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The CAF Digital Campaign Plan: Digital Transformation in Jeopardy

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THE CAF DIGITAL CAMPAIGN PLAN: DIGITAL TRANSFORMATION IN JEOPARDY

AIM

1. During an interview conducted with *Vanguard* on 13 May 2022, Brigadier General Chris Ayotte, Army Chief of Staff for Strategy, singled out Digital Transformation as the “single most important element” for the modernization of the Canadian Army. This element was so important that the reliability and credibility of the Canadian Armed Forces (CAF) was at stake with its allies and adversaries alike.¹

2. In the following month, the Chief of Defence Staff (CDS) signed the *CAF Digital Campaign Plan* with the vision of digitally transforming the CAF by 2030². Due to the tremendous amount of effort required across the CAF and the lack of both cohesion and coordination to accomplish this challenge, the campaign plan is not poised to succeed unless there is a significant re-alignment of institutional priorities amongst its services.

3. The aim of this service paper is to provide analysis, discussion, and recommendations on what changes are required, from both the services and the subsequent Digital Transformation implementation plan, in order to set the conditions for a fundamental transformation in the organization.

INTRODUCTION

4. The *CAF Digital Campaign Plan*, despite being superior level guidance, is the latest guidance published on modernization and follows the release of guidance already published by the individual services. The *Canadian Army (CA) Digital Strategy* and *CA Modernization Strategy* were released in 2022 and 2020, respectively. The Canadian Special Operations Forces Command (CANSOFCOM) released their *Future Operating Concept Handbook* in 2019. The Royal Canadian Navy (RCN) and Royal Canadian Air Force (RCAF) released their *Leadmark 2050* and *Future Air Operating Concept* both in 2016.

5. These documents were analyzed to assess if the future operating concepts, campaign plans, and guiding principles of the individual services were aligned to achieve holistic transformation of the CAF. Some mutually supporting initiatives were identified but many more gaps were discovered between services. Industry best practices were also examined to provide additional recommendations and course corrections to the current CAF trajectory.

¹ "Digitalized Army: The Way of the Future " last modified May 13, accessed 28 Sept, 2022, <https://vanguardcanada.com/digitalized-army-the-way-of-the-future/>.

² National Defence and the Canadian Armed Forces, *Canadian Armed Forces Digital Campaign Plan* (Canada: National Defence and the Canadian Armed Forces, 2022).

DISCUSSION

6. The urgency to digitally transform the CAF is self evident as Canada's adversaries progressively leverage all instruments of their national power, specifically in the domains of information and cyber, to challenge the rules-based international order. An hour prior to the Russian invasion of Ukraine on 24 Feb 2022, Russian government hackers compromised the American satellite communications company Viasat, and disrupted critical military communications which the Ukrainians relied upon for Command and Control (C2)³. Conversely, the US was able to predict the imminent Russian invasion as early as Oct 2021, providing time to warn Ukraine, harden their defences, prepare economic and political sanctions, and rally an international coalition⁴. This pre-emptive action was enabled by a cohesive multi-domain strategy, underpinned by a Whole of Government (WoG) approach and a willingness to share information between government agencies, the international intelligence community, and military partners⁵.

7. Major General Mick Ryan of the Australian Army states in his book, *War Transformed*, that the emergence of Artificial Intelligence in modern militaries will change the balance of power on the battlefield⁶. As China positions itself to become the world leader in Artificial Intelligence by 2030⁷, Canada must mount a credible pan-domain defence built on the realization of the *Digital Campaign Plan* vision. The employment of Artificial Intelligence cannot be achieved without first completing the objectives defined in the *Digital Campaign Plan* and establishing a common data enterprise. In US Multi-Domain operations, the Joint All-Domain Command and Control Strategy establishes its second Line of Effort in the usage of innovative Artificial Intelligence and Machine Learning (AI/ML) tools only after a Strategic Joint Force data enterprise is built⁸. As the CAF struggles to meet recruiting goals, the importance of force multiplying technologies, such as AI/ML become increasing relevant.

