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CANADIAN FORCES COLLEGE / COLLÈGE DES FORCES CANADIENNES
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Exercise NEW HORIZONS

SPACE POWER: CANADA'S KEY TO A 21st CENTURY MILITARY

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INTRODUCTION

Within Canada there has been much talk but little achieved in terms of action or investment in a military space capability. There is a modest capability that has been generated by the Directorate of Space Development (DSpaceD) which, until recently, fell under the Deputy Chief of the Defence Staff (DCDS). This initial space organization was placed there in the hopes that the DCDS would provide a strong joint advocate to grow and nurture space capability within the Canadian Forces (CF). However, the DCDS had a large area of responsibilities and space was only one of its many focus areas. Despite this, there was some progress made, particularly over the past five years. Today, the CF is in the midst of a transformation initiative that will reorganize the forces based on a force generation and force employment model. As a result, the DCDS group has disbanded with the majority of its component parts being shuffled into appropriate force generation or force employment organizations. DSpaceD has not migrated into the force generation and employment roles. This is a vital oversight in a transformation meant to structure a force to meet 21st century challenges and threats. Now is the opportunity to formalize and expand the CF's commitment to a military space capability by incorporating it into the new force generation and force employment model. This will enable the force to increase and highlight a capability that will be essential in meeting continental and international responsibilities in the future. *In order to meet the*

challenges of the 21st century, the CF must take aggressive and deliberate action to grow a more effective, robust, and operationalized military space capability.

This paper will advocate for a more effective and robust Canadian military space capability by focusing on two critical questions. The first question will deal with why it is essential for Canada to move out more aggressively in pursuing military space capability. This capability will be a critical force multiplier in helping achieve national security objectives in the future, and that is why there has been much discussion in government documents and aerospace doctrine on its benefits. Although it is possible that these documents mention space capability only as a token gesture, the assumption is made that there is indeed a genuine interest in a CF space capability. The second question will ask what is the best way to implement this space capability within the transformation reorganization in order to revitalize it and make it more visible. The Defence R&D Canada Technology Investment Strategy points out, “The 1998 DND Space Policy reiterated the 1994 Defence White Paper statement that space has emerged as an ‘increasingly important component of the global security environment.’”¹ The bottom line is that a champion is needed to take aggressive action and integrate space into the CF.

WHY IS IT ESSENTIAL TO MOVE OUT NOW ON SPACE CAPABILITY?

The Chief of the Air Staff introduces the vision of CF Air Force transformation this way:

¹ Defence Research and Development Canada, “Technology Investment Strategy,” http://drdc-rddc.gc.ca/researchtech/tis/activ3_e.asp; Internet; accessed 10 Mar 2006.

As the old axiom states, ‘The future will not wait; it arrives and becomes today.’ We will not wait for the future to arrive; we are committed to transforming the Air Force to meet the demands of the future, to respond to a challenging and evolving security environment and to fulfill Canadian’s expectations of its military services.²

Truly, the future will not wait, and the trick is being able to groom military capabilities today so that one is ready for the challenges of tomorrow. Not many people would question whether space will play an important role in the future of military conflict, and that is why space provides a tremendous opportunity for the CF. Canada has a large geography with a comparatively small population and an even smaller military force with which to defend her. Therefore, the first benefit that compels Canada to move out more aggressively is that space is a force multiplier that provides a tremendous advantage that can not be ignored. The United States (US) and Russia are not the only countries with the resources to take advantage of space. Lower costs for space access and the proliferation of technology are enabling a growing number of countries to foster their own new military space capabilities. Some of the newer players include Spain, South Korea, and even Thailand.³ However, this is still a growing area of expertise with a limited number of competitors, which makes it easier for Canada to build and gain a reputation of having a world-class space capability.

A second benefit is that the world leader in space capability lives right next door and is Canada’s largest ally. The Space Security index highlights US dominance:

² Department of National Defence, A-GA-007-000/AF-004 *Strategic Vectors* (Ottawa: DND Canada, 2004), 2.

³ Space Security Index, “Space Support for Terrestrial Military Operations,” <http://www.spacesecurity.org/BN-SpaceSupportForTerrestrialMilitaryOperations.pdf>; Internet; accessed 25 Mar 2006.

