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ANALYSIS OF DEPARTMENT OF NATIONAL DEFENCE SPACE POLICY

LCdr C.E. Kabatoff

JCSP 40

Exercise *Solo Flight*

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LCdr C.E. Kabatoff

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ANALYSIS OF DEPARTMENT OF NATIONAL DEFENCE SPACE POLICY

> *Canadian policymakers should not rest on their laurels. Space weaponization is an inevitable reality for all countries, including Canada.*
>
> - Steve Butcha, *Space Weaponization and Canada-US Relations*

The significance of space and its application to every day life has reached critical importance, as both military and civilian operations now have critical dependencies on space. The Department of National Defence (DND) has demonstrated some recognition of the strategic and operational importance of space with the recent establishment of the Director General-Space (DG Space), the stand-up of the Space Component Commander (SCC) as well as the Canadian Space Operations Centre (CANSpOC) within the Canadian Joint Operations Centre (CJOC).[1] These actions speak to DND's commitment to ensuring space applications continue to enable and enhance Canadian Armed Forces' (CAF) operations.

However, all of these actions have taken place under an antiquated DND Space Policy. Considering the CAF's dependency on space and the significant increased use of space by numerous countries and commercial entities, it is clear that DND Space Policy is lacking in several areas. The purpose of this paper is to expand further upon those areas where DND Space Policy can and should improve. This analysis starts with a brief introduction on space and explains its strategic and operational importance. Then, the current Canadian and DND Space Policies are introduced. Finally, an analysis is

[1] Government of Canada, Department of National Defence and the Canadian Armed Forces, "Supporting Operations Through Space," Last modified 25 March 2014, http://www.forces.gc.ca/en/news/article.page?doc=supporting-operations-through-space/ht6x4r56.

conducted on the DND Space Policy, which examines the policy from a domestic and global perspective, from which numerous policy gaps will be exposed.

SPACE BACKGROUND & TRENDS

Although many may believe that the definition for space is straightforward, it is not. In fact, the United Nations has not defined outer space in the Outer Space Treaty (OST), and the United Nations Committee on the Peaceful Uses of Outer Space is continuing to ask member states if outer space should in fact, be defined.[2] For the purposes of this paper, the term space will be taken to mean altitudes above 100km, otherwise known as the Karman line,[3] up to and including the Geo-Stationary Orbit (GEO). This constrained definition is used because Canada and DND currently have no operational interest outside this region. Below 100 km spacecraft cannot remain in orbit, and above GEO, there are no known applications for DND.

Within this region of space, there are essentially three types of orbits of interest to DND. First, Low-Earth Orbit (LEO) satellites operate below 2000 km and consist primarily of Earth Observation (EO) satellites for Intelligence, Surveillance and Reconnaissance purposes.[4] Medium-Earth Orbit (MEO) satellites operate at the 10,000-20,000 km range, and are best for communications and Position, Navigation and Timing (PNT) satellites. The United States (US) version of PNT satellites are known as the Global Positioning System (GPS), while the Russians have GLONASS and the Chinese

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[2] United Nations Office of Outer Space Affairs, "Questions on the Definition and Delimitation of Outer Space: Replies from Member States," Last Accessed 22 May 2015, http://www.unoosa.org/pdf/reports/ac105/AC105_889Add13E.pdf.

[3] Fédération Aéronautique Internationale, "100km Altitude Boundary for Astronautics," Last modified on 25 May 2012, http://www.fai.org/icare-records/100km-altitude-boundary-for-astronautics.

[4] Cesar Jaramillo edit., *Space Security Index 2014* (Kitchner: Pandora Print Shop, 2014), 97.

have BeiDou. Finally, GEO satellites orbit at 36,000 km and at this distance satellites remain virtually stationary in relation to the surface of the Earth. This makes these orbits suitable for communication and weather satellites.[5] These three classes of orbits and their associated applications are where all of DND's space interests currently lie.

Canada is not the only country, and DND not the only defence department increasing its foray into space. As a result, space today has been characterized by the United States as being *congested*, *contested* and *competitive*.[6]

Space is *congested* due to other spacecraft, debris and Radio Frequency (RF) spectrum use. Space debris now "poses a significant, constant, and indiscriminate threat to all spacecraft."[7] The RF spectrum is being used by an increasing number of satellites, which are "using frequency bands in common and increasing the likelihood of frequency interference."[8]

Space is *contested* in that a growing number of nations are employing "a wider spectrum of weapons capable of countering U.S. space capabilities."[9] William Lynn makes an alarming point that "irregular warfare has come to space,"[10] since more nations are adding counter-space capabilities as part of their military doctrine.[11]

Space is *competitive* for the industrial base of each space-faring nation. With the proliferation of nations and companies exploiting space, traditional space industries now have to compete globally. For example, satellite imagery is being produced by companies

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[5] Government of Canada, Department of National Defence and the Canadian Armed Forces, "Space Applications Course Manual, v1.5," 3-15-3-17

[6] Jaramillo, *Space Security Index 2014*, 90.

