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A New Space for NATO: How Is NATO Getting After the Space Domain

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Exercise Solo Flight

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Major Pierre-Luc Gauthier

A NEW SPACE FOR NATO:
HOW IS NATO GETTING AFTER THE SPACE DOMAIN?

Introduction

In most developed countries, reliance on the space domain, for all aspects of life, has increased significantly over the last two decades. In today's world, people around the globe rely continuously on space enabled capabilities and effects for services like banking, commerce, agriculture, weather monitoring, support to disaster relief and social activities.[1] From a military perspective, things are no different. Indeed, as stated in the recent Royal Canadian Air Force (RCAF) Strategy for Space Mission Assurance (SMA), "all military missions today depend on the persistence and precision provided by space-based capabilities enabling global surveillance, communication and the precise application of force in complex operating environments."[2] From the 1991 Operation Desert Storm that was dubbed the first space war, to the 2003 Operation Iraqi Freedom where space support had unequivocally been recognized as critical enabler for the joint force,[3] practitioners of the domain have had to adapt very quickly to changes generated by this swift increased reliance on space. For the United States, this resulted in the creation of the U.S. Space Force in December 2019, a dedicated service branch responsible for the domain.[4] Another result was the official branding of the space domain as a warfighting one by the commander of the U.S. Space Command (USSPACECOM), and the associated shift in mindset it required amongst the joint force.[5] Here in Canada, this resulted in 2022, as stated in *Our North, Strong and Free*, the recently released renewed vision for Canada's Defence, in the "standing up [of] 3 Canadian Space Division, which is responsible for delivering space power in support of Canadian and allied military operations, ensuring space domain awareness, and defending and protecting our […] space capabilities."[6]

These changes were obviously also felt on the broader international stage which drove alliances like the North Atlantic Treaty Organization (NATO) to respond in kind. NATO is not, however, completely new to the space domain. In fact, the alliance has

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[1] Royal Canadian Air Force, 'B-GA-400-000/FP-001 RCAF Doctrine: Air and Space Power' (National Defence, 21 August 2023). 3-2.
[2] Royal Canadian Air Force, *Strategy for Space Mission Assurance*, 1st edition (Ottawa, ON: National Defence, 2022). 2.
[3] Everett Carl Dolman, 'Space Is a Warfighting Domain', *Æther: A Journal of Strategic Airpower & Spacepower* 1, no. 1 (Spring 2022) (2022): 82–90. 83.
[4] United States Space Force, 'History', Official United States Space Force Website, accessed 1 January 2024, https://www.spaceforce.mil/About-Us/About-Space-Force/History/.
[5] Lucy Bierer, 'The New Warfighting Frontier', Defense One, accessed 19 March 2024, http://www.defenseone.com/feature/new-warfighting-frontier/.
[6] Department of National Defence, *Our North, Strong and Free: A Renewed Vision for Canada's Defence* (Ottawa, ON: National Defence, 2024). 33.

been a player in space dating back to the 1960s.[7] Nevertheless, a massive step forward was taken in 2019 when the "allies adopted a new space policy and declared space an operational domain."[8] This however raises a few questions such as how will these changes affect this military alliance that is dependent on contributions from member nations, and how will NATO intend to get after the space domain, from a holistic point of view?

To answer these questions and really understand how NATO endeavours to navigate this new domain, we will take NATO's three core tasks and study them separately in relation to some of the emergent repercussions stemming from the growing influence of space activities. Reaffirmed in NATO's 2022 Strategic Concept, the alliance defines its three core tasks as "deterrence and defence, crisis prevention and management, and cooperative security."[9] In each case, we will start by defining the task, look at space capabilities and effects that NATO can leverage to assist with these activities, expose some of the threats in, through or from the space domain that must be considered in relation to this task, look at what NATO is already doing from a space domain point of view to support this specific endeavor and finish by recommending space-focused areas where NATO could consider investing more to further enhance its ability to conduct this task. This broad examination will demonstrate that NATO possess an adequate understanding of the space domain. However, as this paper will argue, to become a credible and relevant actor in the domain, the alliance must rapidly progress on numerous space-centric initiatives to bolster its ability to deliver on its three core tasks.

