



# **CANADIAN SPACE AGENCY**

## **Performance Report For the period ending March 31, 2006**

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**Maxime Bernier  
Minister of Industry**



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## SECTION 2: OVERVIEW

### 2.1 MINISTER'S MESSAGE



The Canadian economy has adapted well to the changing circumstances of the global economy. Core inflation has remained low, unemployment remains near its lowest level in more than 30 years, and the employment rate is near its highest on record as Canadian companies continue to grow and create more jobs. Canadian industries have the skilled workers, the technological know-how, the innovative capacity and the drive to compete and prosper on the world stage.

My goal as Minister of Industry, and the goal of the Government of Canada, is to ensure that Canadian businesses can continue to grow and evolve in the best possible environment — one that encourages innovation and allows Canadians to reach their full potential. That means an efficient marketplace that supports competition, attracts investment, both from within Canada and from around the world, and encourages and rewards new ideas and inventions. It means minimizing barriers to trade and labour mobility, both within the economic union and with Canada's trading partners. And it means having the infrastructure in place to support sustainable growth.

In support of these goals, the Department and the Industry Portfolio have continued to make progress over the past year on a wide range of responsibilities, including small business financing, consumer protection, the continuing health of Canada's manufacturing sectors, competition law, basic and applied sciences, and practical research. Through these efforts, the Industry Portfolio plays an important role in supporting the economic health of this country — and of all Canadians.

The Industry Portfolio is composed of Industry Canada and 10 other agencies, Crown corporations and quasi-judicial bodies. These organizations collectively play a key role in advancing Canada's industrial, scientific and economic development, and help to ensure that we remain competitive in an increasingly global marketplace.

#### **Members of the Industry Portfolio are:**

- Business Development Bank of Canada
- Canadian Space Agency
- Canadian Tourism Commission
- Competition Tribunal
- Copyright Board of Canada
- Industry Canada
- National Research Council Canada
- Natural Sciences and Engineering Research Council of Canada
- Social Sciences and Humanities Research Council of Canada
- Standards Council of Canada
- Statistics Canada

The Canadian Space Agency's *Departmental Performance Report* for the period ending March 31, 2006, describes the achievements and results of the Department by implementing the Canadian Space Program in cooperation with other government departments and agencies, Canadian industries and universities, as well as international partners.

We have accomplished much, but there is room for improvement. We will continue to work with companies and industries to make sure they are ready to capitalize on the opportunities presented by the changing global economy, while remaining mindful of the expectation of Canadians that we be fiscally responsible and results-focused.

I am pleased to present the Canadian Space Agency's *Departmental Performance Report* for 2005–2006.

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Maxime Bernier  
Minister of Industry

## 2.2 MANAGEMENT REPRESENTATION STATEMENT

I submit, for tabling in Parliament, the 2005-2006 Departmental Performance Report (DPR) for the Canadian Space Agency.

This document has been prepared based on the reporting principles contained in the *Guide for the Preparation of Part III of the 2006-2007 Estimates – Reports on Plans and Priorities and Departmental Performance Reports*:

- It adheres to the specific reporting requirements outlined in the Treasury Board Secretariat (TBS) guidance;
- It is based on the department's approved accountability structure as reflected in its Management Resources and Results Structure (MRRS);
- It presents consistent, comprehensive, balanced and reliable information;
- It provides a basis of accountability for the results achieved with the resources and authorities entrusted to it; and,
- It reports finances based on approved numbers from the Estimates and the Public Accounts of Canada in the DPR.

Name:

\_\_\_\_\_  
Carole Lacombe, Acting President

## 2.3 SUMMARY INFORMATION

### RAISON D'ÊTRE

The mandate of the Agency is *to promote the peaceful use and development of space, to advance the knowledge of space through science and to ensure that space science and technology provide social and economic benefits for Canadians.*

The Canadian Space Agency (CSA) is achieving this mandate by implementing the Canadian Space Program (CSP) in cooperation with other government departments/agencies, industries, and universities, as well as international partners. In addition to delivering its own programs, the CSA is responsible for coordinating all federal civil space-related policies and programs pertaining to science and technology research, industrial development, and international cooperation.

To learn more about the mandate of the CSA, go to:

<http://www.space.gc.ca/asc/eng/about/mission.asp>

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
341.6	345.0	288.0
2005-2006 - Human Resources (FTEs)		
Planned	Actual	Difference
614.0	595.6	18.4

### CSA STRATEGIC OUTCOMES

Further to the approval of the Canadian Space Strategy (CSS) by the Government of Canada, the CSA has substantially revised its strategic outcomes in line with the Government of Canada's top priorities.

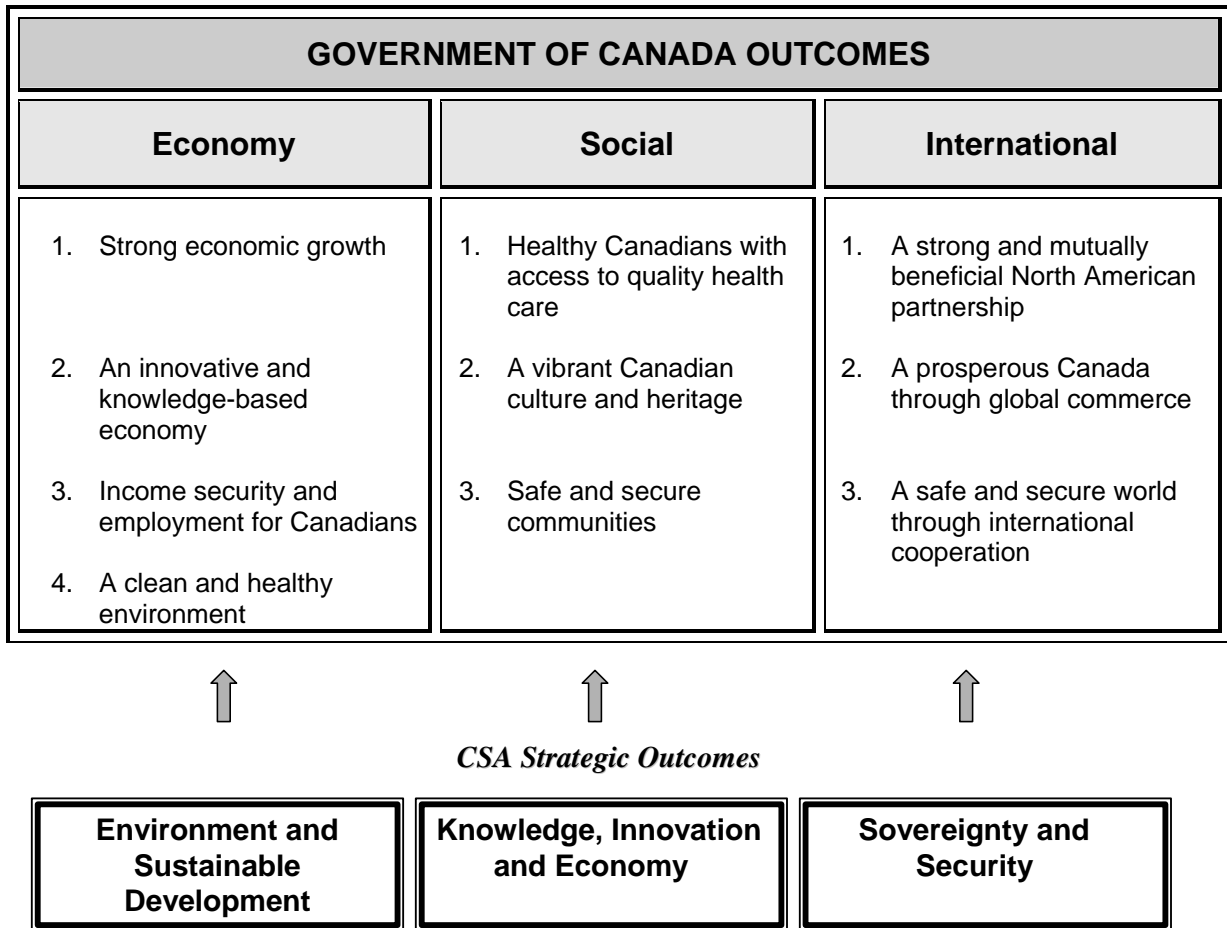
**Environment and Sustainable Development:** A Space Program that helps Canada understand and protect the environment, and develop its resources in a sustainable manner.

**Knowledge, Innovation and Economy:** A Space Program that generates knowledge and pushes innovation, while leading (where appropriate) to increased productivity and economic growth through commercialization.

**Sovereignty and Security:** A Space Program that supports recognition of Canada's sovereignty and the security of its communities.

To learn more, go to: [Section 4.3 – Strategic Outcomes Crosswalk 2004-2005 to 2005-2006](#)

**CSA CONTRIBUTIONS TO GOVERNMENT OF CANADA OUTCOMES**



**CSA Contributions to Government of Canada Economic Outcomes**

The CSA's three strategic outcomes contribute to the development of Canada's economy as measured against the following outcomes outlined in *Canada's Performance Report*:

- Strong economic growth;
- An innovative and knowledge-based economy;
- Income security and employment for Canadians; and,
- A clean and healthy environment.

The space industry contributes to Canada's economic well-being and helps achieve a higher standard of living and quality of life for all Canadians.

Through its Research and Development (R&D) investments and the resulting transfers of applications to the private and public sectors, the CSA's programs and activities attract highly skilled labour that contributes to Canada's knowledge-based economy; helps enhance the Canadian space industry's competitiveness by encouraging dynamic trade relationships with other nations; and increases Canada's ability to compete in the global marketplace.



Earth Observation missions drive some of the changes that are improving our quality of life by helping our government deliver on priorities such as protection of the environment, sustainable development, management of natural resources, understanding climate change and providing support for disaster management.

Satellite communications missions are a key element in linking all Canadians in a communication network including the remote and northern communities.

### **CSA Contributions to Government of Canada Social Outcomes**

The CSA's three strategic outcomes contribute to Canada's social foundations as measured against the following outcomes outlined in *Canada's Performance Report*:

- Healthy Canadians with access to quality health care;
- A vibrant Canadian culture and heritage; and,
- Safe and secure communities.

As part of the *Connecting Canadians* priority, space infrastructure allows access and dissemination of timely health, cultural, security and safety related information to all Canadians, no matter where they live in Canada.

Earth Observation and communication and navigation satellites drive some of the changes that are improving our quality of life by helping our government deliver on environment, safety and security priorities, by allowing timely monitoring and maintenance of a healthy physical environment over the Canadian territory, and by providing support for disaster management in such situations as floods, forest fires and earthquakes. They also allow the essential communication tool to support law and order enforcement interventions and enhance search and rescue capabilities.

Fundamental research in physical and life sciences, space exploration, science and technology attracts the bright minds of a nation in participating in visionary endeavours. It encourages science and technology literacy, particularly among our youth, which is inspired by the role model of Canadian astronauts, scientists and researchers inviting them to reach for their highest aspirations. Satellite communication is a powerful channel that plays a significant role towards sharing Canadian culture and heritage. It is also the engine that drives the knowledge economy by contributing to the development of the new technologies that will maintain Canada's leadership in fields ranging from nanotechnology and robotics to healthcare.

Satellite communication is essential to provide all Canadians, no matter where they live in Canada, with timely access to expert knowledge and expertise related to health and education through a range of non-commercial services, including e-government, e-learning, tele-justice, tele-education, as well as tele-medicine disciplines such as tele-psychiatry, tele-radiology, tele-surgery, and tele-consultations.

## **CSA Contributions to Government of Canada International Outcomes**

The CSA's three strategic outcomes contribute to establishing Canada's international presence as measured against the following outcomes outlined in *Canada's Performance Report*:

- A strong and mutually beneficial North American partnership;
- A prosperous Canada through global commerce; and,
- A safe and secure world through international cooperation.

Space is now recognized by industrialized nations as an essential and strategic tool to meet social and economic objectives. Canada must therefore possess a space infrastructure, not only to meet its specific national needs, but also to play a tangible and visible role in responding to the issues that interest the international community.

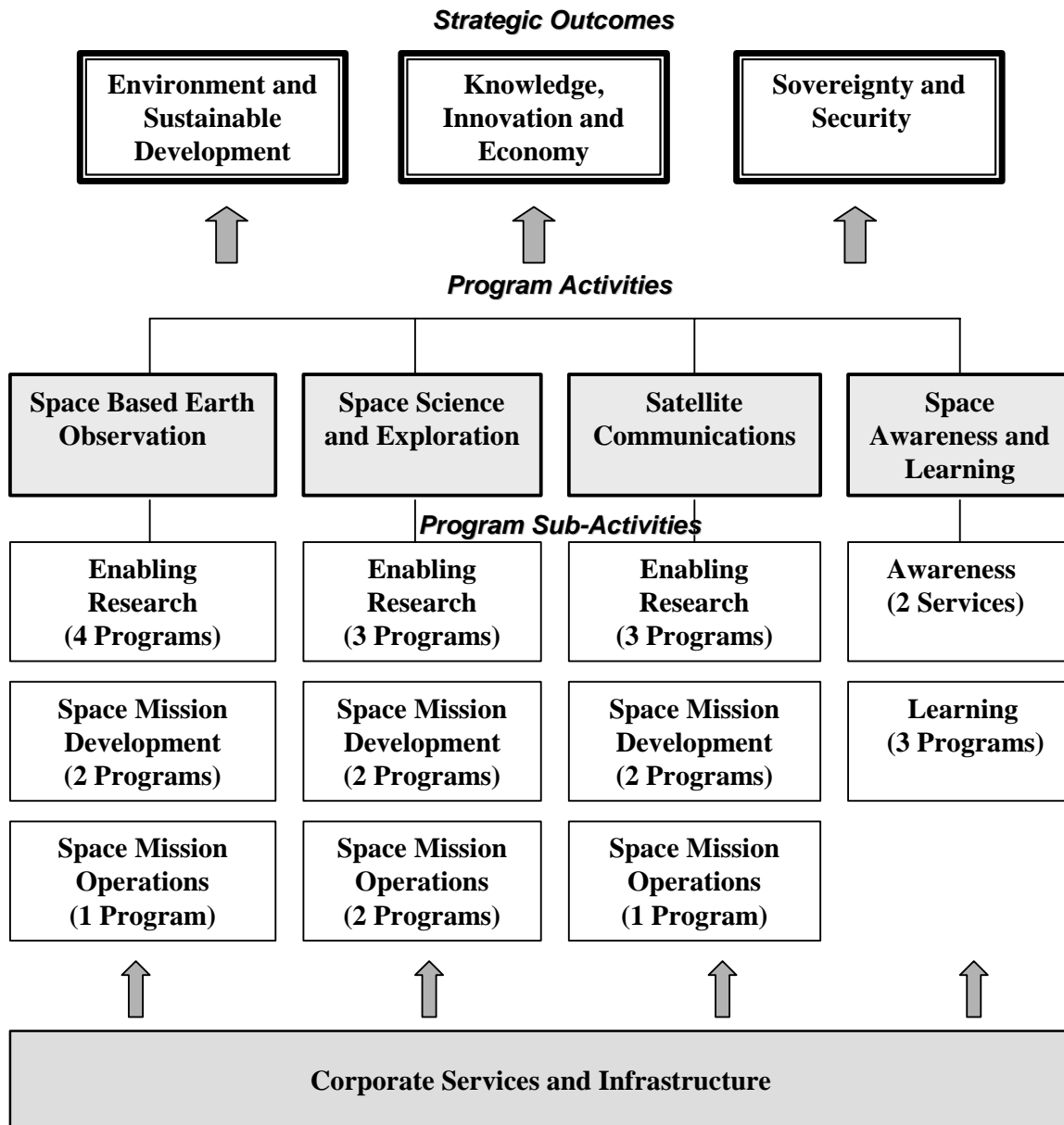
With its space exploration, science and technology endeavours, the majority of which involve international partners, the CSA plays an influential role in building bridges between an increasing number of space-faring countries. In striving to become one of the most advanced, connected, and innovative nations in the world, Canada offers and shares tremendous opportunities for the development and safety of the global community through the peaceful use of space.

Canada is an official member of the International Charter on Space and Major Disasters, through which all members agree to use their Earth Observation satellites when required to respond to disasters.

Canada's participation in the International Space Station (ISS) provides access to the unique space laboratory to Canadian researchers and ensures that Canada remains a partner of choice for future international partnerships that will explore the solar system and other planets.

Canada's participation, as a cooperating state, in European Space Agency (ESA) programs allows our industry and our scientific community to participate in forward-looking studies in Earth observation, space science and exploration as well as new telecommunications applications.

## CSA PROGRAM ACTIVITY ARCHITECTURE



The CSA manages the Canadian Space Program (CSP) according to the Canadian Space Strategy (CSS) approved by the Government of Canada in February 2005. The CSS greatly influenced decision-making at the CSA as it streamlined its Strategic Outcomes and set the long-term priorities for all activities under the Program Activity Architecture (PAA). In 2005-2006 the PAA is divided in five Program Activities that contribute to the CSA's three Strategic Outcomes. The first four are in line with the CSS thrusts: *Space Based Earth Observation, Space Science and Exploration, Satellite Communications, and Space Awareness and Learning*. All Program Activities are supported by the services provided under the *Corporate Services and Infrastructure* Program Activity.

## **Comprehensive Approach to Program Activity Management**

The CSA manages its Program Activities by organizing its scientific and engineering programs into three large clusters: Enabling Research, Space Mission Development, and Space Mission Operations. Each cluster carries out a specific objective in line with the CSA's priorities and stakeholder expectations:

- Through *Enabling Research*, the CSA provides leadership, coordination and support to basic and applied research and experimental development in order to increase the knowledge base, devise new applications through space missions, and allow the transfer of intellectual property and proven technologies to Canadian industry, academia, and government organizations.
- Through *Space Mission Development*, the CSA provides coordination and support to the development of space missions through the definition, critical design, manufacturing, integration, testing and delivery phases leading to launch and early operations of space systems.
- Through *Space Mission Operations*, the CSA operates manned and unmanned space missions through crew and ground support personnel training, mission analysis and planning, on-orbit ground control operations, system monitoring, maintenance and logistic support, as well as data handling and delivery.

The CSA coordinates its activities from initial research phases to the final operational phases with this comprehensive end-to-end approach. The synergy between the clusters is meant to optimize the effectiveness and expertise of employees coming from different core functions and promote an integrated team and multi-functional approach to projects and services.

## SUMMARY OF CANADIAN SPACE AGENCY PERFORMANCE

<b>Program Activity – Space Based Earth Observation (EO)</b>		
<p><b><u>GOVERNMENT OF CANADA OUTCOMES:</u></b></p> <ul style="list-style-type: none"> <li>- A clean and healthy environment</li> <li>- An innovative and knowledge-based economy</li> <li>- Strong economic growth</li> <li>- Safe and secure communities</li> </ul>	<p><b><u>CSA STRATEGIC OUTCOMES:</u></b></p> <ul style="list-style-type: none"> <li>- Environment and Sustainable Development</li> <li>- Knowledge, Innovation and Economy</li> <li>- Sovereignty and Security</li> </ul>	
<p><b><u>PRIORITY:</u></b></p> <p>Develop and operationalize the use of Space Based EO for the benefit of Canadians.</p>	<p><b>2005-2006 Planned Spending (\$ in million)</b></p> <p style="text-align: center;">131.1</p>	<p><b>2005-2006 Actual Spending (\$ in million)</b></p> <p style="text-align: center;">98.4</p>
<p><b><u>EXPECTED RESULT:</u></b></p> <p>Delivery, directly or in partnership, of Space Based EO data, products and services in response to operational and scientific user requirements in the field of Environment, Resource and Land Use Management, and Security and Foreign Policy, supported by access capacity development.</p>	<p><b><u>PERFORMANCE STATUS:</u></b></p> <p>Successfully met: 79% (18/23) of the targets were exceeded or successfully met in 2005-2006.</p>	
<p><b><u>EXAMPLES OF 2005-2006 MAIN ACCOMPLISHMENTS:</u></b></p> <p>RADARSAT-1 operations continued with the same level of high performance for satellite reliability and image production, ensuring the supply of data until full commissioning of RADARSAT-2.</p> <p>Significant progress was achieved on the Assembly, Integration and Test of the RADARSAT-2 spacecraft in preparation for the launch and operations in the second quarter of 2007.</p> <p>Preparatory activities promoting the use of RADARSAT-2 data lead to the implementation of 16 EO application development projects and the addition of 12 new projects and generated 190 research proposals from national and international research communities.</p> <p>Successful launch of the CLOUDSAT Satellite, enabling Canadian scientists to increase our understanding of the effect of clouds on our climate.</p> <p>Canada's SCISAT-1 mission is producing significant scientific results that are enhancing Canada's leadership in stratospheric ozone studies.</p> <p>To learn more, go to: <a href="#">Space Based Earth Observation Program Activity Performance Measurement</a></p>		

Any significant variance reported against Planned Spending set in the 2005-2006 Report on Plans and Priorities is explained in [Section 3.6 – Spending by Program Activity](#).

<b>Program Activity – Space Science and Exploration (SE)</b>			
<b><u>GOVERNMENT OF CANADA OUTCOMES:</u></b>		<b><u>CSA STRATEGIC OUTCOMES:</u></b>	
<ul style="list-style-type: none"> <li>- An innovative and knowledge-based economy</li> <li>- Strong economic growth</li> <li>- A safe and secure world through international cooperation</li> <li>- A strong and mutually beneficial North American partnership</li> </ul>		<ul style="list-style-type: none"> <li>- Knowledge, Innovation and Economy</li> <li>- Sovereignty and Security</li> </ul>	
<b><u>PRIORITY:</u></b>		<b>2005-2006 Planned Spending (\$ in million)</b>	<b>2005-2006 Actual Spending (\$ in million)</b>
Understand the solar system and the universe, expand our knowledge on the constituent elements and origins of life, and strengthen a human presence in space.		145.0	123.4
<b><u>EXPECTED RESULT:</u></b>		<b><u>PERFORMANCE STATUS:</u></b>	
Increased participation in Canadian and international opportunities in order to expand the scientific knowledge base made available to Canadian academia and R&D communities in astronomy, space exploration and solar-terrestrial relation as well as physical and life sciences.		Successfully met: 79% (19/24) of the targets were exceeded or successfully met in 2005-2006.	
<b><u>EXAMPLES OF 2005-2006 MAIN ACCOMPLISHMENTS:</u></b>			
<p>Fifty-two proposals for Concept Studies were received from one global Announcement of Opportunity that was released to the various space science research communities in order to develop the next generation of scientific and instrumentation ideas for inclusion on future Canadian and/or international space science missions.</p> <p>The CSA met the objective of three missions and is developing nineteen missions in astronomy, space exploration and solar-terrestrial relation as well as physical and life sciences.</p> <p>Canada maintained a trained and versatile Astronaut Corps to continue to develop and maintain human space flight expertise to meet the requirements of CSA's space sciences and human exploration programs. All active Canadian astronauts are qualified as Mission Specialist on the Space Shuttle. Two Canadian astronauts are qualified as Flight Engineers on the Soyuz spacecraft.</p> <p>The CSA fulfilled its responsibilities for the operations of the Mobile Servicing System on the International Space Station (ISS) and provided all necessary support in accordance with the agreed ISS program requirements 100% of the time.</p> <p>To learn more, go to: <a href="#">Space Science and Exploration Program Activity Performance Measurement</a></p>			

Any significant variance reported against Planned Spending set in the 2005-2006 Report on Plans and Priorities is explained in [Section 3.6 – Spending by Program Activity](#).

## Program Activity – Satellite Communications (SC)

<p><b><u>GOVERNMENT OF CANADA OUTCOMES:</u></b></p> <ul style="list-style-type: none"> <li>- Safe and secure communities</li> <li>- A vibrant Canadian culture and heritage</li> <li>- An innovative and knowledge-based economy</li> <li>- Strong economic growth</li> </ul>	<p><b><u>CSA STRATEGIC OUTCOMES:</u></b></p> <ul style="list-style-type: none"> <li>- Knowledge, Innovation and Economy</li> <li>- Sovereignty and Security</li> </ul>	
<p><b><u>PRIORITY:</u></b></p> <p>Provide all Canadians with the means to participate in and fully benefit from the global information age.</p>	<p><b>2005-2006 Planned Spending (\$ in million)</b></p>	<p><b>2005-2006 Actual Spending (\$ in million)</b></p>
<p><b><u>EXPECTED RESULTS:</u></b></p> <p>1) Increased access for Canadians to state-of-the-art communications systems and services to meet their social and economic needs.</p> <p>2) Better use of space communications, search and rescue, and global navigation satellite systems and applications to improve the efficiency and effectiveness of other government departments and organizations in delivering services to Canadians.</p>	<p><b><u>PERFORMANCE STATUS:</u></b></p> <p>Successfully met: 65% (9/14) of the targets were exceeded or successfully met in 2005-2006.</p>	
<p><b><u>EXAMPLE OF 2005-2006 MAIN ACCOMPLISHMENTS:</u></b></p> <p>As part of the CASSIOPE Mission the CSA has initiated the development and demonstration of the CASCADE telecommunications payload on a small satellite bus. Work continued in 2005-2006 on the small satellite spacecraft that will be fully designed and constructed by Canadian companies during the 2004-2007 period. CASCADE is the precursor of a communication satellite constellations that will help position the Canadian industry on the international market both as a supplier of advanced components and as a service provider of high volume, high data rate telecommunications anywhere in the world.</p> <p>Canada’s participation in European Space Agency (ESA) programs allowed our industry to access forward-looking studies on new telecommunications services; to develop new technologies, equipment and applications in multi-media, optical inter-satellite and mobile communications; and, to demonstrate satellite-based communications services such as interactive communications services for remote communities and disaster management.</p> <p>To learn more, go to: <a href="#">Satellite Communications Program Activity Performance Measurement</a></p>		

Any significant variance reported against Planned Spending set in the 2005-2006 Report on Plans and Priorities is explained in [Section 3.6 – Spending by Program Activity](#).