8. Significant hurdles exist for this vision as demonstrated through the release of separate guidance amongst the individual services prior to the release of the overarching CAF-level guidance. There is a lack of cohesion in the sequencing of priorities and a clear fragmentation of the overall framework required to achieve the lines of effort as outlined in the *Digital Campaign Plan*. As several industry studies have shown, this lack of cohesion has a catastrophic effect on

³ "Russia Hacked an American Satellite Company One Hour before the Ukraine Invasion," last modified May 10, accessed 20 Feb, 2023, <https://www.technologyreview.com/2022/05/10/1051973/russia-hack-viasat-satellite-ukraine-invasion>.

⁴ "'Something was Badly Wrong': When Washington Realized Russia was Actually Invading Ukraine " last modified 24 Feb, accessed 24 Feb, 2023, https://www.politico.com/news/magazine/2023/02/24/russia-ukraine-war-oral-history-00083757?utm_source=pocket-newtab.

⁵ Ibid.

⁶ Mick Ryan, *War Transformed: The Future of Twenty-First-Century Great Power Competition and Conflict* (La Vergne: Naval Institute Press, 2022).

⁷ Huw Roberts et al., "The Chinese Approach to Artificial Intelligence: An Analysis of Policy, Ethics, and Regulation," *AI & Society* 36, no. 1 (2021), 59-77. doi:10.1007/s00146-020-00992-2. <https://link.springer.com/article/10.1007/s00146-020-00992-2>.

⁸ Department of Defense, *Summary of JADC2 Strategy*, (2022).

digital transformation. A study conducted on Ukrainian companies reported that a lack of a clear vision and leadership support was one of the main obstacles to transformation⁹. A separate study of large companies including the telecommunications company, Vodaphone, highlighted fragmentation between strategy and implementation, rooted in an undefined scope and unclear strategic-level goals, as a key indicator for a failure in transformation¹⁰. Digital transformation is not manifested through the acquisition of technology but through the impact of technology on business processes and organizational culture, creating novel processes and new competencies¹¹. The newly established Chief of Combat Systems Integration (CCSI), reporting to the Vice Chief of Defence Staff, must be appropriately resourced and empowered to force an alignment across the CAF to establish a cohesive framework at the strategic and operational levels of command. Taking the lead from the United Kingdom's *Integrated Operating Concept*, this alignment must also extend to Other Government Departments (OGDs), industry, and allies, in order for to leverage the total national enterprise¹².

9. Exploring the modernization strategies and future operating concepts of each service, potential synergies are revealed that reinforce the priorities in the *Digital Campaign Plan*. These synergies are organically developed by the services and must be made into explicit objectives, measured for performance, prioritized, and enabled by CCSI. The analysis completed in Annex A emphasizes four common objectives aligned to the *Digital Campaign Plan* lines of effort. In priority, they are the desire for increased situational awareness (SA) (Objective 2.2), the desire to achieve unity of effort (Objective 1.2), the intent to develop capabilities that enable the digital CAF (Objective 3.2), and a digital approach to Force Design and Development (Objective 3.1).

- a. Increased SA is required for Line of Effort (LOE) 1.6, Cyber Mission Assurance, of the *CA Modernization Strategy*, which aims to protect, detect, respond, and recover from cyber attacks¹³. *CA Digital Strategy's* LOE 4 also aligns with increased SA through the integration of current and future C2 systems in a unified network architecture¹⁴. *Future Air Operating Concept* explicitly states SA as an objective across Considerations 1 through 3¹⁵. *Leadmark 2050's* Capabilities 1

⁹ Nataliia Trushkina et al., "Digital Transformation of Organizational Culture Under Conditions of the Information Economy," *Virtual Economics* 3, no. 1 (Jan 27, 2020), 7-38. doi:10.34021/ve.2020.03.01(1). <https://doaj.org/article/93b857cf3edf4bf593c958d9e2e572ee>.

¹⁰ Alessia Correani et al., "Implementing a Digital Strategy: Learning from the Experience of Three Digital Transformation Projects," *California Management Review* 62, no. 4 (Aug, 2020), 37-56. doi:10.1177/0008125620934864. <https://journals.sagepub.com/doi/full/10.1177/0008125620934864>.

