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## PAN-DOMAIN OPERATIONS: HOW CAN THE CANADIAN ARMY PREPARE ITS FORCES AND CONTRIBUTE TO MULTI-DOMAIN COALITIONS?

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# PAN-DOMAIN OPERATIONS: HOW CAN THE CANADIAN ARMY PREPARE ITS FORCES AND CONTRIBUTE TO MULTI-DOMAIN COALITIONS?

## AIM

1. This paper aims to identify the advantages, challenges and opportunities of allied approaches to multi-domain operations and provide recommendations on how the Canadian Army (CA) can prepare its forces and contribute to multi-domain operations.

## INTRODUCTION

2. The proliferation of technology and the return of great power competition have significantly changed the character of conflicts. Adversaries like Russia and China developed layers of anti-access and area denial (A2AD) capabilities that challenge Western countries' ability to project forces in the traditional domains. Peer adversaries also demonstrated the willingness to compete below the threshold of armed conflict in the cyber, space and information domains. To offset adversaries' levelling of capabilities and solve the problem of layered stand-offs in all domains, the United States (US) Army developed the Multi-Domain Operations (MDO) concept.<sup>1</sup> The US Air Force developed the Joint All-Domain Command and Control (JADC2) concept, which evolved from its ambition to connect all sensors and shooters in all domains, to a new decision-making approach that leverages artificial intelligence to support the emerging joint warfighting concept known as Joint All-Domain Operations (JADO).<sup>2</sup> Canada and its allies have also been developing similar multi-domain concepts.

3. The Canadian Armed Forces' (CAF) Pan-Domain Force Employment Concept (PFEC) acknowledges the requirement to integrate effects across domains and emphasizes collaborating with allies, partners and whole-of-government.<sup>3</sup> The CA capstone concept, Close Engagement (CE), describes the future environment as complex, dynamic, volatile and highly uncertain, and it highlights the growth of adversaries' A2AD systems. Despite not including terms like pan or multi-domain, CE reaffirms the imperative for agility, modularity, connectivity and integration with joint, interagency, multinational and public partners.<sup>4</sup> The new CA modernization strategy recognizes the requirement for a broader set of pan-domain capabilities.<sup>5</sup> However, besides digital transformation and cyber mission assurance initiatives, the strategy does not provide new information describing how the CA will prepare for MDO. This paper will provide recommendations on how the CA can prepare for, or contribute to, MDOs by examining

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<sup>1</sup>Congressional Research Service, *Defense Primer: Army Multi-Domain Operations (MDO)*, CRS in Focus (Washington, DC: Congressional Research Service, 16 January 2020). The US Army aims to be able to conduct MDOs by 2028.

<sup>2</sup>Bryan Clark and Dan Patt, "JADC2 May be Built to Fight the Wrong War," *Breaking Defense*, last modified 14 January 2021. <https://breakingdefense.com/2021/01/jadc2-may-be-built-to-fight-the-wrong-war/>. The JADO warfighting concept has not yet been published by the US Joint Staff. However, a JADO definition is provided by the US Air Force in: US Department of Defense, *USAF Role in Joint all-Domain Operations* (United States Air Force, 2020), 2.

<sup>3</sup>Department of National Defence, *Pan-Domain Force Employment Concept, Prevailing in an Uncertain World* (Ottawa: DND Canada, 2020).

<sup>4</sup>Anthony Kaduck, *Close Engagement* (Ottawa, Canada: Canadian Army Headquarters, 2019): 11, 17-18.

<sup>5</sup>Department of National Defence, *Advancing with Purpose, the Canadian Army Modernization Strategy, 4th Edition* (Ottawa, Canada: Canadian Army Headquarters, 2020): 26.

primarily the US multi-domain concepts focused on the tactical and operational levels of warfighting, followed by the United Kingdom's (UK) multi-domain concept of strategic and whole-of-government integration.