<b>Program Activity – Space Awareness and Learning (AL)</b>			
<b><u>GOVERNMENT OF CANADA OUTCOMES:</u></b>		<b><u>CSA STRATEGIC OUTCOME:</u></b>	
<ul style="list-style-type: none"> <li>- A vibrant Canadian culture and heritage</li> <li>- An innovative and knowledge-based economy</li> </ul>		<ul style="list-style-type: none"> <li>- Knowledge, Innovation and Economy</li> </ul>	
<b><u>PRIORITY:</u></b>		<b>2005-2006 Planned Spending (\$ in million)</b>	<b>2005-2006 Actual Spending (\$ in million)</b>
Further public understanding and engagement with regards to space-related issues, ultimately leading to improving the scientific literacy of Canadians.		5.3	5.0
<b><u>EXPECTED RESULT:</u></b>		<b><u>PERFORMANCE STATUS:</u></b>	
Increase public awareness of Canada's activities in space and space benefits positively affecting the quality of life of Canadians.		Successfully met: 94% (14/15) of the targets were exceeded or successfully met in 2005-2006.	
<b><u>EXAMPLES OF 2005-2006 MAIN ACCOMPLISHMENTS:</u></b>			
<p>A survey was conducted in early 2005 with the general public to assess awareness, knowledge, and attitudes toward Canada's space program. Several results contribute to determining levels of awareness:</p> <ul style="list-style-type: none"> <li>- 71% believed Canadians are proud of our activities in space, and that Canadian success in advanced space technologies contributes to our knowledge-based economy, innovation, and economic competitiveness;</li> <li>- 65% felt that our space activities inspire youth in science and engineering;</li> <li>- 46% of respondents are aware of the CSA as champion of space activities;</li> <li>- 47% identified Earth-related benefits that flow from Canada's space program; and,</li> <li>- 19% of respondents have moderate knowledge of Canada's space activities.</li> </ul> <p>The CSA implemented a proactive and balanced communications program that resulted in:</p> <ul style="list-style-type: none"> <li>- An increase in educator and student participation in space-centred learning initiatives;</li> <li>- A 35% increase in CSA Web site visitors;</li> <li>- A 23% increase in educators accessing the Web site Educator Resources section; and,</li> <li>- Through proactive public appearances Canadian astronaut tours reached almost 30,000 people during 100 events held in 9 provinces.</li> </ul> <p>To learn more, go to: <a href="#">Space Awareness and Learning Program Activity Performance Measurement</a></p>			

Any significant variance reported against Planned Spending set in the 2005-2006 Report on Plans and Priorities is explained in [Section 3.6 – Spending by Program Activity](#).



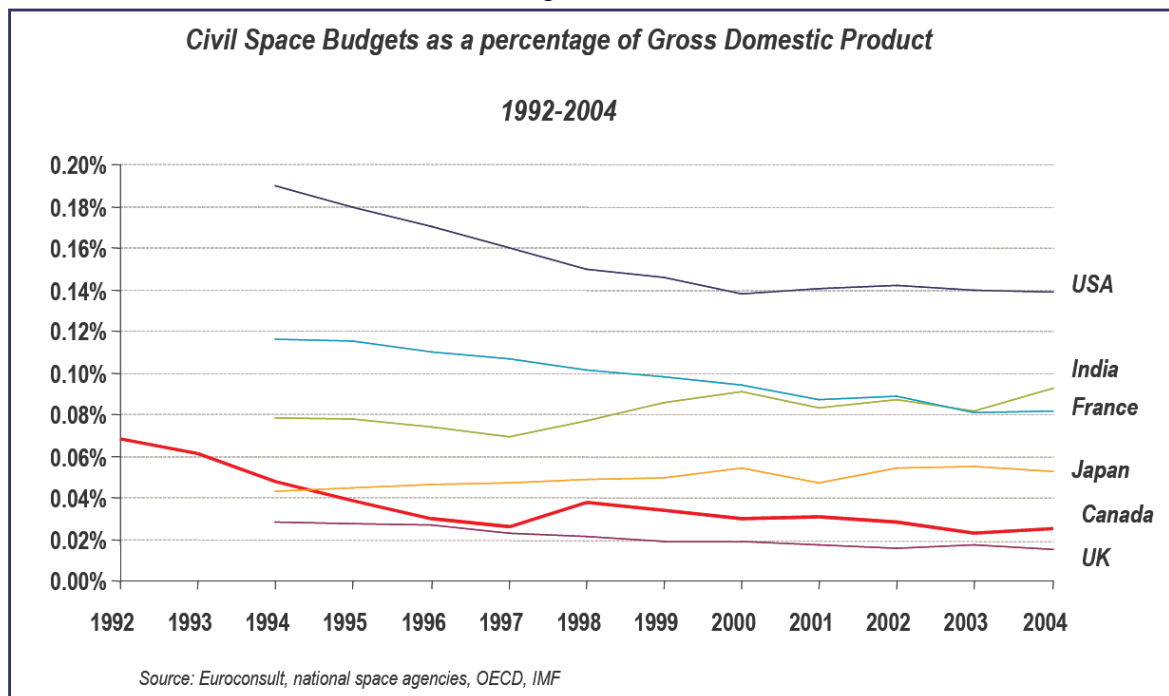
## 2.4 DEPARTMENTAL PERFORMANCE

### Strategic Context of the Canadian Space Agency

#### *International Environment*

In the global context, space is recognized by industrialized nations as an essential and strategic tool to meet their social, economic, and foreign policy objectives. Accordingly, many governments around the world, traditional and newly emerging space-faring nations, are increasing their investments in space activities, looking for increased consolidation and advancement of their space capabilities. Canada has been losing ground internationally in terms of public expenditures in the space sector (Figure 1). The ratio of public investment in space to national Gross Domestic Product (GDP) is a prominent illustration of the decreasing effort of the Canadian Government to finance the national space program. The national effort to finance the space program in 2004 (0.025% of GDP) is almost one third of what it was in 1994 (0.068%)<sup>1</sup>.

Figure 1



International cooperation is critical to the implementation of the Canadian Space Program. Canada must therefore possess a space infrastructure not only to meet its specific national needs, but also to play a tangible and visible role in responding to the issues that interest the international community.

<sup>1</sup> EUROCONSULT – CONFERENCE BOARD OF CANADA: *Socio-economic Study and Policy Analysis of Future Canadian Investments in Space-based Robotics Opportunities* (2006)

Canada can leverage its resources and maximize its return on investment by working in partnership with other space-faring nations. Such partnerships allow for sharing of technical expertise, knowledge and infrastructure, and provide access to areas in which Canada has chosen not to invest its restricted resources. In addition, increasing concerns over issues such as space debris, climate change and security, which transcend national borders, encourage nations with common goals to increase cooperation. Canada cooperates with a number of international partners and has ties to various space agencies. Although the United States National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) remain Canada's longstanding international partners, we are developing relationships with national space organizations in India, Sweden, Norway, Germany, Russia, Argentina and China.

To learn more about Canada's international partners, go to:  
[http://www.space.gc.ca/asc/eng/resources/links\\_agencies.asp](http://www.space.gc.ca/asc/eng/resources/links_agencies.asp)

Canada is regarded as a reliable partner possessing unique technical and scientific capabilities and as a nation that can meaningfully contribute to the initiatives of foreign space agencies. In particular, emerging space-faring countries in Asia and South America may offer great potential for future cooperation. Consequently, Canada maintains its efforts to establish a foothold in these emerging markets. It is of paramount importance that the CSA continue to work with its stakeholders to ensure that our research community and industry remain active and competitive vis-à-vis world standards and markets.

The perception of Canada's space industry as being internationally competitive is confirmed by the results of the 2005 Annual Survey of the Canadian Space Sector. With annual revenues of \$2.5 billion, of which exports represent 50% (\$1.245 billion)<sup>2</sup> of the industry's total revenues, Canada has a higher percentage of exports than any other major space-faring nation. The destination of Canada space exports is distributed as follows: 47% generally destined to the US, 32% to Europe and 8% to Asia.<sup>3</sup>

### ***National Environment***

The Canadian Space Agency recognizes that the best means of turning scientific and technological advancements into innovative products and services is through partnerships with Canadian universities and industry. The CSA firmly believes that industry is the best vehicle for providing a broad range of services to diverse groups of users – from individuals to public and private organizations. With its highly skilled workforce, the space industry in Canada not only generates wealth in our economy, but also provides Canadians with competitive products and services that would otherwise have to be obtained from foreign sources.

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<sup>2</sup> State of the Canadian Space Sector 2005; Overall Revenues, Domestic v. Export Revenues

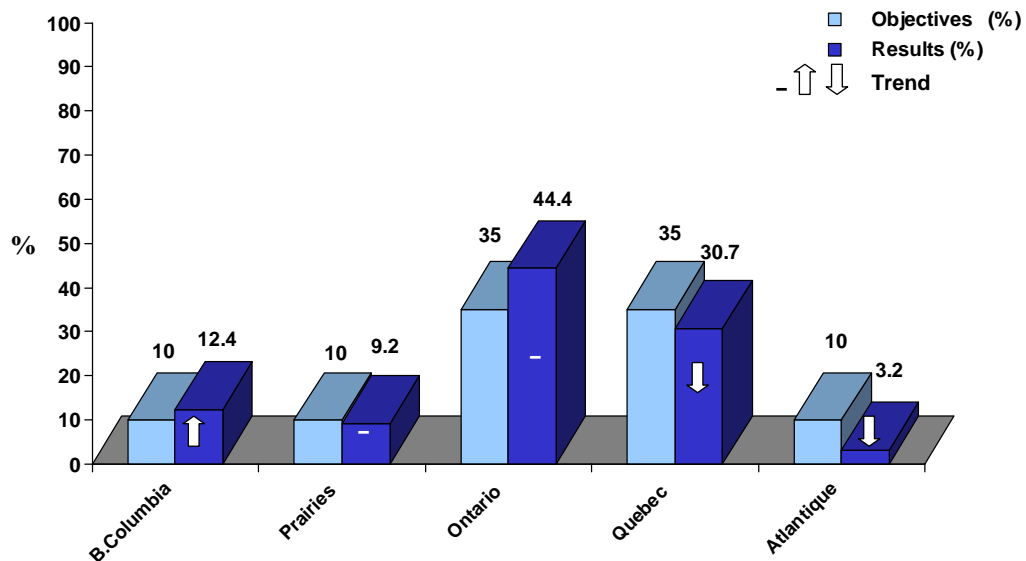
<sup>3</sup> State of the Canadian Space Sector 2005; Export Revenues

<http://www.space.gc.ca/asc/eng/industry/state.asp>

In 2005, Canada's space industry generated \$2.5 billion in revenues.<sup>4</sup> Satellite Communications continued to generate the lion's share of the Canadian space sector's revenues with a total of \$1.83 billion. A breakdown of the revenues by sectors of activity is as follows: Satellite Communications: 77.6% (\$1.83 billion); Earth Observation: 8% (\$192 million); Navigation: 4.8% (\$120 million); Robotics: 6.1% (\$153 million); Space Science: 3.4% (\$84 million); and all space-related activities in areas other than those mentioned above: \$11 million.<sup>5</sup> While small in number of firms, the Canadian space sector is knowledge-intensive and at the forefront of research and innovation. Building on the strengths of 6,710 highly skilled workers,<sup>6</sup> Canadian firms have acquired world-leading capabilities in niche areas such as earth observation, space robotics, satellite communications and navigation.

Given that the national market is relatively small, it is critical that the Canadian industry be able to leverage foreign investments and generate export sales. Capitalizing on export revenue depends on the industry's ability to commercialize highly competitive products and services and establish local partnerships. The Government of Canada plays a key role in helping to establish such partnerships, facilitating trade relations and export opportunities and securing a strategic role for Canadian industry and academia in important international space initiatives. The CSA works very closely with the Canadian space industry and scientists in 25 Canadian universities and 12 research centres on the planning and implementation of the Canadian Space Program.

**Regional distribution of CSA R&D contracts from 1988 to 2006 (in %):**



To learn more about Canadian space-related organizations, go to:  
<http://www3.espace.gc.ca/asc/eng/industry/csd.asp>

<sup>4</sup> State of the Canadian Space Sector 2005; Overall Revenues

<sup>5</sup> State of the Canadian Space Sector 2005; Revenues by Sector of Activity

<sup>6</sup> State of the Canadian Space Sector 2005; Space Sector Workforce, Workforce Groups  
<http://www.space.gc.ca/asc/eng/industry/state.asp>

## ***Government Environment***

In keeping with its objective to be an open and transparent organization, the CSA's strategic planning was done in full consultation with Government of Canada organizations and with its Canadian stakeholders, particularly through the use of several program advisory groups.

The CSA also carries out ongoing consultations with Government of Canada organizations to identify where and how space science and technologies could be used to enhance the delivery of their mandates and provide new or more efficient services to Canadians. More specifically, the CSA is constantly seeking ways to contribute significantly to the effective and efficient delivery of government programs and services in the fields of communications, environment and sustainable development, security, intelligence, emergency preparedness, industry development and space science.

The wide range of space applications and technologies used by the Government is reflected in the CSA's three Strategic Outcomes, as well as in the number of partnerships between the CSA and other federal organizations. Sorted by Strategic Outcome, the list of partner organizations include:

- **Knowledge, Innovation and Economy:** The Communications Research Centre of Industry Canada, which manages satellite communications programs on behalf of the CSA, National Research Council Canada, Industry Canada, National Sciences and Engineering Research Council of Canada, Foreign Affairs and International Trade Canada, and the Canadian International Development Agency.
- **Sovereignty and Security:** Department of National Defence, the Canadian Coast Guard, and Public Safety and Emergency Preparedness Canada.
- **Environment and Sustainable Development:** Natural Resources Canada including the Canada Centre for Remote Sensing, Environment Canada, Parks Canada, Fisheries and Oceans Canada, Indian and Northern Affairs Canada, Agriculture and Agri-Food Canada.

## **Performance against priorities under the Canadian Space Strategy**

The strategic context outlined above lends some perspective on CSA performance against the priorities set under the Canadian Space Strategy (CSS). The CSS is instrumental in decision-making at the CSA, as it streamlines its Strategic Outcomes and sets the long-term priorities for all activities under the revised Program Activity Architecture (PAA). A priority has been set for each of the four CSS thrusts.

### ***Priority for the Program Activity – Space Based Earth Observation (EO)***

The priority of the Program Activity Space Based Earth Observation is to achieve a long-term overarching objective stated in the CSS thrust strategy, which is to develop and operationalize the use of Space Based Earth Observation for the benefit of Canadians by tapping into the unique vantage point it offers for observing the Earth and its environment.

Given Canada's geo-political situation, our immense territory, our rich natural resources, the changes now occurring in our climate, innovative Earth observation technologies become increasingly important for our country. Space Based EO enables environmental understanding, monitoring and prediction with unparalleled coverage and scope. Space Based EO enables sustainable management and development of natural resources, land use, fisheries and agriculture. Productivity and efficiency gains create jobs, maintain the competitiveness of the resource sector and generate wealth for Canadians. Space Based EO also offers cost-effective wide-area surveillance of land, ice and sea. This is especially true in areas difficult to access like the northern sea passage. Satellites are critical to Canada's security and foreign policy. This priority contributes in many ways to all the CSA's Strategic Outcomes: Knowledge, Innovation and Economy, Sovereignty and Security, and Environment and Sustainable Development.

To learn more, go to: [Space Based Earth Observation Program Activity Performance Measurement](#)

### ***Priority for the Program Activity – Space Science and Exploration (SE)***

The priority for the Program Activity Space Science and Exploration is to achieve a long-term overarching objective stated in the CSS thrust strategy, which is to better understand the solar system and the universe, expand our knowledge on the constituent elements and origins of life, and strengthen a human presence in space.

This priority consists of performing research in, on and from space to answer a series of fundamental questions posed by the international scientific community of importance to Canadians. The Canadian scientific community relies on the CSA to contribute the means to answer these fundamental questions and ensure a dynamic environment for scientific research in Canada. With a trained and versatile Astronaut Corps, the CSA continues to develop and maintain human space flight expertise to meet the requirements of the space sciences and human exploration programs.

Canada's participation in the International Space Station (ISS) provides access to the unique space laboratory to Canadian researchers and ensures that Canada remains a partner of choice for future international partnerships that will explore the solar systems and other planets. This priority directly contributes to the following CSA Strategic Outcomes: Knowledge, Innovation and Economy, and Sovereignty and Security.

To learn more, go to: [Space Science and Exploration Program Activity Performance Measurement](#)

***Priority for the Program Activity – Satellite Communications (SC)***

The priority for the Program Activity Satellite Communications is to achieve a long-term overarching objective stated in the CSS thrust strategy, which is to provide all Canadians with the means to participate in and fully benefit from the global information age.

Satellite technology has dramatically changed the world of communications. By offering instantaneous global access and global broadcasting, Satellite Communications technologies have begun to erase the notion of distance, bringing remote regions into a global village and enabling new business models based on broadband services, enhanced personal communications, global navigation, and positioning and localization services. The CSA strives to increase the connectivity of Canadian communities, support federal government departments in the delivery of programs and services and support Canadian sovereignty and foreign policy objectives. This priority contributes to the following CSA Strategic Outcomes: Knowledge, Innovation and Economy, and Sovereignty and Security.

To learn more, go to: [Satellite Communications Program Activity Performance Measurement](#)

***Priority for the Program Activity – Space Awareness and Learning (AL)***

The priority for the Program Activity Space Awareness and Learning is to achieve a long-term overarching objective stated in the CSS thrust strategy, which is to further public understanding and engagement with regards to space-related issues, ultimately leading to improving the scientific literacy of Canadians.

If Canada is to meet the challenge posed by a truly global economy, Canadians must be encouraged to pursue careers in science and technology, as a skilled pool of human capital is at the heart of an innovative economy. We must encourage science and technology literacy today, particularly among our youth. Canadians' interest in science and technology must also be engaged by sharing our discoveries and breakthroughs in meaningful ways that relate to their daily lives. The CSA enhances public understanding and engagement, especially among youth and their families, through its national Learning Program and a range of awareness initiatives. This priority contributes to the Strategic Outcome: Knowledge, Innovation and Economy.

To learn more, go to: [Space Awareness and Learning Program Activity Performance Measurement](#)

## SECTION 3: ANALYSIS OF PROGRAM ACTIVITIES BY STRATEGIC OUTCOME

### 3.1 RESULTS-BASED MEASUREMENT METHODOLOGY

The 2005-2006 Report on Plans and Priorities (RPP) and the Departmental Performance Report (DPR) are the first editions to be produced under the Management Resources and Results Structure (MRRS) Policy. The information presented in the following detailed analysis requires an introduction on the approach taken by the CSA in the implementation of results-based management and the methodology used to measure expected results against performance indicators at each level of the Program Activity Architecture (PAA).

#### MILESTONES IN THE IMPLEMENTATION OF THE MRRS

In 2005-2006, the CSA completed the following milestones in the implementation of the MRRS:

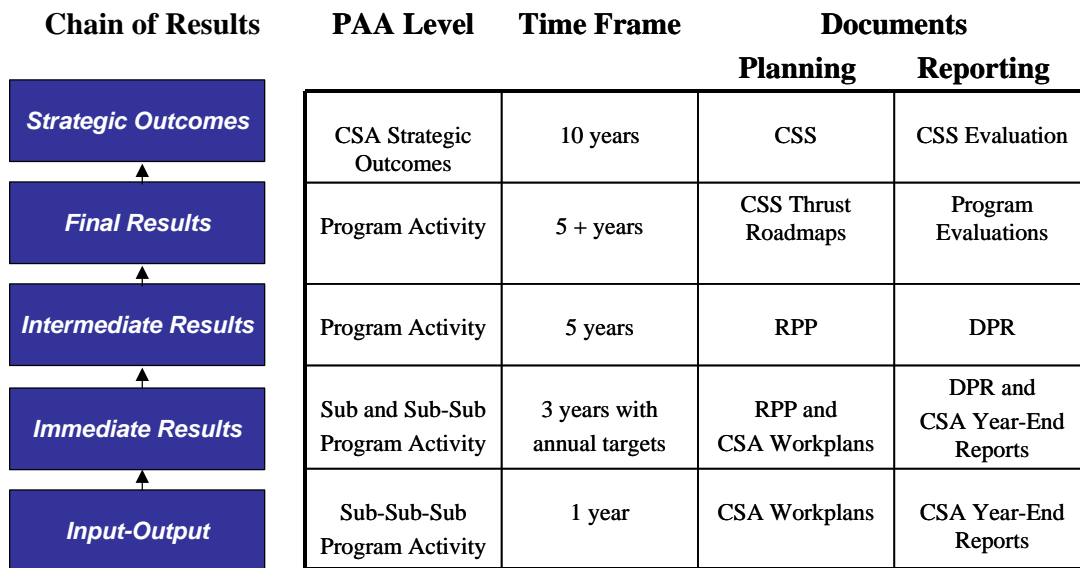
- Approving a roadmap with a budget horizon of ten years for each of the four thrusts of the Canadian Space Strategy (CSS);
- Initiating the development study of socio-economic indicators for each CSS thrust;
- Developing performance measurement logic models that link all levels of each Program Activity to the Strategic Outcomes;
- For each component of the CSA, setting-up planning and reporting documents framed under the PAA and sharing the RPP three-year horizon;
- Amending the PAA to reflect properly generic technology research and space qualifications activities and better monitor financial and performance information;
- Improving the coding of the PAA in financial systems in order to fully link financial and performance information and track every financial transaction by Program Activity expected results, starting April 1, 2006;
- Setting up a CSA Corporate Performance Measurement memory through a set of performance indicator records for expected results at all levels of the PAA;
- Assessing CSA's performance measurement capacity all through the 2006-2007 RPP, 2005-2006 DPR, and workplan year-end reporting processes; and,
- Providing results-based management training and coaching for managers and staff.

#### IMPLEMENTATION OF RESULTS-BASED MANAGEMENT

The CSA manages the Canadian Space Program (CSP) in accordance with the Canadian Space Strategy (CSS), which streamlines strategic outcomes, long-term priorities, expected results and activities under the Program Activity Architecture. In 2005-2006 the PAA was divided in five Program Activities. The first four are in line with the CSS thrusts and are supported by a corporate services and infrastructure Program Activity. Program Activities are broken down into clusters, which constitute as many Program Sub Activities. Objectives and results were developed down to Sub-Sub Program Activities.

The illustration below shows, using a logic model, how all PAA levels are linked together through a chain of results ultimately contributing to the CSA Strategic Outcomes, and how financial and non-financial performance information as well as management accountability are tracked down by a hierarchy of corporate planning and reporting documents.

### Program Activity Logic Model



#### PERFORMANCE MEASUREMENT IMPLEMENTATION STATUS

The implementation of a results-based measurement regime should be considered a work in progress that will take several years to complete. Here are the major milestones achieved since the introduction of the MRRS Policy on April 1, 2005.

**CSA STRATEGIC OUTCOMES:** Building on the performance measurement findings from a first socio-economic study and policy analysis in Space Science and Exploration, the CSA has initiated the development of socio-economic indicators that are meant to evaluate the final results of each Program Activity and its contribution to CSA's Strategic Outcomes over a ten-year period. These socio-economic indicators will first appear in the 2007-2008 RPP.

**Program Activities:** Intermediate results and performance indicators were developed at the Program Activity level based on the objectives and roadmaps set for each thrust of the Canadian Space Strategy along with a ten-year financial plan. These expected results, which will be fully measurable after a five-year period, were presented for the first time in the 2005-2006 RPP with associated Main Estimates financial information. The corresponding DPR provides either baseline information or a progress report made during the first planning year.



**Program Sub and Sub-Sub Activities:** The CSA manages its Program Activities by organizing its programs into clusters, which constitute as many Sub Activities. Immediate results and performance indicators were developed at the Sub-Sub Program Activity level. These expected results were presented for the first time in the 2005-2006 RPP with associated Main Estimates financial information. They will be fully measurable after a three-year period and they carry yearly targets in order to monitor progress made through the DPR. The RPP result commitments were assigned to CSA components by means of their workplans, which share the same PAA structure and time horizons for the purpose of resource allocation and performance measurement.

**Program Sub-Sub-Sub Activities:** It is at this lowest level of the PAA that yearly program inputs and expected outputs were assigned to CSA components by means of their workplans and that all activities were coded into financial systems in accordance with the PAA. Therefore the CSA can fully link financial and performance information by Program Activity result, identify management accountability, and monitor transactions at all levels of the PAA, starting April 1, 2006.

#### **HOW TO READ PERFORMANCE INFORMATION IN THE DPR DETAILED ANALYSIS**

**Program Activity:** The information is reported against intermediate results and performance indicators. Since these expected results will be fully measurable after a five-year period this report provides either baseline information or a progress report made during the first planning year.

**Program Sub-Sub Activity:** Under each program cluster, the information is reported against Program Sub-Sub Activity immediate results and performance indicators. Since these expected results will be fully measurable after a three-year period, this report provides performance information against the first year targets. They are defined as either preparatory, benchmark or initial targets pending the CSA's capacity to provide performance information.

