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Strong, Secure, Engaged in a Threatened Space Domain

by Charity Weeden

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POLICY UPDATE

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To say the space domain has changed over the past decade is an understatement. It has transformed into an economic hub, poised to grow into a trillion-dollar industry. Space is also a security nexus where use of space assets is so common that their absence is, at a minimum, a severe disruption to the mission and in some cases, paralyzing. A 2017 Senate report went so far as to recommend the Government of Canada declare satellites as critical infrastructure and seek ways to secure these assets against significant threats.

Canada's *Strong, Secure, Engaged* (*SSE*) defence policy takes a leap forward by signalling the government's recognition of this dependency on critical space assets and the growing threat environment they face. It highlights the necessity of deterrence, diplomacy, interoperability and modernization of space capabilities. By describing the space environment as "contested, congested and competitive", the government recognizes that the number of satellites, actors and debris in space is growing; nation-states are testing and investing in technologies to deny access to space; and the competitive nature of the space industry, alongside the growing need for spectrum with which to transmit data, is an important element to consider.

"Complex" is another adjective that would fit well in describing the modern space environment. Space activity is poised to include on-orbit servicing, large constellations requiring careful planning, deployment and end-of-life operations, and in-space manufacturing, mining and private tourism opportunities. These activities only add to the challenge of maintaining a safe and secure space domain.

The *SSE* policy makes progress in recognizing the changing space environment and signalled a commitment to invest in space technology as a key capability for Canada's defence. However, it is not clear how the government intends to defend against aggressive and threatening activities, or how to assure mission success when space capability is denied.

The Increasing Space Threat

The *SSE* policy rightfully highlights orbital debris as a core threat to operations in space due to millions of pieces of harm-inducing debris that encircle the planet. Lately, however, the alarm bell has been set off because of the prevalent threat of satellite communications jamming, dazzling of remote sensing satellites, hacking of ground systems and testing of kinetic anti-satellite technologies. These counter-space threats taken together toss out the notion that space is a sanctuary for Canadian defence assets.

Indeed, much has been written lately on the subject of space as a war-fighting domain and the counter-space threats that have made it so. Both the Secure World Foundation (SWF) and the Center for Strategic and International Studies (CSIS) recently released open-source analyses on counter-space capabilities with a number of specific examples to draw from. Some of these

technologies, like jamming and cyber-attacks, are easy to access and employ, making a low barrier to entry for states and non-state actors alike.

As stated in the CSIS Space Threat Assessment, Russia jammed GPS signals during the Crimean conflict in 2014. The same year, Chinese hackers disrupted National Oceanographic and Atmospheric Administration (NOAA) systems. The SWF Global Counterspace Capabilities Assessment detailed a 2013 test of a Chinese direct-ascent anti-satellite capability that approached the geostationary orbit (up to 30,000 km). It was asserted that a transporter-erector-launcher (TEL) was used – a mobile platform that is employed to launch ballistic missiles.

Clearly, weapons are being developed to disrupt and destroy space capabilities. The United States is establishing a posture to defend itself, but is also looking to deterrence to prevent the use of these weapons. Similarly, the *SSE* policy notes the burgeoning importance of deterrence in a renewed era of major power competition. This is a significant alignment of thought that can be built upon in the Canada-U.S. national security space partnership.

> *The return of major power rivalry, new threats from non-state actors, and challenges in the space and cyber domains have returned deterrence to the centre of defence thinking. Strong, Secure, Engaged*. Canada's Defence Policy (2017)

Deterrence Through Alliances

There are several rationales for Canada to contribute to a national security space alliance with the U.S. and other close partners. Not only does such partnership share the resource burden of funding space capabilities, but it also creates a more costly and complex decision calculus for any actor tempted to disrupt or destroy defence capabilities emanating from space – thus supporting a resilient space architecture. A recent Aerospace Corporation Center for Space Policy and Strategy (CSPS) paper names deterrence as chief among rationales for alliances in space, citing the 2018 U.S. National Defense Strategy: "the willingness of rivals to abandon aggression will depend on their perception of U.S. strength and the vitality of our alliances and partnerships."

While there is a legacy of leveraging the North American Aerospace Defence Command (NORAD) relationship for space collaboration in the past, today there is a trend toward multi-lateral partnerships such as combined space operations (CSpO). CSpO is named specifically in the *SSE* policy as a means of co-ordinating Five-Eye community efforts to enhance resiliency and share resources due in part to the critical and frequent role of space assets in a coalition and shared intelligence construct. Further, the Joint Space Operations Center (JSpOC) will soon transition towards a combined space operations centre that more closely integrates allies and commercial partners into space operations, and the multi-national space collaboration initiative will support co-operation and relationship building for allied space mission requirements.