Deterrence and Defence

Deterrence can be argued as NATO's main founding principle. Put simply, "the Alliance deters aggression by maintaining a credible deterrence and defence posture based on an appropriate mix of nuclear, conventional and missile defence capabilities, complemented by space and cyber capabilities."[10] From this definition, we can see that capability lies at the centre of the concept of deterrence. However, capability alone cannot achieve deterrence. Looking in Canadian Forces Joint Publication (CFJP) 01 – Canadian Military Doctrine, we can read deterrence defined as "the convincing of a potential aggressor that the consequences of coercion or armed conflict would outweigh

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[7] Aurel Sari and Hitoshi Nasu, 'NATO and Collective Defense in Space: Same Mission, New Domain', *Turkish Policy Quarterly* 20, no. 2 (Summer 2021) (2021): 35–43. 37.
[8] NATO, 'NATO's Approach to Space', NATO, 7 March 2024, https://www.nato.int/cps/en/natohq/topics_175419.htm.
[9] NATO, 'NATO 2022 Strategic Concept' (NATO, 29 June 2022), https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/290622-strategic-concept.pdf. 1.
[10] NATO, 'Deterrence and Defence', NATO, 10 October 2023, https://www.nato.int/cps/en/natohq/topics_133127.htm.

the potential gains."[11] It further asserts that to be successful, deterrence requires the right mix of credibility and political will for the use of said capabilities, if required.[12] Therefore, put together, it can be posited that deterrence can be achieved with the right capabilities, sufficient credibility and adequate supporting strategic messaging.[13]

Broadening the aperture to include the space domain, we can find that "scholars define space deterrence as preventing an adversary's hostile actions against both space-based assets and terrestrial systems that support space operations by whatever means."[14] Merging these two ideas together, we can therefore conclude that for NATO to be successful at space deterrence, it must possess, or have access to the right ground based and on orbit space capabilities to match those of potential adversaries, be seen as a credible space actor through the actions of its member nations and control a narrative that serves NATO's interests in the space domain. Searching through NATO's overarching space policy, we can find lines of effort that are supporting these principles. For example, it is stated that "the alliance will consider a range of potential options, for Council approval, across the conflict spectrum to deter and defend against threats to or attacks on Allies' space systems."[15]

With the general concepts surrounding NATO's space deterrence defined, let us now look at specific space enabled capabilities and effects that can support the alliance in the accomplishment of this task. At this point, it is important to point out that as part of its strategic messaging campaign, NATO has come out stating that "the Alliance is not aiming to develop space capabilities of its own and will continue to rely on national space assets."[16] Therefore, NATO is not looking at procuring and operating its own space assets, akin to the NATO Airborne Early Warning And Control Force,[17] but will be looking at leveraging space enabled capabilities and effects that will be presented to the alliance by its member nations.

First, for an alliance or a nation to be successful at deterring and defending against adversarial actions in the space domain, it must maintain a certain level of awareness within the domain. In Canadian doctrine, Space Domain Awareness (SDA) is

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[11] Department of National Defence, 'Canadian Forces Joint Publication 01 - Canadian Military Doctrine', September 2011. GL-2.
[12] *Ibid*.
[13] Robert P. Haffa Jr., 'The Future of Conventional Deterrence: Strategies for Great Power Competition', *Strategic Studies Quarterly*, no. Winter 2018 (2018): 94–115. 96.
[14] Kiseok Michael Kang, 'Extended Space Deterrence: Providing Security Assurance in Space', *Journal of Strategic Security* 16, no. 2 (July 2023): 11–25, https://doi.org/10.5038/1944-0472.16.2.2095. 13.
[15] NATO, 'NATO's Overarching Space Policy', NATO, 17 January 2022, https://www.nato.int/cps/en/natohq/official_texts_190862.htm.
[16] NATO, 'NATO's Approach to Space'.
[17] NATO, 'Airborne Early Warning and Control Force', awacs.nato.int, accessed 21 March 2024, https://awacs.nato.int/default.aspx.

defined as "the effective identification, characterization and understanding of any factor […] associated with the space operating domain that could affect space operations and thereby impact the security, safety, economy or environment."[18] Therefore, it can be posited that sufficient SDA capabilities rest as the foundation upon which space deterrence and defence can then be built. This is a common truth within space practitioners and NATO seems to have hoisted that point in as this is identified as the alliance's first line of effort in support of its key roles, as part of its overall approach to space.[19] SDA capabilities can be a mix of ground-based sensors and on orbit assets focusing on the *surveillance of space* aspect of space operations; versus *surveillance from space* which relates more to the support of the joint force for operations in conventional domains.

