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**Distributed Maritime Operations:
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Contested Maritime Environment**

Lieutenant-Commander Jason Pike

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DISTRIBUTED MARITIME OPERATIONS: A NEW OPERATIONAL CONCEPT FOR THE ROYAL CANADIAN NAVY IN A CONTESTED MARITIME ENVIRONMENT

AIM

1. The aim of this paper is to present the operational concept of (DMO) as an alternative operational concept to the Naval Task Group (NTG) with the goal to enabling the Royal Canadian Navy (RCN) to achieve its missions in the Contemporary Operating Environment (COE). It will present arguments supported by relevant professional literature for DMO's inclusion into RCN Force Development efforts, as well as recommendations for further study and experimentation to ensure DMO is incorporated effectively into practice.

INTRODUCTION

2. The People's Liberation Army Navy (PLAN) is expanding at an incredible rate and is well on its way to establishing a blue water navy capable of establishing sea control in areas contested by Western navies. The RCN has held the concept of a NTG at the heart of its Operational doctrine since, at least, the RCN deployed a Canadian NTG to participate in the First Gulf War. It has also predominantly participated in coalition and expeditionary operations overseas, typical against inferior or "near-peer" adversaries. However, the reality of the PLAN's increasing capabilities in the COE, necessitate a review of how the RCN implements the concept of expeditionary defence.

3. Canada's Indo-Pacific strategy identifies the Indo-Pacific region as presenting opportunities vital to Canada's national interest and that Canada will invest in building relationships and capacities with like-minded nations in the region.¹ The RCN will have a key role to play given maritime nature of the region, its flexibility, global reach, and maritime diplomacy capabilities. Meanwhile, China's increasingly assertive actions in contravention of the rules-based order have heightened military tensions in the region, elevating the possibility for military confrontation in which Canada may take part. Given the relative size, age, and armament of platforms, the RCN is poorly suited to fleet on fleet engagements against the PLAN. To maintain a competitive advantage, the RCN must seek new doctrinal and technological solutions to augment its current warfighting capacity at sea.

DISCUSSION

4. The concept of DMO emerged several years ago as a result of the United States Navy (USN) considering how it would operate in the future operating environment, an environment where its adversaries had taken great steps to counter its signature force package, the Carrier Strike Group (CSG). The USN was, and remains, a power projection and sea control force.² A result of long history, from the Battle of Midway, to the Cold War, to its various adventures in

¹ Government of Canada, 'Canada's Indo-Pacific Strategy', 3,5.

² Caverley and Dombrowski, 'Cruising for a Bruising', 2.

the Middle East, the aircraft carrier's unparalleled capability to both control the sea and create effects ashore led to an ever-increasing scale, and therefore cost, of aircraft carriers. This led to a concentration of power in a reduced number of hulls and, in turn, led to an increasing imperative to defend the carrier as the High Value Unit (HVV) of its maritime force. This imperative solidified the now ubiquitous maritime concept called the NTG. The NTG is a flotilla of ships with the HVV at its centre, and a variety of screening escorts providing a "ring of steel" to defend it. A typical USN CSG can now be expected to consist of a nuclear-powered aircraft carrier, five surface combatants, a nuclear-powered submarine, and a multi-product logistical ship.³ This powerful force, centered around one of the 11 large, nuclear-powered carriers of the USN, served as a powerful motivator to America's adversaries to improve their capabilities to counter this force.

5. During this period, China was growing economically, increasing their engagement abroad via the Belt and Road Initiative, and expanding and modernizing their military. Progressively, the PLAN's focus shifted away from China's near-seas, to the South China Sea (SCS) and First Island Chain. By 2013, China had illegally occupied, built-up, and militarized three of the rocks in the Island chain.⁴ Concurrently, likely anticipating an American response, they were modernizing their Anti-Ship Cruise Missile (ASCM) capability and developing a new threat to the US CSGs, a variety of Anti-Ship Ballistic Missiles (ASBMs) commonly referred to as carrier killers.⁵ China's conventional navy also continued to expand in scope and capability, leading Captain USN (ret'd) James Farnell to remark, "I... witnessed the transformation of the PLAN from a timid, near-seas assembly of ships into a global naval force whose ships' crewmembers were true mariners—as comfortable, confident, and capable as their German, British, and American counterparts".⁶ Considering China's future trajectory, Farnell anticipated China would be capable of achieving sea control on the high seas as early as 2030, and achieving sea superiority by 2049.⁷

