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*Mandated by the Government of Canada*

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Volume 2 – Executive Summary

*Reaching Higher:*  
**Canada's Interests  
and Future  
in SPACE**

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The Honourable Christian Paradis  
Minister of Industry

Dear Minister,

I am pleased to submit *Reaching Higher: Canada's Interests and Future in Space*, volume 2 of my report pursuant to the mandate given to me as Head of the Review of Aerospace and Space Programs and Policies. Volume 1, entitled *Beyond the Horizon: Canada's Interests and Future in Aerospace*, focuses on the aerospace sector.

The over-arching objective of this volume is to outline the foundations for a Canadian Space Program that helps unlock the country's wealth, improves delivery of public services, supports environmental sustainability, and protects public safety. Canada was one of the first nations in space, and over the coming decades our prosperity and security will depend more than ever on designing, building, and operating an optimal mix of space assets and services.

I have aimed to produce a report that is evidence-based, grounded in a long-term perspective on global and industry trends, innovative, and practical. The report summarizes the Review's findings and sets out broad policy directions. Many of the details underlying its analysis and recommendations can be found in working group reports, research reports, and submissions posted on the Review's website: [aerospacereview.ca](http://aerospacereview.ca).

It has been an honour to serve as Review Head. I hope the advice contained in these volumes will prove helpful to the government, and thank you for the opportunity to lead the Review.

Yours sincerely,



David Emerson

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# Executive summary

Canada has been in space for 50 of the 55 years humans have been there. Ours was the third country to have a domestically built satellite in space, the first to have its own domestic communications satellite, the first to develop a direct broadcast satellite, and – as all Canadians familiar with the maple leaf on the bicep of the Canadarm will know – a pioneer in space robotics.

Space is becoming ever more essential to modern economies and national security. The digital information revolution that is remaking contemporary societies – bringing into being new means of knowledge production, mobile access to global pools of information and entertainment, and new relations between public authorities and populations – is possible in part because of space-based assets and applications. Satellites are playing growing roles in fields as diverse as precision agriculture, resource extraction, meteorology and climatology, environmental monitoring, the delivery of education and health services, emergency response, border surveillance, the operation of civil and military drones, and the rapid deployment of armed forces. And it is not just big, expensive satellites that are providing such capabilities: smaller, cheaper satellites are becoming increasingly sophisticated, offering public and private sector customers a wider range of options when they buy and use space assets.

For all these reasons, dozens of countries have committed themselves to joining established space-faring nations in placing and operating assets in orbit, while a growing number of investors have taken an interest in commercial space ventures, from satellite launch and on-orbit refuelling services to space tourism and space mining.

Canada – with its vast geography, dispersed population, isolated communities, long coastlines, rich endowment of natural resources, and northern location – has a particular need for space assets and applications. The right mix of satellites and associated ground infrastructure, for example, will be indispensable if the country is to accelerate wealth creation, protect the environment, and assert its sovereignty as the North opens.

Historically, space-related activity has largely been led by governments. Motivated partly by prestige, partly by curiosity, and partly by the desire to support provision of public services, governments have borne much of the cost and risk of space exploration and activity. Where market economies exist, governments have done so in partnership with companies that have received contracts to design and manufacture space assets for public as well as private use. In Canada, the result has been the creation of a \$3.4 billion space industry that employs 8,000 workers across the country, derives 80 per cent of its revenue from satellite communications, and generates half of its revenue from sales abroad, making it one of the most export-oriented space sectors in the world.

By virtue of niche strengths in areas like satellite communications, Earth observation, and space robotics – along with strong global networks and a positive reputation – the Canadian industry is well-positioned to take advantage of emerging opportunities, succeed commercially, and contribute to the public good.

But business as usual will not be good enough. Advancing the national interest through space-based activity and fostering a competitive Canadian space industry will require resolve, clear priorities that are set at the highest levels, and effective plans and programs to translate these priorities into practice. If the Canadian effort in space has been hampered over the past decade, it is partly because there has not been sufficient clarity of purpose, lines of authority among public agencies have been blurred, and processes for procuring space assets and services have failed to adapt to new global realities and the commercial capacity of space firms. In a sector whose undertakings are innovation-dependent, long term, expensive, and complex, it is critical to have concrete goals, predictable funding, and orderly implementation.