Once an adequate awareness of the domain has been achieved, the next categories of space capabilities that are crucial for effective deterrence and defence are counter-space capabilities. These are designed to "prevent an adversary's hostile use of space capabilities or negate an adversary's ability to interfere with or attack Allied space systems while protecting friendly space capabilities from attack, interference, or unintentional hazards."[20] As one can see, the main purposes of counter-space capabilities line up very well with the ultimate goals of deterrence and defence. Counter-space capabilities can be categorized as active or passive, kinetic or non-kinetic, and can range from reversible to non-reversible.[21] Examples of counter-space capabilities can range from Direct Ascent Anti-Satellite weapon (DA-ASAT), co-orbital ASAT, laser-based or microwave-based Directed-Energy Weapon (DEW) meant to dazzle or blind adversarial satellites, jamming, spoofing, and cyber-attacks.[22] The issue however with counter-space capabilities is that only a handful of countries possess them. Hence the need in this case to talk about the concept of extended space deterrence.

This concept "can be defined as dissuading an adversary from harming a third party's space assets."[23] It is somewhat similar to the familiar concept of extended nuclear deterrence that played a key role during the Cold War, but instead of resting on the possession of nuclear weapon, it rests on the possession of counter-space capabilities.[24] In

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[18] Royal Canadian Air Force, 'RCAF Doctrine: Air & Space Power'. 3-16.
[19] NATO, 'NATO's Overarching Space Policy'.
[20] Paul A. Tombarge, 'NATO Space Operations', George C. Marshall European Center For Security Studies, December 2014, https://www.marshallcenter.org/en/publications/occasional-papers/nato-space-operations-0.
[21] Defense Intelligence Agency, 'Challenges to Security in Space: Space Reliance in an Era of Competition and Expansion' (Washington, D.C.: United States Government, March 2022). 3.
[22] Todd Harrison et al., 'Space Threat Assessment 2020', CSIS Aerospace Security Project (Washington, D.C.: Center for Strategic & International Studies, March 2020). 6-7.
[23] Kang, 'Extended Space Deterrence'. 13.
[24] Kang, 'Extended Space Deterrence'. 11.

the case of NATO, the major space power that can be seen as providing extended space deterrence for all the alliance member nations is the U.S., with France having recently signaled intentions to develop capabilities in that field as well.[25] The 2020 Defense Space Strategy Summary states that "DoD will be prepared to protect and defend U.S. and, as directed, allied, partner, and commercial space capabilities and to deter and defeat adversary hostile use of space."[26] However, scholars argued that even if the U.S. has the capabilities and is messaging intent, credibility remains lacking.[27] To emphasize this point, it is posited that "for extended deterrence to work in space, both a defender and an aggressor should have a clear understanding that certain kinds of hostile actions against one's space assets will trigger a military response."[28] This clear delineation remains mostly inexistant to this day and this brings up a topic that is at the centre of many ongoing discussions and arguments: NATO's concept of collective defence and the existing uncertainties regarding the alliance's position in relation to invoking Article 5 of the North Atlantic Treaty (NAT) for an attack against a member nation's on-orbit space capability.[29]

To fully understand the questions at play, let us first look how Article 5 is defined. From NATO's official website, we can read from Article 5 "that if a NATO Ally is the victim of an armed attack, each and every other member of the Alliance will consider this act of violence as an armed attack against all members and will take the actions it deems necessary to assist the Ally attacked."[30] The reason why this gets murky when dealing with on-orbit space assets is because of the complementing verbiage, relating to Article 5, found under Article 6. For the purpose of Article 5, Article 6 states that the armed attack at the basis of an Article 5 invocation must be deemed to be "on the territory of any of the Parties in Europe or North America, […] or on the Islands under the jurisdiction of any of the Parties in the North Atlantic area north of the Tropic of Cancer,"[31] or

> on the forces, vessels, or aircraft of any of the Parties, when in or over these territories or any other area in Europe in which occupation forces of any of the Parties were stationed on the date when the Treaty entered into

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[25] Kevin Pollpeter and Elizabeth Barrett, 'NATO Ally Contributions to the Space Domain' (China Aerospace Studies Institute, October 2021). 9.
[26] U.S. Department of Defense, '2020 Defense Space Strategy Summary' (Washington, D.C.: The United States Government, June 2020). 2.
[27] Kang, 'Extended Space Deterrence'. 18.
[28] *Ibid*.
[29] Sari and Nasu, 'NATO and Collective Defense in Space: Same Mission, New Domain'. 35.
[30] NATO, 'Collective Defence and Article 5', NATO, accessed 21 March 2024, https://www.nato.int/cps/en/natohq/topics_110496.htm.
[31] *Ibid*.