6. The PLAN's increased capability can be conceptualized in the context of an Anti-Access / Area Denial (A2AD) strategy for the SCS. China uses satellite, air, and surface-based sensors to maintain Maritime Domain Awareness (MDA) inside the SCS, and couples this with its advanced ASCMs (ship and shore launched) and ASBMs to overmatch the USN in terms of weapons range. A CSG will typically carry weapons systems such as the Harpoon ASCM, range 75nm, or the F35-B aircraft, range 450nm. Currently, China can field the YJ-12 ASCM from aircraft or ships, range 250nm with speeds up to Mach 3, or the DF-26 ASBM, range 2,500nm.⁸ The point of this comparison is not to assert Chinese fighting supremacy, but rather to highlight the advances they have achieved in missile technology. Chinese forces can now engage opposing surface forces throughout the entirety of the first island chain, while remaining outside weapons

³ Wade, *The Naval Operations and Planning SMARTbook*, 1–4.

⁴ Pike, 'Briefing Note for DS519 Military Law in Comparative Perspective: PHILIPPINES V REPUBLIC OF CHINA IN THE MATTER OF THE SOUTH CHINA SEA', 4.

⁵ Johnson, 'China's "Guam Express" and "Carrier Killers"', 2–4.

⁶ Farnell, 'China's Global Navy—Today's Challenge for the United States and the U.S. Navy', 2.

⁷ AAP-06 defines sea control as "The condition that exists when one has freedom of action within an area of the sea for one's own purposes for a period of time in the subsurface, surface and above water environments". Farnell, 3.

⁸ Ranges and speeds are representative figures and are drawn from UNCLASSIFIED sources.

range of those forces, thus increasing their capacity to deny the space to other nations' maritime forces.

7. The RCN holds the NTG at the core of its concept of operations for major combat operations. Strong, Secure, Engaged, Canada's Defence Policy, notes the centrality of the Canadian NTG in doctrine and defines it as including up to four surface combatants, a joint support ship, and where required, a submarine.⁹ A consideration for the RCN in the COE is that the NTG as a power projection force is challenged by our adversaries' advances to an even greater extent than the USN given the two Navies' comparative size and combat power. The RCN Strategic Lexicon refers to the NTG as the "cornerstone" of the RCN's ability to power project, but identifies that new concepts and technologies should be sought to improve the NTG's effectiveness.¹⁰ The author argues that not only should the RCN seek to improve the effectiveness of the NTG, but that novel concepts such as DMO should be explored to increase the effectiveness of the Fleet overall by maximizing individual unit survivability and lethality.

8. DMO are a concept of fleet operations predicated on the dispersal of forces over a wide area to make an enemy's detection and targeting problem more challenging, while still enabling the dispersed force to act in a concerted manner to affect the enemy. It contains a number of related concepts, including distributed Command and Control (C2), remaining hidden from the enemy, and Distributed Lethality (DL). China's Mahanian pursuit of a strong naval power to safeguard its economic SLOCs has led to its massive fleet size and technological buildup.¹¹ This powerful force can now challenge allied nations' blue water navies for control of the sea and so a means of regaining the advantage must be attained. Adm Nimitz's orders to his Commanders before the Battle of Midway embodies the concepts underpinning DMO. Addressing Commanders facing a superior enemy Nimitz said, "...you will be governed by the principle of calculated risk...avoid exposing your forces to attack by a superior enemy without good prospect of inflicting...greater damage on the enemy".¹² DMO can provide this advantage by mitigating the threats posed by China's sensor coverage and weapons range, while still allowing allied forces to mass power against China's areas of relative weakness.