The US has dominated the military space arena since the end of the Cold War and currently accounts for roughly 95 percent of total global military space expenditures with approximately 135 operational military-related satellites - over half of all military satellites on orbit.⁴

Canada does not need to spend billions of dollars on an autonomous space program. It already has the potential to provide key assets to viable missions as a contributing partner in North American security.⁵ By leveraging that relationship, Canada can benefit from US space expertise and find complementary areas on which to focus. The timing could not be better for leveraging this relationship, as access to some US space information may be in jeopardy as a result of the October 2002 US reorganization that dissolved United States Space Command (USSPACECOM) and transferred its responsibilities to United States Strategic Command (STRATCOM). Currently Canada still maintains a link to US space planning, operations, and intelligence through NORAD, but it needs to find a way to strengthen it. This link to space information provides Canada an inside seat to world events and pending crises it would not otherwise have, and keeping that seat should be a priority.⁶

The third benefit that compels Canada to move out with a sense of urgency is that it directly supports all three of Canada's core national security interests, "(1) protecting Canada and Canadians at home and abroad; (2) ensuring Canada is not a base for threats

⁴ Ibid.

⁵ Andrew B. Godefroy, "Is the Sky Falling? Canada's Defence Space Programme at the Crossroads," *Canadian Military Journal* 1, no. 2 (Summer 2000): 57.

⁶ Bruce Johnson, "Canadian Decisions in a Shifting North American Landscape," (master's thesis, Queen's University, 2003), 17.

to our allies; and (3) contributing to international security.”⁷ It can accommodate all three core interests at the same time and with the same assets because of the nature and viewpoint of space. Space systems have a forward deployed, global nature that can produce effects in multiple theatres either in peacetime or in conflict. Lieutenant-Colonel Brian Fredriksson points out, “Space power provides distinct advantages, which include global presence, perspective, persistence, responsiveness, and destructive potential.”⁸ The specific potential these qualities can offer to Canada’s defence of North America and contribution to international security merits further examination.

Defence of North America

The Canadian Space Agency *Report on Plans and Priorities* realizes, “Satellites are critical to Canada’s security and foreign policy.”⁹ Resources like intelligence, surveillance, and reconnaissance (ISR) data, command and control, weather data, and secure communications are essential elements in providing security today. By investing in stronger partnerships and maturing a more effective space capability, the CF will be in a better position to accomplish national security goals. There is no doubt that the political climate and will of the public drive the military space agenda. The key is to de-link the concept of military space power from the concept of weaponizing space. The CF

⁷ Privy Council Office, *Securing an Open Society: Canada’s National Security Policy* (Ottawa: Canada Communications Group, 2004) 5.

⁸ Brian E. Fredriksson, “Space Power in Joint Operations,” *Air and Space Power Journal* 18, no. 2 (Summer 2004) [journal on-line]; available from <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj04/sum04/fredriksson.html>; Internet; accessed 21 March 2006.

⁹ The Canadian Space Agency, “2005-2006 Estimates: Report on Plans and Priorities,” available from <http://www.space.gc.ca/asc/eng/resources/publications/default.asp>; Internet; accessed 10 December 2005.

should look to demonstrate the many advantages space can provide that still fall within the Canadian identity.

As the second largest country in the world, Canada has a large expanse of territory to protect. There was a great deal of talk by the Conservative Party during the recent election of focusing more attention and assets on protecting the Canadian Arctic. Reconnaissance capability from space offers the ability to monitor all of Canada's borders, even in the remotest regions. This could save valuable terrestrial based assets from having to search for threats, by using space-based imagery and radar capability to point those assets to where the threats are most active. DSpaceD is currently exploring this capability through the Polar Epsilon project that will, "provide wide area surveillance in support of Canadian security, sovereignty, and CF operations at home and abroad."¹⁰ This effort needs to be championed and displayed as a world-class effort that will improve Canadian security.