¹¹ Haroon Abbu et al., "Measuring the Human Dimensions of Digital Leadership for Successful Digital Transformation: Digital Leaders can use the Authors' Digital Leadership Scale to Assess their Own Readiness and Ability to Accelerate Digital Transformation," *Research Technology Management* 65, no. 3 (2022), 39-49.

¹² UK Ministry of Defence, *Integrated Operating Concept* (Bristol, UK: , 2021).

¹³ Canadian Army, *Advancing with Purpose: The Canadian Army Modernization Strategy*, 4th ed. National Defence and the Canadian Armed Forces, 2020).

¹⁴ Canadian Army, *Modernization Vital Ground: Digital Strategy* (Canada: National Defence and the Canadian Armed Forces, 2022).

¹⁵ Royal Canadian Air Force, *Future Concepts Directive Part 2: Future Air Operating Concept* National Defence and Canadian Armed Forces, 2016).

and 2 desire networked, all-source, battlespace visualization¹⁶. Finally, the *Future Operating Handbook's* LOE 2 seeks enhanced intelligence and cyber capabilities for the cognitive operator¹⁷. In the quest for enhanced SA, the services are aligned. This can be achieved through the study of the data being shared and by mapping each stakeholder's business process throughout the enterprise. By understanding the contact points between processes and sharing the data in standardized, consumable, formats each service can become mutually supportive of the other's information requirement. A common digital lexicon, similar to the North Atlantic Treaty's (NATO's) Consultation, Command, and Control (C3) Taxonomy should be adopted department-wide. NATO C3 Taxonomy provides a generic model across the alliance that defines digital services based on core business processes¹⁸. Common lexicon delivers clear and understandable language required to increase the maturity of the digital strategy¹⁹.

- b. Unity of Effort and horizontal alignment is echoed in the CA's desire to review Concepts and Doctrine²⁰, as well as optimize organizational structures to support digital transformation²¹. The RCAF and RCN seek to achieve greater integration between environments²² through improved data sharing policies, process, and organization²³. CANSOFCOM's LOE 3 will evolve the organization to increase communication and information sharing²⁴.
- c. The *Digital Campaign Plan's* LOE 3 sets forth the complementary objectives of a digital approach to Force Design and Development (Objective 3.1), as well as a focus on developing capabilities that aim to enable a digital CAF (Objective 3.2). This is also prevalent in the CA's focus to evolve an integrated program for digital management²⁵, the RCN's prioritization of technological agility and innovation²⁶, and the RCAF's desire to develop integrated systems in the pursuit of information dominance²⁷. This can be achieved with a tight coupling between capability development and capability validation through collective training. As innovation requires failure to evolve²⁸, new ideas must be tested against the

¹⁶ Royal Canadian Navy, *Canada in a New Maritime World Leadmark 2050*(National Defence, 2016).

¹⁷ Canadian Special Operations Forces Command, "Future Operating Concept Handbook," (1 April, 2019).

¹⁸ North Atlantic Council, *CONSULTATION, COMMAND AND CONTROL BOARD (C3B) C3 Taxonomy Baseline 5.0*, (2021).

¹⁹ Abbu, "Measuring the Human Dimensions of Digital Leadership for Successful Digital Transformation: Digital Leaders can use the Authors' Digital Leadership Scale to Assess their Own Readiness and Ability to Accelerate Digital Transformation," , 39-49

²⁰ Canadian Army, *Advancing with Purpose: The Canadian Army Modernization Strategy*

²¹ Canadian Army, *Modernization Vital Ground: Digital Strategy*

²² Royal Canadian Air Force, *Future Concepts Directive Part 2: Future Air Operating Concept*

²³ Royal Canadian Navy, *Canada in a New Maritime World Leadmark 2050*

²⁴ Canadian Special Operations Forces Command, "Future Operating Concept Handbook,"

²⁵ Canadian Army, *Modernization Vital Ground: Digital Strategy*

²⁶ Royal Canadian Navy, *Canada in a New Maritime World Leadmark 2050*

²⁷ Royal Canadian Air Force, *Future Concepts Directive Part 2: Future Air Operating Concept*

²⁸ James Iain Gow, "Public Sector Innovation Theory Revisited1," *The Innovation Journal* 19, no. 2 (2014), 1.

