

Consultation Paper for the Space Advisory Board: Driving Canada's Future in Space

1. Introduction

Canada is a spacefaring nation with a rich history of achievements in space. We were the third nation in space in 1962 and since then have been a key partner and contributor to human spaceflight, exploration and the use of space for communications, science and the betterment of life on Earth. Our “flagship” programs, such as pioneering communications satellites, our contributions of robotics to the International Space Station and Space Shuttle programs, and the RADARSAT family of space-based radar systems – not to mention our astronauts – are Canadian icons and sources of tremendous pride.

Our country became an early pioneer in satellite telecommunications and Earth observation because we needed to find ways to connect a small population scattered across thousands of kilometres with many remote northern communities and to observe and monitor the longest coastline, and second largest landmass, in the world. No other domain or technology could have provided Canada with such powerful solutions to these challenges. Today, governments at all levels rely on space-based data and technologies to deliver on their mandates and to provide services to Canadians, from enabling weather prediction and environmental monitoring, to supporting Canada's transportation network and national defence.

Space has also become increasingly accessible to the private sector as advances in technology change the economics of building, launching, and operating spacecraft, opening the door to new and lucrative commercial activities. This trend is often referred to as “New Space.” This has led to new partnership opportunities between governments and industry, such as the growing use of commercial spacecraft and services to support national space missions and significant new opportunities for Canada's companies and researchers. New opportunities to become a “customer” for space services rather than the owner or operator of space assets are emerging rapidly and may change the role of the Government of Canada in space innovation and the way that the government engages with the space commercial sector. The emergence of new stakeholders and partnerships in space has also created new challenges, such as new safety and security considerations in space operations.

Canada is committed to maintaining its ability to access, develop, operate, and effectively utilize space-based technologies to serve the needs of Canadians in the context of a rapidly evolving global environment. We are also committed to supporting our companies and researchers as they seek out new and exciting opportunities at home and abroad. Indeed, we are keen to foster a growing and sustainable space sector that can contribute to emerging technologies, scientific advancement, world-class companies and promoting clean growth.

Canada's future Space Strategy will recognize the important role of space in advancing Canada's national interests and priorities, and reflect the importance of the space sector in supporting Canada's successful growth as an innovation economy under the Innovation and Skills Plan.

Indeed, as Minister Bains indicated in November 2016:

"[the] Space Strategy is in effect a research and innovation strategy that will support growth in the sector and leverage the benefits of space for all Canadians."

Source: Minister Bain's Keynote Speech at the Aerospace Industries Association of Canada Summit on 16 November 2016

To deliver on this commitment and move forward on calls from stakeholders to deliver a renewed space strategy for Canada, the Minister of Innovation, Science and Economic Development has revitalized the Space Advisory Board.

The Space Advisory Board will support the development of long term priorities for space by engaging in outreach and consultations to ensure a growing and sustainable space sector in the long term that can create good quality jobs and wealth for Canadians. This consultation paper is meant to help set the context for these ongoing discussions to define the key elements of the future Space Strategy, which will be launched by June 2017.

2. The Case for Space

Space: Connecting Canada and the World

Space is now ubiquitous and deeply integrated into the daily lives of Canadians. It is a rapidly growing global sector, enabling economic growth, driving science and technology forward while also creating important benefits for Canadians.

The Government of Canada relies on space in delivering services to Canadians and in support of day-to-day operations. In particular, space provides a unique vantage point with an unobstructed view of Canada and the world, which allows the government, on a 24/7 basis, to gather information essential to daily operations such as monitoring and protecting Canada's territory, responding to natural and human-induced disasters, providing weather forecasting, supporting search and rescue, detecting pollution, and optimizing agricultural production. For example, National Defence depends on space – including for communications and navigations – for almost all its operations at home and abroad. Indeed, Canada's investments in space and space-based technologies have enabled the Canadian Armed Forces to make valuable contributions to allied capabilities. A strong space sector is critical to Canada's ability to independently gather, process, and analyze the information that we rely on as a nation to support decision making.