> force or the Mediterranean Sea or the North Atlantic area north of the Tropic of Cancer.[32]

Therefore, by looking at the definitions alone, it is easy to understand the challenges with invoking Article 5 for an armed attack against a member nation's on-orbit (and uncrewed) space asset.[33] It is indeed asserted that taken together, the restrictive language of Articles 5 and 6 "seems to exclude attacks in space, after all."[34] Nevertheless, at the 2021 Brussels Summit, in an attempt to clear up confusion on the matter and build on the 2019 declaration that space was now considered an operational domain, "NATO recognised that attacks to, from or within space present a clear challenge to the security of the Alliance and could lead to the invocation of Article 5 of the North Atlantic Treaty."[35] An interesting additional point worth mentioning is that during the same summit, allied leaders stipulated that the decision to whether or not invoke Article 5 for such attacks "would be taken by the North Atlantic Council on a case-by-case basis."[36] We can therefore infer that NATO has made some headway in considering the application of Article 5 of the NAT for attacks to, from or within space, but the actual thresholds for potential invocation remain very much nebulous. Along these lines, scholars argue that this should be NATO's next development in the space domain.[37] It is indeed argued that NATO must "reach consensus on a threshold that constitutes an attack against all in the […] space domain."[38] By doing so, NATO will show resolve and bolster its credibility towards deterrence and collective defence.

At this point, let us now examine some real and credible space threats to NATO's first core task of deterrence and defence; threats that, as we just saw, could potentially result in Article 5 invocation if used against member nations. Considering that NATO deployed significant efforts in the last two years to increase its overall readiness following the Russian attacks on Ukraine, let us examine first what Russia has at its disposal as far counter-space capabilities. From a recent unclassified Defense Intelligence Agency (DIA) report, we can read that Russia is developing ASAT systems and, also has

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[32] *Ibid*.
[33] Noting here that the debate rests solely for a scenario of an attack towards an *on-orbit* space asset from a ground-based or co-orbital weapon system. An attack from space into one or more of the conventional domains (i.e. land, sea, air) can clearly fall within the purview of Article 5.
[34] Aurel Sari, 'NATO in Outer Space: A Domain Too Far?', Lieber Institute West Point, 1 October 2020, https://lieber.westpoint.edu/nato-outer-space/.
[35] NATO, 'NATO's Approach to Space'.
[36] NATO, 'Brussels Summit Communiqué Issued by NATO Heads of State and Government (2021)', NATO, 14 June 2021, https://www.nato.int/cps/en/natohq/news_185000.htm.
[37] Rose Gottemoeller et al., 'Engaging with Emerged and Emerging Domains: Cyber, Space, and Technology in the 2022 NATO Strategic Concept', *Defence Studies* 22, no. 3 (3 July 2022): 516–24, https://doi.org/10.1080/14702436.2022.2082955. 516.
[38] *Ibid*. 521.

ground-based lasers capable of blinding satellites in low earth orbit.[39] A few specific systems worth highlighting are the Nudol, the Burevestnik, and the Nivelir. The Nudol is a "mobile missile defense complex […] which Russian sources describe as capable of destroying ballistic missiles and low-orbiting satellites."[40] The Nudol is the system that was tested in November 2021 against a defunct Roscosmos[41] satellite, creating over 1500 pieces of trackable debris upon impact.[42] Is it interesting to note that for this specific event, "NATO Allies have condemned Russia's reckless and irresponsible anti-satellite missile test,"[43] as part of a strategic messaging campaign. The Burevestnik on the other hand, is a system "based on the Soviet-era system called *Contact* that was designed for launching an ASAT missile from a MiG-31 fighter aircraft."[44] Lastly, the Nivelir program has seen the Russian launched what is descried as an inspector satellite to carry out on-orbit servicing, but "the satellite's behavior has been inconsistent with on-orbit inspection or SSA activities."[45] With that, we can confidently argue that Russia possess credible counter-space capabilities that can challenge NATO's interests in the space domain.

Turning towards China, we can quickly expose that they possess even more counter-space capabilities than Russia. Hence why China is often dubbed by the West as the pacing challenge, or pacing threat, in the space domain.[46] From the same comprehensive DIA report, we learn that "China has […] launched multiple ASAT missiles that are able to destroy satellites and developed mobile jammers to deny SATCOM and GPS."[47] It is also offered that China is developing a new kind of counter-space capability "in the form of spacecraft with robotic arms that might quickly disable US military satellites in a conflict."[48] Finally, also playing in that field are North Korea and Iran that most likely do not own DA-ASAT yet, but are continuing to develop their ballistic missile programs which often serve as the basis for anti-satellite missiles.[49]