However, several questions remain. What is the role of Canada within CSpO and these other new collaborative environments, given existing counter-space threats? Does the *SSE* policy align

sufficiently with the United States and other allies should an attack on an allied space system occur? What would be Canada's response to kinetic or non-kinetic attacks on critical Canadian space systems?

What the *SSE* Policy Tells Us About Canada's Place in Space Warfare

The *SSE* policy provides a high-level perspective that can be built upon to answer these questions. The good news is that the government recognizes the changing space threat environment, understands the vulnerability of space systems, and is committed to working with allies to deter and, if need be, defend these capabilities. Importantly, the *SSE* policy asserts that "the Canadian Armed Forces must take its counter-space capabilities into account as it continues to develop the Canadian defence space program". And it highlights the need to work closely with allies and partners on assuring continuous access to space.

> *Defend and protect military space capabilities, including by working closely with allies and partners to ensure a coordinated approach to assuring continuous access to the space domain and space assets. Strong, Secure, Engaged* New Initiative #83

Further, the Innovation for Defence Excellence and Security program (IDEaS), a research and development program to help solve defence and security challenges, will support the development of technologies to assist new space initiatives outlined in the *SSE* policy. For example, IDEaS research into technology to characterize space objects and attribute cyber-attacks would help to identify potential threats to Canadian and allied space assets. Proactive deterrence measures can help to strategize and plan for the most effective alliance actions to hinder these threats.

The development and implementation of the *SSE* policy demonstrates Canada's continued priority to be a leader in defining norms of behaviour in space and to leverage its standing in the world to influence conduct in-orbit. Canada will work within alliances and partnerships to improve the resiliency of space assets. This is likely to signify CSpO holding a key role for the future of allied space operations where Canada can be a participating, responsible and influential partner that consistently adds value.

Filling in the Gaps

Four areas stand out as prime candidates for follow-up in the *SSE* policy with respect to the space domain. First, there must be an internal understanding how Canada would react to conflict that extends into space against national, commercial or allied capabilities. Canadian participation in the Air Force Space Command (AFSPC)-led Schriever space wargame encourages defence policy-makers and military leaders alike to think through this issue, while current events showcasing

counter-space technologies add to the urgency of being prepared for attack against Canadian or allied space systems.

Next, Canada's closest space allies, specifically those within the CSpO, need to understand where each other stands with regard to counter-space threats. A defence space strategy should be developed to answer how Canada will defend and protect military space capabilities. Having a shareable strategy with allies gives a level of predictability and certainty that encourages further information sharing and collaboration.