## DISCUSSION

### US Concepts: From Multi-Domain Battle to Operations

4. Multi-domain concept development started with extending the air-land battle doctrine into a multi-domain battle framework focused on conventional warfighting.<sup>6</sup> The US Air Force later merged its construct with the Army's framework, leading to the Army-Air Force battlefield framework.<sup>7</sup> The framework then evolved to MDO, reflecting a broader perspective that includes non-kinetic and non-military instruments.<sup>8</sup> While MDO explains how to defeat a conventional peer enemy at the tactical and operational levels, it is less precise in describing how to integrate strategically with other national power instruments to counter the sub-threshold competition. From a Canadian perspective, MDO and JADC2 present advantages, challenges and opportunities.

### Advantages of US Multi-Domain Concepts

5. Robust Warfighting Framework and Credible Deterrence. MDO provides a robust conventional warfighting framework to penetrate and disintegrate enemy A2AD defences and return to competition on favourable terms.<sup>9</sup> MDO is based upon three core tenets: calibrated force posture, multi-domain formations and convergence.<sup>10</sup> Calibrated force posture involves having forward presences with the requisite permissions and authorities to operate in all domains. US multi-domain formations above brigade will possess the capabilities to operate across multiple contested domains against near-peer adversaries. The US Army division, corps, field army and theatre army echelons will converge capabilities from various domains to different portions of the extended multi-domain battlefield framework.<sup>11</sup> The readiness inherent with having forward presences, combined with the echeloning in multi-domain formations above brigade, can provide credible deterrence and defeat the stand-off A2AD layers of a peer enemy if deterrence fails.

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<sup>6</sup>David G. Perkins, "Preparing for the Fight Tonight: Multi-Domain Battle and Field Manual 3-0," *Military Review* 97, no. 5 (2017). This article was part of a series of articles by General Perkins. The first article was: "Multi-Domain Battle: Driving Change to Win the Future," followed by: "Preparing for the Fight Tonight: Multi-Domain Battle and Field Manual 3-0," and finally: "Multi-Domain Battle: Advent of 21st Century War."

<sup>7</sup>David G. Perkins and James M. Holmes, "Multidomain Battle: Converging Concepts Toward a Joint Solution," *Joint Force Quarterly* : JFQ, no. 88 (2018), 57.

<sup>8</sup>US Department of Defense., *TRADOC Pamphlet 525-3-1, the U.S. Army in Multi-Domain Operations 2028* (United States Army, 2018). TRADOC Pamphlet 525-3-1 is usually considered the main referencen on MDO, according to: Carline Grispen-Gelens, "Cohesion through Convergence?" *Seminar 2020 Multi Domain Operations, Seminar Read Ahead* (NATO C2COE, 1 June, 2020): 3. <https://c2coe.org/download/seminar-2020-read-ahead-carlina-grispen-gelens-cohesion-through-convergence/>

<sup>9</sup>US Department of Defense, *TRADOC Pamphlet 525-3-1 . . .*, v.

<sup>10</sup>*Ibid.*, vi, 17-24.

<sup>11</sup>US Department of Defense, *TRADOC Pamphlet 525-3-8, US Army Concept: Multi-Domain Combined Arms Operations at Echelons Above Brigade 2025-2045* (United States Army, 2018): 14.

6. Striving for Information Advantage. Whereas MDO emphasizes defeating an enemy's A2AD system, JADC2 seeks to "translate decisions into actions, leveraging capabilities across all domains and with mission partners to achieve operational and information advantage in both competition and conflict."<sup>12</sup> By leveraging artificial intelligence, automation and decision-support tools, JADC2 aims to turn information into knowledge, decisions and action faster than the enemy.<sup>13</sup> Despite the ambitious requirement for a ubiquitous network connecting sensors and shooters, JADC2 reaffirms the importance of mission command and greater decentralization to operate in contested and degraded environments.<sup>14</sup> JADC2 provides a command and control philosophy that has the potential to overmatch an adversary cognitively by presenting dilemmas in all domains, in competition and conflict.