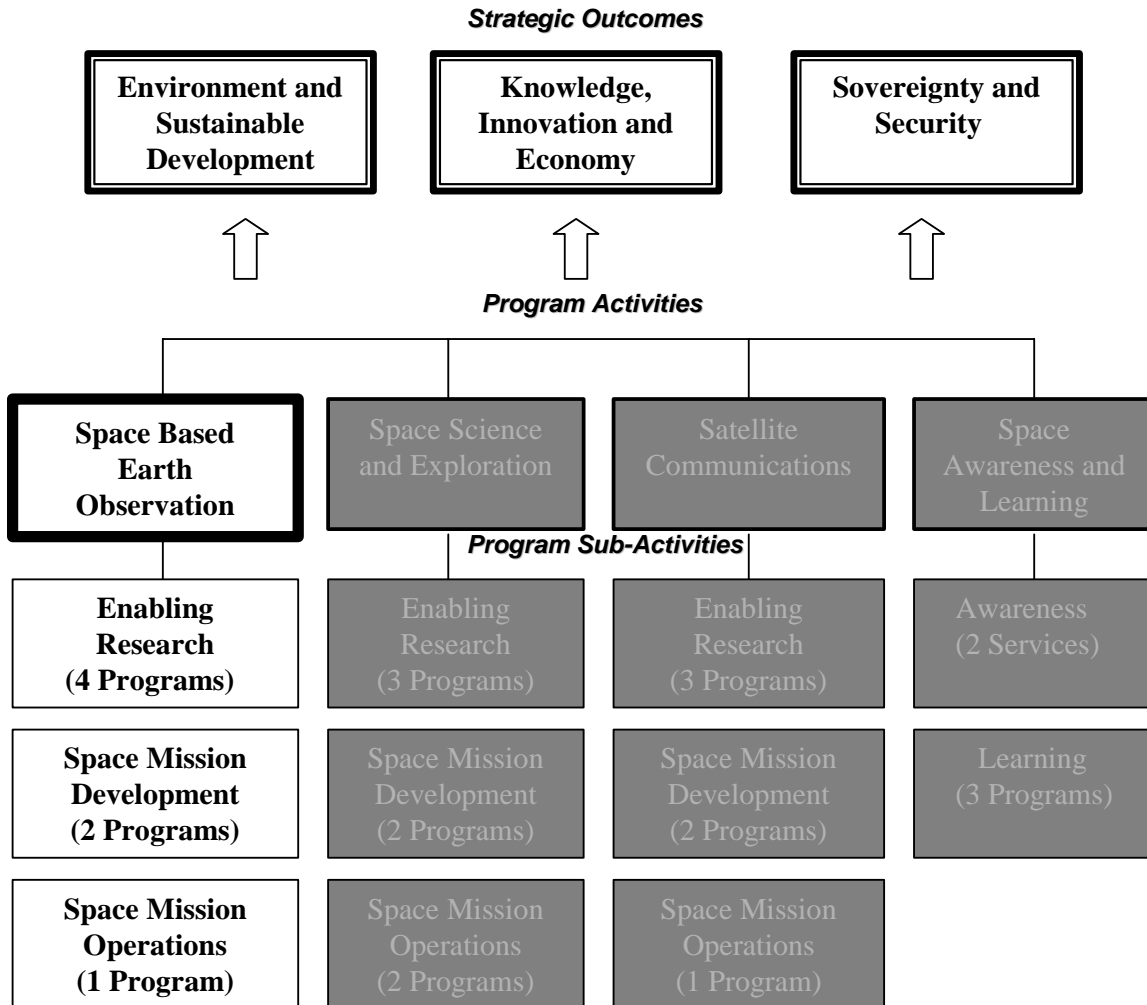
**Performance Analysis:** Result measurement at each level of the PAA is completed by a performance analysis that provides either contextual, complementary or methodology as well as financial and human resources information.

**Highlights of Main Accomplishments:** Under each Program Sub-Activity, examples of achievements are taken from the array of projects and activities carried out by the CSA and its industry, academic and government partners.

***Note:** In some cases, the 2005-2006 DPR will show less or reworded results and performance indicators as compared to the 2005-2006 RPP. All the changes were recorded in the performance analysis. These changes are due to the performance measurement capacity assessment undergone by CSA during the preparation of the 2006-2007 RPP and the 2005-2006 DPR exercises. The main reason for these changes was to assure year-to-year consistency by retroactively introducing the performance measurement improvements applied in the 2006-2007 RPP in the 2005-2006 DPR.*

### 3.2 SPACE BASED EARTH OBSERVATION

**PROGRAM ACTIVITY: SPACE BASED EARTH OBSERVATION (EO)**



**Priority:** Develop and operationalize the use of Space Based Earth Observation for the benefits of Canadians.

**Performance Status:** Successfully met: 79% (18/23) of the targets were exceeded or successfully met in 2005-2006. The Program Activity expected results will be fully measurable after a five-year period.

**SPACE BASED EARTH OBSERVATION**

**PROGRAM ACTIVITY PERFORMANCE MEASUREMENT**

**Expected Result**

Delivery, directly or in partnership, of Space Based EO data, products and services in response to operational and scientific user requirements in the field of Environment, Resource and Land Use Management, and Security and Foreign Policy, supported by access capacity development.

<b>Indicators</b>	<b>Performance</b>
1. Number of RADARSAT operational users and applications.	<p>A total of 17 different applications were utilised by commercial users for a total of 26,251 frames.</p> <p>A total of 18 Canadian Government organizations utilized 8 monitoring, 8 mapping and 5 other specific applications for a total of 5,703 frames.</p>
2. Number of active missions supported directly or indirectly by Canada.	A total of 6 active missions and 5 missions in development are supported directly or indirectly.
3. Growth in the federal government departments and agencies' budget allocated to the exploitation of Space Based EO data, derived information and services in the fields of the Environment, Resource and Land Use Management, and Security and Foreign Policy.	Preliminary Result: 5 governmental departments exploit space-based EO data.
4. Number of hits on the Canadian Geospatial Data Infrastructure (CGDI) related to CSA sponsored (directly and/or indirectly) scientific and operational missions.	Preliminary Result: 4,300 members of CGDI are potential users of the CSA sponsored scientific and operational missions. Memberships show a monthly increase rate of approximately 1.5%.

## Performance Analysis

### Indicator 1:

A total of 26,251 frames were sold by MDA-GSI (Geospatial Services International) for commercial and telemetry usages through 6,485 different orders. The following regions, Far East, Europe/Africa, Canada and United States, account for 89% of the frames. Ship detection, Cartography, Oil pollution, Defence, Ice, Flood and Land Use are the main applications using 87% of the frames.

<b>Government Users</b>	<b>Main Applications</b>	<b>Fields</b>
Environment Canada	Ice monitoring, ISTOP	Environment
Fisheries and Oceans Canada	ISTOP; wave, ship, fishing activities monitoring	Environment and Security and Foreign Policy
Agriculture and Agri-Food	Crops monitoring/mapping	Resource and Land management
Dep. of National Defence	Mapping, disaster, R&D	Security and Foreign Policy
Natural Resources Canada	Monitoring/mapping, R&D	Environment

A total of 5,703 processed image frames were provided to 18 different federal departments and agencies. The five aforementioned departments are utilizing 98% of the total frames provided. Environment and Fisheries and Oceans are utilizing the resources on a daily or bi-weekly basis for ice monitoring and the Integrated Satellite Tracking for Polluters (ISTOP) applications. Other applications include crop, ship, wave, fishing activities, wetlands, oil spill and disaster monitoring; environmental, geological, forestry, agriculture, oceans currents and cartography mapping as well as wind velocity extraction. Please note that these statistics do not include the commercial use of RADARSAT-1 data.

### Indicator 2:

<b>Missions</b>	<b>Status</b>	<b>Fields</b>
MOPITT on Terra (1999)	Minimum Objectives met	Environment
OSIRIS on Odin (2001)	Minimum Objectives met	Environment
SCISAT (2003)	Minimum Objectives met	Environment
CLOUDSAT (2006)	Launched	Environment
RADARSAT-1 (1995)	Minimum objectives met	Environment, Resource and Land Management, Security and Foreign Policy
RADARSAT-2 (2007-2008)	In development	
RSAT CONSTELLATION	In development	
ESA-ENVISAT (2002)	Minimum objectives met	Environment, Resource and land Management
HYDROS (2005-2006)	Cancelled 2006	Environment
PROBA-2 (2007)	In development	Environment
AQUARIUS (2009)	In development	Environment
CHINOOK (2010)	In development	Environment

### Indicator 3:

The Departments exploiting EO data are: Environment, Natural Resources, Fisheries and Oceans, Agriculture and Agri-Food and Department of National Defence. Baseline data on operational budget will be provided, starting in 2006-2007.

### Indicator 4:

The CSA is working closely with CGDI to develop a more accurate and measurable indicator for 2006-2007 based on the data available from the CGDI Web site that went through major changes in order to reflect their renewed program orientation.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
131.1	138.0	98.4
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
129.8	97.7	97.7

Any significant variance reported against Planned Spending set in the 2005-2006 Report on Plans and Priorities is explained in [Section 3.6 – Spending by Program Activity](#).

**The programs under this Program Activity are divided into three clusters: Enabling Research, Space Mission Development and Space Mission Operations.**

### **ENABLING RESEARCH – EARTH OBSERVATION**

Four Earth Observation Enabling Research Programs with a combination of accomplishments demonstrate how the following Expected Results were measured and attained.

**1- Space Technology R&D Programs Supporting EO – Objective:** Assume leadership and provide support in enabling research and development of high-risk technologies leading to the realization of CSA or international EO space missions, including support to value-added applications by academia and government organizations, as well as the transfer of proven technologies to the market place.

#### **EXPECTED RESULT:**

Development and transfer of advanced space technologies by industry, government and academia, in support of EO activities of interest to Canada.

Indicators	Performance
<p>1. Number of publications authored by the CSA and patents issued for the CSA.</p> <p><b>Preparatory Target:</b> Establish a system to measure the overall number of patents and publications.</p>	<p><b>Target Partially Met:</b> 2 out of 3 R&amp;D programs are supported by data collection systems in place. The third system will be implemented by the second quarter of 2006.</p> <p><b>Partial Results:</b> A total of 26 publications and 3 patents.</p>
<p>2. Number of technologies brought to Higher Readiness Levels to advance technological capacity.</p>	

<p><b>Preparatory Target:</b> Establish a system to measure the overall number of technologies brought to Higher Readiness Levels (HRL).</p>	<p><b>Target Partially Met:</b> 1 out of 2 R&amp;D program is supported by a data collection system in place. The second system will be implemented by the second quarter of 2006.</p> <p><b>Partial Results:</b> A total of 2 technologies were brought to Higher Readiness Level.</p>
<p>3. Number of technologies chosen for future missions and/or commercial products by industries.</p> <p><b>Preparatory Target:</b> Establish a system to measure the overall number of spin-off/commercialization.</p>	<p><b>Target Partially Met:</b> 1 out of 3 R&amp;D program is supported by a data collection system in place. The second system will be enhanced to capture the information by commercialization activities and the third will be implemented by the second quarter of 2006.</p> <p><b>Partial Result:</b> 1 technology resulting in significant return on investment (ROI).</p>

**PERFORMANCE ANALYSIS:**

CSA manages the following Technology R&D programs:

- IP&TT: Intellectual Property and Technology Transfer
- STDP: Space Technology Development Program
- STRP: Space Technology Research Program

Development of data collection system:

IP&TT: System already exists to capture information for internal R&D disclosures and will be enhanced to capture information corresponding to commercialization activities.

STDP: A data collection system was designed, developed and integrated in baseline ORIS information management system. The operational deployment of ORIS 7.3 is scheduled for April 2006.

STRP: System in place and producing results in the STRP 2005-2006 Achievement Report, where all publications and patent disclosures are listed.

Detail of Partial Results:

- 22 papers presented in conferences and 4 published in refereed journals;
- 3 patents issued on technologies developed externally;
- 7 inventions disclosures received from which two were not vested in Her Majesty;
- 2 technologies brought to HRL: Technology on near loss less data compression and improving signal to noise ratio of multi-dimensional data; and,
- 1 technology resulting in significant ROI: The in-house developed microbolometer was selected as the baseline detector for an international mission resulting in significant return on investment for CSA.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
18.5	26.8	26.4
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
37.4	18.1	18.1

**2- European Space Agency (ESA) EO Program – Objective:** Through key international partnerships enhance the Canadian industry's technological base and provide access to the European market for value-added products and services in the field of EO.

**EXPECTED RESULT:**

Successful development and demonstration of advanced technologies, systems, components, or studies provided for in the contracts awarded by ESA to Canadian firms under EO Programs.

Indicators	Performance
1. Canadian industrial returns in ESA optional programs in EO.  <b>Benchmarking Target:</b> 0.80 or higher	  <b>Target Exceeded:</b> 0.89

**PERFORMANCE ANALYSIS:**

The indicator *95% of ESA contract exceeding a value of \$250K have been successfully delivered by Canadian suppliers against ESA technical requirements* will be replaced in the 2006-2007 RPP by *Canadian industrial returns in ESA optional programs in EO* in order to improve value-added performance information.

The EO optional programs are: ENVISAT, EOEP (Earth Observation Envelope Program)/EOPP (Earth Observation Preparatory Program), Earth Watch GMES (Global Monitoring for Environment and Security), TerraSar (EO Optional Programs). The Overall Industrial Return Coefficient Indicator is 1.07. It corresponds to the ratio between the actual amount of weighted contracts given to a country and the ideal amount of contracts to be given to that country according to existing rules<sup>7</sup>. Canadian industrial returns are by Program Activity. The Overall Canadian industrial return pertains to all ESA mandatory programs.

A second indicator, *Identification of one story confirming successful development and demonstration of advanced technologies, systems, components or studies*, appearing in the 2005-2006 RPP was removed and will not be referred to in future RPPs because of insufficient value-added performance information.

<sup>7</sup> European Space Agency Council. Paris, June 12, 2006. Agency Key Performance Indicators. ESA/C (2006) 66

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
11.2	17.1	17.1
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
-	-	-

**3- Science Programs for Atmospheric Environment – Objective:** Coordinate the Canadian EO scientific community in order to pursue world-class research space missions to advance our knowledge of Earth's atmosphere and of global climate change phenomena.

**EXPECTED RESULT:**

Opportunities identified for Canadian scientists to advance understanding and scientific knowledge of atmospheric environment through the use of space based observations.

Indicators	Performance
1. Number of scientific publications, reports and conference proceedings acknowledging CSA funding. <b>Initial Target:</b> 20	<b>Target Exceeded:</b> A total of 37 publications, reports and conference proceedings acknowledging CSA funding published in 2005 (calendar year).
2. Number of Highly Qualified Personnel (HQP) involved in the program. <b>Initial Target:</b> 20	<b>Target Exceeded:</b> A total of 62 Highly Qualified Personnel (HQP) involved in the program.
3. Number of operating or approved space science research missions. <b>Initial Target:</b> 5	<b>Target Exceeded:</b> A total of 5 operating and 6 approved space science research missions funded by the Space Science program in this fiscal year.
4. Number of scientific presentations. <b>Initial Target:</b> 15	<b>Target Exceeded:</b> A total of 85 scientific presentations given.



<p>5. Number of research partnerships (nationally and internationally).</p> <p><b>Initial Target:</b> 5</p>	<p><b>Target Exceeded:</b> A total of 15 research partnerships involving national and international partners.</p>
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**PERFORMANCE ANALYSIS:**

The indicators had not been previously collected, therefore baseline values were unavailable and initial targets were estimated at the time of the RPP preparation. This resulted in larger than expected gaps between targets and achievements. The CSA has since reviewed and updated these indicators and targets. Data was collected from an annual survey with scientists currently funded by the Space Science Program.

Indicator 2:

The term Highly Qualified Personnel (HQP) includes undergraduate, graduate and postdoctoral fellows, as well as Research Assistants, Research Associates, Faculty and non-faculty staff.

Indicator 3:

A total of 15 funded activities are supporting instrument control, data validation and processing for 5 operating missions: MOPITT, OSIRIS, SCISAT, RADARSAT-1 and ENVISAT.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
4.0	2.5	2.5
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
4.1	2.8	2.8

**4- EO Application Support Programs – Objective:** Enhance Canada's ground receiving and data processing systems, develop and demonstrate EO data value-added applications for commercial use and for Canadian government operations.

**EXPECTED RESULT:**

Increasing the use of EO data in public and private sectors through the development and demonstration of applications.

Indicators	Performance
1. Number of new EO applications operationally used.	

<b>Preparatory Target:</b> 20 new EO applications used.	<b>Target Exceeded:</b> A total of 23 new EO applications used were inventoried.
2. Number of new field of applications using EO data.	
<b>Preparatory Target:</b> 20 new organizations and/or sectors.	<b>Target Exceeded:</b> A total of 48 new organizations and sectors were inventoried.

**PERFORMANCE ANALYSIS:**

In 2005-2006 program clients were surveyed in order to establish the performance indicator baseline.

The 2005-2006 indicator *Number of committed users and operational engagements* was removed due to insufficient value-added performance information.

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
13.9	12.1	12.1
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
9.0	8.7	8.7

**Highlights of Main Accomplishments – Enabling Research (EO)**

- In order to enhance Canada's capabilities in supporting national and international space missions or activities of Canadian interest, the CSA awarded 13 new technology and applications development projects, mainly to small and medium-size companies (SMEs), through an annual Request for Proposal (RFP) process under EO Application Development and Space Technology Development Programs (STDP). In 2005-2006, the STDP allocation capacity for new projects decreased by 60% due to ongoing multi-year contracts awarded in 2004-2005.
- In order to enhance Canada's industrial competitiveness, the CSA managed the patents and intellectual property licenses portfolio, conducted commercialization assessments and developed marketing plans for new technologies developed in-house and through contracts awarded to Canadian industry.
- The CSA has successfully developed new EO technologies:
  - Two near-lossless data compression technologies for use on-board a hyperspectral satellite. This technology was granted four U.S. patents in the last five years.
  - A leading-edge technology that significantly improves the signal-to-noise ratio of multi-dimensional satellite sensor data was developed.

- A microbolometer, a thermal imaging device, was selected as the baseline detector for the NASA/CONAE (Argentine Commission on Space Activities) satellite mission named Aquarius.
- A concept for a combined full-waveform profiling LIDAR (Light Detection and Ranging) for global precision measurements of Earth's total land vegetation biomass was developed.
- Preparatory activities promoting the use of RADARSAT-2 data, including the Canadian Government data allocation valued at \$445 million, resulted in a Request for Proposals from industry for pilot and demonstration projects as well as several development projects within the federal government. For instance, there were 16 projects implemented under the EO Application Development Program (EOADP) and a new call for proposals was issued to support another 12 to 15 new RADARSAT-2 projects. In addition, the Science and Operational Applications Research (SOAR) program received some 190 research proposals from national and international research communities.
- In order to increase the use of space-borne imagery by the Canadian Government and the industry, the CSA continued the following satellite data application development, technology transfer and demonstration activities, such as:
  - Within a CSA-sponsored project, NRCan (Natural Resources Canada) Topographic Information Centre was enabled to begin the production of cartographic maps of Canada's North, using ERS-1, ERS-2 and 2 and RADARSAT data.
  - A partnership with the European Space Agency's TIGER program allowed Canadian companies to implement sustainable water management-related EO projects in Africa contributing to Canada's international aid efforts and securing future business opportunities.
  - Projects are being implemented by Canadian and Finnish partner companies in areas of mutual industrial benefits such as marine traffic monitoring and protection against ice hazards.
  - The regional launch of the Nile River Awareness Kit, a tool for the improved management of Nile river basin developed under the EOADP, took place in Burundi at the NileRiver Council of Ministers meeting.
  - The use of RADARSAT and other supported missions by Fisheries and Ocean Canada, Environment Canada, and Natural resources Canada for the monitoring of environmental indicators to climate change impact studies and reporting.
  - The integration of RADARSAT data by Fisheries and Ocean Canada in their operations to enhance Search and Rescue response time.
- A partnership with JPL (Jet Propulsion Laboratory – California Institute of Technology) and Colorado State University led to the successful launch of the CLOUDSAT Satellite in May 2006. Canadian scientists will analyze received data in order to increase our understanding of the effect of clouds on our climate. CSA is working with MSC to perform a comprehensive validation of the CLOUDSAT data in relation to parameters of importance to Canada.

**SPACE MISSION DEVELOPMENT – EARTH OBSERVATION**

Two EO Space Mission Development Programs with a combination of accomplishments demonstrate how the following Expected Results were measured and attained.

**1- EO Projects – Objective:** Ensure the development, delivery and commissioning of space-qualified systems for EO missions through effective project, quality and engineering management.

**EXPECTED RESULT:**

EO projects' deliverables meet mission objectives and user expectations.

Indicators	Performance
<p>1. Safety and Mission Assurance (S&amp;MA) and Configuration Management (CM) requirements are identified and met for each project.</p> <p><b>Initial Target 1:</b> S&amp;MA and CM are implemented on all projects in phase B, C and D.</p> <p><b>Preparatory Target 2:</b> Guidelines are initiated.</p> <p><b>Preparatory Target 3:</b> Staffing completed.</p>	<p><b>Target Successfully Met:</b> 1) S&amp;MA services have been implemented on all Earth Observation projects in phases B, C and D. 2) Implementation is partial for CM for some projects.</p> <p><b>Target Successfully Met:</b> Project based Product Assurance requirements developed. CSA CM Plan developed and issued.</p> <p><b>Target Partially Met:</b> Staffing was partially completed.</p>
<p>In accordance with Treasury Board approved Project Approval and Management Framework (PAMF):</p>	
<p>2. Mission objectives and user requirements are met at critical steps of the projects.</p> <p><b>Initial Target:</b> 80% of Space Programs clients are satisfied with respect to mission objectives and user requirements.</p>	<p><b>Target Exceeded:</b> Client satisfaction reached 82% with respect to mission objectives and user requirements.</p>
<p>3. Project cost is maintained within authorized levels.</p> <p><b>Initial Target 1:</b> 60% of projects phases (B, C and D) are delivered on time and within budget.</p>	<p><b>Target Exceeded:</b> 85% of partial/completed milestones.</p>

<b>Initial Target 2:</b> All Project Management (PM) personnel trained in project management principles.	<b>Target Successfully Met:</b> All PM personnel were trained in project management principles.
4. Risks are identified and mitigated for each project.  <b>Initial Target:</b> 100% of projects have an identified risk matrix and a mitigation plan.	<b>Target Successfully Met:</b> 100% of Space Programs projects have an identified risk matrix with risk mitigation actions identified.

**PERFORMANCE ANALYSIS:**

Indicator 1:

According to Treasury Board approved Project Management and Approval Framework phases B, C and D relate to preliminary design definition, detailed design definition and manufacture and acceptance implementation. Together they correspond to project development phases.

Configuration Management implementation is partial for some projects given the inadequacy of resources available. Staffing was completed excluding an ENG-05 position.

Indicator 2:

Space Programs conducted a client survey. The survey was conducted through 31 interviews with Missions Managers, Project Managers or Director General over 14 projects ranging from phases A to E. The interviews were carried out in March 2006 and lasted from 45 to 60 minutes. Only the results of the 17 Mission Managers were considered to establish the satisfaction rate. The other interviews were used to polish improvement recommendations.

Indicator 3:

The mid-year achievement showed that already 78% of milestones were partially or totally completed. The year-end achievement reflected a total of 85%. Information sessions were held on the revised PAMF policy and project management guideline document. Nine training sessions on various project management principles were held during the year. The project management help desk provided answers to all queries related to project management principles, methodology and tools.

Indicator 4:

The project risk matrix is reviewed monthly at each project review and discussed in more details at the Space Program Risk Committee meetings, taking place three times a year.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
64.4	59.3	20.1
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
27.0	12.6	12.6

**2- David Florida Laboratory Supporting EO Projects – Objective:** Provide world-class space qualification services on a national scale, including facilities and expertise in support of the Canadian Space Program and international EO missions.

**EXPECTED RESULT:**

Development, provision of expertise and supply of space qualification services, functional, and environmental testing of space hardware primarily for CSA sponsored programs and projects, and subsequently to Canadian space industry and other private and public sector clients.