[7] *Ibid*., 10.

[8] *Ibid*., 11.

[9] William J. Lynn III, "A Military Strategy for the New Space Environment," *The Washington Quarterly* 34 (2011): 10.

[10] *Ibid*., 11.

[11] *Ibid*.

like Planet Labs, which announced that it will democratize near-real-time imagery of the entire globe by providing universal access.[12] This transformational approach to providing high-resolution imagery puts traditional imagery providers at risk of not being able to compete.

Globally, there is a transformation occurring where Space is being considered as a new domain, just like Army, Navy or Air Force. Today, the US "[Department of Defense] recognizes it as one of the five domains in which US forces operate."[13] As a result, militaries have to consider operations *in* space, and not just support operations *from* space, as illustrated by the recent advent of the term 'space control' in the US National Space Policy (NSP) 2010.[14] With this new way of thinking about space, other nations are planning and developing space control.[15]

SPACE POLICY

United Nations Outer Space Treaty

Global space policy starts with the UN OST, which is so instrumental to space policy that "it has been called the 'Magna Carta' of space law."[16] However, the OST is clear in some regards, but vague in others, which is leading to a militarization and even the potential weaponization of space.[17] Ambiguities in the OST are promoting various positions between states on key space issues. For instance, Article IV of the OST is "very

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[12] "Planet Labs Website," Last accessed on 25 May 2015, www.planet.com.

[13] Luke R. Stover and Dr. Alan Johnson, "Space Separatism," *Air & Space Power Journal* 28 (2013): 18.

[14] United States of America, *National Space Policy 2010,* (Washington: White House, 2010), 14.

[15] Tae-Hyun Kim, "South Korea's Space Policy and Its National Security Implications," *The Korean Journal of Defense Analysis* 22 (2010): 522.

[16] Todd Barnett, "United States National Space Policy, 2006 & 2010," *The Florida Journal of International Law* 23 (2011): 277.

[17] *Ibid*.

specific in that it prohibits the placement of nuclear weapons and other weapons of mass destruction in orbit around the Earth."[18] However, the OST is silent when it comes to conventional weapons in space or militarization.[19] The OST does indicate in many areas that space and space exploration will be used for "peaceful purposes,"[20] however different states have different interpretations of the word 'peaceful.' The United States' official and unique position is "that peaceful means 'non-aggressive,'"[21] while Canada's position is much more conservative as evidenced by Canada's decision not to participate in the US Ballistic Missile Defence programme.[22] DND Space Policy indicates that the Government of Canada has a policy against the weaponization of space. Even though the OST is central to international space policy development, it is also fostering disparate interpretations, which is invariably causing the militarization and weaponization of space.[23] In fact, Steve Butcha states that, "space weaponization is an inevitable reality for all countries, including Canada."[24]

Canadian Space Policy Framework

In 2014, the Canadian Space Agency (CSA) published the new Canadian Space Policy Framework (CSPF), which seems blind to the new realities, namely the congested,

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[18] Michel Bourbonnière and Ricky J. Lee, "Legality of the Development of Conventional Weapons in Earth Orbit: Balancing Space Law and the Law of Armed Conflict," *The European Journal of International Law* 18 (2008): 875.

[19] *Ibid*.

[20] United Nations Office for Outer Space Affairs, *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies,* (New York: United Nations, 1967).

[21] Barnett, "United States National Space Policy, 2006 & 2010," 280.

[22] Government of Canada, Standing Senate Committee on National Security and Defence – Evidence by Honorable Bill Graham, last accessed on 16 May 2015, http://www.parl.gc.ca/content/sen/committee/412%5CSECD/51441-E.HTM.

[23] Steve Buchta, "Space Weaponization and Canada-U.S. Relations: Lessons from Australia," *Journal of Public and International Affairs* 19 (2008): 182.

[24] *Ibid*.

contested and competitive features, of the space domain today. It contains five high-level principles, which are: Canadian interests first, positioning the private sector, partnerships (international and domestic industry), a focus on key capabilities, and inspiring Canadians.[25] There is fleeting mention of security or defence, and nothing about potential militarization or weaponization of space. The CSPF is instead keenly focussed on supporting industry, research and development and partnerships.[26] Overall, the CSPF touts that it "modernizes Canada's space program for the second decade of the 21st century and beyond,"[27] even though it makes no mention of the increasingly congested, contested and competitive realities of space which seems short-sighted.