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[39] Defense Intelligence Agency, 'Challenges to Security in Space'. 28.
[40] Defense Intelligence Agency, 'Challenges to Security in Space'. 28.
[41] Roscosmos is the Russian civil agency responsible for space; much like the NASA for the U.S. and the Canadian Space Agency for us here in Canada.
[42] Shannon Bugos, 'Russian ASAT Test Creates Massive Debris', Arms Control Association, December 2021, https://www.armscontrol.org/act/2021-12/news/russian-asat-test-creates-massive-debris.
[43] NATO, 'NATO's Approach to Space'.
[44] Defense Intelligence Agency, 'Challenges to Security in Space'. 29.
[45] *Ibid*. SSA stands for "Space Situational Awareness" which can be seen as a subset of Space Domain Awareness (SDA).
[46] U.S. Department of Defense, '2022 National Defense Strategy' (Washington, D.C.: The United States Government, 27 October 2022). 1.
[47] Defense Intelligence Agency, 'Challenges to Security in Space'. 8.
[48] James Clay Moltz, 'The Changing Dynamics of Twenty-First-Century Space Power', *Journal of Strategic Security* 12, no. 1 (April 2019): 15–43, https://doi.org/10.5038/1944-0472.12.1.1729. 312.
[49] Harrison et al., 'Space Threat Assessment 2020'. 35.

Fortunately, by looking at NATO's space policy, we can see that the alliance understands the importance of these threats quite well. Indeed, we can read the affirmation that "potential adversaries are developing, testing and operationalising sophisticated counter-space technologies that could threaten Allies' access to, and freedom to operate in space."[50] And since counter-space capabilities are only the purview of a handful of states, mainly the U.S. in the case of NATO, collaboration and intelligence sharing becomes vital to ensure the alliance maintains an analogous understanding of this space mission area. Along these lines, NATO's space policy states that the alliance must be "serving as a forum for political-military consultations and information sharing on relevant deterrence and defence-related space developments."[51]

However, some scholars raise the preponderance of NATO space assets belonging to the U.S. as a major detractor to alliance cohesion in the space domain and a limiting factor in the alliance's ability to exert credible space deterrence.[52] A possible avenue for improvement offered is that "NATO member states other than the U.S. should engage in more concerted efforts to develop their own satellite programs with defence applications to supplement NATO's pool of orbital assets."[53] Finally, another area of potential growth, vis-à-vis NATO's existing space policy, would be to openly discuss a plan to integrate counter-space capabilities into its concepts of operation.[54] In adapting to new threats and key capabilities, and by messaging intent, NATO will bolster its credibility as a serious space actor and will, simultaneously, enhance its deterrence posture.

Crisis Prevention and Management

Crisis prevention and management is NATO's second core task.[55] NATO's latest strategic vision asserts that the alliance "will continue to work to prevent and respond to crises when these have the potential to affect Allied security [and] […] will build on the unique capabilities and expertise […] acquired in crisis management."[56] The first time for NATO to take part in a major crisis management operation was in 1992, in the former Yugoslavia.[57] Prior to that operation, NATO's Strategic Concept was already recognizing the role of the alliance in crisis management, but following a series of similar

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[50] NATO, 'NATO's Overarching Space Policy'.
[51] *Ibid*.
[52] Jonas Vidhammer Berge and Liselotte Odgaard, 'NATO in the Global Commons: Defending Outer Space Against Threats from China', *International Journal: Canada's Journal of Global Policy Analysis* 78, no. 4 (December 2023): 634–42, https://doi.org/10.1177/00207020231217119. 634.
[53] *Ibid*. 640.
[54] Benjamin Silverstein, 'NATO's Return to Space', War on the Rocks, 3 August 2020, http://warontherocks.com/2020/08/natos-return-to-space/.
[55] NATO, 'NATO 2022 Strategic Concept'. 1.
[56] *Ibid*. 9.
[57] NATO, 'Crisis Management', NATO, 7 July 2022, https://www.nato.int/cps/en/natohq/topics_49192.htm.

experiences, the concept was broaden to include activities to prevent crises and considerations for efforts that must be deployed following conflicts.[58] In today's NATO lexicon, crisis response can represent a myriad of different situations "that may include conflict prevention, peacekeeping, peacemaking, peace building, peace enforcement and humanitarian operations."[59] An important key factor to consider for NATO's task of crisis prevention and management, that was not such an important factor in the case of deterrence and defence, is the fact that this is not merely a task for military organizations alone.[60] Indeed, "NATO recognises that the military alone cannot resolve a crisis or conflict, and […] make it clear that a comprehensive political, civilian and military approach is necessary for effective crisis management."[61]

