
Securing Canada's Place in Space: Key to Canada's Competitiveness

Written Submission for
the Pre-Budget Consultations
in Advance of the 2019 Budget

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- Recommendation 1: That, consistent with the report of the Space Advisory Board, the government **recognize space as a national strategic asset and a key contributor to Canada's competitiveness** today and in the new space economy.
 - Recommendation 2: That the government develop **a long-term space plan for Canada** that establishes the requisite funding to maintain our existing world leadership in satellite communications, robotics, Earth observation and space science; cultivate new areas of leadership; and position Canada to be competitive in the new space economy.
 - Recommendation 3: That, as an important first pillar of Canada's long-term space plan, the government announce **a commitment in Budget 2019 (at the latest – time is running out) to provide a third generation Canadarm to the international space community's next big exploration mission, the Gateway project.**
 - Recommendation 4: That the government provide **\$1-2B over the next 20 years, starting in Budget 2019, to fund a third generation Canadarm**, securing Canada's existing world leadership in space robotics and positioning this country for competitiveness in the new space economy.
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Space is a national strategic asset and a key contributor to Canada's competitiveness

Canada was the third country in space in 1962 with the launch of the Alouette satellite, after the (then) USSR and USA superpowers. And the expertise that was developed as a result led to other great accomplishments: Canada was the first country to operate a commercial domestic communications satellite from geostationary orbit in 1972, the first to deploy a direct-to-home broadcasting service in 1982; the first to have an operational and commercially-focused radar remote sensing system in 1995; and the first to introduce two-way broadband Internet across the country in 2004.

This is not the sum of our accomplishments in space, by any means, just some notable firsts made possible by the bold vision, deliberate choices and strategic investments of past Canadian governments. Because, when it comes to space, governments have to lead.

Today, the rationale for pursuing space is simple and well-documented. It makes countries more competitive: *"smarter, richer, safer and more respected globally,"* as eloquently stated and amply demonstrated in the 2012 Aerospace Review. That case had yet to be proven when those first decisions were taken, yet past Governments understood that spending on space would pay dividends to Canadians in advancements in science and technology, delivering economic and social benefits, and adding to our stature as a country. They understood that, for Canada, space is not only inspirational and aspirational, but also highly pragmatic. Because of our vast and northern territory and dispersed population, we need space infrastructure for the monitoring and communication capabilities it provides.

The investments they made in Canada's space infrastructure have:

- Led to better telecommunications and Internet services, connecting Canadians, including those in remote communities, to each other and to the world;
- Allowed us to keep an eye on our oceans, forests, wetlands, farmlands, natural resources and transportation corridors from space, providing early warning of natural disasters, flood mitigation and monitoring, ice monitoring, and providing data to measure the effects of climate change; and
- Enabled us to monitor our borders, maritime approaches and remote Arctic territories so that Canada can be defended and its sovereignty protected.

Today, Canada is an acknowledged world leader in satellite communications, Earth observation, space robotics, optics and sensors, with a diverse space sector that contributes strongly to Canada's innovation eco-system and competitiveness.

The space sector includes some of Canada's most innovative companies, universities and research institutions and employs our brightest minds. In 2016, our space sector achieved \$5.5 billion in revenue, employed 10,000 Canadians (41% highly skilled HQP), supported close to 22,000 Canadian jobs and contributed \$2.3 billion to the GDP.

After decades without a long-term space plan, Canada is at an inflection point

Space is ubiquitous in modern life. It touches the lives of Canadians 20-30 times a day, from weather predictions, to using an ATM, to checking a map on a smartphone, to downloading movies, to ground and air traffic management. It enables and accelerates innovations that drive Canada's competitiveness. It is going to be even more ubiquitous in the fast-approaching tomorrow of autonomous cars, smart cities, advanced autonomous Artificial Intelligence (AI) and robotics.

Yet, unlike other countries that have been increasing their investments in space, Canada's space program has faced declining investment for many years, and has had no long-term space plan since 1994.

According to the latest figures, whereas in 1992, Canada was 4th in spending as a share of GDP among G7 countries, by 2016 Canada was last, tied with the United Kingdom (the UK will not remain at the bottom of the ranking, it has recently turned around years of neglect with a strong reinvestment in its space program).

If we look at investment across all spacefaring countries, in 1992, Canada was ranked 8th in spending as a share of GDP; by 2016 we had fallen to 18th, behind Luxembourg, the USA, France, Belgium, Germany, Russia, Switzerland, Italy, Japan, Korea, Sweden, Norway, Finland, Austria, the Netherlands, the United Kingdom and Australia. Looking forward, that downward trend is projected to accelerate, based on known plans and Government spending.

The current Government has taken promising steps forward – it has made investing in innovation, science and economic development a priority; describes space as at the cutting edge of innovation; appointed a Space Advisory Board; and committed to developing a long-term space strategy.