Many of the recommendations made in the companion volume on aerospace apply to the space sector as well, from including aerospace and space as priorities in the government's Science and Technology Strategy, to reviewing export and domestic control regimes to ensure that they are not unnecessarily restrictive, to encouraging youth to consider aerospace- and space-related studies and careers.

This volume focuses on policy and program improvements specific to the space sector. It recommends that:

1. The government explicitly recognize the importance of space technologies and capacity to national security, economic prosperity, and sustainable growth, and that the Minister of Industry bring 10-year, 5-year, and annual government-wide priorities for the Canadian Space Program to the Cabinet Committee on Priorities and Planning, which is chaired by the Prime Minister, for discussion and approval each spring.
2. The government establish a Canadian Space Advisory Council, reporting to the Minister of Industry, with membership from industry, the research and academic communities, provinces and territories, and federal departments and agencies.
3. A deputy minister-level Space Program Management Board be created to coordinate federal space activities, project-specific arrangements be put in place to ensure disciplined project management, and all agencies and departments with a role in the Canadian Space Program be required to report on how they are implementing priorities set out by Cabinet.
4. The Canadian Space Agency's core funding be stabilized, in real dollar terms, for a 10-year period; major space projects and initiatives be funded from multiple sources, both within and beyond the federal government; and increased international cooperation be pursued as a way of sharing the costs and rewards of major space projects and initiatives.
5. The scope of space projects, project timelines, and performance requirements be finalized as early as possible in the project definition phase.
6. Space asset and service procurement processes be competitive in nature and proposals be assessed on the basis of their price, responsiveness to scoped requirements, and industrial and technological value for the Canadian space sector.
7. Total funding for the Canadian Space Agency's technology development programs be raised by \$10 million per year for each of the next three years, and that it be maintained at that level.
8. Where costs are modest and there is no risk to public safety, the government create conditions conducive to the expansion of space-related commercial activity.

Space has been important to Canada over the last half century, but not nearly as important as it will be over the next half century. Simply put, it will be an essential tool of nationhood for a country that aspires to provide long-term prosperity and security to its people, protect its natural environment, and discharge its international responsibilities.

The question is not whether Canada should be in space, but how public policies and programs can ensure that its presence there, and related activities on the ground, best serve the public interest and help the space sector thrive. Fundamental to reaching these objectives is a Canadian Space Program characterized by considered and explicit priorities that are implemented through sound governance, solid management plans, modern procurement practices, and greater emphasis on technological and commercial development. Although increased investment in space infrastructure and services may eventually be required, all the elements described above can be achieved in a fiscally neutral way. There is no reason for equivocation or delay.

## Conclusion

Human endeavours in space have shifted increasingly from a focus on exploration to practical applications and commercial activity. For the foreseeable future, nation-states will remain the largest clients for space ventures – including scientific discovery, Earth observation, and the provision of public services – but more and more, they will be joined by companies selling space-related activities and services at a profit.

Technological advances, primarily in the capabilities of satellites, have made space indispensable to the functioning of contemporary societies. Space-based assets make life on Earth more productive, prosperous, safe, and interesting. The value of space activity – both in commercial terms and in its contribution to the public good – will multiply in the future.

It is essential that Canada capitalize on its strengths in space and position its space sector to be at the forefront of what has become an international race for new ways to turn space to public advantage and private gain. Not to do so is to forfeit opportunities that can never be regained. Our national interests, including in the North and along our security perimeter, demand a range of space-based equipment and applications. Our space firms should be marketing cutting-edge designs and services to the world. Our economy should be benefiting from the rewarding jobs, investment opportunities, and technological innovations and spinoffs that come with space projects. And our researchers and youth should be inspired by the potential to contribute to fundamental knowledge and the betterment of humankind through space-related studies and careers.

Taking advantage of these opportunities requires, first and foremost, that clear priorities for the Canadian Space Program be established at the highest levels. Only then can the creative energies and resources of government agencies, industry, and the academic and research communities be effectively channelled. Robust management structures and plans are required to efficiently marshal efforts in support of these priorities. A carefully calibrated approach to public procurements must be used to balance emphasis on fostering the technological and commercial capacities of Canada's space sector with value-for-money considerations. And the competitive spirit of the Canadian space industry must be as great as its manifest ingenuity.

Canada has already accomplished great things in space. Renewed clarity of purpose and focused administration will allow us to eclipse even those successes. For the sake of future generations of Canadians, it's time to reach higher.