CAF's core business processes and presented with opportunities to either succeed or fail. With operational experts to guide the sense-making in the midst of failure, a deeper understanding of our core business is attained with the subsequent practical knowledge of what improves or impedes our core business.

10. This examination also reveals an objective in the *Digital Campaign Plan* that is not addressed by the services but should be prioritized, which is to holistically consolidate the demand signal for the digital foundation for data-centric capability projects (Objective 2.1). As programs across the CAF and DND have a potential to impact the technical and digital foundation consisting of equipment, such as the data mesh, and the people that process these projects requirements, capacity to execute this LOE is strained.

11. In contrast to gaps found in the services, the services highlight LOE's not explicitly addressed in the *Digital Campaign Plan*. This is the cooperative WoG and industry approach to transformation. The CA seeks to strengthen the military-industry partnership as part of LOE 2 in the optimization of structures and processes²⁹. The RCAF is heavily focused on viewing initiatives through a WoG context to achieve Information Dominance and Interoperability Considerations, explicitly mentioning partnerships with the Canadian Coast Guard, federal, provincial, and municipal governments to support Search and Rescue operations³⁰. The RCN's first Strategic Mean of creating an agile and adaptive institution seeks to gain strategic insight through forward deployments to region partners, alliances, and security organizations³¹. Finally, CANSOFCOM's LOE 3 sees the organization evolving through innovation with old partners, such as Defence Research and Development Canada, and new partners to include academia and industry³². Although a WoG approach is discussed in the *Digital Campaign Plan*, it is not an explicit objective in any LOE.

CONCLUSION

12. Spurred by the actions of authoritarian governments, a paradigm shift in military endeavours occurred when Canada's allies began preparing for the conduct of Multi-Domain operations. Aiming to leverage all instruments of national power, from diplomacy and economics to academia and industry, the willingness and ability to share information is paramount to achieving total integration. The ability to share information and leverage novel technologies such as AI/ML is underpinned by the ability to digitally transform our CAF, its culture, and its command-and-control systems. World events such as the invasion of Ukraine and the unprecedented military modernization by China, highlight the urgency for Canada to modernize the CAF in order to remain a reliable and credible partner of choice for our allies.

13. The vision put forth in the CAF *Digital Campaign Plan* has not been embraced by all services and remains a fragmented framework without cohesive objectives across the CAF

²⁹ Canadian Army, *Modernization Vital Ground: Digital Strategy*

³⁰ Royal Canadian Air Force, *Future Concepts Directive Part 2: Future Air Operating Concept*

³¹ Royal Canadian Navy, *Canada in a New Maritime World Leadmark 2050*

³² Canadian Special Operations Forces Command, "Future Operating Concept Handbook,"

stakeholders. Although strategic goals have been defined, the scope and efficacy of the plan is not reflected in the future operating concepts or modernization strategies of the services. Organic synergies have been identified, but without the realignment, resourcing, or monitoring of these objectives by a centralized authority, the vision of Digital Transformation by 2030 cannot be achieved.

RECOMMENDATIONS

14. Through examination of available research, industry best practices, and comparison of key modernization guidance across the services, the following priorities are recommended for alignment, resourcing, and monitoring:
 - a. Objective 2.2: Design, build, and field Pan-Domain Situational Awareness tools and concepts that integrate all domains;
 - b. Objective 1.2: Achieve unity of effort through increased horizontal alignment and a coherent CAF *Digital Campaign Plan*;
 - c. Objective 3.1: Adopt a Digital-First design approach in all elements of Force Design and Development to ensure that the CAF is digitally capable; and
 - d. Objective 3.2: Develop the capabilities and processes that enable the digitally capable CAF.
15. The following objective should be adopted by the CAF *Digital Campaign Plan*:
 - a. Alignment of interoperability and a WoG approach to information sharing.
16. The following objective should be adopted by the services in order to manage Digital Transformation resources:
 - a. Objective 2.1: Align CAF capability projects and program requirements for data and the technical foundation into a coherent demand signal for Departmental partners.
17. The following sequence should be considered for the subsequent CAF Digital Implementation Plan:
 - a. Through coupling between Force Development and Collective Training across the services, identify core business processes;
 - b. Conduct an enterprise-wide mapping, based on a common taxonomy or catalogue of digital services, of the core business processes from a data perspective;
 - c. Identify synergies and streamline processes that are common or redundant;

- d. Identify contact points between processes where organizations can become mutually supportive through information sharing;
- e. Establishing the monitoring of organizational use of novel processes and new competencies as a Measure of Effectiveness; and
- f. Expand enterprise mapping to allies, OGDs, WoG, industry, and academia in order to leverage all instruments of national power.