DND Space Policy

Space policy within DND was promulgated in 1998 to address the changes from the 1994 Defence White Paper[28] and is antiquated in many ways. It refers to studying and potentially participating in BMD and the potential future renewal of the NORAD agreement, and it lists vintage organizations, which no longer exist.[29] The policy very briefly highlights three key goals: protecting national security and sovereignty, protecting national interests from space, and exploiting space based technology, where appropriate in support of DND missions.[30] The DND space policy is mute on the militarization of

[25] Canadian Space Agency, *Canadian Space Policy Framework* (Ottawa: Canada Communications Group, 2014), 9-10.
[26] *Ibid*., 11-12.
[27] *Ibid*., 13.
[28] Government of Canada, Department of National Defence and the Canadian Armed Forces, *Department of National Defence Space Policy*, (Ottawa: Canada Communications Group, 1998): 1.
[29] *Ibid*.
[30] *Ibid*., 3-4.

space, only briefly mentions the concept of weaponization of space, and just like the CSPF, makes no mention of the three 'Cs'.[31]

ANALYSIS OF DND SPACE POLICY

The purpose of this section is to use a simple analytical framework to analyze the DND space policy more closely. The proposed framework is broken down into two major sections, domestic and international, which are further divided into space trends, policy and law, and partnerships.

Domestic

Space Trends

The first domestic space trend relates to the transformation in thinking of space as a new domain. DND Space Policy is critically lacking in this regard, as all references to space and space capabilities refer only to space support operations, or gaining access to space. The policy does not event hint to space being considered as another domain. There is no evidence of considering space control or any other protection mechanisms as methods of ensuring "unhampered legitimate exploitation of space."[32] It is clear that DND Space Policy needs to modernize and include space as a domain.

A second space trend which DND Space Policy does not address is the congested, contested and competitive nature of space today. Both congested and contested aspects of space will be discussed further below as they relate more to international efforts than domestic. The competitive nature of space does have an impact domestically, but the

[31] *Ibid*.
[32] *Ibid*., 3.

DND Space Policy is silent in this regard. Nowhere is there mention of supporting Canadian industry to ensure future domestic space capability. The policy briefly mentions developing a capability to access space data, but this is not the same as generating a domestic space industrial capability in an increasingly competitive environment. Support to Canadian industry in the face of international competition is in contrast to the CSPF, and is another area where DND Space Policy could provide additional guidance.

Policy and Law

As previously alluded, the DND Space Policy is out of sync with the CSPF. The CSPF makes little mention of national security and defence, while the DND policy makes no reference to the CSPF or Canadian industry. The gaps between the CSPF and DND policies leave Canadian policy vacant as to how DND should address many of the current trends in space, especially the increasing threat of militarization and weaponization. The DND policy "supports the Government policy against the weaponization of space"[33] however does not provide any further details, and is worryingly mute on militarization.

There is also a Canadian law, to which DND Space Policy should be aligned. The Remote Sensing Space Systems Act (RSSSA) regulates EO or ISR satellite operations and data. The purpose of the RSSSA is to allow the Minister of the Department of Foreign Affairs, Trade and Development (DFATD) to regulate remote sensing in Canada and control the exports of Canadian remote sensing data.[34] The RSSSA was passed in 2005, [35] which was well after the DND Space Policy was written. As such a new policy

[33] *Ibid*., 5.
[34] Government of Canada, Department of Foreign Affairs, Trade and Development, *Remote Sensing Space Systems Act*, Last Accessed 19 May 2015, http://laws-lois.justice.gc.ca/PDF/R-5.4.pdf.
[35] Buchta, "Space Weaponization and Canada-U.S. Relations,"184.

should make reference to this law since ISR is a critical application for DND.

Partnerships

Due to the technological complexities and costs of space projects, partnership initiatives are becoming increasingly important. In fact, various states are exploring international cooperation as an avenue to access space, and even the US "[Department of Defence] is now engaged in significant international outreach."[36] The purpose of this section is to analyze how well the DND Space Policy enables domestic partnerships.

The primary organization with which DND should consider a partnership agreement is the CSA. Steve Butcha states that in order to ensure DND security interests are addressed, "DND investments need to be integrated into a CSA space investment and policy framework."[37] He goes further to say that "an autonomous CSA that embodies DND objectives"[38] would be more effective when working with the US and that this could also help reduce stove piping of valuable financial resources.[39] The DND Space Policy does emphasize the importance of exploiting cooperation with the CSA "to the greatest extent possible,"[40] but is silent on how to accomplish this. The DND Space Policy should be bolstered to provide guidance on how DND should partner with the CSA.