### **Challenges and Implications from a CA Perspective**

7. Limited Capability to Support Multi-Domain Echelons above Brigade. Canada cannot deploy forces larger than brigades and does not have capabilities that could add value to US multi-domain echelons above brigade, such as long-range precision fires.<sup>15</sup> During a conventional fight, a Canadian brigade would be operating within a divisional close area, in the close battle within the range of their integral weapon systems.<sup>16</sup> As a CA brigade's most likely employment within a US MDO campaign would be in the close battle, maintaining close combat as a foundational collective competency remains imperative. CE identifies this competency as a key focus area for the CA.<sup>17</sup> Despite CE's emphasis on empowering combined arms teams that are flexible enough to integrate various lethal and non-lethal enablers, CA brigades will have minimal opportunity to integrate coalition multi-domain capabilities.

8. Limited Integration of Coalition Multi-domain Capabilities. A Canadian brigade could not easily integrate coalition capabilities from non-traditional domains such as space and cyber. For example, the US Army Space Brigade can only provide space support elements down to divisions.<sup>18</sup> Under MDO, the US Army does not envision integrating multi-domain elements below the division level.<sup>19</sup> In its modernization strategy, the CA mentions generating and employing cyber protection teams.<sup>20</sup> However, these teams would focus on protecting Canadian networks instead of contributing offensive cyber effects to be converged with those from other domains. Canadian brigades operating within US-led coalitions will struggle to understand the higher-level multi-domain fight due to a lack of understanding of effects that can be requested. The requirement to share classified information of different national security caveats will exacerbate this challenge.

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<sup>12</sup>US Department of Defense, *USAF Role in Joint all-Domain Operations* (United States Air Force, 2020): 2.

<sup>13</sup>*Ibid.*, 4.

<sup>14</sup>*Ibid.*, 5.

<sup>15</sup>Jack Watling and Daniel Roper, "European Allies in US Multi-Domain Operations," *Royal United Services Institute for Defence and Security Studies*, no. RUSI Occasional Paper (October, 2019): 10. Long-range precision fires is the US Army top modernization priority.

<sup>16</sup>US Department of Defense, *Field Manual 3-0 Operations* (Washington, DC: Headquarters, Department of the Army, 2017): 1-32. Figure 1-8 provides an example of contiguous corps, division and brigade areas of operations within which a CA brigade or unit could operate.

<sup>17</sup>Kaduck, *Close Engagement*, . . . , 7.

<sup>18</sup>US Department of Defense, *Field Manual 3-0 Operations* . . . , 2-21.

<sup>19</sup>US Department of Defense, *TRADOC Pamphlet 525-3-1* . . . , C-6.

<sup>20</sup>Department of National Defence, *Advancing with Purpose*, . . . , 30.

9. Authorities for Forward Presences. Despite not providing niche capabilities such as cyber or long-range precision fires, Canadian land forces can contribute to MDO through their readiness posture. Readiness includes having a calibrated force posture in permanent or rotational forward presence forces.<sup>21</sup> It will remain challenging for Canada to quickly obtain host nation consent to project forces without having permanent bases outside Canada, except for a few operational support hubs. Integrating into host nation command and control, intelligence, and logistical structures takes significant time; therefore, pre-positioning forces during the competition phase enhances readiness and deterrence.<sup>22</sup> The Canadian contribution to the North Atlantic Treaty Organization's Enhanced Forward Presence is a notable example of how the CA contributes to deterring Russia with a presence forward.