Annex: A. Review of Future Operating Concepts and Modernization Strategies with CAF Digital Campaign Plan

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ANNEX A: REVIEW OF FUTURE OPERATING CONCEPTS AND MODERNIZATION STRATEGIES WITH CAF DIGITAL CAMPAIGN PLAN

<p>Canadian Armed Forces</p> <p>Digital Campaign Plan</p> <p>2022</p>	<p><u>LOE 1: Manage Digital Transformation</u></p> <ul style="list-style-type: none"> • Objective 1.1: Align existing governance structures to enable deeper integration of disparate efforts across the CAF. • Objective 1.2: Achieve unity of effort through increased horizontal alignment and a coherent CAF Digital Campaign Plan. • Objective 1.3: Produce and monitor the Implementation Plan to achieve continuous improvement. <p><u>LOE 2: Enable Pan-Domain Operations</u></p> <ul style="list-style-type: none"> • Objective 2.1: Align CAF capability projects and program requirements for data and the technical foundation into a coherent demand signal for Departmental partners. • Objective 2.2: Design, build, and field Pan-Domain Situational Awareness (PDSA) tools and concepts that integrate all domains. • Objective 2.3: Ensure continued interoperability with US, FVEY, and NATO. Promote close alignment with the US Mission Partner Environment and NATO Federated Mission Networking. <p><u>LOE 3: Design and Equip the Digital Force</u></p> <ul style="list-style-type: none"> • Objective 3.1: Adopt a Digital-First design approach in all elements of Force Design and Development to ensure that the CAF is digitally capable. • Objective 3.2: Develop the capabilities and processes that enable the digitally capable CAF. • Objective 3.3: Design the Digital Workforce that will form the core of the digitally capable CAF. <p><u>LOE 4: Develop the Digital Force</u></p> <ul style="list-style-type: none"> • Objective 4.1: Deliver a digitally empowered CAF recruiting experience that places recruits at the centre of the process. • Objective 4.2: Develop the digital literacy knowledge, skills, and attitudes necessary for CAF members to successfully interact in the current digital world and to shape the CAF of the future. • Objective 4.3: Deliver inclusive, human-centred personnel support services, informed by GBA Plus, designed to improve retention of CAF members. <p><u>LOE 5: Sustain the Digital Force</u></p> <ul style="list-style-type: none"> • Objective 5.1: Maximize the value of our data to improve the stewardship of resources and fully enable operations. • Objective 5.2: Transform Enterprise Resource Planning (ERP) through the adoption of modern technologies and processes. • Objective 5.3: Modernize the planning, direction, and delivery of Operational Sustainment.
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<u>Organization and Document</u>	<u>Plan Reviewed</u>	<u>Synergy with CAF Digital Campaign Plan Objectives</u>
<p>Canadian Army</p> <p>Advancing with Purpose: The Canadian Army Modernization Strategy</p> <p>4th Ed</p> <p>2020</p>	<p><u>LOE 1 – POSTURE FOR CONCURRENCY</u></p> <ul style="list-style-type: none"> ● 1.1 Adapt the Managed Readiness Plan ● 1.2 Concepts and Doctrine ● 1.3 Training Approach ● 1.4 Operational Output ● 1.5 Sustainment ● 1.6 Cyber Mission Assurance <p><u>LOE 2 – HUMAN DIMENSION</u></p> <ul style="list-style-type: none"> ● 2.1 Mission Ready ● 2.2 Professional Military Conduct ● 2.3 Diversity and Inclusion ● 2.4 Personnel Management ● 2.5 Professional Development <p><u>LOE 3 – ONE ARMY INTEGRATION</u></p> <ul style="list-style-type: none"> ● 3.1 Army Reserve Policy Initiatives ● 3.2 Community Engagement ● 3.3 Canadian Rangers <p><u>LOE 4 – PRIORITY INITIATIVES</u></p> <ul style="list-style-type: none"> ● 4.1 Force 2025 ● 4.2 Digital Transformation ● 4.3 International Engagement ● 4.4 Analytics, Performance Management, and Governance ● 4.5 Research and Development ● 4.6 Capital Investment 	<ol style="list-style-type: none"> 1. LOE 1.6 synergy with Objective 2.2 2. LOEs 2.2, 2.3, 2.5 synergy with Objective 4.3 3. LOE 4.2 synergy with Objective 1.2 4. LOE 4.3 synergy with Objective 2.3 5. LOE 4.4 synergy with Objective 1.3 6. LOE 4.5 synergy with Objective 3.2
<p>Canadian Army</p> <p>Modernization Vital Ground: Digital Strategy</p> <p>2022</p>	<p><u>LOE 1 – INVEST IN OUR PEOPLE</u></p> <ul style="list-style-type: none"> ● a. increasing the digital literacy across all CA personnel ● b. recruiting and managing digital talent — including proactively amending existing job specifications to ensure training and equipment adequately reflect real-world expectations ● c. embracing change driven by a digital workforce <p><u>LOE 2 – OPTIMIZE CA STRUCTURES AND TRANSFORM OUR PROCESSES</u></p> <ul style="list-style-type: none"> ● a. building digital leadership capacity in the CA ● b. adopting a lean, agile governance model to keep pace with exponential digital growth. This framework exchanges big wins for small wins, which simultaneously suppresses the impact of losses ● c. evolving our current project focus into a more integrated program and digital product management practice ● d. reinforcing and expanding our military-industry partnerships to alleviate CA resource pressures (people, money, and time) ● e. integrating software engineers and developers alongside the end-user by adopting a DevOps framework 	<ol style="list-style-type: none"> 1. LOE 1 synergy with Objectives 3.3, 4.1, 4.2 2. LOE 2 synergy with Objectives 1.1, 1.2, 3.1 3. LOE 3 synergy with Objectives 2.3, 3.1, 3.2, 5.1 4. LOE 4 synergy with Objectives 2.2, 5.1