With that in mind, if we move to what the space domain can bring to strengthen NATO's ability to conduct crisis prevention and management, it can be posited that this task will rely more heavily on space mission areas that have for focus to enable operations in traditional domains, versus counter-space capabilities like what we saw for the task of deterrence and defence. In fact, building upon the need to maintain sufficient awareness of the space domain, as exposed in the last section, NATO's first line of effort in support of its key roles also identifies "Intelligence, surveillance and reconnaissance [ISR]; space-based monitoring of the atmospheric, oceanic and space environment; satellite communications; positioning, navigation and timing [PNT]; and shared early warning"[62] as space mission areas that are critical to its ability to handle crises. Therefore, much like most modern militaries, NATO has become reliant to the support provided by space capabilities and effects for the conduct of its operations.[63]

Referring to the RCAF strategy for SMA, it is asserted that "Canada and its allies and partners must now navigate a future in Space that is increasingly congested, competitive, [and] contested."[64] This is no different for NATO and if we circle back to the many counter-space capabilities discussed in the last section, we can infer that these fell in the *contested* aspect of the space domain. If we look at the aspects that are left, *congested* and *competitive*, we can argue that one can perhaps threaten NATO's ability to conduct crisis management and prevention where the other one can, in some respect, support it. The congested aspect of the space domain can be defined as "the increasing growth in the number of space systems in orbit and proliferation of space debris."[65] Every

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[58] NATO, 'Crisis Management'.
[59] *Ibid*.
[60] NATO, 'NATO 2022 Strategic Concept'. 9.
[61] NATO, 'Crisis Management'.
[62] NATO, 'NATO's Overarching Space Policy'.
[63] Sari and Nasu, 'NATO and Collective Defense in Space: Same Mission, New Domain'. 37.
[64] Royal Canadian Air Force, *Strategy for Space Mission Assurance*. 3.
[65] *Ibid*.

day, this aspect of the space domain is threatening our continued ability to leverage the space domain for the conduct of operations.

To minimize risk here, an ability to maintain adequate SDA comes in to play again. To increase alliance resilience in that specific space mission area, NATO recently launched the Alliance Persistent Surveillance from Space (APSS) initiative.[66] This new initiative is a "multi-year, multi-domain, multinational initiative that aims to achieve 'persistent surveillance', [and] increase space-based intelligence sharing across the Alliance,"[67] to name a few of the key objectives. From the press release on this initiative, we learn that APSS "will make use of existing and future space assets in Allied countries and connect them together in a NATO virtual constellation called *Aquila*."[68] This initiative is clearly a step in the right direction towards minimizing some of the risks associated with the ever-growing congestion of the space domain and will simultaneously create a level of resilience around NATO's ability to leverage the domain for the conduct crisis prevention and management. Interesting to point out that Canada is part of that initiative, with 15 other NATO members, plus invitees Finland and Sweden.[69] Finally, this initiative can also serve as a direct response to some of the critics that were arguing that NATO was falling behind with no intentions or plans for an alliance wide SSA program.[70]

If we turn to the competitive aspect of the space domain, it is defined in RCAF doctrine as "increasing number of state-sponsored space programmes and a wave of activity from the commercial sector in pursuit of new business opportunities."[71] Remembering that NATO identified its core task of crisis prevention and management as a collaborative one between political, civilian and military entities, this is where we can perhaps see the role of civil and commercial space actors playing an increasingly important role supporting NATO in that task. Combined with the fact that NATO's APSS initiative is looking at further leveraging the "effective use of both government-owned and commercial space-based assets, technologies and data,"[72] we can see there again the competitive aspect of the space domain playing in favour of this NATO task. This rapprochement between military and commercial space actors in a NATO context is

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[66] NATO, 'Alliance Persistent Surveillance from Space (APSS)' (Public Diplomacy Division (PDD), February 2023), https://www.nato.int/nato_static_fl2014/assets/pdf/2023/2/pdf/230215-factsheet-apss.pdf.
[67] *Ibid*.
[68] NATO, 'Alliance Persistent Surveillance from Space (APSS)'.
[69] *Ibid*.
[70] Silverstein, 'NATO's Return to Space'.
[71] Royal Canadian Air Force, 'RCAF Doctrine: Air & Space Power'. 3-8.
[72] NATO, 'Alliance Persistent Surveillance from Space (APSS)'.

following similar trends that can be witnessed in most Combined Space Operations (CSpO) nations,[73] including Canada.[74]

One final point worth highlighting in relation to the task of crisis prevention and management are the exercises NATO organizes "in which […] Headquarters (civilian and military) and capitals participate, including partners and other bodies that may be involved in a real-life crisis."[75] For these events, however, a lesson observed was that "rotating space expertise into an organization only in times of crisis did not lead to effective integration of space capabilities."[76] A possible way to improve here may be to further develop and leverage NATO's Space Operations Centre[77] in Ramstein, Germany, or NATO's Space Centre of Excellence[78] in Toulouse, France, to continue to improve and help sustain NATO's overall expertise in the space domain.