Another area that does not get a great amount of publicity when it comes to defending North America is the need to defend space based assets. Both the Canadian and American economies are inextricably linked to a dependence on space assets. For example, satellite communications are integral to global financial markets, GPS provides timing for cell phones and Automated Teller Machines (ATM), and earth observation

¹⁰ Tracey Hayes, "Space Theory and Applications," (briefing, Canadian Forces College, Toronto, ON, November 28, 2005), slide 92.

provides critical environmental monitoring.¹¹ Lieutenant-General Daniel P. Leaf, former Vice Commander of Air Force Space Command in the US, points out:

Electronic commerce relies very heavily on the GPS precision timing signal to synchronize transactions. Roads are cleared of snow, crops are raised and cultivated, airliners and ocean going freighters are steered - all with GPS.¹²

These types of commercial activities need to be protected since interruption of these services could have a dramatic affect on both the Canadian and US economies. The mechanical failure of the Galaxy IV communications satellite in May 1998 provides a small sample of the everyday dependence on space assets. Its sudden loss left 35 million people without cell phone or pager service, gas stations across the continent unable to accept credit cards, and television stations without any live on-scene coverage.¹³ This example demonstrates that space can be seen not only as a threat to Canada, but even as a critical centre of gravity given the asymmetric threats in the world today.¹⁴ In order to effectively address that threat, the CF needs to cultivate its understanding and integration of space assets; future Canadian security may depend on it.

¹¹ James Fergusson, "Out of Sight, Out of Mind: Canada, Outer Space, & National Security," *Fraser Forum*, May 2005.

¹² Daniel P. Leaf, "Is Arms Control Sufficient to Protect US National Security in Space," Remarks to World Affairs Council on 15 Mar 2005, available from <http://www.peterson.af.mil/hqafspc/50th/speeches.asp?YearList=2005&SpeechChoice=111>; Internet; accessed 4 October 2005.

¹³ John T. Correll, "Destiny in Space," *Air Force Magazine Online* 81, no. 8 (August 1998) [journal on-line]; available from <http://www.afa.org/magazine/Aug1998/0898edit.asp>; Internet; accessed 30 March 2006.

¹⁴ Andrew B. Godefroy, "A Launch Window of Opportunity: Making Space a Strategic Goal for Canada," Conference of Defence Associations Institute Second Annual Graduate Student Symposium, 12-13 November 1999, available from <http://www.cda-cdai.ca/symposia/1999/godefroy99.htm>; Internet; accessed 4 October 2005.

So too does US security. Its National Security Strategy and Space Policy

recognize the threat, and its military forces are trying to adapt. General Lord highlights his concerns:

Our enemies have seen space capabilities make us faster, more precise and more lethal than ever - and they will try to deny us that advantage. ... We must have continuous situation awareness of both environmental effects and the actions of all nations in space to allow us to plan and act - not react. ... The vast number of financial transactions worldwide depend upon the precise timing provided by satellites, including stock market trades and credit card purchases.¹⁵

This opens a window of opportunity to team with the US to grow space capability together in the name of North American defence. This would prove valuable to Canada in several ways. First, it would keep open the doors to sharing space related information upon which the Canadian Forces have become dependent. Second, it would demonstrate Canadian resolve to defending North America, an important symbolic action in the wake of not participating in missile defence. Canada's technology investment policy recognizes the value, "Canada's ability to contribute to space systems for surveillance and warning could provide options for burden sharing in North American defence."¹⁶ Third, it would provide Canada a voice and reduce US tendency to act unilaterally in the defence of North America. Last, it would make Canada essential in an area where the US has more to lose than any other country. The Space Commission highlighted that the US' dependence on space systems make it uniquely vulnerable to a 'Space Pearl

¹⁵ Lance W. Lord, "Space Warfighter," *Military Aerospace Technology Online Edition* 4, no. 3 (October 2005) [journal on-line]; available from http://www.military-aerospace-technology.com/print_article.cfm?DocID=1207; Internet; accessed 12 December 2005.

¹⁶ Defence Research and Development Canada, "Technology Investment Strategy," available from http://www.drdc-rddc.gc.ca/researchtech/tis/activ3_e.asp; Internet; accessed 10 March 2006.