	<ul style="list-style-type: none"> f. gaining momentum toward transformational change via top-down encouragement of habitual experimentation. Leaders must defend against the 'Sunk Cost Fallacy' through a willingness to accept calculated risk and fail forward <p><u>LOE 3 — STRENGTHEN OUR RELATIONSHIP WITH DATA</u></p> <ul style="list-style-type: none"> a. empowering the Force to transform raw data into useful information via automated data analytics (AI/ML) b. adopting, implementing, and achieving industry standards and best-practices for data management to ensure quality and accessibility of data used in digital solutions and decision making c. protecting CA operations by securing our data against the harshest digital adversary d. augmenting CA operations by assuring timely, global access to our own data and that of our allies <p><u>LOE 4 — MODERNIZE OUR TECHNOLOGY</u></p> <ul style="list-style-type: none"> a. integrating our current and future command and control systems into a unified network architecture b. leveraging cloud computing c. streamlining the end-user experience through device agnosticism d. alleviating resources by outsourcing when possible, seeking everything as a service (EaaS) where applicable e. ensuring Force Development efforts adhere to an interoperable design 	
<p><u>Royal Canadian Air Force</u></p> <p>Future Concepts</p> <p>Directive Part 2: Future Air Operating Concept</p> <p>2016</p>	<p><u>CONSIDERATIONS</u></p> <ul style="list-style-type: none"> 1. Core Functions <ul style="list-style-type: none"> 1.14 Optimize resupply response times and associated delivery systems by integrating logistics with operational C2 systems. 1.15 Advance the Combined Aerospace Operations Centre (CAOC) with appropriate capabilities to support or direct multidomain and NORAD operations. 2. Improved Reliance <ul style="list-style-type: none"> 2.1 Support the development and maintenance of SA on potential threat approaches to Canada, including the ability to respond with speed and power to those threats. 2.6 RCAF sensors, automated systems, information nodes/connections and human cognition must be integrated seamlessly into a secure, reliable, resilient and high-capacity global information architecture, such as the MI3. 3. Information Dominance <ul style="list-style-type: none"> 3.1 The ability to detect and monitor an evolving situation and increase SA should be improved, in both domestic and expeditionary locations, across full-spectrum operations and all-domain surveillance. 3.2 Requirements and TTP for big data should be defined to permit more efficient and effective RCAF and military operations, particularly cyber and influence activities, in WoG and coalition contexts. 3.10 Ensure that the RCAF contribution to the MI3 is interoperable with the JIMP community, synchronize and integrate PED as well as coordinate collection in collaboration with JIMP partners. 3.12 Enhance capabilities to detect, monitor, analyse and attribute threats (kinetic and non-kinetic) of adversaries and their support networks. 3.16 Flow of data and information should be defined like C2 diagrams. 3.19 A cyberspace security-awareness education programme should be developed to ensure cyberspace threats and vulnerabilities are understood and mitigated. 4. Interoperability 	<ol style="list-style-type: none"> Consideration 1 synergy with Objectives 2.2, 5.3 Consideration 2 synergy with Objectives 2.2, 3.2 Consideration 3 synergy with Objectives 1.2, 2.2, 3.1, 3.2 Consideration 4 synergy with Objectives 1.2, 2.3, 3.2 Consideration 6 synergy with Objectives 3.1, 3.3