10. National Pan-Domain Authorities. As part of MDO, the US assumes that allied governments will provide authorities to its forces to conduct offensive operations in space, cyberspace, electromagnetic spectrum and information environment.<sup>23</sup> The lack of integration of Canadian elements of national security, such as Foreign Affairs, the Canadian Security Establishment, the Canadian Security Intelligence Service and the Royal Canadian Mounted Police, with the CAF into a functional and responsive framework, makes it challenging for the CAF to have the requisite legal authorities to operate below the threshold of armed conflicts in non-traditional domains. Additionally, the future of influence activities within the CAF remains uncertain in light of recent controversies during the COVID-19 pandemic.<sup>24</sup> Nevertheless, as the CAF continues to work with other government departments to define policy and legal frameworks, having forces reaching back to leverage national pan-domain resources could offset the lack of non-traditional niche capabilities the CAF can contribute to a multi-domain coalition.

11. Shared Situational Awareness and Technical Interoperability. Achieving convergence of effects across multiple domains requires a high degree of shared situational awareness at all levels of warfare.<sup>25</sup> MDO and JADC2 call for even greater interoperability between components and allies by connecting sensor and shooter platforms and establishing a common operating picture. Developing and maintaining multinational, joint or even intra-service interoperability remains challenging. From a technical perspective, many Land Command Support System (LCSS) components are not interoperable with the Royal Canadian Air Force and Royal Canadian Navy's communication systems. Even within the LCSS, some radios employed in the soldiers' domain are not interoperable with those of the mobile domain, and the mobile domain is not interoperable with the headquarters domain. To be ready to fight as part of US multi-domain formations, the CAF and the CA need to keep pace with the US military's rapid modernization and put interoperability at the design forefront.<sup>26</sup> In addition to technical

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<sup>21</sup>US Department of Defense, *TRADOC Pamphlet 525-3-1*, . . . , 17.

<sup>22</sup>*Ibid.*, 18.

<sup>23</sup>*Ibid.*, A-1.

<sup>24</sup>David Pugliese, "Canadian Forces 'information operations' pandemic campaign quashed after details revealed to top general," *Ottawa Citizen*, 21 July 2020. <https://ottawacitizen.com/news/national/defence-watch/canadian-forces-information-operations-pandemic-campaign-squashed-after-details-revealed-to-top-general>

<sup>25</sup>Watling and Roper, "European Allies in US Multi-Domain Operations," 14-15.

<sup>26</sup>Losey, Stephen, "New in 2021: Advanced Battle Management System testing begins," *Air Forces Times*, 27 December 2020. <https://www.airforcetimes.com/news/your-air-force/2020/12/27/new-in-2021-advanced-battle-management-system-testing-begins/>. For example, the US Air Force and Army have signed a two years agreement

interoperability, the CA must strive to enhance human and procedural interoperability by aligning its concepts, doctrine and training further.<sup>27</sup>

## **Opportunities for the CA to Prepare for Multi-Domain Operations**

12. Alignment of Concepts and Doctrine. There is significant conceptual alignment between CE and MDO despite the use of different nomenclature. For example, CE emphasizes developing shared situational awareness, enhancing decision-support, increasing interoperability with joint, interagency, multinational and public partners, leveraging networking technologies and improving the projection and sustainment of expeditionary forces.<sup>28</sup> In its current strategy, the US Army stipulates that it “will continue to train and fight with allies and partners” and “strive to integrate them further . . . to increase interoperability.”<sup>29</sup> As concepts eventually become doctrine, adopting similar nomenclature to the US Army and describing how Canadian land units would operate within an MDO framework would contribute to greater common understanding, thereby improving interoperability.

13. Training and Interoperability. The CA should continue to take every opportunity to participate in US and other multinational exercises such as Joint Warfighter Assessment to enhance interoperability. Multinational training helps military leaders to understand better the capabilities brought by each country along with their national caveats for employment. Despite the limited cyber, space and electronic warfare capabilities available for training, the CA should restrict using GPS devices and deliberately turn off networks to simulate degraded communications. Additionally, the CA should modernize the constructive synthetic environment to simulate multi-domain effects, specifically the electromagnetic spectrum, cyber and space. The simulation of events from non-traditional domains during command post exercises would enhance leaders’ ability to think in all domains.