Beyond government operations, space is a catalyst for innovation and economic growth. Canadians rely on space systems to navigate almost every aspect of modern life. Satellites are now an indispensable part of our communication network, enabling everything from cell phone services and television broadcasts to financial transactions. Our use of space will likely continue growing as new technologies and systems generate new products and services to meet our evolving needs. As an example, the Global Navigation Satellite System (GNSS), in addition to supporting navigation, now enables approximately 40 million location-based services via GPS-enabled devices in Canada, changing the way that Canadians carry out their daily routines and interactions across a wide range of activities. The embedded GNSS timing signal is critical to science, maintaining our infrastructure and enables economic activities. This includes enabling earth observation activities, synchronising communication networks, managing power grids, and authenticating electronic financial transactions. Canada also relies on systems developed and maintained by the U.S., namely the Global Positioning System (GPS), and European Union, namely the Galileo system.

Space is an important venue for international cooperation, uniting nations through a common desire for exploration, scientific discovery, and in a search for solutions to global challenges. Indeed, Canada is both a contributor to, and a major user of, a number of global networks of space-based systems and data collection that are used by governments worldwide to monitor climate change and support search and rescue, amongst other activities.

Emerging Challenges

Space is not a well-regulated environment and space assets are highly vulnerable. As technological advances make space more accessible, there are global efforts underway, through the United Nations Committee on the Peaceful Uses of Outer Space and in other fora, to develop global norms and frameworks that would enable humankind to continue to explore and innovate in space in a safe, sustainable, and responsible manner. Globally, nations are also examining how to ensure the safety and security of this growing network of space infrastructure, and to mitigate the impact of natural and human-induced hazards on space-based operations, including threats from potential adversaries, space weather and space debris.

Increasingly, nations are investing in a national space capability as a matter of strategic interest, and providing significant support and incentives both to grow domestic firms and to attract international talent and companies. This presents significant opportunities for Canada – with its established experience in space – to engage in new partnerships to advance Canada’s space sector and economic interests, while ensuring national security considerations are taken into account. The growing number of public and private interests in space also means that Canada must continue to invest to preserve its expertise and global leadership in space technologies and services, both of which are critical to Canada’s ability to develop and operate space technologies in our national interest.

Space as a Driver of Innovation

Canada's space sector is a clear example of the innovation success that Canada can achieve. It is a key component of Canada's high-technology ecosystem, one that has driven advances in innovation, technologies and talent, and brought benefits that span sectoral boundaries.

Canada, along with its industry and academic partners within the space sector, have developed and employed some of our nation's brightest talent and created thousands of high-quality, high-paying jobs. Innate to this sector is a drive for progress and discovery that is emblematic of Canada's renewed focus on technology and fundamental science. Today, Canada is home to some of the world's best space scientists, research institutions and globally renowned companies of all sizes, including a number of new entrants that are poised for growth.

Canada's space firms are recognized globally for their excellence. As reported in the Canadian Space Agency's (CSA's) *State of the Canadian Space Sector 2014*, the space sector generates \$5.4 billion in revenues overall (27% of which are from exports) and \$2.9 billion in GDP. Upstream segment activities related to research, engineering and manufacturing account for \$1B, while downstream segment activities related to satellite operations, applications, products and services account for \$4.4B, with satellite communication dominating the downstream segment. Compensation in the sector's 10,000 jobs averages \$96,000 per year; just under half of these employees are highly qualified personnel (HQP). The intensity of research and development activities within this sector is also six times higher than the broader manufacturing sector.

Innovation and Skills Plan Consultations: What We Heard From Industry and Academia

During the public consultation process for the Innovation and Skills Plan, the Aerospace Industries Association of Canada (AIAC) issued a call for action to the Canadian government to establish a whole-of-government long-term space vision that would encapsulate both civilian and military space priorities.

The AIAC submission signals that to keep pace with this changing context and secure Canada's position as an innovative space faring nation requires recognition and renewed commitment by the government to the sector, what they call a long-term vision. The AIAC proposed that Canada's long-term vision for its civilian space program should focus on three core areas:

- Support for flagship space programs that continue Canada's leadership in space;
- Support for a balanced program of affordable space missions; and,
- Support for a robust program of space technology development.

In the months leading up to the AIAC submission, the CSA and ISED also engaged in a series of meetings with the AIAC and its members to discuss and gather their views and perspectives on the future of the space sector, as well as possible options for enhancing the relationship between Canada and its space sector.

Concurrently, the CSA developed a paper on the opportunities and challenges that affect the space research community and the alignment of space with the Innovation Agenda, based on the CSA's interactions with the space research community in recent years.

The CSA shared this paper with a number of individuals and science/consultative committees within the research community to validate the CSA's understanding of the issues facing the space research domain. As well, the CSA sought the community's views on how the space sector could contribute to the successful delivery of the Innovation Agenda. A total of 76 individuals/groups were contacted and 50 responses were received.