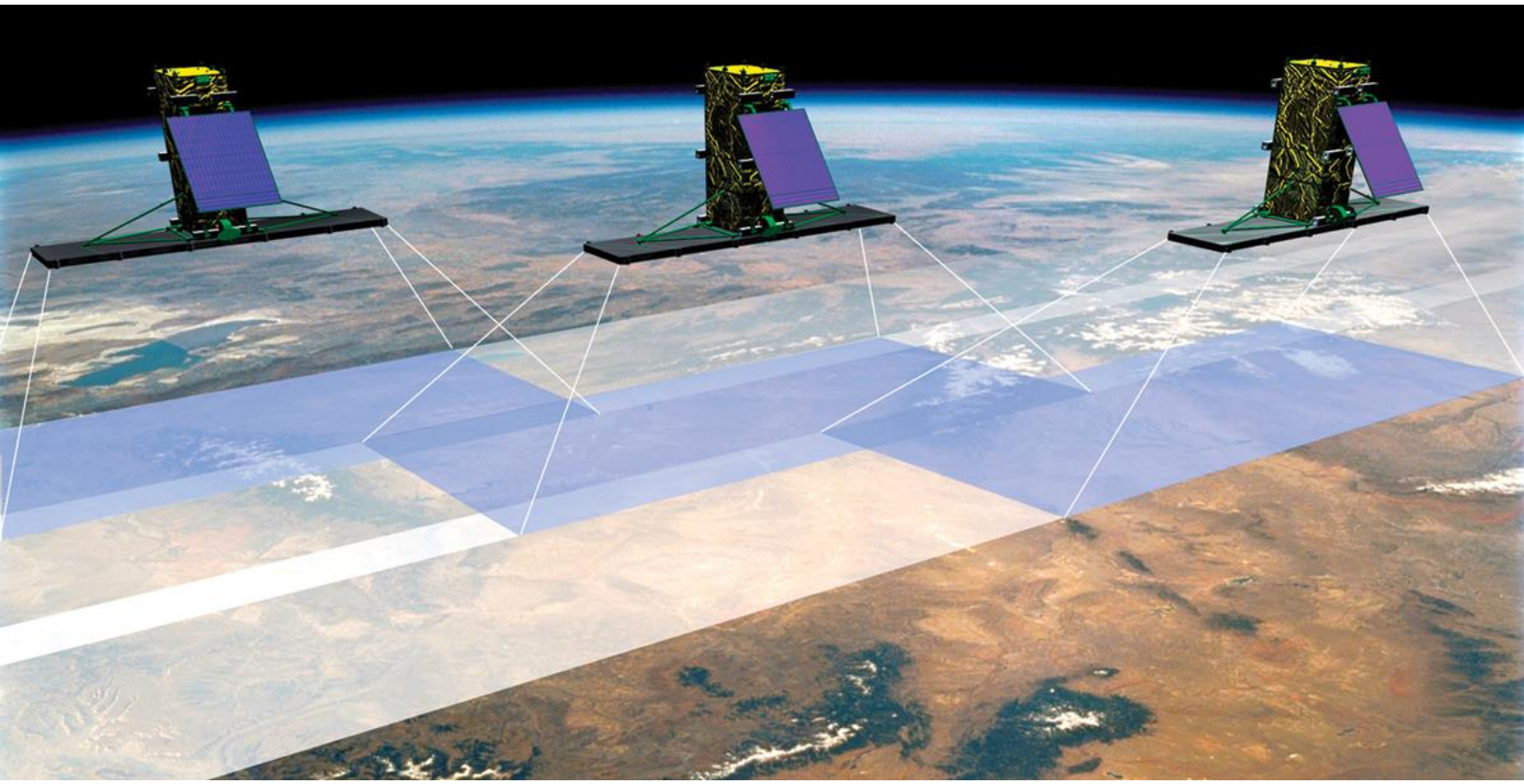


Figure 1: *"Scheduled for launch in 2018, the RADARSAT Constellation Mission is a fleet of three sophisticated remote-sensing satellites that will monitor all of Canada's land and ocean territories and 95 per cent of the world's surface." (Source: MDA Corporation; Canadian Space Agency)*

Third, Canada must ensure that it does not leave a gap in capability that allies have come to rely upon. Scheduled to launch later this year, Radarsat Constellation Mission will bring this continuity. However, DND's Sapphire surveillance of space satellite has reached its minimum design life and a follow-on project is not expected to be delivered until 2025.

Fourth, shaping norms of behaviour in space can be more easily said than done in today's hyper-political environment. However, Canada has several options at its disposal to lead. Efforts at the United Nations Committee on the Peaceful Purposes of Outer Space (UNCOPUOS) are a long and arduous process, yet its 87 members have agreed upon 21 guidelines on space sustainability. Canada's G7 presidency has space security as a topic of concern, with ministers stating in a recent communiqué : "We confirm our resolve in the face of threats in and from space, and our

commitment to build collective resilience against such threats." Additionally, though not an official government activity, Canadians are supporting efforts to develop a better understanding of how international law applies to military space activities through the development of manuals that provide expert guidance on the application of international humanitarian law and the Law of Armed Conflict to space. Finally, there is no better way to lead in developing norms than to lead by example. Canada should instill in national space strategy what it believes to be responsible behaviour in space, and then practise it.

Conclusion

Canada is certainly not immune to disabling or destructive counter-space systems and must play a role in deterring aggressive behaviours that threaten access to space. Canada also has opportunities to be a beacon for responsible actions and diplomacy. The *SSE* policy, though not comprehensive in addressing how Canada will defend against such counter-space threats, sets the tone for increased co-operation with the United States and allies in deterring such conflict. Providing further definition in a space defence strategy would help to frame the extent to which Canada will be involved in deterring aggressive action and defending assets in the space domain.

About the Author

Charity Weeden *is President and co-founder of Lquinox Consulting LLC, an independent space and data management consulting company fostering international partnerships and providing expert advice on the economic, security, scientific, and societal benefits of satellite applications, and is a Fellow at the Canadian Global Affairs Institute. Prior, Ms. Weeden was Senior Director of Policy at the Satellite Industry Association, responsible for advancing industry interests in government services, regulatory, legislative, defense, export-control and trade.*

As a 23-year veteran of the Royal Canadian Air Force, Weeden served as operator, manager, and diplomat for air and space applications in various posts. Her last assignment was as Assistant Attaché of Air & Space Operations at the Embassy of Canada in Washington, DC, liaising with the U.S. Government and Embassy space community. Weeden has also held positions at the Canadian Space Agency, NORAD and USNORTHCOM Headquarters, and U.S. Air Force Space Command, where she was responsible for providing analysis of U.S. Space Surveillance Network satellite observations. She started her Air Force career as a long-range maritime patrol Air Navigator on the CP-140 Aurora, conducting sovereignty operations in the North, fishery and pollution patrols, search and rescue operations, and submarine tracking.

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Canadian Global Affairs Institute

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