In its 2017 [consultation report](#), the Space Advisory Board noted that *“Canada has had a very successful space program that met national needs and created an internationally competitive space industry and science capability. However ... Canada has lost ground in a world environment driven by rapidly changing technology and substantial increases in space investments by other nations.”*

The Space Advisory Board's report urges the Government to designate space as a National Strategic Asset, and take a whole of Government approach, since space is a strategic sector essential for our sovereignty, security, and economic growth. It also issues an urgent call for action, *“to reverse the decline in Canada's space capability before it's too late.”*

MDA echoes this recommendation and the urgency of the call to action.

To hold onto Canada's leadership in space, we need a long-term, funded space plan that includes a commitment to provide a third generation Canadarm to the international space community's next big exploration mission, the Gateway project

A long-term space strategy and investment plan cannot come too soon. There are pressing decisions that need to be made now, including whether Canada will participate, or not, in the international space community's next big exploration mission, the Gateway project.

International space exploration partners, including the US, Europe, and Japan, are currently planning a return to the Moon in the 2020s. NASA will lead on the development of a small space station that orbits the Moon, as a base for lunar surface exploration, a science laboratory, a communications hub and Gateway to explore deeper space. The international community expects Canada to participate in this mission and to provide advanced robotics, as we have in the past. Canadian government technology contributions to past missions – notably the Canadarm program – have placed our country among the elite spacefaring nations and have enabled our robust astronaut program.

Canadians care about the Canadarm. With its prominent Canada wordmark, it is an important national symbol. It continues to be the main image that comes to mind when Canadians think about Canada's space program or involvement in space, according to an Ipsos national telephone survey conducted in June of this year. It is also a strong point of pride – 92% agree (including 60% who strongly agree) “When I think about or see the Canadarm I feel proud.”

Given the Gateway's distance from Earth – the International Space Station is 400 kilometres away, the Gateway is 400,000 – a Canadarm3 would incorporate significantly more autonomous decision-making capabilities using artificial intelligence and state-of-the-art robotics, optics, sensors and software.

Canada's best and brightest minds will need to be mobilized to design and build technology solutions that will push the limits of science, technology, engineering and math, thereby contributing to the advancement of Canada's knowledge-based economy over the next two decades in areas so key to our competitiveness.

With construction of the Gateway beginning in less than three years, the first robotic elements need to be delivered in 2021. The Government of Canada must announce a commitment and funding in Budget 2019, *at the latest*, to allow sufficient time to develop and deliver the first Canadian robotic elements.

Canada's commitment to participate with robotics could also open the door to future complementary contributions of lunar surface rovers and space medicine technologies.

Investment in a Canadarm3 would yield strategic and substantive returns. It would:

- Secure Canada's position as the global leader in space robotics and Tier 1 partner through the delivery of essential advanced robotics;



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- Sustain Canada's prestigious astronaut program, with astronaut flights to the Moon vicinity, which will inspire Canada's next generation of youth;
 - Maintain a strategic geopolitical position at the international table of elite spacefaring nations, extending Canada as a major partner;
 - Stimulate and grow the competitiveness of the Canadian space sector; and
 - Create the necessary catalyst for innovative, 4th Industrial Revolution-type capabilities, providing a foundational competitive position in the new and growing global commercial space economy, as nations venture beyond Low Earth Orbit.

Any delay past Budget 2019 in committing to the Gateway means Canada will lose its prized, iconic and highly-coveted space robotics role on the next large international space exploration mission, spelling the end of Canada's space robotics leadership, and inevitable brain drain to other countries who seize the opportunity to dislodge this country from its leading position.

A timely, strategic and fairly modest investment is needed to secure Canada's place in space and ensure Canadian competitiveness in the new space economy

The required investment is strategic and fairly modest: \$1-2B spread over the next 20 years, starting in Budget 2019, would fund a third generation Canadarm, securing Canada's existing world leadership in space robotics and positioning this country for competitiveness in the new space economy.

Canadians would support this investment. The Ipsos survey found that roughly eight in 10 Canadians think the federal government should be supporting the development of the space sector; say that if they heard the amount Canada is investing in space robotics was increasing they would think this is a good decision; and that success in space contributes a great deal to knowledge, innovation, and the competitiveness of Canada. An even greater proportion agree (91%, including 52% who strongly agree) that maintaining leadership in space robotics, like the Canadarm, is important for Canada.

Countries and companies are jostling to capture their place in the new space economy. Ambitious governments are staking their claims. Luxembourg plans to be the leading country in space mining; the UK aims to capture 10 percent of the global space market by 2030.

Canada cannot afford to be left behind. The global space market is worth over USD \$380B today; analysts forecast it will grow to be a multi-trillion-dollar market in coming decades. Commercial space endeavours like on-orbit satellite servicing or space mining are no longer science fiction. Space mining missions will start as early as 2020.

Past Canadian governments planned for a future that they could not entirely anticipate. Thanks to their courage and vision, the return on investment from space for this country and its citizens has been enormous, in terms of advances in science and technology, of innovation, of jobs and economic growth, of inspiration and pride, and of stature on the world stage.

We believe that this Government, with its focus on leveraging innovation to ensure Canada's competitiveness and on creating job opportunities and a better future for all Canadians, has the wisdom and vision to invest in space today for the continued competitiveness and prosperity of Canada.



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