Indicators	Performance
<p>1. Percentage of satisfied clients.</p> <p><b>Initial Target:</b> Based on client feedback and customer satisfaction surveys, achieve a client satisfaction rating of 95% or better.</p>	<p><b>Target Exceeded:</b> 99% of David Florida Laboratory (DFL) clients expressed complete satisfaction with the services and support they received for their programs and projects.</p>

**PERFORMANCE ANALYSIS:**

During the fiscal year, 109 client feedback surveys were distributed and 14 completed surveys were returned representing approximately a 14% return rate. In addition, a positive program level satisfaction survey was received on the environmental test campaign carried out on behalf of CLOUDSAT. Minor issues were identified and addressed as part of DFL's ongoing quality improvement program and in consultation with our clients. A formal acknowledgement and thanks was also received from NEPTEC Design Group for DFL's contributions to the successful Orbital Boom Sensor Program developed after the Space Shuttle Columbia accident.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
10.5	9.4	9.4
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
47.7	45.3	45.3

## Highlights of Main Accomplishments – Space Mission Development (EO)

- With the completion of the RADARSAT-2 hardware deliveries to the DFL significant progress has been achieved on the Assembly, Integration and Test of the RADARSAT-2 spacecraft, which will be completed in early 2007. The emphasis will shift to preparing the operations team and ground segment for the launch and operations of the RADARSAT-2 satellite, scheduled to start in the second quarter of 2007. Equipped with advanced technologies, RADARSAT-2 will be the first commercial radar satellite to offer multi-polarisation, produce images with a resolution of down to three meters, and access an area of 800 kilometres to either side of the sub-satellite track.
- The CSA completed the preliminary design of an instrument called SWIFT (Stratospheric Wind Interferometer for Transport studies) designed to help scientists better understand the global atmospheric circulation and thereby provide the means to validate and improve complex climate and weather models. The continued development of SWIFT is now integrated into the Chinook project. The Meteorological Service of Canada (MSC) is an important partner in this three-year mission currently planned for 2011-2013.
- DFL provided world-class and cost effective environmental space qualification services with respect to the assembly, integration and testing of spacecraft systems and sub-systems for CSA's flight hardware programs. Many priority projects have benefited from DFL support: RADARSAT-2 and SWIFT for EO Program Activity: Enhanced Polar Outflow Probe (ePOP), Quicksat, e-OSTEO, James Webb Space Telescope (JWST) and Ultraviolet Imaging Telescope (UVIT) for Space Science and Exploration; CASCADE and Smallsat Bus for Satellite Communications Program Activities; as well as commercial programs including Skynet V, the Orbiter Boom Sensor System, and the Hubble Space Telescope repair mission.

## **SPACE MISSION OPERATIONS – EARTH OBSERVATION**

One EO Space Mission Operations Program with a combination of accomplishments demonstrates how the following Expected Result was measured and attained.

**1- EO Mission Operations – Objective:** Operate the space and ground segments for EO mission operations.

<b>EXPECTED RESULT:</b>	
EO Space Mission Operations meet user/client needs as per mission requirements.	
<b>Indicators</b>	<b>Performance</b>
1. System performance, as per mission requirements and resources (%).	

<b>Benchmark Target:</b> RADARSAT-1 annual average system performance of 92%.	<b>Target Exceeded:</b> Achieved average system performance of 96%.
2. Volume of data acquired or delivered as per mission requirements and resources.  <b>Benchmark Target 1:</b> Annual 350 Gbyte of SCISAT-1 data acquired.  <b>Benchmark Target 2:</b> Annual 40,000 SAR minutes of RADARSAT-1 data acquired.	<b>Target Exceeded:</b> A total of 1,038 GByte of science data was acquired from SCISAT-1 instruments.  <b>Target Exceeded:</b> Realized 41,265 minutes of total SAR on time.

**PERFORMANCE ANALYSIS:**

Indicator 1:

System performance is measured in terms of the percentage of those data requests that were planned and were subsequently executed by the spacecraft payload and received. The benchmark target was 92% for RADARSAT-1 system performance. This target was exceeded (96%).

Indicator 2:

Target 1: SCISAT instruments all exceeded the Science Principal Investigator expectations. Broken down by scientific instruments, the total of 1, 038 GByte delivered to customer lists as follows: FTS: 903 GByte; Imager: 113 Gbyte; and MAESTRO: 22 Gbyte.

Target 2: The benchmark target of RADARSAT-1 image data as the number of SAR on time minutes was exceeded to attain a total of 41,265 minutes of SAR data collected. In addition, to customer order requests, 133 individual frames for time and site-specific objectives worldwide and four-season coverage of the Arctic Basin were included in this data collection.

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
12.1	12.1	12.1
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
22.0	16.1	16.1

**Highlights of Main Accomplishments – Space Mission Operations (EO)**

- RADARSAT-1 operations continued well beyond its design lifetime with the same level of high performance for satellite reliability and image production, ensuring the supply of data until full commissioning of RADARSAT-2 in mid 2007. A contingency plan is in place to use foreign sensors as backup to RADARSAT-1 in order to continue to meet the needs of operational users until RADARSAT-2 data becomes available.



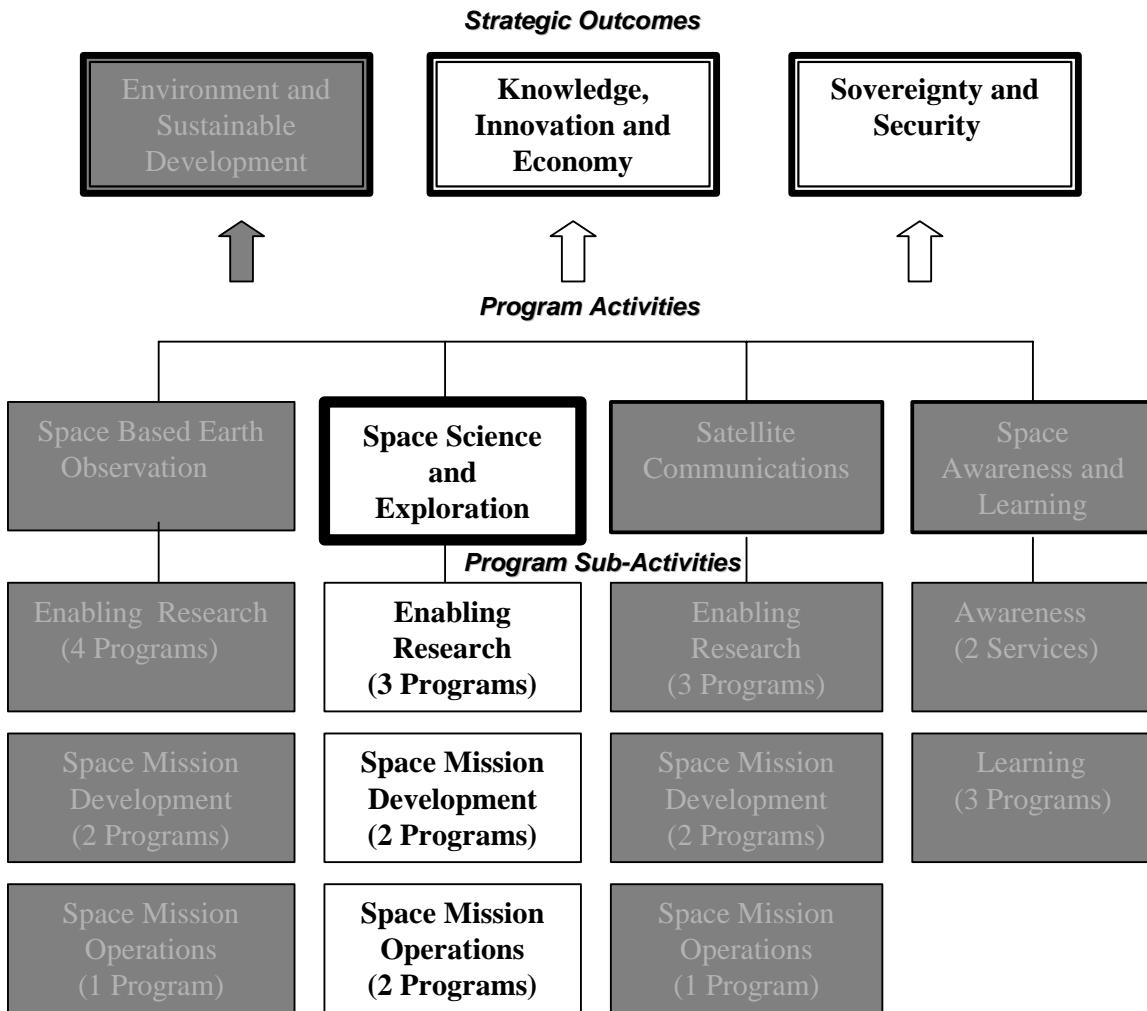
- Canada is an official member of the International Charter on Space and Major Disasters through which all members agree to use their EO satellites when required to respond to disasters. The CSA regularly contributes RADARSAT data and plans to remain a key player in this field while gradually increasing its participation.
- Canada's SCISAT-1 Atmospheric Chemistry Experiment (ACE), launched in August 2003 and operated by the CSA, is yielding an excellent data set which measures numerous trace gases, thin clouds and aerosols in the stratosphere. This mission is producing significant scientific results that are enhancing Canada's leadership in stratospheric ozone studies. The data set is rapidly becoming a benchmark to which other satellite missions are being compared. The success of the ACE instrument on SCISAT-1 lead directly to an export order for a similar instrument for the Canadian manufacturer from Japan.
- Two major Canadian science instruments are currently orbiting Earth and collecting new environmental data: MOPITT (Measurements of Pollution in the Troposphere) and OSIRIS (Optical Spectrograph and Infrared Imaging System). MOPITT, which is aboard the NASA Terra satellite, contributes to our understanding of the sources and pathways of atmospheric pollutants. By virtue of the outstanding success and important of the data, the Terra satellite mission including MOPITT, has been extended by four years to 2009. OSIRIS, which is on-board the Swedish Odin satellite, measures the concentration of various gases in the stratosphere, thereby allowing our scientists to make a significant contribution to the global understanding of stratospheric ozone depletion processes.

To learn more about Earth Observation, go to:

<http://www.space.gc.ca/asc/eng/satellites/default.asp?page=observation>

### 3.3 SPACE SCIENCE AND EXPLORATION

**Program Activity: SPACE SCIENCE AND EXPLORATION (SE)**



**Priority:** Understand the solar system and the universe, expand our knowledge on the constituent elements and origins of life, and strengthen a human presence in space.

**Performance Status:** Successfully met: 79% (19/24) of the targets were exceeded or successfully met in 2005-2006. The Program Activity expected results will be fully measurable after a five-year period.

**SPACE SCIENCE AND EXPLORATION**

**PROGRAM ACTIVITY PERFORMANCE MEASUREMENT**

**Expected Result**

Increased participation in Canadian and international opportunities in order to expand the scientific knowledge base made available to Canadian academia and R&D communities in:

- 1) Astronomy, space exploration and solar-terrestrial relation; and,
- 2) Physical and Life Sciences.

<b>Indicators</b>	<b>Performance</b>
1. Number of participations in Canadian and international space science missions.	<ol style="list-style-type: none"> <li>1) A total of 2 active missions and 10 missions in development in Astronomy, Planetary Exploration, and Solar-Terrestrial relation.</li> <li>2) A total of 1 active mission and 10 missions in development in Physical and Life Sciences.</li> </ol>
2. Rate of successful missions (Total or partial successful Canadian missions/total missions with Canadian participation).	<ol style="list-style-type: none"> <li>1) An overall success rate of 87.5% for Astronomy, space Exploration and Solar-Terrestrial relation with a recent trend to achieve 100% success rate over the last 3 years.</li> <li>2) Rate of successful missions for Physical and Life Sciences will be available once a critical number have flown starting in 2007-2008.</li> </ol>
3. Number of peer-reviewed papers over the next three years published in world-class scientific journals as a result of the CSA's participation in Canadian and international missions (papers featuring Canadian academia and/or R&D community).	A total of 83 peer-review papers for all scientific fields were published as a result of the CSA's participation.

## Performance Analysis

### Indicator 1:

<b>Missions</b>	<b>Status</b>	<b>Field</b>
ICE-First (2004)	Objectives met	Life Science
FUSE (1999)	Objectives met	Astronomy
MOST (2003)	Objectives met	Astronomy
TPA – Nozomi (1998)	Abandoned in 2003	Planetary Exploration
THEMIS (2006)	In development	Solar-Terrestrial Relation
CASSIOPE-ePOP (2008)	In development	Solar-Terrestrial Relation
ESA-EOEP/SWARM (2009)	In development	Solar-Terrestrial Relation
BLAST (2007)	In development	Astronomy
Herschel-HIFI/Spire (2008)	In development	Astronomy
JWST-FGS (2013)	In development	Astronomy
UVIT-ASTROSAT (2008)	In development	Astronomy
NEOSSAT (2009)	In development	Planetary Exploration
MARS-PHOENIX (2007)	In development	Planetary Exploration
APXS (2009)	In development	Planetary Exploration
e-OSTEO (2006)	In development	Life Science
Insect Habitat	Under review	Life Science
CCISS (2007)	In development	Life Science
EVARM (2007)	In development	Life Science
PMDIS/TRAC (2006-2007)	Ready to launch	Life Science
MVIS (2006-07)	Ready to launch	Physical Science
SCCO Foton M3 (2007)	In development	Physical Science
ICAPS on ELIPS (2009)	In development	Physical Science
IVIDIL on ELIPS (2008)	In development	Physical Science
CIMEX on ELIPS (2009)	In development	Physical Science

The indicator *Number of participations in Canadian and international space science missions* replaces the 2005-2006 RPP indicator *Rate of increase, over the next three years, of Canadian participation in International Astronomy and Space Science Exploration missions*.

### Indicator 2:

1) Analysis of the last three periods of three years span shows 83%, 100% and 100% for an overall success rate of 87.5%. The unsuccessful mission was due to a probe launched in 1998 and later lost. The experiment was officially abandoned in 2003. 2) The Physical and Life Sciences Program rely on the International Space Station (ISS) or Space Shuttle. Two Canadian research missions were lost on-board the Space Shuttle Columbia. Since then, there have been no opportunities for missions on the International Space Station or on space shuttles, which are now being used almost exclusively for re-supply and construction of ISS.

### Indicator 3:

A total of 83 peer-reviewed papers were published in Space Astronomy and Exploration, Solar-Terrestrial relations, and Physical and Life Sciences. The breakdown of the information by fields will be available in 2006-2007.

The indicator *Number of peer-reviewed papers over the next three years published in world-class scientific journals as a result of the CSA's participation in Canadian and international mission*, replaces the 2005-2006 RPP indicator *Rate of increase, over the next three years, of Canadian peer-review papers published in world-class scientific journals as a result of CSA's participation to international astronomy, space exploration and physical and life sciences missions*.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
145.0	129.5	123.4
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
222.5	246.9	246.9

Any significant variance reported against Planned Spending set in the 2005-2006 Report on Plans and Priorities is explained in [Section 3.6 – Spending by Program Activity](#).

**The programs under this Program Activity are divided into three clusters: Enabling Research, Space Mission Development and Space Mission Operations.**

**ENABLING RESEARCH – SPACE SCIENCE AND EXPLORATION**

Four Science and Exploration Enabling Research Programs with a combination of accomplishments demonstrate how the following Expected Results were measured and attained.

**1- Space Sciences and Human Exploration Programs – Objective:** Coordinate the Canadian Space Sciences and Human Exploration community in order to pursue world-class research space missions to advance our knowledge of basic physical and chemical processes, the near-Earth space environment and Earth's electromagnetic field, our solar system, the universe and its evolution, as well as the adaptation of humans and other life forms in the weightless environment.

**EXPECTED RESULT:**

Identified opportunities for Canadian scientists to advance Space Science and Exploration understanding and scientific knowledge through CSA, national and international research missions.

Indicators	Performance
1. Number of scientific publications reports and conference proceedings acknowledging CSA funding.  <b>Initial Target:</b> 44	<b>Target Exceeded:</b> A total of 83 publications, reports and conference proceedings acknowledging CSA funding published in 2005 (calendar year).

2. Number of Highly Qualified Personnel (HQP) involved in the program.  <b>Initial Target:</b> 38	<b>Target Exceeded:</b> A total of 220 HQP involved in the program.
3. Number of operating or approved space science research missions.  <b>Initial Target:</b> 20	<b>Target Exceeded:</b> A total of 28 ongoing and new science missions were funded by the Space Science program.
4. Number of scientific presentations.  <b>Initial Target:</b> 75	<b>Target Exceeded:</b> A total of 205 presentations performed during this year.
5. Number of research partnerships (nationally and internationally).  <b>Initial Target:</b> 18	<b>Target Exceeded:</b> A total of 71 research partnerships involving national and international partners.

**PERFORMANCE ANALYSIS:**

The indicators had not been previously collected, therefore baseline values were unavailable and initial targets were estimated at the time of the RPP preparation. This resulted in larger than expected gaps between targets and achievements. The CSA has since reviewed and updated these indicators and targets. Data was collected from an annual survey with scientists currently funded by the Space Science Program.

Indicator 2: The term Highly Qualified Personnel (HQP) includes undergraduate, graduate and postdoctoral fellows, as well as Research Assistants, Research Associates, Faculty and non-faculty staff.

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
26.4	20.9	20.4
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
20.3	34.6	34.6

## 2- Space Technology R&D Programs Supporting Science and Exploration –

**Objective:** Assume leadership and provide support in enabling research and the development of high-risk technologies leading to the realization of CSA or international SE missions, including support to value-added applications by academia and government organizations, as well as the transfer of proven technologies to the market place.

### EXPECTED RESULT:

Develop and transfer of advanced space technologies by industry, government and academia, in support of SE activities of interest to Canada.

Indicators	Performance
<p>1. Number of publications authored by the CSA and patents issued for the CSA.</p> <p><b>Preparatory Target:</b> Establish a system to measure the overall number of patents and publications.</p>	<p><b>Target Partially Met:</b> 2 out of 3 R&amp;D programs are supported by data collection systems in place. The third system will be implemented by the second quarter of 2006.</p> <p><b>Partial Results:</b> A total of 29 publications and 0 patents.</p>
<p>2. Number of technologies brought to Higher Readiness Levels (HRL) to advance technological capacity.</p> <p><b>Preparatory Target:</b> Establish a system to measure the overall number of technologies brought to HRL.</p>	<p><b>Target Partially Met:</b> 1 out of 2 R&amp;D programs is supported by a data collection system in place. The second system will be implemented by the second quarter of 2006.</p> <p><b>Partial Results:</b> A total of 5 technologies were brought to HRL.</p>
<p>3. Number of technologies chosen for future missions and/or commercial products by industries.</p> <p><b>Preparatory Target:</b> Establish a system to measure the overall number of spin-off/commercialization.</p>	<p><b>Target Partially Met:</b> 1 out of 3 R&amp;D programs is supported by a data collection system in place. The second system will be enhanced to capture the information by commercialization activities and the third will be implemented by the second quarter of 2006.</p> <p><b>Partial Result:</b> The 5 technologies brought to HRL are showing great potential for commercialization in future years.</p>

**PERFORMANCE ANALYSIS:**

CSA manages the following Technology R&D programs:

- IP&TT: Intellectual Property and Technology Transfer
- STDP: Space Technology Development Program
- STRP: Space Technology Research Program

Development of data collection system:

IP&TT: System already exists to capture information for internal R&D disclosures and will be enhanced to capture information corresponding to commercialization activities.

STDP: A data collection system was designed, developed and integrated into the baseline ORIS information management system. The operational deployment of ORIS 7.3 is scheduled for April 2006.

STRP: System in place and producing results in the STRP 2005-2006 Achievement Report, where all publications and patent disclosures are listed.

Detail of Partial Results:

- 27 papers presented in conferences and 2 published in refereed journals;
- 3 patents and 7 invention disclosures were already identified under the Program activity Space Based Earth Observation;
- 5 invention disclosures from STRP;
- 5 technologies brought to HRL: Technology development on smart coating-based thermal radiator, shape memory alloy actuator, hopping micro-robot, spacecraft autonomy and attitude sensor fusion; and,
- 5 technologies that have the readiness level brought up also have the potential to be commercialized in the future.

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
11.0	11.8	11.8
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
33.0	67.2	67.2



**3- ESA Exploration Programs – Objective:** Through key international partnerships, allow the participation of Canadian academia and the demonstration of Canadian space technologies in European SE missions.

**EXPECTED RESULT:**

Successful development and demonstration of advanced technologies, systems, components, or studies provided for in the contracts awarded by ESA to Canadian firms under SE programs.

Indicators	Performance
1. Canadian industrial returns in ESA optional programs in SE.  <b>Benchmarking Target:</b> 0.80 or higher.	<b>Target Exceeded:</b> 1.01

**PERFORMANCE ANALYSIS:**

In order to reconcile EO and SC result statements, the expected result *Successful development and demonstration of advanced technologies, systems, components, or studies provided for in the contracts awarded by ESA to Canadian firms under SE programs* replaces the RPP 2005-2006 result *Development of new alliances and/or strengthening of established alliances between Canadian and European companies to diversify Canada's international space partnerships*.

The indicator *One new alliance set annually* will be replaced in the 2006-2007 RPP by *Canadian industrial returns in ESA optional programs in SE* in order to improved value-added performance information.

The Overall Industrial Return Coefficient Indicator is 1.07. It corresponds to the ratio between the actual amount of weighted contracts given to a country and the ideal amount of contracts to be given to that country according to existing rules<sup>8</sup>. Canadian industrial returns are by Program Activity. The Overall Canadian industrial return pertains to all ESA mandatory programs.

A second indicator, *One established alliance strengthened annually*, appearing in the 2005-2006 RPP was removed and will not be referred to in future RPPs because of insufficient value-added performance information.

<sup>8</sup> European Space Agency Council. Paris, June 12, 2006. Agency Key Performance Indicators. ESA/C (2006) 66

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
3.1	4.5	4.5
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
-	4.0	4.0

### **Highlights of Main Accomplishments – Enabling Research (SE)**

- In order to enhance Canada's capabilities in supporting national and international space missions or activities of Canadian interest, the CSA awarded six new technology and applications development projects to mainly small and medium-size companies (SMEs) through an annual Request for Proposal process under the Space Technology Development Program. In 2005-2006, the allocation capacity for new projects decreased by 60% due to ongoing multi-year contracts awarded in 2004-2005.
- In order to enhance Canada's industrial competitiveness, the CSA managed the portfolio of patents and intellectual property licenses, conducted commercialization assessments and developed marketing plans for new technologies developed in-house, and through contracts to Canadian industry.
- The CSA has successfully developed new SE technologies:
  - For the first time, a smart coating demonstrated a significant transition in thermal emittance over a temperature range of -60°C to 120°C. This coating has the potential to reduce thermal insulation required on satellites.
  - One challenge for planetary exploration is the dust environment, which can damage sensitive instrument. As such, it is desirable to have a dust cover that is simple in design and can be open and shut easily. Such a mechanism was designed and a prototype was developed.
  - Current planetary exploration focuses on large rovers, which are limited in terms of the terrain they can cover. To increase the terrain of exploration, one proposal is the utilization of many lightweight hopping robots. CSA has developed a prototype hopping robot which can hop as high as 1 metre on Mars.
  - Future planetary exploration would demand more autonomy on-board the spacecraft. Using sensors built by a Canadian company, CSA engineers have demonstrated an autonomous spacecraft rendezvous system.
  - The success of a space mission depends on the Attitude Control System (ACS). A new method, based on fusion of attitude sensor information, was developed and will improve on the spacecraft attitude accuracy.

- Fifty-two proposals for Concept Studies were received from one global Announcement of Opportunity that was released to the various space science research communities in order to develop the next generation of scientific and instrumentation ideas for inclusion on future Canadian and/or international space science missions.
- Ground-based and sub-orbital activities complement, benefit or lead to space mission in solar-terrestrial and atmospheric science. For example, the Canadian GeoSpace Monitoring (CGSM) network of ground-based observatories provides measurements of solar-terrestrial phenomena associated with space weather (geomagnetic flux, aurora borealis, ionospheric perturbations). Likewise, sounding rocket and balloon missions provide measurements in the upper reaches of our atmosphere that are extremely pertinent to the fields of solar-terrestrial and atmospheric science. Measurements made with these ground-based and sub-orbital missions are important because they complement and validate measurements made by satellites.
- A partnership with the ESA relating to their planetary exploration program (AURORA) was established. The CSA has joined this program at a 3% level in order to potentially position our scientific and industrial partners in future scientific and technological developments relating to this new initiative.
- A partnership with the ESA relating to the second European Physical and Life Sciences Program (ELIPS-2) was established. The CSA has joined this program at a 4% level to facilitate the participation of Canadian researchers in four space missions looking at how the lack of gravity affects physical processes.
- ComDev, a Canadian company, is building a scientific instrument for ESA's next EO mission (SWARM a constellation of small satellites to study the dynamics of the Earth's magnetic field and its interactions with the Earth system). The CSA is supporting a Canadian science team in the development of the instrument and preparing for analysis of the data.
- The CSA and the Institute of Musculoskeletal Health and Arthritis (IMHA) have created opportunities for Canadian researchers to take part in a study that is designed to shed light on the physiological changes occurring during long-term bed rest. This major initiative was conducted in cooperation with ESA, CNES (Centre national d'études spatiales – France) and NASA and promises to provide information that may contribute to more effective treatment of a broad array of medical conditions affecting bone, joint and muscle conditions such as osteoporosis and osteoarthritis and cardiovascular deconditioning associated with inactivity.

- Canada and Russia are collaborating in Matroshka studies to determine radiation exposure of astronauts during space walks using unique Canadian technology. Canada provided two types of radiation dosimeters: The MOSFET dosimeters were launched to the ISS on December 23, 2005 and have been operating since January 4, 2006. The Bubble dosimeters were launched to the ISS on June 16, 2006.
- Canada and Russia are collaborating in the SMP study on astronaut and cosmonaut performance reliability and skill dynamics during long-term space flights. The SMP-2 Hardware was delivered to the ISS on August 25, 2005 and SMP-2 Software has been delivered to the ISS on March 31, 2006. An updated software package will need to be flight certified and delivered to the ISS in the fall 2006.
- Canada has undertaken a study, in collaboration with international partners, to evaluate cross-cultural training requirements for the ISS environment. The survey of American, Russian, European, Japanese and Canadian astronauts has been completed and the final report is being reviewed and analysed. It is expected to have the requirements and curriculum for the cross-cultural training by the fall 2006.
- The CSA contracted a Needs and Capacity study to identify solutions to the delivery of health care on future long duration exploration-class missions. Specifically, the study will focus on health care needs and solutions for space missions, overlaps with terrestrial remote medicine, and capacity within Canada to meet those needs (industry, academic, government). Ultimately, this report will help define the role that Canada could play in the development of the infrastructures and hardware necessary to medically support crewmembers on exploration-class missions and, while doing so, improve terrestrial health care delivery through the transfer of space technology.