Harbor'.¹⁷ How valuable is the opportunity for Canada to assist in the defending the US or even prevent this type of attack from occurring? Surely that is a role that would make the Canadian contribution essential, relevant, and ensure a tight defence relationship with the superpower next door. This relationship would be useful not only for homeland defence, but also for strengthening the partnership in international security as well.

Contribution to International Security

The employment of space capability is critical to international security throughout the entire spectrum of strategic, operational, and tactical levels of operations. The Space Security Index points out, "Space is becoming increasingly important for the military strategies of a larger community of states."¹⁸ The utility of space is that it both increases combat effectiveness while decreasing the vulnerability of coalition troops and civilians through better communications, better intelligence products, better precision, and a shorter decision cycle.¹⁹ Even more importantly, it has raised the expectations governments and citizens place on their military for quicker response times, lower casualty rates, and less collateral damage. As the Swedish Defence Research Agency points out:

The enhancement of military capabilities such as long-distance high capacity communications or precision positioning are no longer nice features but necessary to have if a Network-Based Defence capable of international peace support operations is to be a reality. Space systems are one, if not the only, way to create

¹⁷ Commission to Assess United States National Security Space Management and Organization, *Report of the Commission to Assess United States National Security Space Management and Organization* (Washington DC: The [Space] Commission, 11 January 2001), viii.

¹⁸ Space Security Index, "Space Support . . .".

¹⁹ Lord, "Space Warfighter."

those capabilities. From a Swedish perspective space systems have gone from systems that can enhance military operations to systems that will enable military operations.²⁰

This growing space revolution in military technology is happening while Canada's Air Force seeks to find a way to remain relevant in future coalition operations, "The second mission theme is to be relevant for future operations...make a substantive military contribution to a coalition effort or domestic security task and not simply one that is symbolic."²¹ Unlike conventional capabilities like fighters (CF-18s) or tactical airlift (C-130s), there are few countries who possess a military space capability. More importantly, those conventional capabilities' effectiveness is severely diminished without the benefit of space capability. Consider Responsibility to Protect missions in failed and failing states that lack communications infrastructure and require satellites to provide secure links to deployed troops, operational, and strategic level headquarters. Without satellite communications links, many conventional assets can not be employed. Likewise, military responses in asymmetric, urban environments require timely imaging and precise positioning to limit collateral damage and avoid fratricide. The CF and most militaries are modifying their equipment to accommodate precision weapons because they understand political and public support relies on the ability to minimize collateral damage. Another key political and public concern is minimizing casualties. Theatre Ballistic Missile (TBM) warning via satellite provides vectoring for intercept batteries, launch point detection, and impact prediction to protect friendly forces. Weather data

²⁰ Swedish Defence Research Agency, FOI-R-1264-SE *Strategy for Space* (Stockholm: Ministry of Defence, September 2004), 4.

²¹ *Strategic Vectors*, 40.

from satellites is critical in responding to natural disasters, facilitating the movement of troops, adjusting targeting and air sorties around bad weather, and ensuring satellite communications failures due to solar activity do not impact operations. Without access to these kinds of space capability, CF conventional assets are far less effective, perhaps even irrelevant. All it takes is one loss of a communications link during critical operations, one non-precision strike going astray and hitting a hospital, or one undetected TBM strike on a Canadian base to destroy public and political support for a major operation.

Because of the critical nature of space as an enabler, the CF will continue to find themselves in need of this essential capability in the future. Dr. Godefroy points out, “As ‘human security’ becomes increasingly central to Canada’s foreign policy, the Canadian Forces will undoubtedly be tasked to provide ever-increasing numbers of forces around the world.”²² There is no guarantee that the US or any other space capable nation will deploy to the same international crises, and the CF may find themselves in need of a robust, indigenous space capability. Even though the CF still enjoy some ability through cooperative channels to access US data, the US may already be tasking the required assets for other higher national priorities. Another factor that might limit access to US data is if the US weaponizes space. Canadian public and political outrage could potentially sever any CF ties to US military space capability. The CF could not afford to lose access to that space information without a viable backup plan. As a recent CF Space Policy research paper highlights, “The CF must develop the capacity to use space assets

²² Andrew B. Godefroy, “Is the Sky . . .”, 57.

