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# Innovation to Expand Canada's Global Naval Influence

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Credit: Naval History and Heritage Command

*The Japanese battleship Yamato under attack by aircraft from a US Navy aircraft carrier in the East China Sea on 7 April 1945. Yamato sank later that day. Will modern surface ships meet similar fates against swarms of uncrewed vehicles?*

Russia's war in Ukraine has shown us many lessons about both the changing character and the enduring nature of war. We must incorporate these lessons, from the tactical to the strategic, with a sense of urgency. *General Wayne Eyre*<sup>1</sup>

On 29 October 2022, the first combined attack of multiple uncrewed surface and aerial vehicles (USVs and UAVs) was executed against the Russian Black Sea Fleet near Sevastopol. This attack should be a wake-up call to Canadian naval warfighters, not just to the danger but to the opportunity it presents. Developing the technology and, more importantly, creating the tactics or theory of employment to harness the potential of multiple, low-cost underwater, surface and aerial vehicles working in concert could fundamentally change how maritime operations are conducted. This vision contrasts with current Royal Canadian Navy (RCN) modernization programs, which envision uncrewed vehicles as merely augmenting current naval doctrine and practices. This traditional thinking – i.e., incrementally incorporate new technology to ‘do the old way better’ – lacks innovation (and imagination). Even more concerning is that this current vision lacks focus on both the threat and the opportunity that cheap uncrewed vehicles operating en masse presents.

This article is not merely a critique but rather a call to seize an opportunity. A country with the vision, motivation and resources can act upon the shifting characteristics of warfare and fundamentally change future naval conflict. This article will argue that the RCN should seize this opportunity to innovate, articulate a vision with uncrewed vehicle technologies at its core and, finally, lead industry, partners and allies in driving change to achieve this future.

### ***Innovation Not Iteration***

The RCN, unfortunately, was not much different than other large bureaucracies. Simply put, any efforts to be innovative were quickly dispatched by the bureaucratic antibodies that exist to ensure the status quo was maintained. *Vice-Admiral (Ret'd) Ron Lloyd*<sup>2</sup>

Whether or not you are convinced that the Black Sea Fleet attack marks a paradigm shift in naval operations, the character of warfare is changing. This evolution has caused some Canadian military leaders to direct the Canadian Armed Forces (CAF) to apply future thinking, innovation and technology to meet this evolving demand. For example, in *Leadmark 2050*, the RCN's vision of the

future, then-RCN Commander, Vice-Admiral Ron Lloyd, stated that the force “must evolve to meet future challenges” brought upon, in part, by evolving “technology [that] will continue to change the means and methods of warfare.”<sup>3</sup>

The current Chief of Defence Staff amplified this point in early 2023. Specifically, General Wayne Eyre stated that the Russia-Ukraine conflict highlights the changing character of warfare and that the CAF must inculcate a culture of innovation and reframe its situational understanding to meet these challenges.<sup>4</sup> Those charged with preparing Canada’s future naval force must consider that the character of warfare is changing, and perhaps current naval theory and doctrine are no longer adequate.

There is good reason for leaders to illuminate changing characteristics of warfare as history reveals that if a country does not recognize and adapt to these shifts, it risks failure in conflict. One example comes from the Imperial Japanese Navy during the Second World War. Despite the aircraft carrier emerging as a replacement for battleship-era tactics, Japan failed to identify this change in naval operations and invested significant resources in building two of the largest battleships ever made – *Yamato* and *Musashi*. They were the most technologically advanced battleships ever built, but they were relics of outdated tactics. These large ships were easy prey for the US Navy which applied modern technology (the aircraft carrier) to create a new method for naval warfare (striking other ships with carrier-launched planes). As a result, USN carrier-based bombers sank both Japanese battleships before either vessel could significantly affect the war.

A similar shift in the character of naval warfare could be occurring, in part, due to uncrewed vehicles. Perhaps the seeds of this trend began in October 2000, when a small boat filled with explosives was driven alongside USS *Cole* and exploded, killing 17 sailors. In the following years, Iran built upon this tactic, creating a ‘mosquito fleet’ comprised of several hundred armed speedboats to be used asymmetrically against conventional naval forces. By 2022, attacks by piloted vehicles appear to have shifted towards uncrewed systems, as exemplified by the drone attack against the Russian Black Sea Fleet mentioned above. Similar attacks also occurred against maritime targets near Yemen in October and November 2022. While predicting the future is an imperfect science, there are clear indications that the future of naval operations will involve the increased use of uncrewed vehicles.