Cooperative Security

On to NATO's third and last core task, cooperative security.[79] For this last task, it is not as straightforward as with the first two tasks to find direct correlations with the space domain that may perhaps support or threaten alliance activities, yet it is still possible to find areas where space can play a role in NATO's concept of cooperative security. From NATO's definition of this task, partnerships are seen as the foundation for success[80] and it is argued that cooperative security "is best assured through a wide network of partner relationships with countries and organisations around the globe."[81] Looking at NATO's overarching space policy, we can find, this time again, initiatives that are supporting this task. Indeed, as an example, is it stated that "NATO will engage

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[73] CSpO is an alliance of spacefaring nations that have come together to partner in national security space operations and lead as responsible space actors. CSpO started in 2014 and now includes Australia, Canada, France, Germany, Italy, Japan, New Zealand, Norway, the United Kingdom, and the United States.
[74] Cal Biesecker, 'Space Command Introduces Strategy to Work with Commercial Partners', Defense Daily, 5 April 2022, https://www.defensedaily.com/space-command-introduces-strategy-to-work-with-commercial-partners/space/; CSpO Nations, 'Combined Space Operations Vision 2031' (Combined Space Operations, 22 February 2022). 3; UKspace, 'UKspace and RAF to Establish Commercial Integration Cell for Greater Military and Commercial Space Collaboration', UKspace, 23 July 2020, https://www.ukspace.org/ukspace-raf-establish-cic-for-greater-military-and-commercial-space-collaboration/.
[75] NATO, 'Crisis Management'.
[76] Tombarge, 'NATO Space Operations'.
[77] NATO, 'NATO Space Centre | Home', shape.nato.int, accessed 22 March 2024, https://shape.nato.int/about/aco-capabilities2/nato-space-centre.aspx.
[78] NATO, 'NATO Space Centre of Excellence | Home', NATO Space, accessed 22 March 2024, https://www.space-coe.org.
[79] NATO, 'NATO 2022 Strategic Concept'. 1.
[80] NATO, 'NATO 2022 Strategic Concept'. 10.
[81] NATO, 'Partnerships: A Cooperative Approach to Security' (Public Diplomacy Division (PDD), December 2013), https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2013_12/20131127_131201-MediaBackgrounder-Partne.pdf. 1.

with selected partners and relevant international organisations, such as the UN and the EU, on space and space-related aspects, as appropriate, and where it adds value to NATO's core tasks."[82] Therefore, we can argue that NATO understands well that both its concept of cooperative security and peaceful evolution in the space domain rests heavily on international partnerships and cooperation.

To highlight possible space capabilities and effects that can support the task of cooperative security, it is posited that "intra-Alliance communication improves the resilience of the Alliance and enhances Cooperative Security and Crisis Management."[83] Building on this argument, we find NATO implementing concrete steps, whilst leveraging the space domain, to enhance the alliance's capabilities in that area. Indeed, "to allow NATO forces to communicate more securely and quickly, NATO is investing over EUR 1 billion in procuring satellite communications services for the period of 2020-2034. This is the Alliance's biggest-ever investment in satellite communications."[84] This will without a doubt bolster NATO's ability to fulfil its cooperative security task and will also enhance the alliance ability to conduct its two other previously discussed core tasks. This specific investment also reminds us of two concepts discussed earlier: the fact that NATO is not looking at acquiring its own space assets[85] and a contemporary space operations landscape that is colored by a prevailing rapprochement between military, civil and commercial space actors. This last point is, in of itself, argued to be something that supports NATO's efforts towards cooperative security. Indeed, it is offered that "cooperation with industry partners […] to maintain a cutting technological edge […] enhances cooperative security through a common strategic culture of innovation." [86] We can therefore expect this trend to remain steady as the world continues to further explore space and leverage the domain in new innovative ways.

If we now focus on potential threats emanating from the space domain that can impact NATO's third core task, we uncover not physical threats per se, put perhaps a more normative limitation that can play against the concept of cooperative security. In fact, a very relevant contemporary issue that can be found at the intersection of international relationships (and therefore cooperative security), and the space domain is the evolving discussion surrounding space law.[87] Indeed, with technology and space activities growing at a dizzying pace, it leaves international rules and regulations making bodies meant to govern outer space, in a never ending race trying to catch up with these

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[82] NATO, 'NATO's Overarching Space Policy'.
[83] Gottemoeller et al., 'Engaging with Emerged and Emerging Domains'. 520.
[84] NATO, 'NATO's Approach to Space'.
[85] *Ibid*.
[86] Gottemoeller et al., 'Engaging with Emerged and Emerging Domains'. 516.
[87] Josh Gonzales and Jason Joll, 'Space Law Pt. 1', Spacepower, accessed 21 March 2024, https://www.airuniversity.af.edu/Wild-Blue-Yonder/Podcast/mod/42855/player/560/audio/75885.

rapid changes.[88] Something that NATO is doing to positively affect this forum is actively supporting "international efforts to develop norms, rules and principles of responsible space behaviours."[89] This again is done in partnership with other international organizations like the United Nations (UN) and the European Union (EU).