in the projection of force ... be they peace keeping, peacemaking, or humanitarian.”²³

Those last few words highlight the utility of space to deliver capabilities that enrich, including weather information, navigation, intelligence, and communication. These things are helpful and not destructive in themselves, as Lieutenant-General Leaf points out:

I imagine many, in uniform and out, look at those before and after photos thinking they represent the destructive power of military Space capabilities. I see it differently. I think of bombs that were not dropped, the broader destruction that did not have to occur, because of our precision that is based very heavily on military Space. ...We are more likely to complete our mission rapidly, able to risk and lose less of our forces, and required to kill less and destroy less on the enemy side of the lines. When one looks at the reduction in the number of casualties from the World Wars to the present, one should think of the role that precision, and therefore Space, has played in that reduction.²⁴

That is a description of a noble contribution that is inherently Canadian. Even more important, it is a force multiplier that provides the ability to donate support to international operations without having to deploy large amounts of personnel or equipment to the area of operations. Space support does not require strategic airlift, since the bulk of support can be accessed via reach-back from the field. The 1998 Space Policy paper saw value in this approach, and it is time the CF re-energizes the implementation of that vision:

... a comprehensive space capability is fundamental to effective force projection in regional crises, rapid response under conditions of uncertainty and instability, high

²³ Louis Haeck and Michel Bourbonniere, “A New Space Policy for the Canadian Forces,” available from http://www.ccs21.org/research-papers/papers/haeck_bourbonniere-space.htm; Internet; accessed 6 February 2006.

²⁴ Leaf, “Is Arms Control . . .”.

mobility with minimized forward presence, and maximum efficiency using space to support operations.²⁵

WHAT IS THE BEST WAY TO IMPLEMENT SPACE CAPABILITY IN THE CF?

The 1998 Space Policy provided direction to the CF to use space to protect Canadian sovereignty and security.²⁶ The beginnings of DSpaceD were started in 1997 with that same charge. The CF has made strides in accomplishing this charge, but, as mentioned earlier, the program is in danger of losing momentum without a champion to push this capability into the 21st century. General J.G.J.C. Barabe', Commander of Joint Task Force East, points out the concern:

The issue is now what to do since the DCDS Group no longer exists and the functions it performed are now shared among at least three Ops Groups. I, for one, continue to believe that space needs a "central" champion since the capability it offers spans the spectrum of capabilities offered by the newly formed commands and not only one of them can satisfy the full continuum of operations that space needs to address as a capability, and especially as a potent strategic resource.²⁷

Any implementation plan needs to look at two areas: force generation and force employment; this is in line with the transformation initiative. This section will examine both of these areas with respect to who should accomplish them and what they should entail.

²⁵ Department of National Defence, *Space Policy* (Ottawa: Canada Communications Group, 1998), 3.

²⁶ *Ibid.*, 3.

²⁷ J.G.J.C. Barabe', e-mail correspondence with the author, 23 March 2006.

Force Generation

Force generation is important because it is what grows and matures the expertise in a functional area to make it a reliable and potent resource for the warfighter. This activity is especially key to an unseasoned function like space, since it carries the extra responsibility of generating doctrine and experimentation to prove the usefulness of the capability in support of combat forces. A great deal of attention should be paid to the organize, train, and equip roles of force generation to foster a viable space capability.

Under the current *organizational* construct, there is no active advocate (i.e. Environment or Centre advocate) for space employment. What is needed is a champion to advocate and promote the funding, resourcing, development, and implementation of military space capability throughout the CF. There are three potential options available. The first is the current construct of moving DSpaceD under the VCDS, but this will be discounted early since it is too easy for space to get lost as just another staff function. This seems apparent if the rumours are true about space being downgraded to a section with a Lieutenant-Colonel lead. The second potential option is to create a completely separate Environment focused on space capability. Again, this option will be discounted immediately since the current amount of space capability does not justify the overhead and infrastructure that would be required to support this option. The third, and most favourable option, is to incorporate space into one of the existing Environments, and allow it to provide force generation to warfighting commands.

The most appropriate home to grow this capability is in the Air Force. Admittedly, there is a danger of losing jointness by placing space into the Air Force.