The DND Space Policy should also expand upon an organizational partnership with DFATD. DFATD is the regulating department for the RSSSA. Should DND

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[36] Jaramillo, *Space Security Index 2014*, 90.
[37] Buchta, "Space Weaponization and Canada-U.S. Relations," 189.
[38] *Ibid*.
[39] Stover and Johnson, "Space Separatism," 22.
[40] Department of National Defence and the Canadian Armed Forces, *Department of National Defence Space Policy*, 7.

consider launching an ISR asset, DFATD would have to license it under the RSSSA, which would require cooperation and collaboration between the two departments. The current policy is lacking in this regard, likely as a result of the RSSSA being established well after the DND Space Policy.

Finally, the DND Space Policy makes no mention of the importance of partnerships with domestic commercial entities. Although the first goal in the policy is "to protect national security and sovereignty,"[41] William Lynn suggests that this mentality is Cold War thinking.[42] He recommends that countries should focus on "protecting both the [space] domain itself and our industrial base. Our security depends on the integrity of both."[43] In addition, the current cumbersome procurement process in Canada does not protect nor enable domestic space industry. The "current approach of procuring one satellite at a time creates an unpredictable demand, fostering a boom-and-bust dynamic unhelpful to accumulating manufacturing and design expertise."[44] The DND Space Policy is lacking regarding partnering and supporting domestic industry and can use the CSPF as an example to follow.

International

Space Trends

Since competition has been discussed previously, this section demonstrates that the DND Space Policy is lacking in terms of the congested and contested nature of space. The DND Space Policy makes no mention of the significant problems of space debris and

[41] *Ibid*., 3.
[42] Lynn III, "A Military Strategy for the New Space Environment," 15.
[43] *Ibid*., 14.
[44] *Ibid*., 15.

RF interference. This reduces its usefulness and effectiveness, given that today, NASA reports that there are over 21,000 objects larger than 10cm,[45] most of which pollute the region of space most useful to DND.

On the other hand, one could argue that space debris is not a significant concern to DND since DND has only one space-based asset, SAPPHIRE. Ironically, SAPPHIRE is designed to detect and track debris in MEO and GEO, but has no ability to either detect or avoid debris in LEO.[46] Instead, DND uses SAPPHIRE to contribute to the Space Surveillance Network (SSN), which helps key allies protect *their* space assets. This contribution by DND ensures access to space capabilities through helping allies deal with the congested nature of space today. There is enough strategic direction to justify the SAPPHIRE mission; however, the policy should provide further details on the DND position on the congested nature of space.

The *contested* element of current space trends is also missing from the DND Space Policy. The policy refers to "space in support of operations,"[47] and using space to help "exercis[e] control of our territory, airspace and sea approaches,"[48] but it ignores the fact that a growing number of nations are employing weapons and jammers capable of neutralizing space capabilities.[49] DND Space Policy must, at the very least, take these space denial capabilities into account; ideally it should address the full realities of contested space.

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[45] "Orbital Debris FAQ," NASA Orbital Debris Program Office, Last updated 3 December 2012, http://orbitaldebris.jsc.nasa.gov/faqs.html#3.

[46] Jaramillo, *Space Security Index 2014*, 68.

[47] Department of National Defence and the Canadian Armed Forces, *Department of National Defence Space Policy*, 3-5.

[48] *Ibid*.

[49] Lynn III, "A Military Strategy for the New Space Environment," 10.

Policy and Law

The most significant legal document for space is the OST, to which DND Space Policy makes fleeting and incorrect reference. The DND Space Policy incorrectly states that the OST "limits the use of weapons in space."[50] The only *real* limitation is on weapons of mass destruction. In fact, "Article IV of the OST does not [even] prohibit the deployment and use of conventional space weapons that have a nuclear power source, as these are not considered to be weapons of mass destruction in the OST sense of the term."[51] In order to be more relevant, the DND Space Policy needs to correct these inconsistencies and clearly articulate the DND position on space weaponization in line with the Government of Canada's position.

Partnerships

This section analyzes how well the DND Space Policy enables international partnerships, including other states and organizations such as NATO.

The DND Space Policy makes no mention of NATO whatsoever, and this void complicates cooperative efforts in time of greatest need. NATO is experiencing fiscal and capability reductions, partially due to the US shifting its' focus towards Asia.[52] A situation now exists where, "NATO leaders and political decision-makers are more reliant on space power than ever before, but are unwilling or unable to work together to evolve space power."[53] If these issues persist, NATO space capabilities, and ultimately

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[50] Department of National Defence and the Canadian Armed Forces, *Department of National Defence Space Policy*, 5.