## **SPACE MISSION DEVELOPMENT – SPACE SCIENCE AND EXPLORATION**

One Science and Exploration Space Mission Development Program with a combination of accomplishments demonstrates how the following Expected Result was measured and attained.

**1- Science and Exploration Projects – Objective:** Ensure the development, delivery and commissioning of space-qualified systems for SE missions through effective project, quality and engineering management.

<b>EXPECTED RESULT:</b>
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SE projects' deliverables meet mission objectives and user expectations.
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Indicators	Performance
<p>1. Safety and Mission Assurance (S&amp;MA) and Configuration Management (CM) requirements are identified and met for each project.</p> <p><b>Initial Target 1:</b> S&amp;MA and CM are implemented on all projects in phase B, C and D.</p> <p><b>Preparatory Target 2:</b> Guidelines are initiated.</p> <p><b>Preparatory Target 3:</b> Staffing completed.</p>	<p><b>Target Successfully Met:</b> 1) S&amp;MA services have been implemented on all Science and Exploration's projects in phases B, C and D. 2) Implementation is partial for CM for some projects.</p> <p><b>Target Successfully Met:</b> Project based Product Assurance requirements developed. CSA CM Plan developed and issued.</p> <p><b>Target Partially Met:</b> Staffing was partially completed.</p>
<p>In accordance with Treasury Board approved Project Approval and Management Framework (PAMF):</p>	
<p>2. Mission objectives and user requirements are met at critical steps of the projects.</p> <p><b>Initial Target:</b> 80% of Space Programs clients are satisfied with respect to mission objectives and user requirements.</p> <p>3. Project cost is maintained within authorized levels.</p> <p><b>Initial Target 1:</b> 60% of projects phases (B, C and D) are delivered on time and within budget.</p> <p><b>Initial Target 2:</b> All Project Management (PM) personnel trained in project management principles.</p> <p>4. Risks are identified and mitigated for each project.</p> <p><b>Initial Target:</b> 100% of projects have an identified risk matrix and a mitigation plan.</p>	<p><b>Target Exceeded:</b> Client satisfaction reached 82% with respect to mission objectives and user requirements.</p> <p><b>Target Exceeded:</b> 85% of partial/completed milestones.</p> <p><b>Target Successfully Met:</b> All PM personnel were trained in project management principles.</p> <p><b>Target Successfully Met:</b> 100% of Space Programs projects have an identified risk matrix with risk mitigation actions identified.</p>

**PERFORMANCE ANALYSIS:**Indicator 1:

According to Treasury Board approved Project Management and Approval Framework phases B, C and D relate to preliminary design definition, detailed design definition and manufacture and acceptance implementation. Together they correspond to project development phases.

Configuration Management implementation is partial for some projects given the inadequacy of resources available. Staffing was completed excluding an ENG-05 position.

Indicator 2:

Space Programs conducted a client survey. The survey was conducted through 31 interviews with Missions Managers, Project Managers or Director General over 14 projects ranging from phases A to E. The interviews were carried out in March 2006 and lasted from 45 to 60 minutes. Only the results of the 17 Mission Managers were considered to establish the satisfaction rate. The other interviews were used to polish improvement recommendations.

Indicator 3:

The mid-year achievement showed that already 78% of milestones were partially or totally completed. The year-end achievement reflected a total of 85%.

Information sessions were held on the revised PAMF policy and project management guideline document. Nine training sessions on various project management principles were held during the year. The project management help desk provided answers to all queries related to project management principles, methodology and tools.

Indicator 4:

The project risk matrix is reviewed monthly at each project review and discussed in more details at the Space Program Risk Committee meetings, taking place three times a year.

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
42.7	35.0	29.6
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
21.0	14.1	14.1

**Highlights of Main Accomplishments – Space Mission Development (SE)**

- The design and production of a Canadian meteorological station for the NASA Phoenix Scout mission continued. This Mars lander mission will be launched in 2007. The station will position Canada as a respected and reliable provider of planetary science instrumentation and will provide basic scientific knowledge of the Martian atmosphere. The Canadian science team continued to develop theoretical models and data analysis techniques to fully exploit the data when received.

- The development of the Enhanced Polar Outflow Probe (ePOP) instrument continued. This instrument, integrated with the Canadian CASSIOPE Mission, is scheduled for launch in late 2007. It will probe the upper atmosphere and ionosphere region where solar variability exerts influence on global change in various time scales. The scientific data collected by ePOP will help scientists understand particle exchange and energy coupling processes between the Earth's atmosphere and space environment.
- A Canadian science experiment was prepared to study the behaviour of industry-supplied oil samples in response to heat for flight on recoverable Russian satellite. The experiment will lead to better methods for oil detection and extraction. This mission is scheduled to fly in September 2007.
- Three Canadian science teams were prepared to conduct a 12-day space mission looking at how bone cells respond to weightlessness. The researchers are working in parallel with CSA as it develops the next generation of completely automated bone cell culture apparatus, e-OSTEO. This mission is scheduled to fly in September 2007.
- CSA continued to work with NASA to fly the Canadian Cardiovascular Study on ISS (CCISS) experiment, which looks at Cardiovascular deconditioning in space. The experiment was selected in an international space research announcement of opportunity and NASA agreed to fly it on their resources.
- Work is also ongoing to validate the Canadian High-Energy Neutron Spectrometry System (CHNESS), a system designed to measure the radiation environment in space.
- The CSA has agreed to provide the Indian Space Research Organization (ISRO) with: the Flight Detector Subsystem, the Ground Test Subsystem, the Calibration Subsystem, and required flight spares for the Ultra Violet Imaging Telescope (UVIT) on-board the ISRO ASTROSAT satellite. The ASTROSAT mission is scheduled for launch in 2008. Canadian scientists will benefit by received access to all data from this mission.
- Canada is participating in the James Webb Space Telescope (JWST), a major facility-class space observatory that will be launched in 2013. The JWST is a successor to the highly successful Hubble Space Telescope (HST). Canada is responsible for the design and construction of the Fine Guidance Sensor (FGS), a critical element of the mission, which ensures the very precise pointing of the telescope. By virtue of the CSA's contribution, Canadian astronomers will have guaranteed access to 5% of the observing time of this approximately U.S. \$4.5 billion project.

- Canada is participating in the Herschel Space Observatory, a European Space Agency satellite that will be launched in 2008 by contributing the high-resolution spectrometer, the Heterodyne Instrument for the Far Infrared (HIFI), to the on-board telescope. This will allow Canadian scientists to address key science questions such as how galaxies were formed in the early universe and how stars have been forming throughout the history of the universe.
- The CSA along with the department of National Defence is developing the NEOSSAT mission, the first space mission to study Earth-crossing, asteroids, and comets allowing precise information on these bodies with orbits between the earth and the sun. The NEOSSAT mission is a combination of the Near Earth Space Surveillance (NESS) and the High Earth Orbit Surveillance (HEOS) projects.
- Canada continued to use space-analog facilities (e.g. Aquarius underwater habitat/Haughton-Mars) to further scientific knowledge, develop scientific and medical technologies, develop mission operation concepts and train crew and support personnel. Canadian astronaut Dave Williams was Commander of the NEEMO 9 mission at the Aquarius underwater habitat of the Key Largo Coast. The mission was initially scheduled for the fall 2005 but was delayed until April 2006 due to hurricanes. In July 2005, Canada also participated in the Haughton-Mars Project at Devon Island in the Canadian Arctic and explored the use of communication technology and telemedicine applications for the medical support of crew on exploration-class missions.

## **SPACE MISSION OPERATIONS – SPACE SCIENCE AND EXPLORATION**

Three Science and Exploration Space Mission Operations Programs with a combination of accomplishments demonstrate how the following Expected Results were measured and attained.

**1- International Space Station (ISS) – Objective:** Provide required CSA operations, training and engineering services to the ISS Program.

<b>EXPECTED RESULT:</b>
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CSA robotics operations and engineering services meet International Space Station Program (ISSP) and Canadian Space Station Program (CSSP) stakeholders' expectations in accordance with Intergovernmental Agreement (IGA) and the Memorandum of Understanding with NASA.
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<b>Indicators</b>	<b>Performance</b>
<p>1. Percentage of active participation of the CSSP Team in the various multi-lateral boards and panels managing the ISSP.</p> <p><b>Benchmark Target:</b> The CSSP Team participates more than 95% of ISS multilateral program meetings, boards and panels.</p>	<p><b>Target Exceeded:</b> The CSSP Management team participated actively in 100% of the meetings where formal CSA participation was expected.</p>



<p>2. Rate of availability of Operational Centre.</p> <p><b>Benchmark Target:</b> The availability of the CSA Remote-Multi-Purpose Support Room (RMPSR) will be at least 99% during planned "real-time" support operations.</p>	<p><b>Target Successfully Met:</b> The availability of the RMPSR has been maintained at an average level of 99.91% over the year.</p>
<p>3. Rate of training delivered vs. training requested.</p> <p><b>Benchmark Target:</b> CSA MSS (Mobile Servicing System) training meets more than 95% of the agreed ISS program requirements.</p>	<p><b>Target Exceeded:</b> 100% of the agreed ISS program requirements.</p>
<p>4. Percentage of MSS system(s) and operational support availability for planned and unplanned events (%).</p> <p><b>Benchmark Target:</b> Planning, dynamic analysis, operational products production, real-time mission support, spares availability, integrated logistics and sustaining engineering support and the on-orbit vehicle meet more than 95% of the agreed ISS program requirements.</p>	<p><b>Target Exceeded:</b> The MSS was fully available on-orbit 100% of the time to perform all of its planned activities.</p>
<p>5. Percentage of software and flight products delivered as required/scheduled (%).</p> <p><b>Benchmark Target:</b> Delivery dates for software and flight products meet more than 95% of the agreed ISS program requirements.</p>	<p><b>Target Exceeded:</b> 100% software and flight products were delivered in accordance with the schedule and the requirements.</p>
<p>6. Rate of Payload operational support availability for planned and unplanned events (%).</p> <p><b>Initial Target:</b> The integration, certification and operational activities required to meet planned and unplanned events are successfully completed for the Physical and Life Sciences, and Canadian Astronaut Office experiments manifested on the ISS.</p>	<p><b>Target Successfully Met:</b> All integration activities required to meet planned and unplanned events were successfully completed. No certification or operational activities were required to be supported this past year.</p>

**PERFORMANCE ANALYSIS:**

Indicator 1:

The active participation in the ISS multilateral program meetings and boards allows Canada to position the CSA on the ISS Management Structure program and ensures proposals and decisions are determined accordingly to Canada's delivery capacity and are properly communicated to all partners.

Indicators 3, 5 and 6:

Achievements against set requirements are monitored and certified by NASA counterparts.

Indicators 2 and 4:

Systems availability is measured in systems response time during operational activities as required by NASA counterparts.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
50.8	47.9	47.9
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
94.8	92.4	92.4

**2- Science Mission Operations – Objective:** Operate the space and ground segments for SE mission operations.

**EXPECTED RESULT:**

SE Space Mission Operations meet mission objectives and user/client expectations.

Indicators	Performance
<p>1. Sponsoring organization's requirements for payload projects are met at critical steps of the operations.</p> <p><b>Initial Target:</b> Integration and launch activities for the PMDIS/TRAC (Perceptual-Motor Deficits in Space/Test of Reaction and Adaptation Capabilities) meet sponsoring organization's requirements.</p>	<p><b>Target Successfully Met:</b> PMDIS/TRAC experiment development is 95% completed, according to sponsoring organization's requirements.</p>

**PERFORMANCE ANALYSIS:**

The following indicators appearing in the 2005-2006 RPP were removed and will not be referred to in future RPPs because of insufficient value-added performance information:

2. User/client requirements met at critical steps of the operations.
3. Availability of the required operational support facility (%).
4. Availability of the required on-orbit facility and or instrument (%).

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
0.1	1.0	1.0
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
0.3	0.9	0.9

**Highlights of Main Accomplishments – Space Mission Operations (SE)**

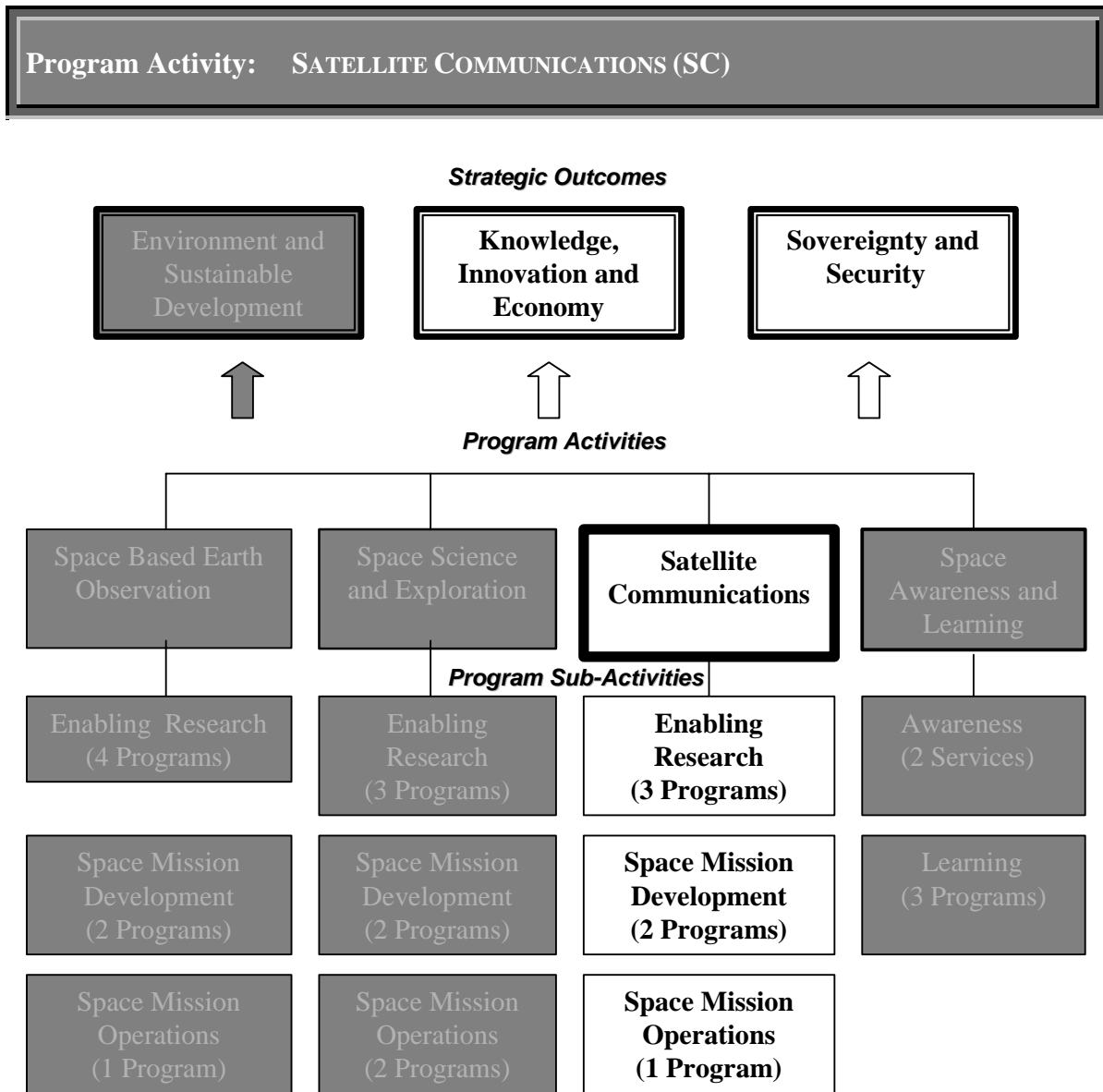
- As part of the Canadian Space Station Program (CSSP), a ground control capability was implemented for Canadarm2, which will enable movement of the robotic arm by personnel on the ground without involvement of the on-orbit crew. This new capability will free up crew time for science and provide greater operational flexibility to the International Space Station (ISS) operations team. Ground control development will be progressively expanded for the Mobile Servicing System (MSS) to enable more efficient use of the Special Purpose Dexterous Manipulator (Dextre) robot when it is launched in late 2007.
- The development and the end-to-end testing of MSS-4 software on the Dextre were completed. The design and development of training material and operational procedures also continued through the year. Definition of the MSS-5 software load destined to be the flight software for final integration with Dextre was completed and work to build and test the software was initiated. Planning to support ISS integrated testing, launch preparation, and on-orbit operations started.
- The CSA fulfilled its responsibilities related to MSS operations that comprises maintaining MSS hardware and software, performing repair and overhaul work on the MSS hardware, operating MSS training facilities, planning and supporting operations of MSS missions, and conducting operations in conjunction with the NASA from the Remote-Multi-Purpose Support Room (RMPSR) in St. Hubert, Québec. The RMPSR was scheduled by NASA to support MSS activities for a total of 6262 hours and 516 hours of simulation.
- CSA delivered 16 weeks of MSS training at CSA facilities to NASA and International Partners. Twelve astronauts, 11 CAPCOMs, 3 mission controllers, 9 CSA operations engineers and 16 real-time operations personnel were fully qualified. This represents 100% of the agreed ISS program requirements.

- Development of the PMDIS/TRAC (Perceptual-Motor Deficits in Space/Test of Reaction and Adaptation Capabilities) experiment is almost completed (95%) and will be ready to be integrated into the launch vehicle in fall of 2006. PMDIS/TRAC, the first experiment to use the Canadian ISS allocation rights is currently placed during Mission STS-116/12A.1 scheduled for launch in December 2006, with a return planned for Mission STS-120/10A in August 2007.
- Canada maintained a trained and versatile Astronaut Corps to continue developing and maintaining human space flight expertise to meet the requirements of CSA's space sciences and human exploration programs. All active Canadian astronauts are qualified as Mission Specialist on the Space Shuttle. Two Canadian astronauts are qualified as Flight Engineers on the Soyuz spacecraft.
- Operations for the Microvariability and Oscillations of Stars (MOST) micro-satellite space telescope, launched in June 2003, continued with additional significant science results expected from this innovative mission. Scientists analysing the MOST space telescope data have made major astronomical discoveries suggesting that long-held theories on the formation and aging of the Sun and other stars need to be reconsidered. This small Canadian telescope continues to expand the boundaries of our knowledge of our galaxy.
- Canadian scientists continue to obtain data from our participation in NASA's Far UltraViolet Space Explorer (FUSE) mission (launched in 1999) and from the Canadian Geospace Monitoring (CGSM) ground-based array of geophysical instruments, which complement international solar-terrestrial space probes. Since the initiation of the CANOPUS (Canadian Auroral Network for the Observation of Plasmas in the Upper-atmosphere and Space)/CGSM array in the late 1980's, over 1,000 peer-review scientific papers have been published using data from the array. Activities continued on enhancing the CGSM array in conjunction with a NASA mid-explorer (MIDEX) mission called THEMIS scheduled for launch in 2006. Through this modest contribution Canadian scientists will become a full partner in this U.S. \$400 million mission.
- In the absence of the NASA Space Shuttle program, the Osteoporosis Experiments in Orbit (OSTEO) were accommodated with an enhanced system (e-OSTEO) in order to fly on-board an ESA unmanned science mission scheduled for launch in 2007.
- The CSA continued to support of the Microgravity Vibration Isolation Sub-system (MVIS) delivered to ESA for integration into the Fluid Science Laboratory, which will be flown aboard their Columbus module. MVIS has been integrated and tested. This integration and testing are to continue into late 2006. ESA plans to launch this module in late 2007 on Space Shuttle mission 1E.

To learn more about Space Science and Exploration, go to:

<http://www.space.gc.ca/asc/eng/sciences/default.asp> and,  
<http://www.space.gc.ca/asc/eng/exploration/default.asp>

### 3.4 SATELLITE COMMUNICATIONS



**Priority:** Provide all Canadians with the means to participate and fully benefit from the global information age.

**Performance Status:** Successfully met: 65% (9/14) of the targets were exceeded or successfully met in 2005-2006. The Program Activity expected results will be fully measurable after a five-year period.

<b>SATELLITE COMMUNICATIONS</b>	
<b>PROGRAM ACTIVITY PERFORMANCE MEASUREMENT</b>	
<b>Expected Result 1</b>	
Increased access for Canadians to state-of-the-art communications systems and services to meet their social and economic needs.	
<b>Indicators</b>	<b>Performance</b>
1. Gap between current capabilities and future needs of Canadians for satellite communications and the available or expected system's capacity.	Baseline performance information will be presented in the 2007-2008 DPR based on needs analysis.
2. Percentage of coverage over Canada by satellite and ground systems in place for commercial and governmental usage.	100% coverage over Canada for commercial usage.  Demonstration and trial campaign for the provision of government service to northern and remote communities is ongoing.
3. Utilization rate of Anik F2 Ka-band payload and in particular the service delivery utilizing the \$50 million Government Ka-band capacity credit.	Baseline performance information will be presented in the 2006-2007 DPR based on analysis of Anik F2 commercial take-up.

## Performance Analysis

### Indicator 1:

In 2006-2007, the CSA will initiate studies on communication satellite service needs and opportunities from which baseline data will be drawn to measure the gap between current capabilities and future needs of Canadians that may require a special attention from the Canadian Government.

### Indicator 2:

The CSA has deployed DVB-RCS hubs in Vancouver and Winnipeg to demonstrate Ka-band applications and services over Anik F2's four northern beams. In conjunction with the infrastructure set in place, nine Ka-band terminals were procured to demonstrate institutional services and applications in the Canadian North. This ongoing trial campaign will continue until an operational service upgrade is achieved. These initiatives have led to a proposal submission under consideration by National Satellite Initiative and Infrastructure Canada.

### Indicator 3:

Baseline performance information will be presented in the 2006-2007 DPR based on analysis of Anik F2 commercial take-up. A maximum of 150 000 basic service equivalents can be used by Canadian consumers to receive multi-media services through Anik F2. Service take over rate is estimated at 3,000 new basic service equivalents per month. Additional performance information on Anik F2 commercial take-up such as number of communities served and type of applications and services used will be available as soon as the operating upgrade by National Satellite Initiative is up and running.

Through its support of the Anik F2, the Government of Canada has secured a Government Capacity Credit access worth \$50 million over 11 years starting April 2005. Industry Canada has transferred this Capacity Credit to the National Satellite Initiative to support the Government's connectivity agenda for the remote and underserved northern rural communities. So far, the Government Capacity Credit access of Anik F2 was only used for testing and demonstration purposes, resulting in low rate of utilization since April 2005.

## Expected Result 2

Better use of space communications, search and rescue, and global navigation satellite systems and applications to improve the efficiency and effectiveness of other government departments in delivering services to Canadians.

Indicators	Performance
1. Number of joint studies and projects between the CSA and other government departments in the field of satellite communications, navigation and search and rescue.	A first joint study was conducted on Global Navigation Satellite Systems opportunities.

### Performance Analysis

The joint study, undertaken in cooperation with DND, NRCan and Industry Canada looks at the importance of GNSS technology to Canada and identifies some of the country's strengths and opportunities. The analysis is based on the input of over 100 representatives from government, industry and academia.

A second indicator *Number of agencies and governmental departments using space communication asset* appearing in the 2005-2006 RPP was removed and will not be referred to in future RPPs because of insufficient value-added performance information.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
30.5	38.5	28.0
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
24.5	19.6	19.6

Any significant variance reported against Planned Spending set in the 2005-2006 Report on Plans and Priorities is explained in [Section 3.6 – Spending by Program Activity](#).

**The programs under this Program Activity are divided into three clusters: Enabling Research, Space Mission Development and Space Mission Operations.**

**However, no Space Mission Operations are mentioned in this report since CSA is not operating communication satellite.**

### **ENABLING RESEARCH – SATELLITE COMMUNICATIONS**

Three Satellite Communications Enabling Research Programs with a combination of accomplishments demonstrate how the following Expected Results were measured and attained.

**1- Space Technology R&D Programs Supporting SC – Objective:** Assume leadership and provide support in enabling research and development of high-risk technologies leading to the realization of CSA or international SC missions, including support to value-added applications by academia and government organizations, as well as the transfer of proven technologies to the market place.



**EXPECTED RESULT:**

Develop and transfer of advanced space technologies by industry, government and academia, in support of SC activities of interest to Canada.

Indicators	Performance
<p>1. Number of publications authored by the CSA and patents issued for the CSA.</p> <p><b>Preparatory Target:</b> Establish a system to measure the overall number of patents and publications.</p>	<p><b>Target Partially Met:</b> 2 out of 3 R&amp;D programs are supported by data collection systems in place. The third system will be implemented by the second quarter of 2006.</p> <p><b>Partial Results:</b> A total of 6 publications and 0 patents.</p>
<p>2. Number of technologies brought to Higher Readiness Levels to advance technological capacity.</p> <p><b>Preparatory Target:</b> Establish a system to measure the overall number of technologies brought to Higher Readiness Levels.</p>	<p><b>Target Partially Met:</b> 1 out of 2 R&amp;D programs is supported by a data collection system in place. The second system will be implemented by the second quarter of 2006.</p> <p><b>Partial Results:</b> A total of 2 technologies were brought to Higher Readiness Level.</p>
<p>3. Number of technologies chosen for future missions and/or commercial products by industries.</p> <p><b>Preparatory Target:</b> Establish a system to measure the overall number of spin-off/commercialization.</p>	<p><b>Target Partially Met:</b> 1 out of 3 R&amp;D programs is supported by a data collection system in place. The second system will be enhanced to capture the information by commercialization activities and the third will be implemented by the second quarter of 2006.</p> <p><b>Partial Result:</b> The 2 technologies brought to Higher Readiness Level are showing great potential for commercialization in future years.</p>

**PERFORMANCE ANALYSIS:**

CSA manages the following Technology R&D programs:

- IP&TT: Intellectual Property and Technology Transfer
- STDP: Space Technology Development Program
- STRP: Space Technology Research Program

Development of data collection system:

IP&TT: System already exists to capture information for internal R&D disclosures and will be enhanced to capture information corresponding to commercialization activities.