The science community's perspective on the key opportunities and challenges that space research encounters can be narrowed down to the following common messages:

- Need for sustained and predictable funding for researchers and students and for enhancing Science, Technology, Engineering, and Mathematics (STEM) engagement and outreach;
- Regular, predictable access to space mission opportunities, fostering international partnerships, and leveraging Canada's research strengths to achieve greater return on investments from science missions;
- Access to physical research infrastructure and low-cost, sub-orbital platforms; and,
- Collaboration among academia, government, and industry and effective cooperation among federal/provincial/territorial government partners to enhance the capabilities and strengths of Canada's space sector.

These common messages represent activities that are critical to attracting, developing, and retaining Highly Qualified Personnel (HQP) to build a resilient future in space for Canada.

3. Moving Forward – Proposed Objectives and Goals/Areas for Action

Our space activities are currently guided by five core principles set out under Canada’s Space Policy Framework.¹ Canada’s future priorities for space will build on these principles as Canada works to respond to the sector’s call for national leadership and to partner with industry and academic stakeholders to grow the sector and unlock further benefits from space.

The Space Strategy will set out the directions and priorities for Canada’s space program and sector, as well as signal a willingness to partner and potentially engage in new investment opportunities. While national investments remain important, as the global commercial space market continues to grow, Canada’s approach must also evolve to ensure that it continues to be effective in paving the way for Canadian firms of all sizes to extend their reach in the flourishing New Space sector and bring benefits to Canadians, while attracting new investments and talent for Canada.

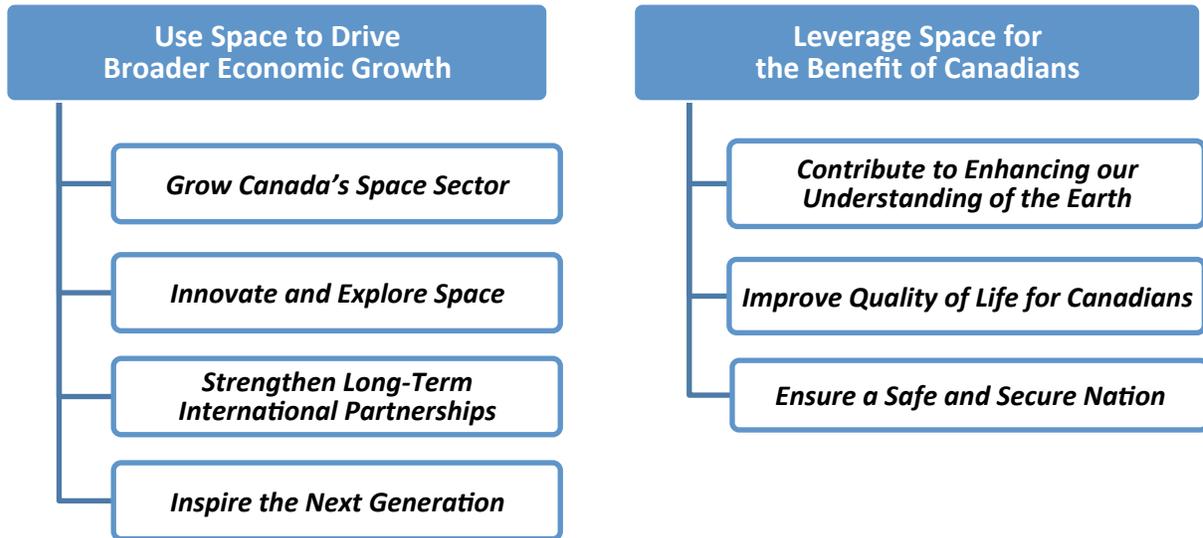
This consultation document positions broad priority areas that align with Canada’s Innovation and Skills Plan to ensure that Canada is home to the most skilled workforce in the world, is a nation of innovators and is a world-leader in the innovation economy. Moreover, the Space Strategy will also take into account Canada’s current and future use of space technologies, drawing on insights gathered in public and government-wide consultations on the use of space in advancing Canada’s priorities, such as adapting to and addressing climate change, advancing clean growth, and ensuring domestic and global safety and security.

