Holmes, "Multi-Domain Battle: Converging Concepts Toward a Joint Solution," Joint Force Quarterly 88, (1st Quarter 2018): 57.

[297]David Perkins, "Multi-Domain Battle: Driving Change to Win in the Future," *Military Review* 97, no. 4 (July-August 2017): 8.

[298]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 48, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf

system, where simultaneous offensive fires […] delivered synergistic effects [enabled by the Space domain] across the entire social and military system."[299]

Although AirLand Battle proved effective during the 1991 Gulf War,[300] unity in the face of a common and well-defined threat was eroded by the end of the Cold War. Victory in the Gulf War ironically misled the services to believe in the importance of their independent, vice collaborative, contributions to mission success. Throughout the 1990s, and the many small United Nations peacekeeping and NATO peace enforcement missions, the US Army and USAF pursued independent capability development in competition for new and expensive equipment within a limited national defence budget.[301]

AirLand Battle doctrine stagnated, and was essentially shelved in absence of an identified potential 'near-peer' adversary or any large-scale combat operations. Following the attacks of 11 September, 2001, the next decade of war against terrorism was defined primarily by counterinsurgency operations in Afghanistan and Iraq, neither of which had more than one or two examples of 'set-piece battles' in any domain. The AirLand Battle doctrine designed to fight the Soviet Union in Europe was inadequate for this new conflict.[302]

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[299]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 48-49, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf

[300]Scott King, and Dennis B. Boykin IV, "Distinctly Different Doctrine: Why Multi-Domain Operations Isn't AirLand Battle 2.0," Association of the United States Army, 2, last accessed 23 February 2019, https://www.ausa.org/articles/distinctly-different-doctrine-why-multi-domain-operations-isn%E2%80%99t-airland-battle-20.

[301]David Johnson, "The Lessons of AirLand Battle and the 31 Initiatives for Multi-Domain Battle," Santa Monica, California: RAND Corporation, 2018, Report No.: PE-301-A/AF, 3-5, https://www.rand.org/pubs/perspectives/PE301.html.

[302] David Perkins, "Preparing for the Fight Tonight: Multi-Domain Battle and Field Manual 3-0," *Military Review* 97, no. 5 (September-October 2017): 9.

Despite the focus in the Middle East and South East Asia, some analysts and DoD officials were noting major changes in other parts of the world. Shortly after his retirement as a USMC Colonel in 2001, Robert Work, who would later become Deputy Secretary of Defense, taught defence analysis at George Washington University. He was among the first to warn of "emerging concerns over China, Russia, and Iran, which were actively modernizing anti-access/area-denial strategies."[303] China and Russia especially were fielding advanced capabilities designed to prevent adversary force projection at regional scales.

Ten years later, the Army released an updated Army Doctrine Publication (ADP 3-0, *Operations*). ADP 3-0 introduced "unified land operations, an evolutionary concept reflecting the progression from AirLand Battle and [the need for decisive action in] full spectrum operations."[304] Similar to the Army, the other services recognized the need to develop new ideas and capabilities to enhance force projection, as well as to ensure freedom of action, given the rise of adversarial anti-access/area-denial (A2/AD) threats.[305]

Alongside the services' independent but unhurried doctrine development, contemporary joint concepts recognized the value of joint force integration, resulting in 2016's "Joint Concept for Access and Maneuvering in the Global Commons [JAM-GC]."[306] In reviewing JAM-GC, Hutchens noted that "since the end of World War II, U.S. forces have generally enjoyed unrestricted and unchallenged access to the global

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[303]David Perkins, "Preparing for the Fight Tonight: Multi-Domain Battle and Field Manual 3-0," *Military Review* 97, no. 5 (September-October 2017): 10.
[304]*Ibid.*
[305]*Ibid.*
[306]Albert Harris, "Preparing for Multidomain Warfare," *Air & Space Power Journal* 32, no. 3 (Fall 2018): 49, https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-32_Issue-3/V-Harris.pdf.

commons, which in turn has facilitated the ability to project power." Global projection of power was identified as an operational centre of gravity, and comprehensive A2/AD threats denied this freedom of access and manoeuvre. JAM-GC was meant to inform the joint force of the requirement for "the integration of capabilities from all five warfighting domains (land, sea, air, space, and cyberspace)" in order to defeat these adversary threats.[307]

Even as late as 2017, US Army doctrine still "did not sufficiently account for how to synchronize capabilities in sea, cyber, or space domains during large-scale combat operations against peer opponents."[308] Russia was, by then, considered to be a peer opponent. Despite not having larger numbers of forces relative to NATO, it was "threatening a multidomain equivalence in long-range missiles, rockets, drones, sophisticated cyber attacks, jamming, and an integrated information campaign."[309] Even though the adversary was the same, AirLand Battle could not be resurrected to meet multi-domain threats– it was overcome by events, chiefly: increased domain interdependence, the proliferation of A2/AD systems, and advanced capabilities in Space and Cyber.