If we compare this trend in maritime operations to the evolution of unmanned aerial vehicle (UAV) technology, one could predict that future naval drone usage will be small, cheap platforms used en masse. UAV technology began as a reconnaissance asset, then moved to large

armed platforms (i.e., the Predator drone), and more recently to the small cheap, commercially made armed drones used by the Islamic State and now Russian and Ukrainian forces. As UAV technology and tactics matured, the employment of these systems moved to smaller, more cheaply made, armed devices used in multiple numbers. Should maritime technology follow a similar trend, future naval and commercial ships will operate in an environment with threats from high numbers of small aerial, surface and underwater uncrewed platforms (UUVs) working together.

With indications of a future that will include dozens, or perhaps hundreds, of small cheap drones being used to overwhelm defence mechanisms and threaten multi-billion-dollar naval vessels, you can see why people are raising the alarm about the potential shifting character of maritime operations. If those responsible for the future of the RCN can break the barriers imposed by a bias towards current methods, uncrewed vehicle technology can be leveraged to provide the force with an advantage over other navies limited by their resistance to change.

### ***A Novel Future Vision***

Despite calls for innovation and greater incorporation of technology into tactics, particularly uncrewed vehicles, adaption remains slow and predictable. RCN modernization and procurement projects provide insight into how the navy sees itself in the future. Analyzing this future highlights how the current RCN vision does not place sufficient emphasis on the trend towards small, cheap drones used en masse. Should the RCN create a vision of naval



*A quadcopter drone equipped with a pair of M72 rocket launchers is on display at the DSEI 2023 defence trade show in London, UK, September 2023.*

Credit: Timothy Choi





Credit: FLTLT Ricky Treloar

The first 'Loyal Wingman' prototype, later named MQ-28A Ghost Bat, takes flight over Woomera, South Australia, in September 2021. The uncrewed aircraft is a collaborative effort between Boeing Australia and the Australian Department of Defence.

warfare with greater emphasis on forthcoming technology and the characteristics of tomorrow's warfare, versus today's, it has the potential to become a leader in a fundamentally different naval environment.

An analysis of current and future investments for RCN equipment underscores a bias towards traditional military thought and a lack of emphasis on innovation. Although Canada's 2017 defence policy *Strong, Secured, Engaged* warns of the dangers of not adequately preparing for a different future, none of the five naval investments identified in the policy mention uncrewed platforms.<sup>5</sup> Instead, all items are either large ships or technology to improve upon current methods of conducting naval operations. Despite indications that the nature of operations is changing, all investments seem to be for a future that resembles today's naval warfare: large surface and subsurface ships equipped with the latest surveillance and weapon systems. But if the future includes small, cheap uncrewed vehicles used en masse against naval ships, there is a lack of investment with this threat in mind. Moreover, and perhaps more significantly, no major project aims to harness this capability for the RCN's future advantage.

Beyond *Strong, Secured, Engaged*, the RCN's modernization projects also reveal little consideration for adopting uncrewed vehicles. For example, the navy's design of the Canadian Surface Combatants (CSCs), labeled advanced and modern ships with next-generation technology, makes no mention of counter-USV, UAV or UUV threats and includes little consideration for using these technologies in support of its operations.<sup>6</sup> In addition, the current maintenance and modernization program for Canada's submarine fleet indicates that this platform is Canada's most strategic asset for surveilling Canadian and international waterways. However, sustainment costs alone are \$300 million annually, with a total upgrade budget of \$2.1 billion.<sup>7</sup> An investment of similar scale could purchase a large fleet of uncrewed systems, which, if enabled by artificial intelligence (AI), would have the potential to replace

large, expensive, maintenance-heavy crewed submarines to become Canada's best asset to surveil waterways. Buying the latest billion-dollar ship or upgrading old vessels with newer technology, both to be employed under traditional tactics, is not the innovation the CAF/RCN needs.

It is not too late for change, and Canadian strategic documents provide some components for an innovative future vision. *Leadmark 2050* hints at a future that, within the next 12 years, could include "the introduction of autonomous vehicles in all three maritime dimensions ... well-suited to a range of tasks," including reconnaissance and armed strikes.<sup>8</sup> While this is perhaps the beginning of innovative change, these statements must be built upon to draft a clear vision. After a vision is developed, the pathway to achieving this future must be pursued aggressively. While articulating a comprehensive new vision is beyond the scope of this article, perhaps small, cheap, AI-enabled uncrewed vehicles operating in all three naval dimensions could become the future long-range sensors, guided torpedoes, mines, missiles and bombs, creating an advantage over traditional naval vessels in future conflict.