To achieve these aims, discussions related to Canada’s strategic objectives could focus on two key areas. Firstly, Canada will consider how best to use space to drive broader economic growth by ensuring the space sector is positioned for success, is a deep source of innovation, an engine for partnerships and a source of inspiration for the next generation of scientists, innovators and explorers. Secondly, we will consider how Canada will leverage space for the benefit of Canadians by applying our space knowledge and expertise to address global challenges, by increasing the integration of space technologies into everyday life, and by continuing to use space to support key government mandates.

These two objectives could be achieved by a proposed series of key goals and areas for action that reflect Canada’s aspirations for the future of the space program over a 10-year horizon.

¹ The five principles of the Space Policy Framework are 1) Canadian interests first; 2) positioning the private sector at the forefront of space activities; 3) progress through partnerships; 4) excellence in key capabilities; and 5) inspiring Canadians.

Proposed Key Objectives and Goals for Canada's Space Strategy

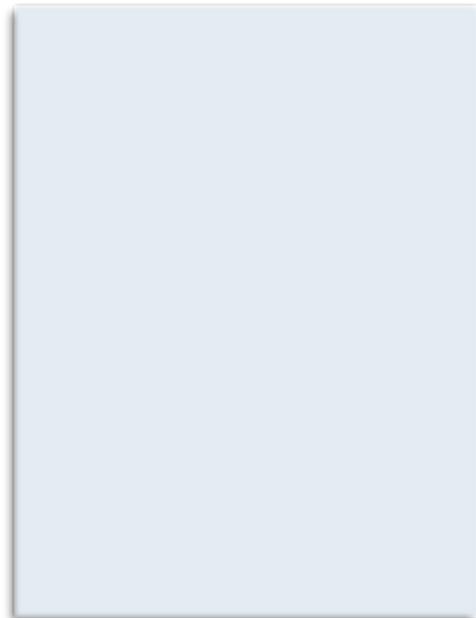


4. Key Objective 1: Use Space to Drive Broader Economic Growth

1. *Grow Canada's Space Sector*

Canada recognizes the growing importance of space for our society, economy and security, as well as for the daily operations of federal, provincial, territorial and municipal governments. Canada similarly recognizes the strategic importance of having a vibrant, competitive and innovative domestic space sector that can provide Canada with the technology it needs as a modern nation in a technologically driven global economy, and establish a strong presence within the growing global space market.

Canada's space sector, though relatively small by international standards, is world-leading in niche technologies such as satellite communications, space robotics, space-based radar, optics, and science instruments. Canada could build on its long-standing partnership with the space sector by continuing to support the development and demonstration of new technologies, products, and services, from innovative components and spacecraft to new services to enhance our ability to process and analyze data. Canada could explore opportunities to support its industry partners by being a first customer, when it is beneficial to do so, to unlock international market opportunities. Such investments by Canada and other spacefaring nations have collectively led to technological advances that are making space more accessible to a broader range of



players.

Other countries are also examining existing legal and regulatory frameworks, or putting new ones in place, which are enabling new kinds of commercially-led space activities such as space mining or Earth observation services. Canada too could seek to ensure its frameworks are able to adapt and evolve with technological developments and provide an enabling environment for growth and innovation, while taking into account Canada's national security concerns.

Canada is seeking opportunities to strengthen the space sector by scaling up firms, enhancing export growth and supporting the creation of well-paying jobs to strengthen and grow the middle class. Such partnerships could help maintain and expand Canadian leadership globally, while also ensuring that the sector can continue to maintain and expand its capacity to deliver space-based solutions to Canada and the world.

We are looking for input into questions such as:

- What activities are industry and academia engaging in to advance and evolve Canada's current core areas of expertise? What is being done to identify, explore and develop emerging areas and technologies that Canada should consider for future growth opportunities in space?
- How can the space program better identify, plan and provide additional flight heritage and mission opportunities that mature and demonstrate technology, build capabilities, scale firms and drive global sales and export?
- How can Canada modernize programs and partner with industry to best help innovative firms grow and capitalize on emerging commercial opportunities?
- How could we work together better to foster space entrepreneurship and the growth of the space start-up community, particularly to explore innovative applications for space technologies and space-based data?
- Does Canada have the appropriate legislative and regulatory frameworks in place to encourage investment and growth in the space sector? What areas need modernization and what other policy tools should be explored?

2. Innovate and Explore Space

Canada has a rich space heritage, built upon leading-edge technologies and innovation. We plan to remain active in space exploration. We also plan to continue to engage across the space science disciplines, including life sciences, planetary science, astronomy, Earth system science, atmospheric science and solar terrestrial science. The recent announcement of a renewed contribution to the International Space Station (ISS) to 2024 will allow more Canadian astronauts to work on the Station in support of science, technology development, innovation and partnership building, while ensuring Canada remains at the forefront of human space exploration.