9. To effectively implement DMO, a system of distributed C2 must be fielded. Essentially, the system must be available to present theatre wide, all-domain sensor information to Operational Commanders, enable the Commanders to synthesize the information, and subsequently rapidly issue orders to the distributed force. These Commanders will have the ability, via the C2 system and situational awareness at the theatre level, to coordinate dispersed fleet assets to concentrate effect at a time and place of their choosing. The Joint All Domain Command and Control Systems (JADC2), under development by the USN, aims to do this. The system will allow an operational level Commander to coordinate which units sense, and which attack, while providing MDA to all units in the network, thereby limiting the number of units emitting electromagnetic (EM) radiation which could provide counter-targeting information to

⁹ National Defence, 'Strong Secure Engaged Canada's Defence Policy', 35.

¹⁰ Director General Naval Force Development, 'Royal Canadian Navy Strategic Lexicon', 36, 47.

¹¹ Patricia and Satya, 'Questioning China's Peaceful Development', 271-72.

¹² Hughes Jr. and Girrier, *Fleet Tactics and Naval Operations*, 238.

their adversary. For instance, AWACS sensor data could transmit targeting data via the C2 network to a surface unit, which could then fire Harpoon ASCMs to destroy the target without having to use its radar. This system of separate sensor/shooter is already employed, but JADC2 will further enable it by allowing for theatre-level coordination.

10. JADC2 is facing familiar challenges in its development. Jason Thomas, Director of Operational Warfighting at the Centre for Naval Analysis, highlights that system development complexity could become unmanageable if joint and allied partners cannot be brought onboard early in the program.¹³ Any system with such an expansive envisioned scope can risk costs spiraling given the modern project environment, and the competing priorities and demands of its varied end users. Mr. Thomas highlights that JADC2 is the number two priority for the USN's Chief of Naval Operations, and that to mitigate the development risks, the project office is working hard to include allies as early as possible in the development phase. The US Marines have already joined the program, and the program office is seeking to increase partnership through open and early communication of JADC2's vision

11. Another key component of DMO is the ability of dispersed forces to remain undetected by enemy forces. The global COE is a saturated sensing environment in which deception and discretion in the maritime environment is becoming increasingly difficult, and the time from detection to weapons affects arriving is decreasing. The highly valuable NTGs often transmit on many sensors to maintain MDA, fearing EM silence presents more risks than the benefits its discretion provides. The emissions associated with obtaining MDA are easily intercepted, and make the NTG's detection and targeting by enemy forces much more likely than a that of a dispersed force with coordinated EM emissions. By coordinating EM emissions at the theatre level, some units will emit EM radiation to maintain MDA, while others can remain silent and therefore more discrete.

12. Employing a system such as JADC2 during operations will allow most units in theatre to remain in a posture where they receive broadcast information from the C2 network without emitting any EM radiation. Enemy detection will therefore, require heavy reliance on active sensors. The dispersed posture of allied forces means a smaller proportion of forces can be detected with one active sensor compared to if they were formed as a NTG. As allied forces transition to an aggressive posture, low probability of detection and intercept (LPI/D) communications solutions must be implemented so that units may coordinate with their force elements and higher command. LPI/D systems such as JPALS, which provides aircraft encrypted LPD landing approach data via UHF broadcast, are already in use, and other waveforms allowing beyond line of sight LPI/D are being developed.¹⁴ A tool to facilitate the quantitative assessment of a dispersed force's probability of detection in a given environment would allow a Commander to more effectively assess the amount of risk they are accepting by remaining EM silent. Therefore, a system through which units can model, understand, and exploit the EM spectrum is

¹³ Sea-Air-Space 2022, 'How JADC2 Connects With Distributed Maritime Operations', interview, 15:24 – 18:50, <https://www.youtube.com/watch?v=U7N5L7hcMfE>.

¹⁴ Center for International Maritime Security, 'Distributed Maritime Operations – Becoming Hard-to-Find'.

required to enable Commanders to balance the risk to their units in real time against their ability to exploit EM spectrum vulnerabilities to their advantage.