However, the Air Force is already used to close coordination with the other Environments as a force provider for airlift and reconnaissance with helicopters, C-130s, and Auroras supporting Army and Navy operations. *Strategic Vectors* discusses the need for the Air Force to leverage key operational advantages for the success of the CF.²⁸ It goes on to say, “Aerospace, meaning air and space. ... We use the term deliberately to underscore the increasingly important role space will play in the future of military operations.”²⁹ This is in line with how several other countries are organizing their space capability, including Israel who changed its Air Force into the Israeli Air and Space Force, and South Korea who created its own Air Force Space Command.³⁰ The same strengths of air power are inherent in space power projection: speed, reach, elevation, responsiveness, and precision.³¹ The current draft of CF Air Force doctrine also highlights the natural dovetail fit between air and space:

Aerospace is the total expanse of air and space above the earth's surface. It is the multi-dimensional operating environment wherein aerospace forces perform their missions. The unbounded aerospace medium allows commanders to disperse, concentrate and manoeuvre aerospace forces to obtain universal observation of the Earth's surface. For military operations, the aerospace medium exposes an enemy's entire power structure to assault by aerospace forces. Control of the surface battle in modern conventional warfare is dependent upon control of the aerospace over friendly and enemy territory. When an opponent does not have the ability to conduct aerospace operations, the full effort of aerospace power's combat and support resources can be used to influence the surface battle.³²

²⁸ *Strategic Vectors*, 18.

²⁹ *Ibid.*, 16.

³⁰ Space Security Index, “Key Trends and 2004 Developments,” <http://www.spacesecurity.org/indicator5.htm>; Internet; accessed 5 December 2005.

³¹ Department of National Defence, Canadian Forces Aerospace Doctrine, (writing team draft, Ottawa, 17 February 2005), 11.

³² *Ibid.*, 10.

To highlight the importance of this capability in future aerospace power, a General officer should lead this new organization to fight for resources and focus attention on integrating space power into the Air Force; this will not be a small token effort. There needs to be a detailed space policy put into place, space doctrine inserted, requirements defined, consolidated plans mapped out, and links bringing together research and development, industry, and operational users.

A critical capability like space needs to be "operationalized" in the CF to demonstrate its value to the warfighter. The new Aerospace Warfare Centre would be a perfect place to grow and prove out the operational benefits of space and then inject them into the joint force employers. This institution is also a perfect place to start debating space power theory and doctrine. These conversations will be indispensable in determining where the most productive areas are for the CF.

The Aerospace Warfare Centre will also help groom the force by influencing *training*. *Strategic Vectors* mentions that the CF has been conducting space courses since 1989 and maintains long-standing involvement in U.S. space-related activities.³³ However, despite having a space course for the last 17 years, this powerful space expertise only exists in small pockets, instead of contributing to a larger space culture. Space-qualified personnel are essential to fully understand and take advantage of complex space concepts, technology, and doctrine.³⁴ To this end, the Air Force should establish a space job speciality and begin growing and grooming a cadre of requirements,

³³ *Strategic Vectors*, 34.

³⁴ United States Government Accountability Office, *Defense Space Activities: Additional Actions Needed to Implement Human Capital Strategy and Develop Space Personnel* (Washington DC: Report to Congressional Committees, August 2004), 6.

acquisition, and operations professionals to exploit the space side of 21st century aerospace capability. This does not need to be a large amount of personnel dedicated only to space activities, but it would be an important first step in creating a space culture within the Air Force, and therefore the CF.

A trained cadre of space professionals will also provide two side advantages. First, it will provide a career field that will attract the computer-savvy youth of today, and thereby help recruiting. Second, it will naturally lead to dialogue and exchanges with the US on space related issues. This will give Canada a voice in an area where it has previously had very little, and offer the potential of influencing future US space policy and capabilities. This space expertise will provide credibility on space issues, and hopefully make space a bilateral, vice unilateral, area on issues including the weaponization of space.