[51] Bourbonnière and Lee, "Legality of the Development of Conventional Weapons in Earth Orbit," 881.

[52] North Atlantic Treaty Organization, *Air and Space Power in NATO: Future Vector Part II.* (Germany: The Joint Air Power Competence Centre, 2014): 37.

[53] *Ibid*., 2.

DND's will be negatively affected. Even though the DND Space Policy implies support to NATO when it states that "Canadian contributions to collective space efforts will help ensure access to allied space intelligence, facilities and data,"[54] a comprehensive approach is suggested. The DND Space Policy should at least address the importance of partnering with NATO and potentially establish what types or levels of coordination should exist to facilitate synchronization.

Even though cooperation and partnership with the US is mentioned throughout the DND Space Policy, it does not expand upon the different views between the US and Canada on important issues like militarization and weaponization of space, the concepts of space control and denial, and BMD. DND's Space Policy is severely lacking on all these realities, even though they have potential to stir up significant debate within Canadian leadership. For instance, Canada has declined BMD partnership with the US in the past, however a recent Senate Committee on National Security and Defence completed a study and unanimously recommended that Canada "enter into an agreement with the United States to participate as a partner in ballistic missile defence."[55] This recommendation is contrary to the previous Governmental decision, and this exemplifies the need for unambiguous policy, which either aligns with the US, or identifies the discrepancies. Some of these issues may be outside the jurisdiction of DND, however DND Space Policy should at least provide strategic guidance in line with Canada's views. This would reduce the potential of DND support to a US space program that may run contrary to the Government position on militarization of space.

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[54] Department of National Defence and the Canadian Armed Forces, *Department of National Defence Space Policy*, 6.

[55] Government of Canada, Standing Senate Committee on National Security and Defence, "Canada and Ballistic Missile Defence: Responding to the Evolving Threat," Last accessed 20 May 2015, http://www.parl.gc.ca/Content/SEN/Committee/412/secd/rep/rep10jun14-e.pdf, 21.

Another important area where DND Space Policy is lacking fidelity is in partnering with middle or emerging space powers. Numerous countries are expanding into space through partnerships, and opportunities for Canadian or DND partnership are being lost. For instance, "Australia, Canada, France, Germany, Japan, Israel, Italy and Spain have also been developing multiuse satellites with a wider range of functions applicable to the military."[56] China and Russia have their own PNT constellations called Beidou and GLONASS, and China and Brazil have partnered to launch the China-Brazil Earth Resources Satellite.[57] Of course, partnering with some of these countries on an ISR spacecraft may be controversial, but Canada and DND could benefit from other capabilities, such as space launch instead of relying solely on the Russians. Of note, Russia launched RADARSAT-2 and was supposed to launch M3MSat in 2014, but Canada cancelled at the last minute due to hostilities in Ukraine.[58]

Overall, this analysis shows that DND Space Policy is woefully out of date; it does not represent the current trends in space, and does not provide useful guidance relating to partnerships. The DND Space Policy needs a complete review or overhaul in order to address the numerous issues identified above.

CONCLUSION

The understanding of space and space operations has clearly advanced since the last time DND Space Policy was promulgated. The current space environment should be

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[56] Jaramillo, *Space Security Index 2014*, 62.

[57] "CBERS," China-Brazil Earth Resources Satellite, Last accessed 22 May 2015, http://www.cbers.inpe.br/ingles/.

[58] "Canadian Space Firm Seeks Millions After Harper Government's Anti-Russia Sanctions Ground Satellite," National Post, Last updated 23 Jun 2014, http://news.nationalpost.com/news/canada/canadian-politics/canadian-space-firm-seeks-millions-after-harper-governments-anti-russia-sanctions-ground-satellite.

thought of as a new domain with its own unique characteristics and issues such as congestion, contested areas and competition. Butcha states that "the government's best option is to design an innovative space defence policy,"[59] in order to address the new security threats in space. Although the DND Space Policy correctly states that "space has emerged as an increasingly important component of the global security environment,"[60] the fact that it is so woefully out-dated and out of touch with the current trends indicates a lack of commitment on DND's part and detracts from the importance of space to DND operations. The gaps in the DND Space Policy that were identified by this simple domestic and international analysis are numerous. If DND is serious about continuing to operate in the space domain, then a comprehensive review and update to the DND Space Policy is required.

[59] Buchta, "Space Weaponization and Canada-U.S. Relations," 190.

[60] Department of National Defence and the Canadian Armed Forces, *Department of National Defence Space Policy*, 1.

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