Here on Earth, space science, exploration and technology development activities are essential to driving growth and innovation in the space sector. The fundamental and applied sciences, both in space and on the ground, are critical sources of innovation and discovery that support growth. The technological and scientific impact of space exploration has given rise to a wave of innovations over the last decades that has changed life on Earth. The further miniaturization of technologies – to the point where microsatellites and even nanosatellites are now able to provide operational services – has meant that the cost of accessing space has dramatically fallen. New technologies, such as quantum computing and encryption, optical communications and artificial intelligence, areas where Canada is already a global leader, have significant potential applications in space to both secure communications and help guide future exploration activities.

As a nation of innovators, it is imperative that we keep pushing the frontiers of research, knowledge and technology and seek to engage our international and domestic partners in defining and preparing for the future.

We are looking for input into questions such as:

- What technology contributions to major international endeavours, including the International Space Station (ISS) partnership, would have the greatest benefit for Canada and help support cutting-edge technology development following the ISS mission?
- How can Canada and our space sector best participate, with our international partners, in the next phase of human spaceflight beyond low Earth orbit while also maximizing opportunities for our firms and scientists?
- How can we better enable Canada's world-leading space scientists in their pursuit of scientific excellence, and ensure we are training the next generation of scientists and innovators?
- Should Canada seek a better balance between investing in the science disciplines it currently supports and ensuring that Canada remains well-positioned to adapt to evolutions in the sector?
- How can Canada's existing innovation support programs work better for the space sector?

The Microvariability and Oscillations of Stars (MOST) Project is a CSA-sponsored cooperative scientific partnership that created the world's smallest astronomical space telescope, capable of measuring the age of stars in our galaxy and their composition. The tiny satellite weighs only 60 kg and carries a high-precision telescope no wider than a pie plate. MOST provided scientists with a direct and constant view of a star for extended observations, and has enabled discoveries that have led scientists to reconsider a number of long-held theories on the formation and aging of the Sun and other stars.

3. Strengthen Long-Term International Partnerships

Space missions are often carried out as cooperative endeavours that both inspire ambition and bring tangible benefits across the globe by producing knowledge, capabilities, and relationships

that help society deal with some of the most pressing long-term global challenges, such as climate change. Space is a unique domain in which the nations of the world have collaborated closely on exploration, Earth observation (e.g. through open access and sharing of weather data to support operations and science), and technology development and research, despite geopolitical challenges back on Earth. It is a catalyst for nations to build mutual understanding and trust, to leverage efforts in addressing issues of global scale, and to establish strong partnerships based on a common desire to make new discoveries. Canada is a committed partner in advancing peaceful, globally coordinated multilateral and regulatory activities in space and on Earth through organizations such as the UN Committee on the Peaceful Uses of Outer Space, which is seeking, amongst others, to build norms of responsible behaviour in space.

Canada must continue to collaborate with key international partners, including the U.S. National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA). These, as well as our partnerships with Japan Aerospace Exploration Agency (JAXA), the Indian Space Research Organisation (ISRO), the German space agency (DLR), and the French space agency (CNES), to name a few, have enabled new markets and opportunities for Canadian industry and academia. Canada could pursue and strengthen new and existing relationships to foster the exchange of knowledge and ideas and cross-sectoral collaboration. Government-to-government partnerships can facilitate critical linkages for firms to contribute Canadian technologies to international mission opportunities to address global challenges, and gain access to global data and markets and grow export potential.

We are looking for input into questions such as:

- What additional activities could Canada undertake to strengthen its international relationships (e.g. with ESA and others) to create more opportunities for Canada's space firms and scientists? What are some new partnerships that we could consider?
- What is preventing Canada's small- and medium-sized space firms from scaling and accessing global markets?
- How can we more effectively manage and leverage the vast quantity of data generated globally through partnerships on weather, the environment and climate change studies?
- How can Canada best contribute to the multilateral international discussions on the management and governance of human and commercial activities in space?
- What norms of behaviour would best promote a predictable and secure space environment? What role can industry and academia play to support and/or advance these discussions?