13. DL is the enabling component in DMO which seeks to mitigate the risk to own force presented by our adversaries' increased weapons range and targeting capability. It is a less well-developed concept than other aspects of DMO, but can be summarized as making every asset a fighting asset, and that all assets become more effective fighting assets.¹⁵ The application of this concept for the RCN has a less clear solution space and is therefore, a space which will benefit from a risk accepting and innovate approach. The challenge for adopting DL lies in Canadian procurement processes. Weapons systems and platforms are increasingly complex and costly to acquire, and focus on increased lethality in fewer systems. Simply buying weapons with longer ranges and integrating them to existing platforms is not enough, novel approaches must be pursued. For instance, a recent Congressional Research Service report identifies a USN desire for a new fleet mix where there is a greater number of less costly platforms, vice fewer, more powerful ships.¹⁶ In the Canadian context, instead of building more frigates or corvettes, the RCN could look to augment its planned fleet of Canadian Surface Combatants with smaller autonomous or remote platforms. The platforms would be task-tailored to perform tasks too risky or costly for combatant platforms, such as weapons delivery or carrying sensor payloads. A recent simulation completed at the US Naval Post Graduate school concluded that Fleet on Fleet actions in which jamming and uncrewed deceptive swarms were employed led to a higher survival rate of blue force assets and created a greater opportunity for red force counter-targeting.¹⁷

CONCLUSION

14. The RCN should investigate DMO as operational concept for further development and inclusion in doctrine with a view to improve crewed platform survivability and lethality. The NTG should not be removed from RCN doctrine, but rather, DMO should augment doctrine to provide an asymmetric means of competition against a superior foe. Development of the DMO operational concept will also align the RCN more closely with our most powerful ally, the United States, who is actively developing the concept for implementation within its Pan-Domain force structure.

RECOMMENDATIONS

15. The RCN should liaise with the USN regarding the development of the JADC2 system, via Director Naval Information Warfare or Canadian Forces Maritime Warfare Centre (CFMWC) staff, to assess the viability of partnering in the development and implementation of the system. Early engagement with JADC2 will ensure RCN requirements are considered and that we remain aligned with the USN's implementation of the system.

¹⁵ Majumdar, 'The U.S. Navy Just Gave Us the Inside Scoop on the "Distributed Lethality" Concept'.

¹⁶ Ullman, 'Are There Flaws in the US Navy's Distributed Maritime Operations?', accessed 27 February 2023, <https://www.defensenews.com/opinion/commentary/2023/01/23/are-there-flaws-in-the-us-navys-distributed-maritime-operations/>.

¹⁷ Geiss, 'Analysis of Unmanned Surface Vessel Employment in Distributed Maritime Operations', 120–21.

16. The CFMWC, in partnership with Allied Warfare Centres, should conduct research into modelling of the EM battlespace at the theatre level. The intent of this modelling should be to provide Operational and Tactical Commanders a common tool with which to monitor the EM battlespace in near-real time, enabling our units to remain undetected, while concurrently exploiting the EM spectrum to conduct engagements at a time and place of their choosing.

17. The RCN should employ a model of innovation to seek novel and lower cost means of increasing its lethality. One means of doing so could include the Combat Effectiveness Steering Group seeking input from various RCN stakeholders, such as Digital Navy, Director Innovation, and members serving within the Fleets, to propose solutions to increase RCN lethality. These proposals, if deemed plausible, can be further tested within RCN lines or can leverage existing programs, such as IDEaS or Path to Commercialization (P2C), to fast track affordable solutions. Regardless of the method, risk should be accepted to the extent that the RCN acknowledges that some projects will fail, so that the speed of innovation can increase.

18. A series of war games hosted by CFMWC and supported by simulation should be considered to determine what Canada's future Fleet mix should be. The start state of this series of experimentation should be to investigate how the RCN can best augment current platforms by employing uncrewed systems to do the dangerous work of acting as communications or sensor nodes, or as weapons delivery systems.

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