In developing new concepts, the DoD had to "think in terms of multiple domains working in concert simultaneously to achieve goals rather than solely operating in or

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[307]M. Hutchens, et al, "Joint Concept for Access and Maneuver in the Global Commons: A New Joint Operational Concept," *Joint Force Quarterly* 84 (1st Quarter 2017): 135-137.

[308]David Perkins, "Preparing for the Fight Tonight: Multi-Domain Battle and Field Manual 3-0," *Military Review* 97, no. 5 (September-October 2017): 8.

[309]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation," *Joint Force Quarterly* 88 (1st Quarter 2018): 16.

between two domains."[310] For many reasons, multi-domain concept development was more difficult than for AirLand Battle. US Joint Forces Command, which was responsible for joint concept development and experimentation, was disbanded in 2011. New concepts accounting for new domains still had to overcome ingrained service cultures as much as they had to resolve interdependence and convergence.

New warfighting concepts are disruptive by their nature and their value ought to be questioned. "New concepts need to demonstrate that they are sufficiently better than the status quo at addressing the challenges and opportunities in order to justify the disruptive effects of the change. This, as it should be, is a high bar."[311] Other observations, particularly from within the ranks, were more critical. The first attempts to express multi-domain battle concepts in Army doctrine[312] were critiqued by one serving officer as being replete with "lofty goals" but offering little in the way of "guidance on how we achieve these goals."[313] It seemed multi-domain battle was "essentially a new phrase for what we have always done."[314] Worse, the reviewer noted the continued use of obsolete language, a severe underestimation of the adversary threat, a "muddled writing style" with "tautologies, hyperbole, and bravado"; he ultimately found the contradictions

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[310]Jonathan Bott, "Outlining the Multi-Domain Operating Concept Part II: Evolution of an Idea," *Over the Horizon*, 21 June 2017, 2, last accessed 23 February 2019, https://othjournal.com/2017/06/21/outlining-the-multi-domain-operational-concept-part-ii-evolution-of-an-idea/.

[311]Kevin Woods and Thomas Greenwood, "Multi-Domain Battle: Time for a Campaign of Joint Experimentation." *Joint Force Quarterly* 88 (1st Quarter 2018): 14.

[312]Headquarters, Department of the Army, ADRP 3-0, *Operations*, Washington DC: Government Printing Office, October 2017.

[313]Daniel Kull, "The Myopic Muddle of the Army's Operations Doctrine," *Military Review Online Exclusive* (May 2017), https://www.armyupress.army.mil/Journals/Military-Review/Online-Exclusive/2017-Online-Exclusive-Articles/Myopic-Muddle-of-Army-Ops-Doctrine/.

[314]*Ibid*.

and needless redefinition of common terms led to confusion.[315] Had anything really changed from AirLand Battle?

AirLand Battle, promulgated nearly 40 years ago, shifted the warfighting focus from small-unit counterinsurgency operations in Indo-China to large-scale, heavy-formation operations in Europe. AirLand Battle was built on "Clausewitz's Principles of War, particularly initiative, depth, agility, and synchronization and informed by experience in Vietnam and observations from the 1973 Yom Kippur War."[316] Multi-domain concepts were similarly informed by a study of the Ukrainian experience in the Crimea which noted significant improvements in the Russian army compared with their operations in Estonia seven years prior. A traditional reliance on artillery was augmented by information and electronic warfare, the use of unmanned systems, and social media attacks before actual conflict.[317] AirLand Battle was proven in the First Gulf War but later evolved to meet these emerging multi-domain realities – its successor concept is yet to be assessed.

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[315]Daniel Kull, "The Myopic Muddle of the Army's Operations Doctrine," *Military Review Online Exclusive* (May 2017). https://www.armyupress.army.mil/Journals/Military-Review/Online-Exclusive/2017-Online-Exclusive-Articles/Myopic-Muddle-of-Army-Ops-Doctrine/.

[316]Scott King, and Dennis B. Boykin IV, "Distinctly Different Doctrine: Why Multi-Domain Operations Isn't AirLand Battle 2.0," *Association of the United States Army*, 1, last accessed 23 February 2019, https://www.ausa.org/articles/distinctly-different-doctrine-why-multi-domain-operations-isn%E2%80%99t-airland-battle-20.

[317]*Ibid*., 3.

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