STDP: A data collection system was designed, developed and integrated in baseline ORIS information management system. The operational deployment of ORIS 7.3 is scheduled for April 2006.

STRP: System in place and producing results in the STRP 2005-2006 Achievement Report, where all publications and patent disclosures are listed.

Detail of Partial Results:

- 6 technical reports on the system and software design were produced through the research work on all optical inter-satellite link (OISL);
- 3 patents and 7 invention disclosures were already identified under the Space Based Earth Observation;
- 2 technologies brought to HRL: The OISL was successfully demonstrated in laboratory. The microsatellite bus built by the CSA team will provide a platform for satellite communication payload demonstration; and,
- 2 technologies that have the readiness level brought up also have the potential to be commercialized in the future. Research in OISL and microsatellite bus have generated a lot of interest from Canadian industries.

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
3.6	1.4	1.4
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
9.9	3.9	3.9

**2- ESA Telecommunication Programs – Objective:** Through key international partnerships, enhance Canadian industry's technological base and provide access to European market for value-added products and services in the field of SC.

**EXPECTED RESULT:**

Successful development and demonstration of advanced technologies, systems, components, or studies provided for in the contracts awarded by ESA to Canadian firms under SC programs.

Indicators	Performance
1. Canadian industrial returns in ESA optional programs in Satellite Communications.  <b>Benchmarking Target:</b> 0.80 or higher.	  <b>Target Exceeded:</b> 1.0

**PERFORMANCE ANALYSIS:**

The indicator *95% of ESA contract of more than \$250K have been successfully delivered by Canadian suppliers against ESA technical requirements* will be replaced in the 2006-2007 RPP by *Canadian industrial returns in ESA optional programs in SC* in order to improved value-added performance information.

The Overall Industrial Return Coefficient Indicator is 1.07. It corresponds to the ratio between the actual amount of weighted contracts given to a country and the ideal amount of contracts to be given to that country according to existing rules<sup>9</sup>. Canadian industrial returns are by Program Activity. The Overall Canadian industrial return pertains to all ESA mandatory programs.

A second indicator, *Identification of one story confirming successful development and demonstration of advanced technologies, systems, components or studies*, appearing in the 2005-2006 RPP was removed and will not be referred to in future RPPs because of insufficient value-added performance information.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
9.2	9.1	9.1
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
-	-	-

<sup>9</sup> European Space Agency Council. Paris, June 12, 2006. Agency Key Performance Indicators. ESA/C (2006) 66

**3- Telecommunications Application Program – Objective:** Enhance Canada's ground segment telecommunications technologies, develop and demonstrate SC applications for commercial use and Canadian government operations.

**EXPECTED RESULT:**

Development and demonstration of SC Applications for private and public sector clientele and the support and development of ground-segment telecommunication technologies.

Indicators	Performance
<p>1. Number of new or improved applications.</p> <p><b>Preparatory Target:</b> Develop a new Satellite Communication application Program.</p>	<p><b>Target Successfully Met:</b> New Satellite Communication Program (NSCP) Roadmap developed. Performance information will be available no sooner than 2007-2008.</p>
<p>2. Number of operational engagements.</p> <p><b>Preparatory Target:</b> Develop a new Satellite Communication application Program.</p>	<p><b>Target Successfully Met:</b> NSCP Roadmap developed. Performance information will be available no sooner than 2007-2008.</p>

**PERFORMANCE ANALYSIS:**

A New Satellite Communication Program (NSCP) Roadmap has been developed with three elements consisting of: Satellite Telecommunications Advanced Research (STAR); Telecommunications Infrastructure, Terminals, Applications and Networks (TITAN) and Next Generation Payload Demonstration Program. None of these activities were funded in 2005-2006. Funding approval for TITAN and STAR is being sought. An opportunity assessment and advance study (phase 0) is currently ongoing for the Next Generation Payload Demonstration Program.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
-	-	-
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
-	-	-

## Highlights of Main Accomplishments – Enabling Research (SC)

- In order to enhance Canada's capabilities in supporting national and international space missions or activities of Canadian interest, the CSA awarded five new technology and applications development projects to mainly small and medium-size companies (SMEs) through an annual Request for Proposal process under the Space Technology Development Program. In 2005-2006, the allocation capacity for new projects decreased by 60% due to ongoing multi-year contracts awarded in 2004-2005.
- In order to enhance Canada's industrial competitiveness, the CSA managed the patents and intellectual property licenses portfolio, conducted commercialization assessments and developed marketing plans for new technologies developed in-house, and through contracts to Canadian industry.
- The optical inter-satellite link has the potential to increase the satellite downlink capacity in a secure environment. CSA is developing a unique all optical inter-satellite link that has no moving mechanism. This system was successfully demonstrated in the laboratory environment. The next step is to give a demonstration over a 5 km range outdoor.
- CSA successfully developed a microsatellite bus that can provide a platform for the demonstration of future Canadian satellite communication payloads.
- Canada's participation in European Space Agency (ESA) programs allowed our industry to access forward-looking studies on new telecommunications services; to develop new technologies, equipment and applications in multi-media, optical inter-satellite and mobile communications; and, to demonstrate satellite-based communications services such as interactive communications services for remote communities and disaster management.

## **SPACE MISSION DEVELOPMENT – SATELLITE COMMUNICATIONS**

One Satellite Communications Space Mission Development Program with a combination of accomplishments demonstrates how the following Expected Results was measured and attained.

**1-Satellite Communication Projects – Objective:** Ensure the development, delivery and commissioning of space-qualified systems for SC missions through effective project, quality and engineering management.

<b>EXPECTED RESULT:</b>
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SC projects' deliverables meet mission objectives and user expectations.
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Indicators	Performance
<p>1. Safety and Mission Assurance (S&amp;MA) and Configuration Management (CM) requirements are identified and met for each project.</p> <p><b>Initial Target 1:</b> S&amp;MA and CM are implemented on all projects in phase B, C and D.</p> <p><b>Preparatory Target 2:</b> Guidelines are initiated.</p> <p><b>Preparatory Target 3:</b> Staffing completed.</p>	<p><b>Target Successfully Met:</b> 1) S&amp;MA services have been implemented on all Satellite communications' projects in phases B, C and D. 2) Implementation is partial for CM for some projects.</p> <p><b>Target Successfully Met:</b> Project based Product Assurance requirements developed. CSA CM Plan developed and issued.</p> <p><b>Target Partially Met:</b> Staffing was partially completed.</p>
<p>In accordance with Treasury Board approved Project Approval and Management Framework (PAMF):</p>	
<p>2. Mission objectives and user requirements are met at critical steps of the projects.</p> <p><b>Initial Target:</b> 80% of Space Programs clients are satisfied with respect to mission objectives and user requirements.</p> <p>3. Project cost is maintained within authorized levels.</p> <p><b>Initial Target 1:</b> 60% of projects phases (B, C and D) are delivered on time and within budget.</p> <p><b>Initial Target 2:</b> All Project Management (PM) personnel trained in project management principles.</p> <p>4. Risks are identified and mitigated for each project.</p> <p><b>Initial Target:</b> 100% of projects have an identified risk matrix and a mitigation plan.</p>	<p><b>Target Exceeded:</b> Client satisfaction reached 82% with respect to mission objectives and user requirements.</p> <p><b>Target Exceeded:</b> 85% of partial/completed milestones.</p> <p><b>Target Successfully Met:</b> All PM personnel were trained in project management principles.</p> <p><b>Target Successfully Met:</b> 100% of Space Programs projects have an identified risk matrix with risk mitigation actions identified.</p>

**PERFORMANCE ANALYSIS:**Indicator 1:

According to Treasury Board approved Project Management and Approval Framework phases B, C and D relate to preliminary design definition, detailed design definition and manufacture and acceptance implementation. Together they correspond to project development phases.

Configuration Management implementation is partial for some projects given the inadequacy of resources available. Staffing was completed excluding an ENG-05 position.

Indicator 2:

Space Programs conducted a client survey. The survey was conducted through 31 interviews with Missions Managers, Project Managers or Director General over 14 projects ranging from phases A to E. The interviews were carried out in March 2006 and lasted from 45 to 60 minutes. Only the results of the 17 Mission Managers were considered to establish the satisfaction rate. The other interviews were used to polish improvement recommendations.

Indicator 3:

The mid-year achievement showed that already 78% of milestones were partially or totally completed. The year-end achievement reflected a total of 85%. Information sessions were held on the revised PAMF policy and project management guideline document. Nine training sessions on various project management principles were held during the year. The project management help desk provided answers to all queries related to project management principles, methodology and tools.

Indicator 4:

The project risk matrix is reviewed monthly at each project review and discussed in more details at the Space Program Risk Follow-up Committee meetings, taking place three times a year.

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
15.7	26.0	15.6
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
6.5	3.6	3.6

## **Highlights of Main Accomplishments – Space Mission Development (SC)**

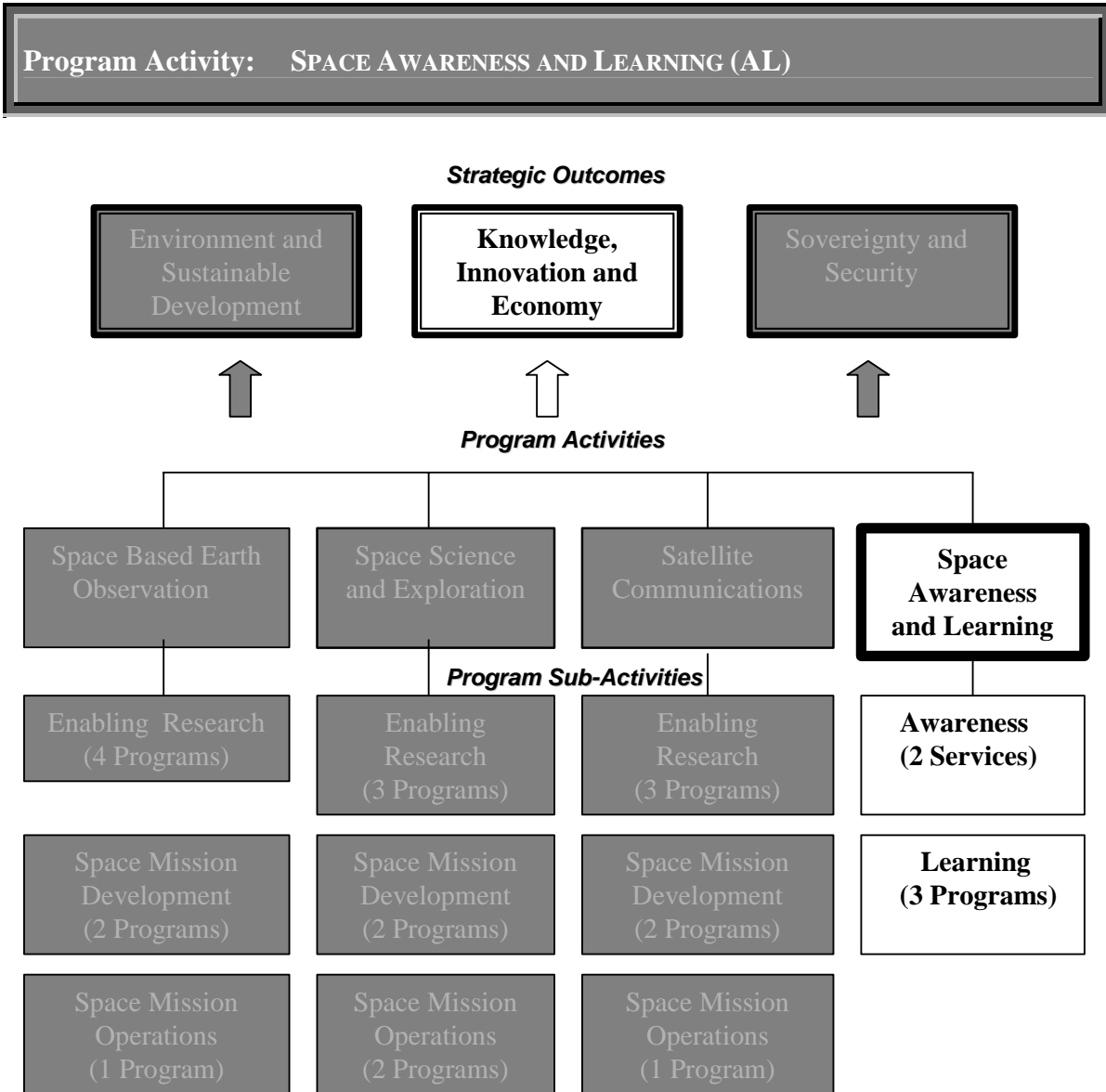
- In 2004-2005, as part of the CASSIOPE Mission Contribution Program, the CSA initiated the development and demonstration of the CASCADE telecommunications payload on a small satellite bus that will be fully designed and constructed by Canadian companies. CASCADE is the precursor of a communication satellite constellations that will help position Canadian industry on the international market, both as a supplier of advanced components and as a service provider of high volume, high data rate telecommunications anywhere in the world. Although, work continued in 2005-2006, a Mission Preliminary Design Review concluded that due to slippages in developing the first generic small satellite bus and to deliver the telecommunications payload, the program should be extended by 11 months, which moved the launch date from January 2007 to December 2007.

To learn more about Satellite Communications, go to:

<http://www.space.gc.ca/asc/eng/satellites/default.asp>



### 3.5 SPACE AWARENESS AND LEARNING



**Priority:** Further public understanding of and engagement with regards to space-related issues, ultimately leading to improving the scientific literacy of Canadians.

**Performance Status:** Successfully met: 94% (14/15) of the targets were exceeded or successfully met in 2005-2006. The Program Activity expected results will be fully measurable after a five-year period.

**SPACE AWARENESS AND LEARNING**

**PROGRAM ACTIVITY PERFORMANCE MEASUREMENT**

**Expected Result**

Increase public awareness of Canada's activities in space and space benefits positively affecting the quality of life of Canadians.

<b>Indicators</b>	<b>Performance</b>
1. Awareness of Canadians measured by telephone survey every three years.	Successfully met. Survey conducted in early 2005 indicates that 46% of respondents are aware of the Canadian Space Agency as champion of space activities and that 19% of respondents have moderate knowledge of Canada's space activities.

**Performance Analysis**

The survey was conducted with the general public to assess awareness, knowledge, and attitudes toward Canada's space program and related activities. The survey was administered by phone to 1,628 Canadian adult residents, on February 4 to 11, 2005. Based on a sample of this size, the overall results can be considered to be accurate within +/- 2.5%, 19 times out of 20.

Several results contribute to determining levels of awareness. Other than the two results cited above, the following could also be considered:

- 47% identified Earth-related benefits that flow from Canada's space program;
- 67% cited images when thinking about Canada's involvement in space;
- 71% believed Canadians are proud of our activities in space, and that Canadian success in advanced space technologies contributes to our knowledge-based economy, innovation, and economic competitiveness; and,
- 65% felt that our space activities inspire youth in science and engineering.

80% of Canadians surveyed think it is important for Canada to continue to have a space program and be active in the development of advanced technologies and science related to space.

Respondents were asked to rate the importance of a number of benefits that result from investment in the Canadian Space Program. A strong majority viewed all potential benefits as important. 90% felt that monitoring the Earth for natural disasters is an important benefit, followed closely by monitoring our oceans, forests, wetlands and farmlands (88%), and new medical discoveries (87%). As well, significant numbers attributed importance to better telecommunications (83%) and leadership in robotics (81%). Benefits that also received strong responses included advancing humankind's knowledge (74%), enhancing Canada's international reputation (71%), and exploring the solar system (67%).

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
5.3	5.0	5.0
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
25.2	23.3	23.3

Any significant variance reported against Planned Spending set in the 2005-2006 Report on Plans and Priorities is explained in [Section 3.6 – Spending by Program Activity](#).

**The programs under this Program Activity are divided into two clusters: Awareness and Learning.**

**AWARENESS**

Two Awareness Programs with a combination of accomplishments demonstrate how the following Expected Results were measured and attained.

**1-Media Relations and Information Services – Objective:** Position information through the media and the Web.

**EXPECTED RESULT 1:**

Information is present in the media, particularly on television.

Indicators	Performance
<p>1. Quantity of media initiatives that resulted in coverage, particularly on television.</p> <p><b>Initial Target:</b> Media analysis for at least 3 key initiatives.</p>	<p><b>Target Successfully Met:</b> Three Media analyses were performed for the following initiatives: STS-114, Tomatosphere project and NEEMO 9. Analyses show coverage is considerably positive and extensive.</p>

**PERFORMANCE ANALYSIS:**

Media interest generated 879 requests for interviews compared to 447 last year. As many as 701 interviews were conducted throughout the year. CSA recorded 863 references and quotes in newspapers.

Indicators 2 and 3:

The following indicators appearing in the 2005-2006 RPP were removed and will not be referred to in future RPPs because of insufficient value-added performance information:

2. Quantity of media requests
3. Number of partnerships in the area of television

**EXPECTED RESULT 2:**

Canadians visit the Canadian Space Agency Web site.

Indicators	Performance
1. Number of Canadian visits.  <b>Initial Target:</b> Increase of 2%.	  <b>Target Exceeded:</b> 35 % increase.

**PERFORMANCE ANALYSIS:**Indicator 1:

The number of unique visits on the Web site went from 500,392 to 710,185. This significant increase can be explained by the high level of interest generated by space mission STS-114 as well as by new award-winning interactive features, such as virtual visits of the Canadian Space Agency and the David-Florida Laboratory, accessible from the site's front page. The interactive elements were greatly appreciated by the public and were recognized by awards for innovation.

Indicators 2 and 3:

The following indicators appearing in the 2005-2006 RPP were removed and will not be referred to in future RPPs because of insufficient value-added performance information:

2. Level of satisfaction of visitors to Web site
3. Number of Canadians sent Internet-based resources

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
0.8	0.7	0.8
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
6.0	5.9	5.9

**2-Creative Services, Marketing and Exhibitions – Objective:** Position information through direct-marketing activities.

**EXPECTED RESULT 1:**

Target audience has access to information through products and publications.

Indicators	Performance
<p>1. Number of products and publications distributed through different communications channels.</p> <p><b>Initial Target:</b> Establishment of a benchmark according to different target audiences.</p>	<p><b>Target Successfully Met:</b> Overall 20,000 units were distributed through information kits.</p>

**PERFORMANCE ANALYSIS:**

Indicator 1:

Number of kits approximately distributed to the following categories:

- 300 kits to teachers;
- 100 kits to Industries and VIPs;
- 400 kits to general public (families and youth); and,
- Between 5 to 10 articles are included in categorised kits.

Additional information:

It is to be noted that 10 new promotion articles and 11 products and publications were produced such as:

- Canadian Success Stories information kit, highlighting the benefits that flow from space to all Canadians through 25 concrete examples;
- Collection cards featuring astronauts and their reading preferences for the *National Library Summer Reading Program* campaign, in collaboration with the Library and Archives Canada (400,000 distributed); and,
- Apogee, the CSA on-line space magazine that went from 2,309 to 3,172 members as well as a 81.5% increase of its visitors from the web from 90,604 to 164,216.

A qualitative analysis for Space Science information cards was completed. Results were positive overall. Although some adjustments are required, the resources evaluated met objectives to provide clear and useful information on how space benefits Canadians' lives and which can serve to inspire and encourage the pursuit of careers in science and technology.

Indicators 1, 3 and 4:

The following indicators appearing in the 2005-2006 RPP were removed and will not be referred to in future RPPs because of insufficient value-added performance information:

1. Number of products/publications developed
2. Qualitative analysis for key resources
3. Number of visitors to exhibits

**EXPECTED RESULT 2:**

Target audience has access to information through outreach activities with partners (conferences and fairs).

Indicators	Performance
<p>1. Number of participation in venues with national or international partners (annual target of 4-5).</p> <p><b>Initial Target:</b> Participation in at least 2 to 3 venues.</p>	<p><b>Target Exceeded:</b> Participation at approximately 25 events over a possibility of 50 with national and international outcome.</p>
<p>2. Number of participation in Government of Canadian horizontal venues.</p> <p><b>Initial Target:</b> Participation in at least 4 to 5 horizontal initiatives.</p>	<p><b>Target Successfully Met:</b> Participation at 5 events: Americana, Federal Communicators' Conference, Expo-Québec, GIS Africa 2005 et COP-11.</p>
<p>3. Qualitative analysis of level of satisfaction for key initiatives.</p> <p><b>Initial Target:</b> Qualitative analysis for at least 1 activity.</p>	<p><b>Target Not Met:</b> No qualitative analysis was done.</p>

**PERFORMANCE ANALYSIS:**Indicators 1, 2 and 3:

All indicators appearing in the 2005-2006 RPP were removed and will not be referred to in future RPPs because of insufficient value-added performance information:

1. Number of participation in venues with national or international partners
2. Number of participation in Government of Canadian horizontal venues
3. Qualitative analysis of level of satisfaction for key initiatives

They will be replaced with a new indicator: Number of persons from targeted audiences having access to information.

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
0.7	1.0	0.9
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
5.6	4.6	4.6

### **Highlights of Main Accomplishments – Awareness**

The CSA is implementing a proactive and balanced communications program focused on engaging Canadians through space so that they may develop and pursue an interest – and in the case of Canadian youth, an education in science and technology. Major highlights list as follows:

- In partnership with Library and Archives Canada, a national reading campaign focused on space and centred on members of the Canadian Astronaut Corps encouraging youth to read. Young Canadians across the country were targeted over the summer. Roughly 400,000 astronaut collector cards were distributed to youth through libraries across Canada.
- Speakers including astronauts addressed a range of audiences across the country. As many as 162 speaking engagements were coordinated in 8 provinces.
- The return to Flight of the space shuttle (STS-114) attracted significant media attention. The coverage of this event exceeded all expectations, producing over 124 hours of radio and television coverage and garnered nearly 2% of all Canadian media coverage sustained over a seven-week period. Over 400 interviews were conducted, and there were 5,562 media mentions of CSA on this event alone.
- A series of information cards intended to inform readers about Earth-related benefits flowing from space as well as scientific and technological accomplishments were distributed through libraries and science centres across Canada.
- A traveling exhibit highlighting the 20<sup>th</sup> anniversary of Canadian human space flight and Canada's achievements in Earth Observation, Telecommunications, Space Science and Exploration continued its trip to Canada's science centres attracting another 1,000 visitors.

- The CSA participated to Expo-Québec a family event inspired by the work of the science fiction writer Jules Verne. The event attracted 375,000 visitors, and the CSA stand was visited by an average of 7,000 people per day.
- Award-winning interactive features on our Web site, contributed to a 35% increase in visitors.
- Promotion of Canada's scientific expertise and satellite technology supporting sustainable development, as well as RADARSAT-1, which has now entered its tenth year of operation, through media initiatives, publications and participation in national and international conferences. AFRICA GIS was particularly successful in raising awareness of Canada's technology, applications and expertise related to sustainable development, as well as the United Nations Conference on Climatic Change (COP-11) hosted by Canada in Montreal.

## **LEARNING**

Three Learning Programs with a combination of accomplishments demonstrates how the following Expected Results were measured and attained.

**1- Program in Support of Research and Training in Space Science, Medicine and Technology – Objective:** Provide opportunities for pursuing space-related studies by awarding scholarship and fellowship grants to Canadian researchers.

<b>EXPECTED RESULT:</b>
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Enhance expertise of Canadian scientists, engineers and physicians in space science, space technology and space medicine through the learning components of the CSA Grants and Contributions Program.
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<b>Indicators</b>	<b>Performance</b>
<p>1. Number of students fellows and medical residents supported through the program.</p> <p><b>Space Science Initial Target:</b> Approximately 10 postgraduate students and postdoctoral fellows supported through the program.</p> <p><b>Space Technology Initial Target:</b> Approximately 20 postgraduate students and postdoctoral fellows supported through the program.</p> <p><b>Canadian Astronaut Office Initial Target:</b> Four grant recipients for Aerospace Medicine training.</p>	<p><b>Target Successfully Met:</b> A total of 10 students and fellows supported through the program.</p> <p><b>Target Successfully Met:</b> A total of 19 postgraduate students and postdoctoral fellows supported through the program.</p> <p><b>Target Successfully Met:</b> A total of 4 grant recipients supported.</p>



**PERFORMANCE ANALYSIS:****Space Science**

Space Science achievements reflect the target planned. 9 Post-Graduate Supplements and 1 Post-Doctoral Fellowships were awarded.

**Space Technology**

Thirteen new Post-Graduate Supplements and 6 new Post-Doctoral Fellowships were awarded. According to the survey performed to analyse the program's performance, more than 80% of the award recipients have completed their studies. Approximately 30% of students supported in previous years have completed their studies. This program was terminated in 2005-2006. The sunset targets for 2006-2007 and 2007-2008 have been modified accordingly.

