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Let's Get Practical in the Renewed Vision for Canada's Defence: Thinking through the Real-World Applications of AI, Quantum, and Drone Technologies

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The key to enhance technological capabilities is to think practically about applications in real world contexts. Investments in technology development and collaboration in deployment requires future-forward thinking that is grounded in the practical real worlds of today. These real worlds include societal, economic, environmental, and technological intersections. In the context of defence, technologies are seen as changing the nature of conflict, and 'future-proofing' capabilities often means accelerating the development, availability, and integration of technologies into the force. The recently released defence policy update makes a step in this direction, but more consideration is needed, especially if certain technologies are envisioned as applied to solve problems and create solutions in the defence of Canada and North America. The purpose of this paper is to examine how the update frames the development, integration, and use of technologies, especially AI, drones,[1] and quantum.[2] I interrogate what this framing may mean for Canadian defence beyond and including the defence policy update and I conclude with recommendations for policy and decision-makers for further consideration.

Introduction

On 8 April 2024, the Department of National Defence released the defence policy update *Our North, Strong and Free: A Renewed Vision for Canada's Defence*, which (while it reads like a policy itself) builds upon the 2017 policy statement *Strong, Secure, Engaged*. Although Canada's allies have signaled their approval of the update, various commentators in the Canadian defence and security community have criticized the lack of specificity or clarity on and timelines for funding. Other commentators are optimistic about the articulation of a formal threat assessment that identifies Russia and China as adversaries, as well as opportunities to sustain the national defence industrial base. The update provides a refocus on defence spending, threats, cooperations, and regional priority areas for Canada. Importantly, it emphasizes the role that certain technologies are poised to play in future conflict contexts.

Major investments in development can extend the capabilities of technologies and this may lead to new applications. However, the development and application of technologies in a defence context can embed certain values and assumptions about its use. Whether the defence policy update is followed by a new national defence policy, a national security strategy, or not, it is important that the association between technological capabilities and the defence of Canada and North America reflect a nuanced understanding of responsible technology use and application.

Technologies can change how people engage in conflict, but also in how its use interacts and impacts with other aspects of society. By enhancing technological capabilities within a defence context through policy and strategy, the use, impact, embedded values and assumptions will also be enhanced. As such, it is important to consider how technologies and their application are framed within defence policy, strategy, and update documents and interrogate the assumptions about their use. By integrating these assumptions, we can critically engage with the potential impact technologies may have in broader society. This task is especially relevant for responsible emerging technology use and application.

The Department of National Defence/ Canadian Armed Forces should ensure that the use and application of certain technologies in the execution of the defence policy update are aligned with the real-world problems and solutions they seek to address. Future policy updates or strategies should embed the value of interoperability to ensure that Canada's renewed vision for defence is practical and responsible. I succinctly detail this consideration in the context of *Our North, Strong and Free* and focus on the positioning of specific technologies within the update to illustrate my argument, especially AI, quantum, and drone technologies.

Real-World Problems and Solutions

Technologies do not exist in silos in society, the environment, or in the world. Although Canada recognizes the strategic and economic benefits of quantum technologies through the *National Quantum Strategy* and other department-specific grant programs[3] and policies,[4] the defence policy update envisions the application and use mainly from a defence and security context and priority area. This is an obvious point, but technologies do not exist in silos and many of the emerging technologies listed in the update have applications in other sectors. For example, quantum sensors have defence applications, but also applications in biomedical research, navigation, mapping, and environmental modelling/ imagery.

Currently, many researchers and companies in the field of quantum technologies are focused on enabling scalability, application, and integration of such technologies into real-world conditions and solving problem sets. The dynamic application and use of quantum technologies are understood in the update as changing the 'character of conflict'[5] and as part of an increasingly complex and interconnected cyber ecosystem.[6] The focus on developing these technologies to gain a military advantage[7] narrows the lens of their application and integration. In thinking through the use and application of quantum technologies, it is important to consider what Canada, through the update, expects these technologies to achieve and the cascading effects this focus may have on other aspects of society. The lack of explicit linkages to the other national quantum documents and programs in the update further reinforces the narrow lens of defence solutions and problems in the application of quantum technologies.[8]

The environment in which certain technologies are expected to operate is an important practical consideration. Some technologies are in earlier stages of development with limited application in operating conditions outside of the lab. Other technologies, such as drones, have proven to be practical assets in current conflicts and operations around the world. Canada's defence policy update affirms the importance of these technologies for Canada in surveillance activities and military operations,[9] but the promises of drones also come with well-documented limitations. For example, varying weather conditions, topographic considerations, and differences in environments can impact the practical applications of technologies. By recognizing that technologies exist in a real world that includes environmental and social considerations, it is possible to further expand their practical applications – rather than expanding into hype. Expanding and embedding the concept of interoperability may help ground the practical and responsible uses of technologies amid their complexities.

Embedding Interoperability

Interoperability is the "ability for Allies to act together coherently, effectively and efficiently to achieve tactical, operational and strategic objectives." It can enable "forces, units and/or systems to operate together, allowing them to communicate and to share common doctrine and procedures, along with each other's infrastructure and bases." Furthermore, it can reduce duplication, enabling the "pooling of resources and produces synergies among all Allies, and whenever possible with partner countries." We also can think of interoperability as an outcome and a process that connects domains, technologies, and people. An expanded understanding of this concept can help position technologies, people, and the environment in the real world. Embedding interoperability as an outcome and process can also aid in understanding the conditions, interconnections, and expectations of certain technological capabilities. For example, the use of AI[10] increasingly connects applications and technologies to solve emerging problems[11] and enhances the functioning of other technologies.[12] Digital technologies have a physical presence in the world, as well as environmental impacts. Combining development and application to embed interoperability can enhance technological capabilities beyond a narrow defence context, while still including it and remaining cognisant of human, environmental, and societal engagement. Through this critical framing, Canada can make progress in cultivating a renewed vision for the responsible use of digital technologies, especially to enable collaboration, focus on sustainability, and address diverse societal needs while ensuring the safety and security of the country.

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Notes

[1] Includes unmanned aerial vehicles and unmanned combat aerial vehicles.
[2] Includes sensing, communication, computing, among other technologies.
[3] See for example, the Internet of Things: Quantum Sensors Challenge program launched by the National Research Council of Canada and the Natural Sciences and Engineering Research Council of Canada.
[4] See Quantum 2030: The DND/CAF Quantum Science & Technology Strategy Implementation Plan and the DND/ CAF Quantum S&T Strategy: Preparing for technological disruptions in the future operating environment.
[5] Our North, Strong and Free: A Renewed Vision for Canada's Defence, pg. 9.
[6] ibid., pg. 10
[7] ibid., pg. 13, 21.
[8] For more on this topic and in the context of cooperating states, see Post-quantum cryptographic assemblages and the governance of the quantum threat and How Canada can prepare for the quantum threat.
[9] Our North, Strong and Free: A Renewed Vision for Canada's Defence, pg. 10, 28,
[10] Specifically models and services. In the context of this discussion, I take an expansive view of AI and include Machine Learning.
[11] And also creating problems of its own, however these problems are beyond the scope of this paper. For more on this topic, see We, the Data, Atlas of AI, Algorithms of Oppression, Unmasking AI, among others.
[12] For example, in the optimization of quantum computing applications, such as large-scale data processing, reducing run times, accelerating data analytics, and the creation of new algorithms.