Despite including language calling for increased use of technology, however, *Leadmark 2050* indicates little motivation for significant change. This conclusion is based on *Leadmark's* statement that "while autonomous vehicles will become increasingly capable ... [crewed] vehicles will remain indispensable for complex situations."<sup>9</sup> Such statements do not encourage the innovation required to respond to the changing characteristics of naval warfare. This cedes the opportunity to lead and benefit from the change to a more creative and adaptive country.

With strategic documents and the Chief of Defence Staff calling for innovation, one would expect the RCN to have implemented creative measures to address the shifting nature of naval warfare. This does not appear to have happened. There are several reasons for the lack of change. First, the navy is facing a personnel shortage. With limited personnel to tackle many challenging



Credit: Mohammadreza Jabbari, Tasnim News Agency

An Iranian Shahed 136 drone is seen at an exhibition in Qom on 16 May 2023. These drones have been purchased and employed by Russia against Ukraine.

issues, problem-solvers will often take the path of least resistance, which, in this situation, is not leading a charge against conventional thought. Another challenge for innovation is a cognitive bias called theory-induced blindness. This bias highlights how once a person has an accepted theory and uses it as a tool in their thinking, it is extraordinarily difficult for that person to notice the theory's flaws.<sup>10</sup> As the likely cause of the phenomenon some call *institutional inertia*, this bias will be difficult to overcome as those charged with crafting the future navy have decades of experience with conventional naval tactics. With decision-makers susceptible to unconscious bias and limited bandwidth to tackle this problem, it is understandable why innovative thought has yet to change the way the RCN operates. These barriers must be overcome. The navy is not taking an innovative approach to emerging technologies. Instead, it is incrementally 'doing the old way' slightly better with newer machines. A vision that harnesses the potential of emerging AI and uncrewed vehicle technology could fundamentally change how seas are controlled and international waterways surveilled.

### ***It is Time to Lead***

Canadians must believe they can become leaders in military technology and operations. Many middle-power countries have achieved this status in particular aspects

of warfare after crafting a vision for the future and aligning resources and efforts toward achieving their goal. For example, the 'Loyal Wingman' program is a joint project between the Australian military and industry, creating an uncrewed aircraft (or wingman) designed to fly alongside a piloted craft.<sup>11</sup> These UAVs are manufactured, and their associated tactics developed, in Australia, with other countries interested in acquiring this innovative solution, including the United States. Along a similar yet less legal pathway, Iran began copying Israeli drone technology in the 1980s, which was the seed of its exponentially increasing role with this technology. Investing heavily in armed systems, Russia has acquired Iranian drones for use in the Ukrainian conflict, with Iran potentially receiving support in return. Neither Australia nor Iran is considered a great power. Nevertheless, with a future vision and associated investment in technology, these countries have become leaders in specific military capabilities.

Canada is well-suited for the challenge of harmonizing industry, partners and allies to drive change, and develop and adopt innovation to achieve a new future. First, there is leadership buy-in, as highlighted by the Chief of Defence Staff's call for innovation. But perhaps more importantly, Canada's Department of National Defence already has structural processes in place to take an ambitious future vision and make it a reality. Canada's Innovation for Defence Excellence and Security (IDeAS) program is an excellent example of this.<sup>12</sup> This program *could* mobilize the Canadian innovation community – academia and industry – to turn an idea into reality. However, without military willingness to change to adopt the ideas and/or tactics, neither academia nor industry will fundamentally change how future maritime operations are conducted.

Beyond being well-suited to lead the world to a new vision of future maritime operations, there are perhaps more significant motivations for a medium-sized power such



Credit: mil.in.ua

A Ukrainian 'kamikaze drone' is spotted beached on the Crimean coast, October 2022. The propulsion system purportedly matches the one produced for Bombardier's Ski-Doo recreational vehicles.





The MQ-9B SkyGuardian is in the running to be Canada's first armed drone.

as Canada to make this leap. For a navy such as Canada's that has limited resources for multiple large vessels, small, cheap drones could augment the force to provide increased capability at less cost than building larger traditional navies. Canada's capacity on the global stage could outweigh its medium-power status. Moreover, Canada's global position makes it the correct country to lead this vision. There is some risk that if a country gets the future vision wrong, its ability to conduct naval operations will decrease. For the United States, a great power that relies on its navy for its global security responsibilities, this risk may be too great to assume. Canada's international position enables it to accept the risk and potentially reap its reward.