**Canadian Astronaut Office**

The *Percentage of grant recipients who participates in additional aerospace medicine training* is targeted at 10%. A survey is conducted with grant recipients every 2 years. The last survey, conducted in February 2005, revealed the following result: 17% or 1 of 6 grant recipients.

Indicators 2 and 3:

The following indicators appearing in the 2005-2006 RPP were removed and will not be referred to in future RPPs because of insufficient value-added performance information:

2. Number of students and fellows supported through the program who will successfully complete their studies (%)
3. Number of supported students and fellows who find a space-related job (%)

<b>2005-2006 - Financial Resources (\$ in millions)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual Spending</b>
1.6	1.2	1.2
<b>2005-2006 - Human Resources (FTEs)</b>		
<b>Planned</b>	<b>Total Authorities</b>	<b>Actual</b>
1.0	0.9	0.9

**2- Astronaut Awareness and Learning Tours – Objective:** Increase awareness of the Canadian Space Program through proactive public appearances by Canadian astronauts throughout Canada.

**EXPECTED RESULT 1:**

Canadians are reached by awareness activities conducted by a Canadian Astronaut.

<b>Indicators</b>	<b>Performance</b>
1. Number of participants reached/astronaut days invested.	

<p><b>Preparatory Target:</b> Establishment of a Benchmark.</p>	<p><b>Target Successfully Met:</b> A total of 29,895 people reached/365 astronaut days invested.</p>
<p>2. Number of events/astronaut days invested.</p> <p><b>Preparatory Target:</b> Establishment of a Benchmark.</p>	<p><b>Target Successfully Met:</b> A total of 100 events supported including 13 video conferences/365 astronaut days invested.</p>
<p>3. Number of provinces and territories visited.</p> <p><b>Initial Target:</b> 6 provinces and 1 territory.</p>	<p><b>Target Exceeded:</b> Nine provinces visited.</p>
<p>4. Percentage of accepted requests.</p> <p><b>Initial Target:</b> Approximately 50%</p>	<p><b>Target Successfully Met:</b> 45.9% requests accepted.</p>

**PERFORMANCE ANALYSIS:**

Indicator 4:

100 events were supported by astronauts over a total of 218 requests received.

Indicators 3 and 4 were rewritten for value-added purposes.

Indicator 5:

The following indicator appearing in the 2005-2006 RPP was removed and will not be referred to in future RPPs because of insufficient value-added performance information:

5. Satisfaction level for message transmitted.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
0.2	0.2	0.2
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
-	-	-

**3-Space Awareness and Learning Program – Objective:** Provide Canadian educators and students with targeted educational resources and space learning opportunities to build knowledge and enhance interest in space science and technology.

**EXPECTED RESULT 1:**

Canadian Educators and students further their learning related to science and technology through space theme.

Indicators	Performance
1. Number of educators reached through professional development initiatives.  <b>Preparatory Target:</b> Establishment of a benchmark.	<b>Target Successfully Met:</b> A total of 150 educators from 11 provinces and 1 territory.
2. Number of students reached through learning activities.  <b>Preparatory Target:</b> Establishment of a benchmark.	<b>Target Successfully Met:</b> A total of 275,648 primary, secondary and post secondary students were reached in all provinces and territories.

**PERFORMANCE ANALYSIS:**

Additional information:

- 55 learning events/opportunities covering all provinces and territories were held; and,
- 1 partnership agreement signed.

The following indicators appearing in the 2005-2006 RPP were removed and will not be referred to in future RPPs because of insufficient value-added performance information:

1. Satisfaction level of educators following participation in annual learning conference
2. Number of learning events, initiatives and engagement opportunities
3. Number of resources developed
4. Number of partnerships

The indicator, *Number of resources distributed* appearing in the 2005-2006 RPP was not measured, it was replaced in the 2006-2007 RPP by the following new indicator *Number of resources accessed by educators*.

2005-2006 - Financial Resources (\$ in millions)		
Planned	Total Authorities	Actual Spending
0.8	0.5	0.5
2005-2006 - Human Resources (FTEs)		
Planned	Total Authorities	Actual
4.0	3.2	3.2

## Highlights of Main Accomplishments – Learning

- The CSA noted an increase in educator and student participation in space-centred learning initiatives, which contributes to encouraging youth to pursue careers in science and engineering.
  - 53% increase in number of workshops coordinated with 33 distance-learning sessions completed, covering 5 provinces and reaching 1,368 students.
  - 96% of educators participating in CSA distance-learning workshops rated the presentations as above average to excellent in quality.
  - 15 onsite workshops reaching 276 students from Québec, Ontario and Northern Ontario.
  - 36 presentations given by 14 CSA scientists, engineers and program personnel reaching 5,584 students and educators in 5 provinces covering Atlantic, Central and Western Canada.
- The CSA provided professional development workshops and teaching materials responding to the needs of educators.
  - 110 educators covering 11 provinces and one territory took part in the Annual Space Educator Conference.
  - Database subscribers who receive information related to Space Education initiatives and learning modules increased from 3,204 to 4,125 (+29%).
  - Increased interest in *Did You Know* pages-Web site, up by 371%, from 2,792 to 13,178.
  - Increase in educators accessing the Educator Resources section of the CSA Web site by 23% from 192,835 to 235,595.
- Through the collaboration of CSA, Agriculture Canada, CresTech, Guelph University, Stokes and Heinz Canada, the number of participants in the Tomatosphere project increased by 38% from 5,098 classrooms or 152,940 students in 2004-2005 to 7,000 classrooms, reaching approximately 210,000 students in 2005-2006. In all, 597,806 students at the primary and secondary level have been reached as this four-year program draws to a close.
- The CSA Space Careers (CD), developed to encourage Canadian youth to pursue studies and careers in science and technology, received 1,837 requests from all 10 provinces and 1 territory for the Space Careers CD-ROM.
- The signature of an MOU with NASA, the European Space Agency (ESA) and the Japanese Space Agency (JAXA) has brought about the creation of the International Space Education Board, which will foster cooperation, collaboration and partnership on space education initiatives on a global scale.

To learn more about Space Awareness and Learning, go to:

<http://www.space.gc.ca/asc/eng/media/default.asp>; and,

<http://www.space.gc.ca/asc/eng/educators/default.asp>

### 3.6 SPENDING BY PROGRAM ACTIVITY

Description	Planned Spending (\$ in million)	Actual (\$ in million)	Variance (\$ in million)	Comments
Space Based Earth Observation	131.1	98.4	32.7	<p>Variances are due mainly to:</p> <p>Reprofiling of \$28.0 million to 2006-2007 reference levels for the RADARSAT-2 Program, due to cumulative technical difficulties encountered with the development of cutting-edge technologies for the payload. This has delayed some construction milestones, and spacecraft assembly, integration and test.</p> <p>Reprofiling of \$11.0 million to 2006-2007 reference levels for the Chinook Program, due to the redefinition of the Mission following the withdrawal of foreign partners.</p> <p>The cumulative reprofiling (\$39.0 million) was partially offset by extra spending of \$5.9 million in ESA EO Program.</p>
Space Science and Exploration	145.0	123.4	21.6	<p>Variances are due mainly to:</p> <p>Reprofiling of \$1.5 million to 2006-2007 reference levels mainly due to implementation delays in the following projects: e-OSTEO (\$0.8 M), ePOP (\$0.7 million).</p> <p>Reprofiling of \$3.4 million in several space science projects for funds kept frozen during the year to cover risks that have yet to materialize.</p> <p>\$10.0 million initially allocated under the Space Science and Exploration Program Activity for</p>

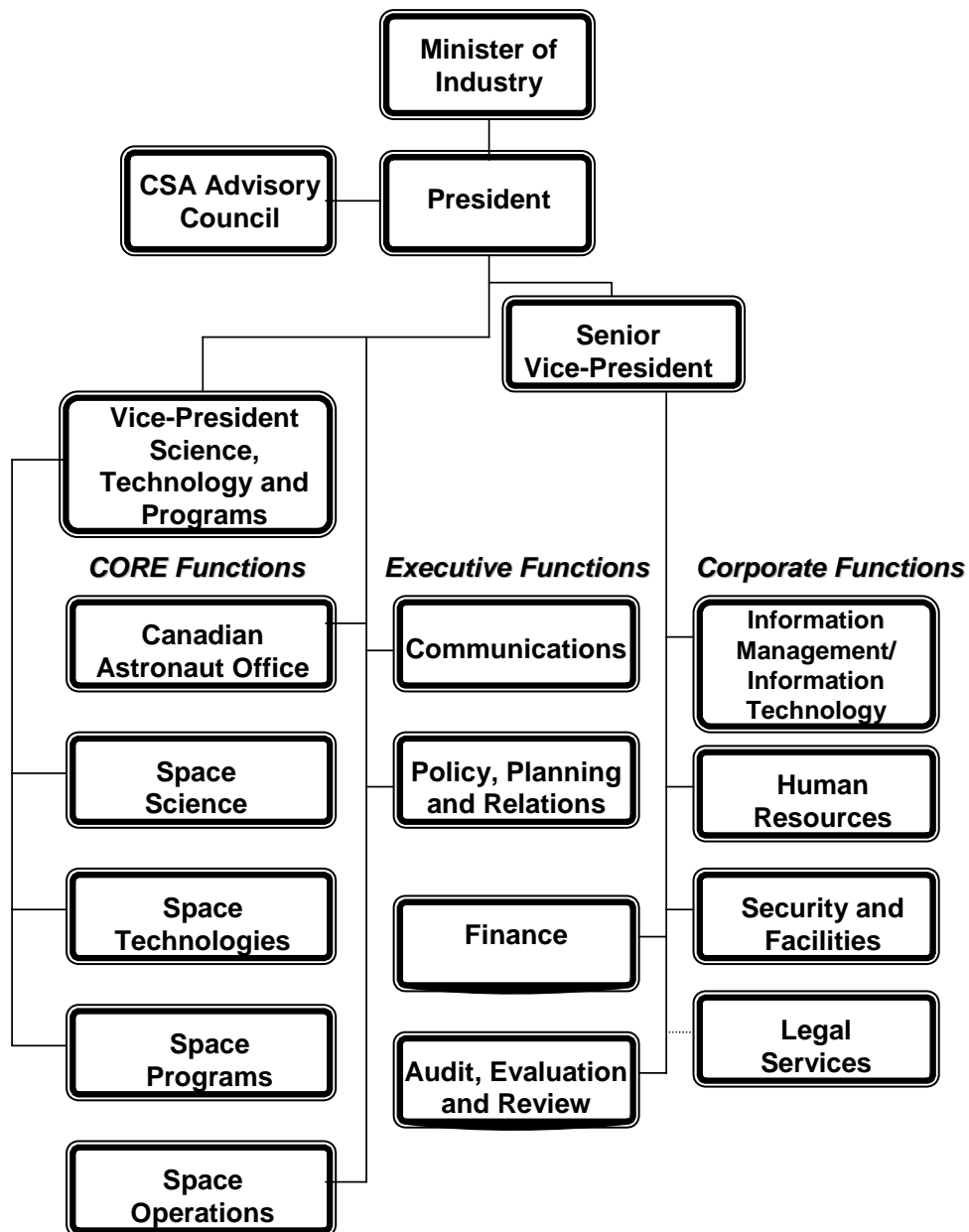
Description	Planned Spending (\$ in million)	Actual (\$ in million)	Variance (\$ in million)	Comments
				<p>the CASCADE component of the CASSIOPE, Contribution Program, and later on reported accurately under the Satellite Communications Program Activity.</p> <p>Under spending of \$2.8 million in MSS Operations caused by the postponement of the Shuttle flights to the ISS.</p>
Satellite Communications	30.5	28.0	2.4	<p>Variations are due mainly to:</p> <p>Several minor gaps that occurred in ongoing programs.</p> <p>A reprofiling of \$10.5 million associated to delays in the implementation of the CASCADE component of the CASSIOPE Contribution Program that was counterbalanced with additional expenditures (\$10 million) for the portion of the CASCADE component initially allocated under the Space Science and Exploration Program Activity.</p>
Space Awareness and Learning	5.3	5.0	0.3	No major variance.
Corporate Services and Infrastructure	29.8	33.2	(3.5)	<p>Variations are due mainly to:</p> <p>Additional spending of \$2.2 million on Information Technologies (\$1.1 million) notably for improving security, and another spending of \$1.1 million on the CSA Headquarter to adapt the building to evolving needs.</p>

\* The table explains the major variances by Program Activity. Not mentioned are less significant gaps that occurred in ongoing programs, and variances that resulted from the adaptation of management practices in the new environment of the Program Activity Architecture (PAA). For 2006-2007, the PAA was amended in order to better monitor financial information by Program Activity and improve the coding in financial systems in order to fully link financial and performance information, and track every financial transactions by Program Activity expected results, starting April 1, 2006.

## SECTION 4: SUPPLEMENTARY INFORMATION

### 4.1 ORGANIZATIONAL INFORMATION

Reporting to the Minister of Industry, the CSA Chief Executive Officer is the President, assisted by the Senior Vice-President and the Vice-President of Science, Technology and Programs. The Policy, Planning and Relations Branch, the Communications Directorate, the Canadian Astronaut Office, and the Space Operations Branch report directly to the President. Three of the core branches report to the Vice-President of Science, Technology and Programs. The five Corporate Services report directly to the Senior Vice-President. Legal Services are provided by the Department of Justice. The organizational chart below became effective as of April 1, 2005.



## 4.2 FINANCIAL TABLES

### 4.2.1 Comparison of Planned to Actual Spending (including Full-time Equivalents)

(\$ in millions)	Actual 2003- 2004	Actual 2004- 2005	2005-2006			
			Main Estimates	Planned Spending	Total Authorities	Actual
Space Based Earth Observation			144.5	155.6	153.3	113.3
Space Science and Exploration			156.9	158.1	143.1	136.7
Satellite Communications			34.0	34.0	42.6	32.0
Space Awareness and Learning			6.2	6.2	6.0	6.0
<b>Total</b>	280.6	286.0	341.6	353.9	345.0	288.0
<b>Less: Non- Respendable revenue</b>	(4.0)	(4.2)	N/A	(4.8)*	N/A	(4.9)
<b>Plus: Cost of services received without charge</b>	4.1	4.3	N/A	4.3	N/A	3.8
<b>Total Departmental Spending</b>	280.7	286.2	N/A	353.4	N/A	286.9
<b>Full Time Equiv.</b>	<b>550</b>	<b>573</b>	<b>N/A</b>	<b>614</b>	<b>N/A</b>	<b>596</b>

**Note:**

- Due to rounding, figures may not add to totals shown.
- For the 2005-2006 reporting cycle, the total authorities column refers to total spending authorities received during the fiscal year, as well as funding received from 2005-2006 Governor General Special Warrants and TB Vote 5.
- Difference between Total Authorities and Actual Spending is mainly due to re-profiling of funds from 2005-2006 to future years.
- Planned Spending corresponds to Total Planned Spending in 2005-2006 RPP.
- The four Program Activities shown in this table include amounts for Corporate Services, Strategic Development and Infrastructure.
- The 2005 Budget announced funding of \$111 million over five years for the design of the next generation of radar satellites. This adjustment is not reflected in the other financial tables.
- This table reflects the reductions to Planned Spending as a result of the Expenditures Review Committee (ERC) exercise, which were announced in the 2005 Budget. This adjustment is not reflected in the other financial tables.



- For the 2003-2004 and 2004-2005 fiscal years, it is impossible to present these numbers in PAA format since this structure did not exist at the time. Considerable effort would be required to convert these numbers in PAA format.

\*In order to provide consistent figures on Non-Respendable Revenue, RADARSAT-1 royalty revenues amounting at \$4.1 million have been added to Planned Spending shown in the 2005-2006 DPR although the 2005-2006 RPP did not show these revenues.

#### 4.2.2 Resources by Program Activity

2005-2006					
Program Activity (\$ in million)	Budgetary				
	Operating	Capital	Grants	Contributions	Total
<b>Space Based Earth Observation</b>					
Main Estimates	64.1	69.1	0.0	11.2	144.5
Planned Spending	64.1	73.5	0.0	11.2	148.9
Total Authorities	74.2	62.0	0.0	17.1	153.3
Actual Spending	73.0	23.2	0.0	17.1	113.3
<b>Space Science and Exploration</b>					
Main Estimates	105.4	35.4	0.0	16.0	156.9
Planned Spending	105.4	36.9	0.0	16.0	158.4
Total Authorities	99.5	36.6	0.0	7.0	143.1
Actual Spending	98.1	31.6	0.0	7.0	136.7
<b>Satellite Communications</b>					
Main Estimates	9.0	0.8	0.0	24.2	34.0
Planned Spending	9.0	0.8	0.0	24.2	34.0
Total Authorities	8.1	6.7	0.0	27.8	42.6
Actual Spending	8.0	0.4	0.0	23.6	32.0

<b>Space Awareness and Learning</b>					
Main Estimates	4.5	0.0	1.5	0.2	6.2
Planned Spending	4.5	0.0	1.5	0.2	6.2
Total Authorities	4.6	0.0	1.2	0.2	6.0
Actual Spending	4.6	0.0	1.2	0.2	6.0
<b>Total</b>					
<b>Main Estimates</b>	183.0	105.4	1.6	51.7	341.6
<b>Planned Spending</b>	183.0	111.3	1.6	51.7	347.5
<b>Total Authorities</b>	186.4	105.4	1.2	52.1	345.0
<b>Actual Spending</b>	183.7	55.3	1.2	47.9	288.0

**Note:**

- Due to rounding, figures may not add to totals shown.
- For the 2005-2006 reporting cycle, the total authorities column refers to total spending authorities received during the fiscal year, as well as funding received from 2005-2006 Governor General Special Warrants and TB Vote 5.
- Operating include Employee Benefit Plans.
- Difference between Total Authorities and Actual Spending is mainly due to re-profiling of funds from 2005-2006 to 2006-2007.
- The four Program Activities shown in this table include amounts for Corporate Services, Strategic Development and Infrastructure.
- Planned Spending corresponds to Total Planned Spending in 2005-2006 RPP except for the 2005 Budget announcements:
  - The 2005 Budget announced funding of \$111 million over five years for the design of the next generation of radar satellites.
  - The 2005 Budget announced a budget reduction arising from an Expenditure Review Committee (ERC) exercise.

#### 4.2.3 Voted and Statutory Items

Voted or Statutory Item	Truncated Vote or Statutory Wording (\$ in millions)	2005-2006			
		Main Estimates	Planned Spending	Total Authorities	Actual
25	Operating expenditures	173.4	173.4	177.1	174.4
30	Capital expenditures	105.4	111.3	105.4	55.3
35	Grants and Contributions	53.3	53.3	53.3	49.1
(S)	Contributions to employee benefit plans	9.5	9.5	9.3	9.3
	<b>Total</b>	<b>341.6</b>	<b>347.5</b>	<b>345.0</b>	<b>288.0</b>

**Note:**

- Due to rounding, figures may not add to totals shown.
- For the 2005-2006 reporting cycle, the total authorities column refers to total spending authorities received during the fiscal year, as well as funding received from 2005-2006 Governor General Special Warrants and TB Vote 5.
- Difference between Total Authorities and Actual Spending is mainly due to re-profiling of funds from 2005-2006 to 2006-2007.
- Planned Spending corresponds to Total Planned spending in 2005-2006 RPP except for the 2005 Budget announcements:
  - The 2005 Budget announced funding of \$111 million over five years for the design of the next generation of radar satellites.
  - The 2005 Budget announced a budget reduction arising from an Expenditure Review Committee (ERC) exercise.

#### 4.2.4 Services Received Without Charge

(\$ in millions)	2005-2006
Accommodation provided by Public Works and Government Services Canada (PWGSC).	0.2
Contributions covering employers' share of employees' insurance premiums and expenditures paid by TBS (excluding revolving funds). Employer's contribution to employees' insured benefits plans and associated expenditures paid by TBS.	3.5
Salary and associated expenditures of legal services provided by Justice Canada.	0.2
<b>Total 2005-2006 Services Received Without Charge</b>	<b>3.8</b>

**Note:**

- Due to rounding, figures may not add to totals shown.

#### 4.2.5 Sources of Respendable and Non-Respendable Revenue

(\$ in millions)	Actual 2003-2004	Actual 2004-2005	2005-2006			
			Main Estimates	Planned Revenue	Total authorities	Actual
Space Based Earth Observation						
Royalties Revenues	3.3	3.1	N/A	4.1	N/A	3.1
Testing Facilities and Services of the David Florida Laboratory (DFL)	0.3	0.5	N/A	0.3	N/A	0.8
Space Science and Exploration						
Testing Facilities and Services of DFL	0.3	0.4	N/A	0.3	N/A	0.7
Satellite Communications						
Testing Facilities and Services of DFL	0.1	0.1	N/A	0.1	N/A	0.2
<b>Total Non- Respendable Revenue</b>	<b>4.0</b>	<b>4.2</b>	<b>N/A</b>	<b>4.8</b>	<b>N/A</b>	<b>4.9</b>

**Note:**

- Due to rounding, figures may not add to totals shown.
- In order to provide consistent figures on Non-Respendable Revenue, RADARSAT-1 royalty revenues amounting at \$4.1 million have been added to the Planned Spending shown in the 2005-2006 DPR although the 2005-2006 RPP did not show these revenues.
- For the 2005-2006 reporting cycle, the total authorities column refers to total spending authorities received during the fiscal year, as well as funding received from 2005-2006 Governor General Special Warrants and TB Vote 5.

#### 4.2.6 Resource Requirements by Branch or Sector

(\$ in millions)	Space Based Earth Observation	Space Science and Exploration	Satellite Communications	Space Awareness and Learning	Total
<b>Space Programs</b>					
Planned Spending	61.4	42.8	15.4	0.0	119.6
Actual Spending	19.2	31.1	16.2	0.0	66.5
<b>Space Technologies</b>					
Planned Spending	50.0	17.2	13.6	0.4	81.2
Actual Spending	56.1	19.2	10.7	0.4	86.4
<b>Space Sciences</b>					
Planned Spending	4.4	27.8	0.0	1.1	33.3
Actual Spending	3.6	18.3	0.0	0.6	22.5
<b>Canadian Astronaut Office</b>					
Planned Spending	0.0	5.4	0.0	0.2	5.6
Actual Spending	0.0	4.3	0.0	0.3	4.6
<b>Space Operations</b>					
Planned Spending	19.3	52.8	1.3	0.0	73.3
Actual Spending	17.4	50.5	1.1	0.0	68.9
<b>Corporate Services</b>					
Planned Spending	13.9	12.4	3.7	4.5	34.6
Actual Spending	17.0	13.4	4.0	4.8	39.2
<b>TOTAL</b>					
Planned Spending	148.9	158.4	34.0	6.2	347.5
Actual Spending	113.3	136.7	32.0	6.0	288.0

**Note:**

- Due to rounding, figures may not add to totals shown.
- In order to provide consistent figures on Planned Spending, supplementary estimates item amounting at \$5.9 million have been added to Planned Spending shown in the 2005-2006 DPR although the 2005-2006 RPP did not show these funds.

#### 4.2.7 2005-2006 User Fee Reporting – User Fees Act

A. User Fee	Fee Type	Fee Setting Authority	Date Last Modified	2005-2006					Planning Years				
				Forecast Revenue (\$000)	Actual Revenue (\$000)	Full Cost (\$000)	Performance Standard	Performance Results	Fiscal Year	Forecast Revenue (\$000)	Estimated Full Cost (\$000)		
Fees charged for the processing of access requests filed under the Access to Information Act	O	Access to Information Act	1992	.>\$ 0.5	\$ 0.1	\$65.0 (incl. Salaries and O&M)	Framework under development by TBS.  More info: <a href="http://lois.justice.gc.ca/en/a-1/8.html">http://lois.justice.gc.ca/en/a-1/8.html</a>	Statutory deadlines met 86% of the time	2006-2007	.>\$ 0.5	\$65.0		
									2007-2008			.>\$ 0.5	\$65.0
									2008-2009				
				Sub-Total (R)	Sub-Total (R)	Sub-Total (R)		Sub-total:	2006-2007	2006-2007			
				Sub-total (O)	Sub-total (O)	Sub-total (O)		Sub-total:	2007-2008	2007-2008			
				Total	Total	Total		Sub-total:	2008-2009	2008-2009			
				>\$ 0.5	\$0.1	\$65.0		Total	Total	Total			
<b>B. Date Last Modified:</b>													
N/A													
<b>C. Other Information:</b>													
The Canadian Space Agency (CSA) Annual Report to Parliament on Access to Information and Privacy for 2005-2006 can be consulted on <a href="#">CSA - Home Page of Canadian Space Agency</a>													



**4.2.8 2005-2006 External Fee Reporting - Policy on Service Standards for External Fees**

<b>A. External Fee</b>	<b>Service Standard</b>	<b>Performance Result</b>	<b>Stakeholder Consultation</b>
User Fees	Section 11 of the <i>Access to Information Act</i> Article 7 of the regulations Respecting Access to Information.	86% of requests made were processed within the delays prescribed by the Act.	
<b>B. Other Information</b>			

#### 4.2.9 Response to Parliamentary Committees, Audits and Evaluations for Fiscal-Year 2005-2006

<b>Response to Parliamentary Committees</b>
No recommendation was received during the period covered by this report.
<b>Response to the Auditor General</b>
No recommendation was received during the period covered by this report. However, a Status Update for 2004-2005 on the 2002 recommendations was produced.  To learn more about the Status Update, go to: <a href="http://www.space.gc.ca/asc/eng/resources/publications/pr-2005_response.asp">http://www.space.gc.ca/asc/eng/resources/publications/pr-2005_response.asp</a>
<b>External Audits (Note: these refer to other external audits conducted by the Public Service Commission or the Office of the Commissioner of the Official Languages or the Official Languages Branch of the Public Service Human Resources Management Agency).</b>
No external audits were conducted during the period covered by this report.
<b>Internal Audits or Evaluations</b>
Here is the list of all internal audits and evaluations conducted at the CSA during fiscal-year 2004-2005:  <b><u>Audits</u></b>  September 2005 - Management Framework of the Space Technologies Branch <a href="http://www.space.gc.ca/asc/eng/resources/publications/ar-0304-0101.asp">http://www.space.gc.ca/asc/eng/resources/publications/ar-0304-0101.asp</a>  November 2005 - Management Framework of the David Florida Laboratory Directorate <a href="http://www.space.gc.ca/asc/eng/resources/publications/ar-0405-0103.asp">http://www.space.gc.ca/asc/eng/resources/publications/ar-0405-0103.asp</a>  March 2006 - Follow-up to Management Actions Plans - Annual Report <a href="http://www.space.gc.ca/asc/eng/resources/publications/management-2006.asp">http://www.space.gc.ca/asc/eng/resources/publications/management-2006.asp</a>  March 2006 - Grant and Contribution Program to support Awareness, Research and Training in Space Science and Technology <a href="http://www.space.gc.ca/asc/eng/resources/publications/management-0405-0102.asp">http://www.space.gc.ca/asc/eng/resources/publications/management-0405-0102.asp</a>  <b><u>Evaluation</u></b>  September 2005 - Payload Flight Demonstration Program <a href="http://www.space.gc.ca/asc/eng/resources/publications/er-0405-0203.asp">http://www.space.gc.ca/asc/eng/resources/publications/er-0405-0203.asp</a>

#### 4.2.10 Procurement and Contracting

Procurement and contracting is at the core of the CSA program delivery. Most program objectives are achieved through the procurement of space hardware and services from Canadian industry, often implemented under international arrangements. In 2005-2006, the CSA awarded all of its contracts in accordance with *Government Contracts Regulations*.