	<ul style="list-style-type: none"> ○ 4.1 Align RCAF FD activities with VCDs's C4ISR strategy, policy and objectives to achieve greater integration within and between environments. ○ 4.4 Expand the interoperability of RCAF air platforms with the GC and OGD assets through leveraging a systems-of-systems approach for information sharing. ○ 4.5 Improve policies, processes and organizations for obtaining, sharing and releasing pertinent multidomain intelligence with joint, interagency and international partners. ○ 4.6 Concepts and capabilities should be developed that integrate air operations planning and execution as well as decision-support tools with OGDs, non-governmental organizations (NGOs) and other supported agencies. ○ 4.7 Federate or link RCAF with OGD planning systems and develop TTP to incorporate OGD/NGO activity into the national CAOC decision-making cycle. ○ 4.8 Surveillance systems from the CA, RCN, USAF, other US services, Canadian and US OGDs as well as civilian air-traffic-management organizations should be seamlessly and continuously linked with RCAF systems to support domestic and continental COPs. ○ 4.11 Develop strong, mutually beneficial partnerships with an array of joint, interagency, multinational, academic and industrial entities to enrich the RCAF understanding of threats and opportunities. ○ 4.12 Deepen relationships with the joint team, intelligence community, diplomatic institutions, developmental agencies, local governments, businesses, communities and international partners through sustained dialogue; increased training and exchange; and iterative enterprises to codify shared doctrine, tactics and capabilities. ○ 4.15 Establish full interoperability with CCG and OGDs (federal, provincial and municipal) to achieve effective and coordinated SAR response. <ul style="list-style-type: none"> ● 5. Technological Enhancements ● 6. Training Enhancements <ul style="list-style-type: none"> ○ 6.2 Info ops, EW, cyber, distributed C2 arrangements and support capabilities should be practiced regularly. ○ 6.3 Joint-level operational and tactical training should be conducted for air-sea and air-land integration. ○ 6.8 Training should be combined across multiple mission sets, including integrated LVC venues and operator-in-the-loop modeling and simulation, to promote agile and robust problem-solving skills, resulting in multidomain solutions to complex problems in uncertain, contested environments. ○ 6.11 The RCAF should integrate current and developing systems into a fully networked LVC environment to support joint and coalition collective training. 	
<p>Royal Canadian Navy</p> <p>Canada in a New Maritime World LEADMARK 2050</p> <p>2016</p>	<p>Three Strategic Means</p> <p>1. A strategically agile and adaptive RCN institution that anticipates how conflict is likely to evolve, driving forward changes in how we prepare, train, equip and organize naval forces for future operations.</p> <ul style="list-style-type: none"> ● Strategic Insight ● Strategic Relationships and Partnerships ● Interoperability ● Comprehensive Integration ● National Maritime Industrial Base ● Technological Agility ● Technological Innovation ● Tactical and Doctrinal Innovation 	<p>1. Means 1 synergy with Objectives 1.1, 2.3, 3.1, 3.2</p> <p>2. Means 2 synergy with Objectives 1.2, 3.3</p> <p>3. Capability 1 synergy with Objective 2.2</p> <p>4. Capability 2 synergy with Objective 2.2</p> <p>5. Capability 4 synergy with Objective 5.3</p>