Equipping the CF with a modern space capability will require an investment. It is understandable that the salesmanship required to convince politicians of the requirement can not risk attaching a huge price tag. The best way to approach equipping the military with space capability is via an incremental development plan that proves its value along the way and justifies investment dollars. In order to increase funding, a moderate three step plan should be considered: place priority on and publicize the current space projects, consider creating military space alliances with other countries, and invest in future dual-use (military and civilian) space capabilities for the CF.

DSpaceD currently has three projects that merit focus: the Joint Space Support Project (JSSP), Polar Epsilon, and Sapphire. These three form a force multiplier to help

further national military objectives, and this collective capability should be made a priority in the CF. The JSSP is a program that will provide tactical C4ISR exploitation of space directly into theatre by providing surveillance and reconnaissance, space situational awareness, and GPS Support.³⁵ It is an extremely valuable tool to provide the tactical commander a more robust and complete picture of the battlespace. As mentioned earlier, Polar Epsilon has the potential of providing critical wide area surveillance of Canada to help guarantee sovereignty and security. Finally, Sapphire will be geared toward surveillance of space.³⁶ It will increase space situational awareness and identify any potential threats. All three of these projects should be highlighted to the public, national leadership, and other countries. At home, it will help demonstrate the advantages of space capability, while de-linking the concepts of military space and weaponization of space. Abroad, it will signal to the world that Canada intends on being a world-class provider of military space capability, and, perhaps, help identify potential partners in that venture.

There are several other countries in the world that are trying to jump-start a military space capability. Many of them have fewer resources than Canada, but see the need to modernize early instead of playing catch-up later. The Space Security Index points out in its 2004 Key Trends and Developments:

Declining costs for space access and the proliferation of space technology are enabling more states to develop and deploy their own military satellites via the

³⁵ Hayes, slide 94.

³⁶ Hayes, slide 102.

launch capabilities and manufacturing services of others, including the commercial sector.³⁷

In order to offset the investment costs even more, many countries are teaming together to lower both development cost and procurement cost. This type of cooperative arrangement would be a good tool for the CF to leverage to reduce the cost of investment. Israel and South Korea were countries mentioned earlier that are trying to build a space capability, however, Canada may want to find potential teaming partners with more similar national interests. Sweden is a prime candidate. Similar to Canada, Sweden recognizes the benefits of space, but also sees the need to partner and adopt a strategy in concert with other EU and NATO states.³⁸ In addition, the European Union is developing teaming arrangements to field modest capabilities. Even Thailand is close to fielding its first intelligence and defense satellite.³⁹ If a country like Thailand can afford to field a modest capability, then so too can Canada.⁴⁰ Not only are these examples indicative of cost-effective solutions to deliver space capability, they are also indicative that Canada will be left behind if it does not move out quickly.

Once Canada proves the benefits of its initial capabilities and establishes partnerships with other emergent space countries, then the question becomes what capabilities to invest in next. This approach must be balanced because the Canadian government will not substantially increase defence spending since such an investment is

³⁷ Space Security Index, “Key Trends . . .”, 2.

³⁸ Swedish Defence Research Agency, 7.

³⁹ Space Security Index, “Key Trends . . .”, 3.

⁴⁰ The AOL Countrywatch website indicates that Canada has over six times the GDP of Thailand in 2000. Statistics are available at <http://aol.countrywatch.com/includes/grank/gdpnumericcer.asp?TYPE=GRANK&TBL=NUMERICCER&vCOUNTRY=170>.

not necessary to secure its vital interests.⁴¹ Given that fact, the most economical approach is to pursue dual-use space capabilities that also provide national benefits outside of the defence arena. Dr. James Fergusson, Deputy Director of the Centre for Defence and Security Studies at the University of Manitoba, highlights the fact that space is more than just an enabler for the military:

Remote sensing systems play a vital role in disaster relief, modern agriculture, weather forecasting, and monitoring ice flows. Overall, space-based systems have become the unseen and poorly understood backbone of a modern information-based economy and society.⁴²

The CF should capitalize on this societal dependence and package their military requirements with other civil uses of space. Satellites are strategic national assets that can provide imagery for military intelligence, while also performing a civil earth observation mission. The earth observation role provides a variety of politically relevant missions including tracking forest fires, monitoring deforestation, and monitoring ice flows in the Arctic just to name a few. The same satellite monitoring the Arctic could also be used in a military role for imagery of Hans Island in a dispute with Denmark. *Strategic Vectors* acknowledges the challenge of covering Canada's entire geography with a strategy geared toward, "the acquisition of multi-purpose [ISR] capabilities with abilities to detect and track targets in airspace, on surface areas, and underwater."⁴³ Dual-use satellites would help the CF execute missions more effectively, protect citizens' security, and safeguard the sovereignty of Canada.