4. Inspire the Next Generation

Canada's innovation economy is dependent on developing a highly skilled technical workforce. To have a dynamic, globally competitive economy in Canada, we must foster a culture of innovation, creativity and science literacy. Space has the power to inspire widespread interest in science, technology, engineering and mathematics (STEM) subjects across all ages. Canada recognizes the importance of talent development to ensure that our nation has the necessary

base of exceptional, knowledge-driven, transferrable skills essential to sustain an innovative domestic space sector and enhance entrepreneurship in this field.

The space sector employs some of Canada's most highly trained and educated engineers and scientists, many of whom have then brought their knowledge and expertise to other sectors as they explore new paths in their careers. The investments we make today will pay dividends as STEM-related careers grow in the future in the space sector and beyond.

We are looking for input into questions such as:

- How can industry, academia and government collaborate to equip the next generation of space innovators, scientists and entrepreneurs, especially women and indigenous youth, with the right skills for the knowledge economy?
- What activities should we pursue to help develop, attract, diversify and retain talent in the space sector, and ensure that Canada continues to have a strong pipeline of innovative and entrepreneurial HQP to advance and grow our space sector?
- How are industry and academia collaborating to encourage the cross-pollination of talent and knowledge between the space sector and other high-tech disciplines?
- How can industry, academia and government collaborate to create greater awareness and interest in space activities in Canada?

Space is a vehicle through which it is possible to inspire and reach millions.

Commander Hadfield's videos from the ISS were viewed by over half a million people. Likewise, as of November 2016, the CSA's social media content on the Astronaut Recruitment Campaign created 365,000 engagements (likes, shares and comments) and appeared 9.25 million times across platforms such as Facebook and Twitter.

5. Key Objective 2: Leverage Space for the Benefit of Canadians

5. *Contribute to Enhancing our Understanding of the Earth*

Space provides a unique vantage point on our world. The information obtained from space, when combined with other sources, has guided the development of strategies with respect to adaptation to climate change, sustainable development of the North, as well as coastal ecosystems management. Space is also critical to understanding and protecting our environment, such as monitoring ice conditions in the North. Space-based technologies such as GNSS also further scientific aims such as earthquake modelling. Of the 50 "Essential Climate Variables" that are internationally recognized and used to monitor climate change, 26 can only be observed globally from space. Earth observation can also be used to understand public health concerns resulting from ecosystem changes.

Canada has a critical dependency on both domestic and international Earth observation technologies and related space systems to meet its daily operational needs, for example in weather prediction, where the majority of the required data come from non-Canadian satellites. In addition to the current RADARSAT-2 and forthcoming RADARSAT Constellation Mission satellites, Canada employs other space assets, such as SCISAT, to support science and international discussions on climate change. Earth observation will continue to play a

prominent, and perhaps expanded, role in the future of our space program and sector. Canada has been and would like to continue to be an innovator in processing and analyzing information to support decision-making and various activities across the public and private sector.

We are looking for input into questions such as:

- What technologies, services and procurement models should Canada consider to ensure that we continue to have timely and reliable access to the Earth observation data that we rely upon to provide critical services to Canadians?
- What are some of the key opportunities and challenges for growing and developing the downstream sector for space data in Canada?
- What is the impact of government policies related to the management of EO data on the growth and development of the downstream sector?
- How can Canada better leverage its excellence in space technology, services, and science to further contribute to global efforts related to climate change, clean growth, development and health?
- How can public sector scientists and technical experts better engage with industry and academia to develop and identify new technologies and solutions?

6. Improve Quality of Life for Canadians

Canada's journey to space, from the launch of the first Canadian-developed satellite, to the construction of the International Space Station, to the incredible voyages of Canada's astronauts, has led to the creation of new technologies that touch upon every aspect of our daily lives.

Space directly impacts our quality of life through links to life sciences research, technological spin-offs and communications. Human spaceflight enhances understanding of how the human body ages and has generated new diagnostic tools. Advanced surgical tools – linked to the Canadarm – are making previously inoperable tumours accessible to surgeons. Satellite communication technologies help bridge the digital divide, offering broadband solutions to rural and remote areas with increasing speeds at lower costs. These space-enabled services are critical for economic development, service delivery, natural resource management and quality of life for indigenous communities and Canadians across the North and other remote regions.

We are looking for input into questions such as:

- How can we better transfer the knowledge and technologies developed through the space program to support the development of new innovations and “spin-off” applications in non-space sectors?