14. Leader Development and Pan-Domain Culture. The CA modernization strategy reaffirms that “the brigade group is the lowest level of headquarters that can integrate and synchronize joint effects.”<sup>30</sup> Despite the limited non-traditional support a CA brigade could provide to US MDO formations, integrating pan-domain enablers within CA brigades provide a training venue for CA leaders to broaden their thinking across multiple domains. In this context, training with organic space or cyber capabilities is not as crucial as evolving the combined arms’ culture beyond traditional kinetic enablers, broadening cognitive thinking across domains and understanding what non-traditional effects can be available nationally or from the coalition. Equally important is for leaders to deepen their understanding of how adversaries’ operations in the cyber, space or information domain affect their operations in the land domain. Ultimately, MDO is about developing the mental agility to think critically and decide faster and present

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to integrate the Air Force’s Advanced Battle Management System and the Army’s Project Convergence through a series of experiments.

<sup>27</sup>North Atlantic Treaty Organization, *AJP-01(D) Allied Joint Doctrine* (United Kingdom: NATO Standardization Agency, 2010): 3-4. NATO describes three dimensions of joint and allied interoperability: technical, procedural and human.

<sup>28</sup>Kaduck, *Close Engagement*, . . . , 20-38.

<sup>29</sup>US Department of Defense, *The Army Strategy*, accessed 05 February 2021.  
[https://www.army.mil/e2/downloads/rv7/the\\_army\\_strategy\\_2018.pdf](https://www.army.mil/e2/downloads/rv7/the_army_strategy_2018.pdf)

<sup>30</sup>Department of National Defence, *Advancing with Purpose*, . . . , 17.



compounding dilemmas on adversaries; therefore, all initiatives to improve how the CA trains, educates, develop and retain leaders with the right balance of breadth and depth of talent, resiliency and mental flexibility, will prepare the force for MDO.

15. Digital Culture and Training Mission Command. Modernizing the network is one of the US Army modernization priorities for MDO.<sup>31</sup> The CA must embrace technology to stay relevant and interoperable with the US and principle allies. The CA strategy mentions the requirement to transform its digital processes, structures, technology and culture. Mission command will remain foundational to MDO in an ever-increasing complex environment.<sup>32</sup> As such, CA leaders must resist micro-managing as the field force becomes more digitally connected. The CA should train leaders to truly exercise mission command by episodically denying the network and creating injects that will force commanders to make tough decisions that can seize fleeting opportunities and meet the overall intent even when not aligned with received orders. Importantly, the CA should embrace a culture where failing and learning from mistakes are encouraged.

### **The UK Perspective: Strategic Posturing for Multi-Domain Integration**

16. The UK recently published its multi-domain integration (MDI) concept to pursue greater integration across domains and levels of warfare, interoperability with principle allies, and fusion across its government.<sup>33</sup> While the MDI concept recognizes the same threats and challenges as US MDO, MDI differs “in scale and geostrategic ambition.”<sup>34</sup> Similarly to Canada, the UK cannot replicate non-traditional capabilities into its Ministry of Defence, acknowledging that partners across its government “either wholly or partly control domain capabilities.”<sup>35</sup> In essence, MDI resembles the Canadian PFEC, focusing on joint and pan-governmental integration before developing a detailed multi-domain doctrine.

17. Multi-Domain Contribution Warfare Opportunities. The UK recently created the Army’s 6th Division specializing in “cyber, electronic warfare, intelligence, information operations and unconventional warfare.”<sup>36</sup> This division generates information manoeuvre and unconventional warfare forces to operate below the threshold of warfighting. With this approach, the UK could contribute niche capabilities better suited to integrate into US multi-domain formations.<sup>37</sup> The Canadian Combat Support Brigade (CCSB) already contains similar enablers except for cyber and unconventional elements. The CA should explore the idea of leveraging the CCSB as a formation focused on integration up to the strategic level and with other government departments. MDI also introduces multi-domain designers and coordinators to converge effects

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<sup>31</sup>US Department of Defense, *2019 Army Modernization Strategy: Investing in the Future* (Washington, DC: United States Army, 2019): 5.