⁴¹ Bruce Johnson, 7.

⁴² James Fergusson, "Out of Sight . . .".

⁴³ *Strategic Vectors*, 29.

Force Employment

Once the force generation is accomplished, the challenge is integrating this operational capability to support combat forces. The space culture and expertise that is fostered in the Air Force will be integral in helping the combatant commander understand space force application. For this reason, Space Support Teams should be incorporated into the Canada Command (CANCOM), Canadian Expeditionary Forces Command (CEFCOM), and Canadian Special Operations Forces Command (CANSOFCOM) operations centres, and augmented as necessary based on contingency operations. These teams can be small, but will provide critical tailored support from high demand, low density space assets. They will also maintain a reach-back capability to additional Air Force space expertise. Once the Air Force has matured and developed a foundation for space capability to the point where it is an established core competency resident in combat execution, the champion of space should migrate to the force employers. As such, the Chief of Force Development would assume the champion role and determine future requirements for space that the force generator should provide.

Another area to focus on force employment is to increase space support to NORAD. This would be a good opportunity to solidify linkages to space related information that may be jeopardized as a result of the 2002 US military reorganization mentioned earlier. Ideally, Canada should seek to mature NORAD into a bi-national command centre link that pulls together US Northern Command (NORTHCOM) and CANCOM while maintaining sovereignty between both countries. That construct is

beyond the scope of this paper, but the ideal institution would provide a consolidation of space resources to provide a common operational picture with which to view any potential threats to North America.

CONCLUSION

Over the past decade, space has become an essential force enhancement capability that provides ever increasing support to the warfighter. The Swedish Defence Research Agency comes to the conclusion that many countries want more than just a reliance on commercial space systems:

Since the usefulness of space services has become evident from military operations like the Gulf War (1991), Afghanistan (2001) and Iraq (2003) more and more countries have started to get involved in space activities and to gather know-how on space. This can be seen as an indication of a wide-spread interest in space-based force enhancement contrasted to the more passive posture of buying commercial images for strategic intelligence purposes.⁴⁴

Admittedly, the politicians in Canada will decide to a large degree if space will be put on the CF agenda, but it is incumbent upon the CF to push for this capability. The sales pitch can be bolstered by the force multiplying contribution of space power to national security, but tempered by minimizing the investment required through pursuing international partnerships and capitalizing on dual-use assets. The bottom line is that the CF must take aggressive and deliberate action to grow a more effective, robust, and operationalized military space capability, in order to meet the challenges of the 21st century.

⁴⁴ Swedish Defence Research Agency, 18.

Space capability is quickly becoming an indispensable enabler for future military operations. As Dr. Godefroy points out, “For Canada space power will be essential to its own future security and prosperity especially in a multi-polar world, therefore making it a strategic interest requiring further development.”⁴⁵ The advances in air defences coupled with the asymmetric nature of warfare today may signal a shift in importance from an atmospheric air force to one geared more toward an infospheric force.⁴⁶ If this is the case, space will be a critical element in bridging between the two. John Correll, Editor in Chief of Air Force Magazine, highlights, “US Space Command predicts that our dependence on space capabilities in the 21st century will rival our dependence on electricity and oil in the 19th and 20th centuries.”⁴⁷ By moving out aggressively and implementing space capability today, the CF will ensure it will not be left behind.

[4836 words]

⁴⁵ Andrew B. Godefroy, “A Launch Window . . .”.

⁴⁶ Richard Szafranski, “Aerospace and Cyberspace: The Transformation of Small Air Forces,” in *Air Symposium 2000: Space in the 21st Century* (Toronto: Canadian Forces College, 2000), 25.

⁴⁷ Correll, “Destiny . . .”.

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