An area of potential growth in this forum could be further collaboration between NATO and CSpO. As we saw quickly previously, founded in 2014, CSpO is a relatively new military alliance of spacefaring nations that is defined around these four guiding principles: "freedom of use of space, responsible and sustainable use of space, partnering while upholding sovereignty, and upholding international law."[90] With both NATO and CSpO voicing an intent to lead as responsible space actors, a rapprochement here could further enhance security in the space domain and could also minimize the risk of possible duplication of efforts. Linkages already exists between NATO and CSpO at the operational level with both Germany and France being CSpO members and being country hosts for NATO's Space Operations Centre and Space Centre of Excellence respectively.[91] Further collaboration would benefit both organizations and would support NATO's vision of cooperative security.

Conclusion

NATO, much like many other organizations, military or otherwise, has realized the advantages brought by space enabled capabilities and effects. And to be able to continue to reap such benefits, the alliance has had to adjust its posture accordingly, so further emphasis was placed on the enabling of a growing number of relevant space activities, all the while protecting and defending vital space enabled capabilities that are now seen as paramount for the successful conduct of NATO's three core tasks. By examining those three tasks separately, it has been possible to expose specific space domain activities that may be supporting, or perhaps threatening each task. Also, we looked at what NATO is already doing from a space perspective to support each task and offered some areas for potential further exploration.

Looking at the task of deterrence and defence, we defined the concepts of space deterrence and extended space deterrence and argued that to be seen as a credible actor in this forum, NATO must have access to the right mix of SDA and counter-space

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[88] Department of National Defence, *Strong Secure Engaged: Canada's Defence Policy* (Ottawa, ON: National Defence, 2017). 57.
[89] NATO, 'NATO's Overarching Space Policy'.
[90] CSpO Nations, 'Combined Space Operations Vision 2031'. 2.
[91] Allied Air Command Public Affairs Office, 'NATO Allies Enhance Space Coordination and Capabilities', ac.nato.int, 11 December 2023, https://ac.nato.int/archive/2023/CSpO_and_SPACEFOREUR-AF.aspx.

capabilities. This led us to a more contentious issue surrounding NATO's concept of collective defence, and the invocation of Article 5 for an armed attack in the space domain. The argument was then made that to bolster resolve and enhance credibility towards deterrence and collective defence, NATO should seek to publish thresholds for such potential invocation. Then, some of the space threats from Russia and China were summarized. Finally, some recommendations were offered in that NATO should attempt to branch out from an over-reliance on U.S. space capabilities and should also consider including counter-space capabilities into its concepts of operation.

Moving on to the task of crisis prevention and management, the importance of collaboration with whole of government and whole of society was underlined. It was then argued that space capabilities and effects that have for purpose to support terrestrial operations were key here (i.e. ISR, PNT, space weather, SATCOM and space warning). This task was then assessed through the lens of the different characteristics defining the space domain (i.e. contested, congested and competitive) to see where risks or opportunities may lie. Finally, the concept of readiness and enduring expertise was quickly covered, and ideas were offered along those lines, about further leveraging NATO's Space Operations Centre and Space Centre of Excellence.

On to the final task of cooperative security, the importance of partnerships and relationships was offered at the onset as a key aspect in this case. From a space domain point of view, it was argued that this can be witnessed through a rapprochement between military, commercial and civil space actors. Turning towards possible threats, it was identified that evolving norms, rules and principles of responsible space behaviours have difficulties keeping pace with the rapid advancements within the domain, leaving this situation as a potential threat here. Finally, a possible area of growth suggested for this task is further collaboration between NATO and CSpO.

Through a detailed examination of NATO's three core tasks in relation with space, we have been able to firmly grasp how the alliance has, thus far, positioned itself to go after this domain. At each turn, opportunities, risks, and areas for potential future growth were uncovered. As a final thought, it can be argued that overall, NATO seems to understand the importance of this domain and the pressing need to protect and defend space capabilities and effects. However, for the alliance to be seen as a credible and relevant actor in the domain, further initiatives must be stood up to progress on the initial trend established.

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