<sup>32</sup>David Smith, "Mission Command in Multi-Domain Operations," *Over the Horizon, Multi-Domain Operations and Strategy* (30 October 2017). <https://othjournal.com/2017/10/30/mission-command-in-multi-domain-operations/>.

<sup>33</sup>UK Ministry of Defense, *Joint Concept Note 1/20, Multi-Domain Integration* (Ministry of Defence, Director Development, Concepts and Doctrine Centre, 2020): iii.

<sup>34</sup>*Ibid.*, 7. MDI also introduces the idea of integration across the “Total Force,” which includes the entire Defence-wide military capability, including its industrial base, other national power instruments, allies and the private sector.

<sup>35</sup>*Ibid.*, 9.

<sup>36</sup>Liam, “British Army Launches New 6<sup>th</sup> Division,” *Warfare Today*, last modified 1 August 2019. <http://www.warfare.today/2019/08/01/british-army-launches-new-6th-division/>

<sup>37</sup>Watling and Roper, "European Allies in US Multi-Domain Operations," . . . , 26.

across domains, warfare levels, and government agencies.<sup>38</sup> Along the same idea, the US Air Force suggested a similar idea of developing joint mission controllers to specialize in multi-domain integration.<sup>39</sup> The CA and the CAF should explore this idea further.

## CONCLUSION

18. The US and UK are developing multi-domain concepts to solve adversaries' exploitation of A2AD capabilities and "below-the-threshold" competition and tactics. This paper examined the US MDO and JADC2 concepts and identified strengths, challenges and opportunities from a CA perspective. This paper also briefly considered the UK MDI concept despite its broader strategic and pan-government scope and identified ideas to explore further. Despite that the CA could provide limited capabilities to coalition multi-domain operations, the tenets of CE and the CA modernization strategy fundamentally align with those of the US and UK multi-domain concepts. Nevertheless, this paper identified a few consideration areas that could better prepare land forces for multi-domain operations without changing its force structure.

## RECOMMENDATIONS

19. This section summarizes recommendations to prepare the CA for pan-domain operations or contribute to coalition multi-domain formations.

- a. Increase soldiers' and units' readiness and lethality by training for the worst case: a protracted conventional fight against a peer enemy as part of a US-led multi-domain coalition.
- b. Leverage NATO's mission in Latvia to enhance readiness, interoperability, and the CA's ability to operate in the information domain.
- c. Collaborate strategically to shape the Canadian national security enterprise toward national pan-domain support to coalition operations. The CA should explore leveraging the CCSB as a formation focusing on greater integration to the strategic level and with other government departments, and training multi-domain designers and coordinators.
- d. Aggressively pursue interoperable digital technologies and artificial intelligence to be able to "plug-in" US multi-domain formations, develop shared situational awareness, and fasten the decision-action cycle.
- e. Leverage all opportunities to train with US and allied multi-domain formations, align doctrine, and modernize the CA simulation training system to account for pan-domain activities and effects.
- f. Train land forces in degraded cyber, electronic warfare and space environments. Train mission command to the threshold of failure by nurturing a culture of learning and

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<sup>38</sup>UK Ministry of Defense, Joint Concept Note 1/20 . . . , 71-72.

<sup>39</sup>Matthew B. Chapman and Gerrit H. Dalman, "Joint Mission Control: From Component to Joint Leadership of all-Domain Missions," *Air & Space Power Journal* 33 (1) 2019: 50-61.

innovative thinking. Evolve the CA culture from combined arms to joint, pan-domain and digital.

g. Train and educate leaders to understand better how friendly and enemy operations in the cyber, space or information domain affect land operations. Manage talent and continue to develop leaders' resiliency and cognitive abilities.

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