With funding and support from the CSA, Dr. Steven Boyd of the University of Calgary has designed an experiment called **TBone** that uses new 3D imaging technology to study changes in astronaut bone mass, structure and density in high resolution on the ISS. The outcomes of TBone could be used to better understand bone loss, identify those who are predisposed to bone loss, and lead to individualized treatment strategies.

- Conversely, how can we better transfer new innovations and ideas from other sectors into the space sector – “spin-ins” – to advance Canada’s space sector competitiveness?
- What can we do to better ensure that the knowledge and capabilities we gain from our space activities are accessible and more effectively communicated to Canadians?
- How can Canada better leverage space to provide services for Canadians?

7. *Ensure a Safe and Secure Nation*

The vastness of our country makes space systems one of the most effective and efficient means of supporting response to disasters, locate persons in distress in remote regions, monitor maritime approaches and coordinate activities across Canada’s vast landmass. For instance, the GPS data enhances public safety by preventing transportation accidents and by enhancing the response times of ambulances, firefighters, and other emergency services. Space technologies also play a critical role in providing communications, navigation and surveillance capabilities to enable the Canadian Armed Forces to effectively conduct operations for the defence of Canada and North America and contribute to global peace and security. Canada’s strategic investment in niche capabilities also adds important value to our key allies, and in turn, enables our access to their systems and capabilities. Canada will continue to maintain and improve, and safeguard where possible, the space-based networks and assets that connect us, support our economic activities and ensure the safety and security of our nation. Partnerships, both bilaterally and with likeminded nations, are key to helping us achieve these goals.

An important question Canada needs to consider going forward is how to ensure a safe and efficient environment for space operations and related terrestrial infrastructure (e.g. ground stations). The growing accessibility of space to nations and the commercial sector represents a unique opportunity for partnerships to access advanced capabilities at a lower cost. However, these activities also raise significant safety and security concerns. The ever-increasing number of space objects orbiting Earth, including debris, is a driving factor behind the growing importance of greater international cooperation on the security and sustainability of outer space. Threats and hazards to governmental and commercial space infrastructure, such as potential adversaries that are developing anti-satellite weapons that could threaten vital space capabilities, or the detrimental effects of space weather, must also be recognized and addressed. Less visible, though no less important, is the need to ensure that the transfer of information across space-based networks can occur in a safe and secure manner.

We are looking for input into questions such as:

Manual on International Law Applicable to Military Uses of Outer Space (MILAMOS):

The McGill University Faculty of Law’s Centre for Research in Air and Space Law and University of Adelaide’s Research Unit on Military Law and Ethics are leading a three-year effort to draft the Manual of International Law Applicable to Military Uses of Outer Space (MILAMOS).

The manual is being drafted by approximately 50 legal and technical experts from around the world (including from Australia, Canada, China, France, Germany, Israel, Japan, Nigeria, Sweden, Switzerland, UK, United States and representatives from the ICRC). The experts are drawn from academia, government, military, international and non-governmental organizations. DND/CAF is contributing experts and observers to the process.

- How can Canada better leverage space technology to detect, monitor, mitigate, and respond to natural and human-induced threats or emergencies? What space technology improvements would better assist in the mitigation of these threats or emergencies?
- What do you see as the biggest challenge to ensuring safe and secure space operations and cybersecurity, including the transfer of information?
- While Canada and other nations space-based operations are likely to greatly benefit from new technologies and services emerging from “New Space” companies? What are the safety and security issues arising from that new paradigm?
- What activities have industry undertaken to address safety, security and privacy concerns related to their space-based assets and terrestrial operations? What are the opportunities (and barriers) that industry partners have encountered in this area?

6. A Call to Action

Canada has a vibrant space sector with firms that have a global reputation in space operations, satellite communications, space robotics, space-based radar, optical, science instruments, and value-added Earth observation and geospatial services. Canada’s space scientists are well-represented amongst the cadre of global leaders in astronomy, planetary exploration, space life sciences research and the environmental sciences crucial to understanding the science and the impacts of climate change.

However, the global space sector is becoming more competitive and the emerging New Space economy is opening up opportunities where Canadians can play an important role. Ensuring our nation moves in the right direction will allow Canada to continue and build on its lead in our areas of strength

Industry, academia, and all Canadians will be critical to Canada’s future growth as a nation. Canada is committed to engaging in meaningful partnerships with the space community as we advance space science and technologies and move to the next stages of space exploration. We look forward to hearing your input on our future directions and your views on how Canada can best support you in your endeavours.