<ul style="list-style-type: none"> ● Innovation in Naval Materiel and Support Organizations ● Innovation in Naval Training and Education <p>2. Sailors and officers prepared as warriors and mariners for the complexities and challenges of future operations, and equipped as leaders and managers to guide the future RCN/Canadian Armed Forces at the tactical, operational and strategic levels.</p> <p>3. A broadly balanced, combat-effective fleet, capable of independent action at sea and able to contribute substantially to operations ashore.</p> <p>Capabilities</p> <p>1. Maritime & joint intelligence, surveillance and reconnaissance</p> <ul style="list-style-type: none"> ● Networked, distributed, all-spectrum, all-source ● Rapid & persistent real-time environmental analysis ● Real-time prediction of weapons/sensor performance ● Organically deployed unmanned vehicles and autonomous vehicles (air, surface and undersea) employed across all intelligence functions <p>2. Integrated command and control</p> <ul style="list-style-type: none"> ● Integrated, joint and combined ● Distributed & collaborative planning ● Highly controlled application of force ● Massively decentralized execution ● Scalable for command of forces ashore ● Robust, redundant and adaptive in physical & cyberspace ● Highly interoperable ● Multi-level secure ● Advanced battlespace visualization & decision support ● Automated detection, classification, identification, tracking and targeting in littoral environments ● Networked to link any joint sensor to any joint shooter <p>3. Maritime weapons and sensors for joint action</p> <ul style="list-style-type: none"> ● Effects delivered at range and with great precision ● Munitions capable of loitering/independent targeting ● Capable of graduated/scalable response ● Lethal and non-lethal means ● Distributed sensing <p>4. Sustainment of forces at sea and ashore</p> <ul style="list-style-type: none"> ● Information-enabled integrated combat logistics ● Unmanned vehicles for replenishment ● Sea-based sustainment of a force ashore ● Capable of limited strategic and theatre sealift 	
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	<p>5. Protection of the maritime and joint force</p> <ul style="list-style-type: none"> ● Layered, multidimensional and integrated ● Stealth inherent in platform design & complemented through tactical signature suppression systems ● Countermeasures to disrupt/defeat hostile action ● Complementary passive and active defence systems ● Effective in contaminated NBC environments ● Protection extended to forces and populations ashore ● Capable of defending a sea base 	
<p>Canadian Special Operations Forces Command</p> <p>Future Operating Concept Handbook</p> <p>2019</p>	<p><u>LOE 1: Optimizing the Operating Space</u></p> <ul style="list-style-type: none"> ● Reorient to Hybrid Grey Space ● Optimized Posture & Readiness ● Increased Forward Presence ● Converged Full Spectrum Targeting ● Expanded Exploitation ● Ops in tech-denied environments <p><u>LOE 2: Enhancing the Operator System</u></p> <ul style="list-style-type: none"> ● Cognitive Operator ● Enhanced Intel, Cyber, CBRNe, EW Capabilities ● SOF Air Power Concept ● Force Diversity ● Stealth/Signature Management ● Mobile, Independent Teams <p><u>LOE 3: Evolving the Organization</u></p> <ul style="list-style-type: none"> ● Innovation with new partners ● Evolved Dynamic, Complementary Inter-Agency Authorities ● Comms/Info Sharing ● Flexible, Agile Outcomes-Based Programming - SOF ● Personnel Policies Review 	<p>1. LOE 2 synergy with Objective 2.2</p> <p>2. LOE 3 synergy with Objective 1.2</p>