Along with its global position, Canada is also a world leader in small craft and AI technology. While one could point to Bombardier Recreational Products, the producer of Ski-Doo snowmobiles and Sea-Doo watercraft and headquartered in Quebec, as an example of Canadian small craft innovation, the fact that Canadian components were used in the attack against the Russian Black Sea Fleet highlights how Canada could be in the armed drone space. Looking at the AI field, according to one source, Canada currently sits as the fifth-ranked country in terms of implementation, innovation and investment, and top three within the G7 countries.<sup>13</sup> But *Leadmark 2050* seems to say that only the United States can provide new technological developments, stating, "potentially revolutionary naval technologies developed by the US will significantly complicate force planning."<sup>14</sup> Canada should not sell itself short. Canada's policy guidance, industrial infrastructure and well-educated population position it well for innovation. With the right vision, the RCN could successfully pursue an AI-enabled uncrewed platform niche.<sup>15</sup>

Despite being well-suited to lead naval innovation, Canada will not automatically fill this role. We must act. A look at Canada's history regarding UAV technology reinforces this idea. In 2014, the United States called Canada a leader in UAV technology.<sup>16</sup> The hype surrounding Canada as a leader in this technological field continued for several years.<sup>17</sup> However, the CAF did not take advantage when Canadian industry was at the leading edge of this innovation. The CAF did not formally request to purchase armed drones until 2019, with this capability not expected to be ready for operational use until 2027.<sup>18</sup> The continuing Russia-Ukraine conflict has demonstrated that UAVs are

already a part of modern warfare, yet the lack of innovative vision has caused Canada to fall behind in this field. It is too late to change this outcome, but it is not too late for Canada to learn from it. Should the RCN act now, it could lead the globe in this fundamental shift in naval warfare.

## Conclusion

We need to inculcate more of a culture of innovation, calculated risk tolerance, continuous learning, security awareness, and reframing our situational understanding. General Wayne Eyre<sup>19</sup>

In conclusion, Canada should use the attack on the Russian Black Sea Fleet as a catalyst for change and create a vision for future naval warfare that harnesses massed, low-cost, AI-enabled uncrewed vehicles. If done correctly and in a timely manner, these actions could position the RCN and Canadian industry to become world leaders in uncrewed naval technology and operations. While making a vision into reality requires significant financial commitments beyond the RCN's control, this future will not occur if the barriers to innovation are not overcome, and a creative future vision is left undrafted. Let us not continue to build battleships in the aircraft carrier era. 🚢

## Notes

1. Canada, Department of National Defence (DND), General Wayne Eyre, "Message from the Chief of the Defence Staff: 2023 Focus Areas," 8 February 2023.
2. Vice-Admiral (Ret'd) Ron Lloyd, "A Commander's Call to Action: Committing to Innovation and Realizing the Naval Force of Tomorrow," *Defence News*, 18 October 2021.
3. Royal Canadian Navy (RCN), *Leadmark 2050: Canada in a New Maritime World*, 2017.
4. General Eyre, "2023 Focus Areas."
5. Canada, DND, *Strong, Secure, Engaged: Canada's Defence Policy*, 2017, p. 55.
6. RCN, "Canadian Surface Combatant," no date.
7. Government of Canada, "Procurement," last updated 2020.
8. RCN, *Leadmark 2050*, p. 49.
9. *Ibid.*, p. 49.
10. Daniel Kahneman, *Thinking, Fast and Slow* (New York: Random House, 2011), p. 277.
11. Boeing, "Loyal Wingman: Uncrewed but Not Alone/Uncrewed Aircraft in Australia," *Innovation Quarterly*, 2021.
12. Canada, DND, "Innovation for Defence Excellence and Security (IDEAS) Program," 2023.
13. Tortoise Media, "The Global AI Index," no date, Available at <https://www.tortoisemedia.com/intelligence/global-ai/>.
14. RCN, *Leadmark 2050*, p. 9.
15. Jerome Duval, "Artificial Intelligence: What should the Canadian Army Focus on?" Master's thesis, US Army Command and General Staff College, 2022, p. 109.
16. Gina Bento and Luz Betancur, "Canada: Opportunities in Canada's Unmanned Aerial Vehicles (UAV) Market," US Commercial Service, 14 September 2014.
17. National Research Council of Canada, "Soaring to Picture-Perfect Heights in Canada's Unmanned Vehicles Industry," 17 March 2016.
18. Canada, DND, "Remotely Piloted Aircraft System (RPAS)," last updated February 2022.
19. General Eyre, "2023 Focus Areas."

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