#### 4.2.11 Travel Policies

##### Comparison to the TBS Special Travel Authorities:

<b>Travel Policy Name of the Canadian Space Agency:</b> “The Canadian Space Agency follows the TBS Special Travel Authorities”
<b>Authority:</b> n/a
<b>Coverage:</b> n/a
<b>Principal difference(s) in policy provisions:</b> n/a
<b>Principal financial implications of the difference(s):</b> n/a

##### Comparison to the TBS Travel Directive, Rates and Allowances:

<b>Travel Policy Name of the Canadian Space Agency:</b> “The Canadian Space Agency follows the TBS Travel Directive, Rates and Allowances”
<b>Authority:</b> n/a
<b>Coverage:</b> n/a
<b>Principal difference(s) in policy provisions:</b> n/a
<b>Principal financial implications of the difference(s):</b> n/a

#### 4.2.12 Fuel Storage Tanks

The Canadian Space Agency (CSA) operates from two distinct sites: St-Hubert, Québec and Nepean, Ontario. The Fuel Storage tanks of those locations fall under different management therefore two separate tables are presented below.

##### **Status of Fuel Storage Tanks located in St-Hubert, Québec; CSA is the building custodian.**

###### **Annual Report for April 30, 2006**

As required under the CEPA, Part IV, *Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal Lands Regulations*, this report provides the information set out in Schedule II of the aforementioned regulation, updated to December 31, 2004.

**The following number of above-ground storage tank systems: Zero tank with storage capacity greater than 4000 litres.**

- Are registered: n/a.
- Comply with the *Federal Aboveground Storage Tank Technical Guidelines*: n/a.
- Do not comply with the *Federal Aboveground Storage Tank Technical Guidelines*: n/a.

**The following number of underground storage tank systems: Two tanks: one with a 15,000 litres capacity and the other with a 20,000 litres capacity.**

- Are registered: Both tanks are currently registered with the department of Natural Resources Québec and Public Works and Government Services Canada which managed the St-Hubert facility from 1992 to December 2000.
- Comply with the *Federal Underground Storage Tank Technical Guidelines*: Both tanks are fully compliant with all provincial and federal guidelines.

##### **Status of Fuel Storage Tanks located in Nepean, Ontario at the David Florida Laboratory (DFL); CSA is the building custodian.**

###### **Annual Report for April 30, 2006**

As required under the CEPA, Part IV, *Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal Lands Regulations*, this report provides the information set out in Schedule II of the aforementioned regulation, updated to December 31, 2004.

**The following number of above-ground storage tank systems: One 9,000 litres diesel fuel tank surrounded by a concrete containment basin.**

- Are registered: Environment Canada is aware of the tank but does not require a formal registration of it.
- Comply with the *Federal Aboveground Storage Tank Technical Guidelines*: Yes, the tank is fully compliant with all federal technical guidelines.
- Do not comply with the *Federal Aboveground Storage Tank Technical Guidelines*: n/a.

**The following number of underground storage tank systems: Zero tank.**

- Are registered: n/a.
- Comply with the *Federal Underground Storage Tank Technical Guidelines*: n/a.

#### 4.2.13 Financial Statements of Departmental Corporations and Agents of Parliament

### Canadian Space Agency Statement of Management Responsibility

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Responsibility for the integrity and objectivity of the accompanying financial statements for the year ended March 31, 2006 and all information contained in these statements rests with Canadian Space Agency management. These financial statements have been prepared by management in accordance with Treasury Board accounting policies which are consistent with Canadian generally accepted accounting principles for the public sector.

Management is responsible for the integrity and objectivity of the information in these financial statements. Some of the information in the financial statements is based on management's best estimates and judgment and gives due consideration to materiality. To fulfill its accounting and reporting responsibilities, management maintains a set of accounts that provides a centralized record of the Agency's financial transactions. Financial information submitted to the *Public Accounts of Canada* and included in the Agency's *Departmental Performance Report* is consistent with these financial statements.

Management maintains a system of financial management and internal control designed to provide reasonable assurance that financial information is reliable, that assets are safeguarded and that transactions are in accordance with the *Financial Administration Act*, are executed in accordance with prescribed regulations, within Parliamentary authorities, and are properly recorded to maintain accountability of Government funds. Management also seeks to ensure the objectivity and integrity of data in its financial statements by careful selection, training and development of qualified staff, by organizational arrangements that provide appropriate divisions of responsibility, and by communication programs aimed at ensuring that regulations, policies, standards and managerial authorities are understood throughout the Agency.

A program of internal audit services to enhance accountability for the Agency's objectives also supports management.

The financial statements of the Canadian Space Agency have not been audited.



Carole Lacombe, Acting President  
Longueuil, Quebec, Canada



Date



Guy Renaud, Chief Financial Officer  
and Acting Senior Financial Officer



Date

**Canadian Space Agency – Statement of Operations (unaudited)**  
For the Year Ended March 31

(\$ in thousands)

	<b>2006</b>	<b>2005</b> (note 15)
	<hr/>	<hr/>
<b>Expenses</b> (note 4)		
Space Based Earth Observation	131,388	
Space Science and Exploration	118,072	
Satellite Communications	34,981	
Space Awareness and Learning	8,847	
	<hr/>	<hr/>
<b>Total Expenses</b>	<b>293,288</b>	<b>360,170</b>
	<hr/>	<hr/>
<b>Revenues</b> (note 5)		
Space Based Earth Observation	2,205	
Space Science and Exploration	1,960	
Satellite Communications	588	
Space Awareness and Learning	147	
	<hr/>	<hr/>
<b>Total Revenues</b>	<b>4,900</b>	<b>4,193</b>
	<hr/>	<hr/>
<b>Net Cost of Operations</b>	<b>288,388</b>	<b>355,977</b>
	<hr/>	<hr/>

The accompanying notes form an integral part of these financial statements.

**Canadian Space Agency – Statement of Financial Position (unaudited)**  
For the Year Ended March 31

(\$ in thousands)

	<u>2006</u>	<u>2005</u>
<b>ASSETS</b>		
<b>Financial Assets</b>		
Accounts receivable and advances (note 6)	2,547	4,490
<b>Total Financial Assets</b>	<u>2,547</u>	<u>4,490</u>
<b>Non-Financial Assets</b>		
Prepaid expenses (note 7)	365,326	309,484
Tangible capital assets (note 8)	<u>1,146,367</u>	<u>1,201,191</u>
<b>Total Non-Financial Assets</b>	<u>1,511,693</u>	<u>1,510,675</u>
<b>TOTAL</b>	<u><u>1,514,240</u></u>	<u><u>1,515,165</u></u>
<b>Liabilities</b>		
Accounts payable and accrued liabilities	77,124	88,705
Deferred revenue (note 9)	4,043	4,034
Vacation pay and compensatory leave	3,205	3,130
Employee severance benefits (note 11)	9,929	9,236
Other liabilities (note 10)	<u>15,847</u>	<u>12,123</u>
	110,148	117,228
<b>Equity of Canada</b>	<u>1,404,092</u>	<u>1,397,937</u>
<b>TOTAL</b>	<u><u>1,514,240</u></u>	<u><u>1,515,165</u></u>
Contingent liabilities (note 12)		
Contractual obligations (note 13)		

**Canadian Space Agency – Statement of Cash Flow (unaudited)**  
For the Year Ended March 31

(\$ in thousands)	<u>2006</u>	<u>2005</u>
<b>Operating Activities</b>		
Net cost of operations	288,388	355,977
Non-cash items:		
Amortization of tangible capital assets	(92,000)	(95,648)
Loss on disposal of tangible capital assets	0	(9)
Services provided without charge by other government departments	<u>(3,825)</u>	<u>(3,601)</u>
	(95,825)	(99,258)
Variations in Statement of Financial Position:		
Decrease in accounts receivable and advances	(1,943)	1,618
Increase in prepaid expenses	55,842	2,888
Increase (decrease) in liabilities:		
Account payable and accrued liabilities	11,581	(13,688)
Deferred revenue	(9)	(62)
Vacation pay and compensatory leave	(75)	(329)
Employee severance benefits	(693)	(849)
Other liabilities	<u>(3,724)</u>	<u>(1,456)</u>
	60,979	(11,878)
<b>Cash used by Operating Activities</b>	<u>253,542</u>	<u>244,841</u>
<b>Capital Investment Activities</b>		
Acquisitions of tangible capital assets	<u>37,176</u>	<u>24,459</u>
<b>Cash used by Capital Investment Activities</b>	<u>37,176</u>	<u>24,459</u>
<b>Financing Activities</b>		
Net Cash provided by Government of Canada	<u>(290,718)</u>	<u>(269,300)</u>

The accompanying notes form an integral part of these financial statements.



**Canadian Space Agency – Statement of Equity of Canada (unaudited)**  
For the year ended March 31

(\$ in thousands)

	<u>2006</u>	<u>2005</u>
<b>Equity of Canada, beginning of year</b>	1,397,937	1,481,013
Net cost of operations	(288,388)	(355,977)
Current year appropriations used (note 3)	288,024	286,047
Revenue not available for spending	(4,900)	(4,193)
Change in net position in the Consolidated Revenue Fund (note 3)	7,594	(12,554)
Services provided without charge by other government departments (note 14)	3,825	3,601
<b>Equity of Canada, end of year</b>	<u><b>1,404,092</b></u>	<u><b>1,397,937</b></u>

## Canadian Space Agency – Notes to the Financial Statements (unaudited)

### 1. AUTHORIZATIONS AND GOALS

The Canadian Space Agency was decreed a “Department” on March 1, 1989 under the Financial Administration Act, Section 2, paragraph b).

For its part, the Canadian Space Agency Act, on legal notice of the Prime Minister, and under Section 29 of the Act to establish the Canadian Space Agency and to provide for other matters in relation to space, was sanctioned on May 10, 1990 under Chapter 13 of the Laws of Canada (L.C. 1990). His excellence, the Governor-in-Council, had fixed the effective date of this Act at December 14, 1990. The objectives of the Canadian Space Program (CSP) are to ensure the development and application of space science and technology to meet Canadian needs and to ensure the development of an international competitive space industry in Canada.

According to the approved 2005-2006 Program Activity Architecture (PAA), the Statement of Operations was detailed by the following Program Activities (Business Lines):

#### Space Based Earth Observation

The program activity objective is to develop and make operational the use of space Earth Observation for the benefits of Canadian, especially in the fields of environment, resource and land use management, as well as security and foreign policy. In doing so, the CSA will maintain and expand Canada's leadership in Earth Observation technologies to obtain the timely, relevant and essential information we need to make judicious decisions about our collective future, in collaboration with national and international partners that share our needs and goals.

#### Space Science and Exploration

The program activity objective is to better understand the solar system and the universe; to expand our knowledge on the constituent elements and origins of life, and strengthen a human presence in space. In doing so, the CSA will sustain and increase Canada's contribution to humankind's scientific knowledge, to the exploration of our solar system and the universe and to the development of related technologies. This will advance supporting technologies and our fundamental and applied knowledge of chemistry, physics, life sciences by carrying out leading-edge experiments in the unique environment of space.

#### Satellite Communications

The program activity objective is to provide all Canadians with the means to participate and fully benefit from the global information age. In doing so, the CSA will uphold Canada's status as a world leader in Satellite Communications,

and extend the most advanced products and services to all Canadians, everywhere.

#### Space Awareness and Learning

The program activity objective is to further public understanding and engagement with regards to space related issues, ultimately leading to improving the scientific literacy of Canadians by carrying out a national awareness and learning initiative in support of the Canadian Space Program.

## **2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES**

The financial statements have been prepared in accordance with Treasury Board accounting policies, which are consistent with Canadian generally accepted accounting principles for the public sector.

Significant accounting policies are as follows:

### **a) Parliamentary Appropriations**

The Agency is financed by the Government of Canada through Parliamentary appropriations. Appropriations provided to the department do not parallel financial reporting according to Canadian generally accepted accounting principles since appropriations are primarily based on cash flow requirements. Consequently, items recognized in the statement of operations and the statement of financial position are not necessarily the same as those provided through appropriations from Parliament. Note 3 provides a high-level reconciliation between the two bases of reporting.

### **b) Net Cash Provided by the Government**

The Agency operates within the Consolidated Revenue Fund (CRF), which is administered by the Receiver General for Canada. All cash received by the department is deposited to the CRF and all cash disbursements made by the department are paid from the CRF. The net cash provided by Government is the difference between all cash receipts and all cash disbursements including transactions between departments of the federal government.

### **c) Change in net position in the Consolidated Revenue Fund**

Change in net position in the Consolidated Revenue Fund is the difference between the net cash provided by Government and appropriations used in a year, excluding the amount of non spendable revenue recorded by the department. It results from timing differences between when a transaction affects appropriations and when it is processed through the CRF.

### **d) Revenues**

- Revenues are accounted for in the period in which the underlying transaction or event occurred that gave rise to the revenues.
- Revenues that have been received but not yet earned are recorded as deferred revenues (see note 9).

#### **e) Expenses**

Expenses are recorded on the accrual basis:

- Grants are recognized in the year in which the payment is due or the beneficiary met eligibility criteria.
- Contributions are recognized in the year in which the beneficiary met eligibility criteria.
- Vacation pay and compensatory leave are expensed as the benefits accrue to employees under their respective terms of employment.
- Services provided without charge by other government departments for accommodation, the employer's contribution to the health and dental insurance plans and legal services are recorded as operating expenses at their estimated cost.

#### **f) Employee Future Benefits**

- Pension benefits: Eligible employees participate in the Public Service Pension Plan, a multi employer plan administered by the Government of Canada. The Agency's contributions to the Plan are charged to expenses in the year incurred and represent the Agency's total obligation to the Plan. Current legislation does not require the Agency to make contributions for any actuarial deficiencies of the Plan.
- Severance benefits: Employees are entitled to severance benefits under labour contracts or conditions of employment. These benefits are accrued as employees render the services necessary to earn them. The obligation relating to the benefits earned by employees is calculated using information derived from the results of the actuarially determined liability for employee severance benefits for the Government as a whole.

#### **g) Accounts Receivable and Advances**

These are stated as amounts expected to be ultimately realized. A provision is made for external receivables where recovery is considered uncertain.

#### **h) Contingent Liabilities**

Contingent liabilities are potential liabilities, which may become actual liabilities when one or more future events occur or fail to occur. To the extent that the future event is likely to occur or fail to occur, and a reasonable estimate of the loss can be made, an estimated liability is accrued and an expense recorded. If the likelihood is not

determinable or an amount cannot be reasonably estimated, the contingency is disclosed in the notes to the financial statements.

**i) Foreign Exchange**

Transactions involving foreign currencies are translated into Canadian dollar equivalents using rates of exchange in effect at the time of those transactions. Monetary assets and liabilities denominated in a foreign currency are translated into Canadian dollars using the rate of exchange in effect on 31 March.

**j) Tangible Capital Assets**

All tangible capital assets and leasehold improvements having an initial cost of \$10,000 or more are recorded at their acquisition cost.

Amortization of tangible capital assets is done on a straight-line basis over the estimated useful life of the asset as follows:

Asset Class	Amortization Period
Buildings	30-40 years
Works and infrastructures	30 years
Material and equipment	10-20 years
Computer material	5-7 years
Computer Software	3 years
Other equipment including furniture	3-15 years
Vehicles	5 years
Other vehicles	10 years
Assets under construction	Once in service, in accordance with asset type

**k) Measurement Uncertainty**

The preparation of these financial statements in accordance with Treasury Board accounting policies, which are consistent with Canadian generally accepted accounting principles for the public sector requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses reported in the financial statements. At the time of preparation of these statements, management believes the estimates and assumptions to be reasonable. The most significant items where estimates are used are contingent liabilities, the liability for employee severance benefits and the useful life of tangible capital assets. Actual results could significantly differ from those estimated. Management's estimates are reviewed periodically and, as adjustments become necessary, they are recorded in the financial statements in the year they become known.

### 3. Parliamentary Appropriations

The Canadian Space Agency receives most of its funding through annual Parliamentary appropriations. Items recognized in the statement of operations and the statement of financial position in one year may be funded through Parliamentary appropriations in prior, current or future years. Accordingly, the Agency has different net cost of operations for the year on a government-funding basis than on an accrual accounting basis. The differences are reconciled in the following tables:

**(a) - Reconciliation of net cost of operations to current year appropriations used**

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
<b>Net Cost of Operations</b>	288,388	355,977
<b>Adjustments for items affecting net cost but not affecting appropriations</b>		
Add (less):		
Amortization of tangible capital assets	(92,000)	(95,648)
Revenues not available for spending	4,900	4,193
Services provided without charge by other government departments	(3,825)	(3,601)
Employee Severance Benefits	(693)	(849)
Refunds of previous years' expenses	453	1,321
Vacation pay and compensatory leave	(75)	(330)
Other	<u>(257)</u>	<u>(466)</u>
	(91,497)	(95,380)
<b>Adjustments for items not affecting net cost but affecting appropriations</b>		
Add (less):		
Prepaid expenses	57,686	8,620
Acquisitions of tangible capital assets	37,176	24,459
Prepaid transfer payments	(1,844)	(5,731)
Non-monetary agreement	(1,874)	(1,909)
Advances to employees	<u>(11)</u>	<u>11</u>
	91,133	25,450
<b>Current year appropriations used</b>	<u><u>288,024</u></u>	<u><u>286,047</u></u>

**(b) - Appropriations provided and used**

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
<b>Appropriations provided:</b>		
Vote 30 - Operating expenditures	177,087	133,158
Vote 35 - Asset acquisitions financed by the capital appropriation	105,386	136,941
Vote 40 - Grants and contributions	53,275	49,060
Statutory amounts	9,296	8,229
Less:		
Appropriations available for future years	0	(7)
Lapsed appropriations: Operating	(2,682)	(8,101)
Lapsed appropriations: Capital	(50,132)	(33,185)
Lapsed appropriations: Grants and contributions	(4,206)	(48)
Current year appropriations used	<u>288,024</u>	<u>286,047</u>

**(c) - Reconciliation of net cash provided by Government to current year appropriations used**

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
Net cash provided by Government	290,718	269,300
Revenue not available for spending	4,900	4,193
<b>Change in net position in the Consolidated Revenue Fund</b>		
Variation in accounts receivable and advances	1,943	(1,618)
Variation in accounts payable and accrued liabilities	(11,581)	13,688
Variation in other liabilities	3,724	1,456
Variation in deferred revenue	9	62
Other adjustments	<u>(1,689)</u>	<u>(1,034)</u>
Current year appropriations used	<u>288,024</u>	<u>286,047</u>

#### 4. Expenses

The following table presents details of expenses by category:

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
<b>Operating Expenses</b>		
Amortization of tangible capital assets	92,000	95,648
Salaries & employee benefits	63,307	58,558
Professional and special services	56,886	122,782
Utilities, materials and supplies	12,392	13,926
Travel	6,789	5,790
Accommodation	6,406	4,732
Communication	3,019	2,620
Loss on disposal of tangible capital assets	0	9
Other expenses	1,009	1,393
<b>Total Operating Expenses</b>	<u><b>241,808</b></u>	<u><b>305,458</b></u>
<b>Transfer Payments</b>		
International organizations	32,479	35,873
Industry	18,649	17,450
Individuals	352	413
Other levels of governments within Canada	0	976
<b>Total Transfer Payments</b>	<u><b>51,480</b></u>	<u><b>54,712</b></u>
<b>Total Expenses</b>	<u><b>293,288</b></u>	<u><b>360,170</b></u>

#### 5. Revenues

The following table presents details of revenues by category:

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
<b>Revenues</b>		
Sale of rights and privileges	3,144	3,107
Sale of goods and services	1,742	1,052
Gain on the disposal of tangible capital assets	7	13
Other revenue	7	21
<b>Total Revenues</b>	<u><b>4,900</b></u>	<u><b>4,193</b></u>



## 6. ACCOUNTS RECEIVABLES AND ADVANCES

The following table presents details of accounts receivable and advances:

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
Other departments	1,270	3,179
External entities	1,268	1,335
Advances to employees	27	38
Less: Allowance for doubtful accounts on external receivables	(18)	(62)
<b>Total</b>	<u><u>2,547</u></u>	<u><u>4,490</u></u>

## 7. Prepaid Expenses

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
RADARSAT-2 – prepaid services	359,620	302,972
Prepaid transfer payments	4,038	5,882
Other prepaid expenses	1,668	630
<b>Total</b>	<u><u>365,326</u></u>	<u><u>309,484</u></u>

## 8. Tangible Capital Assets

(\$ in thousands)

Capital Asset Class	Cost			Accumulated Amortization				Net book Value		
	Opening Balance	Acquisitions	Disposals and Write-Offs	Closing Balance	Opening Balance	Amortization	Disposals and Write-Offs	Closing Balance	2006	2005
Buildings	110,126	96	0	110,222	45,289	3,679	0	48,968	61,254	64,837
Works and infrastructures	279	0	0	279	123	29	0	152	127	156
Material and equipment	29,425	1,082	0	30,507	18,780	1,645	0	20,425	10,082	10,645
Computer material	9,361	1,020	0	10,381	6,414	1,182	0	7,596	2,785	2,947
Computer software	1,759	365	0	2,124	324	569	0	893	1,231	1,435
Other equipment	1,553,575	8,151	0	1,561,726	734,167	84,886	0	819,053	742,673	819,408
Vehicles	42	0	0	42	31	5	0	36	6	11
Other vehicles	172	0	0	172	136	5	0	141	31	36
Assets under construction	301,716	26,462	0	328,178	0	0	0	0	328,178	301,716
<b>Total</b>	<b>2,006,455</b>	<b>37,176</b>	<b>0</b>	<b>2,043,631</b>	<b>805,264</b>	<b>92,000</b>	<b>0</b>	<b>897,264</b>	<b>1,146,367</b>	<b>1,201,191</b>

Amortization expense for the year ended March 31, 2006 is \$ 92,000 (2005 – \$ 95,648).

## 9. Deferred Revenue

2006      2005  
(\$ in thousands)

RADARSAT-1: Amounts received from Canadian provinces and from NASA in exchange for photos to be delivered at a later date.

Opening balance, April 1	3,973	3,972
Plus: Receipts	<u>0</u>	<u>1</u>
<b>Closing balance, March 31</b>	<b>3,973</b>	<b>3,973</b>
Deferred Revenues – Space training project: Special purpose account created to record funds received for the payment of expenses related to the space training project	70	61
<b>Total</b>	<b><u>4,043</u></b>	<b><u>4,034</u></b>

## 10. OTHER LIABILITIES

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
Non-monetary exchange CSA/NASA	10,921	9,048
Contractors holdbacks	4,820	2,968
Participation of provinces – RADARSAT-I	<u>106</u>	<u>107</u>
<b>Total</b>	<b><u>15,847</u></b>	<b><u>12,123</u></b>

### a) Non-Monetary Exchange CSA/NASA

Under the International Space Station Agreement, which was executed in 1998, and ratified by Canada in year 2000, following the passing of the Civil International Space Station Agreement Implementation Act, in 1999 the Agency signed a barter agreement with NASA in August 2001, under which the fair value was estimated at \$20.8M US. Currently, all the costs are not available and the fair value of the yielded services must be revaluated when the identification of total costs will be possible. This agreement provides that the CSA exchanges a part of its utilization rights on the Space Station, access to the Canadian Microgravity Isolation Mount, and agrees to assume repair costs for its Special Purpose Dexterous Manipulator. In return, NASA will provide to the CSA, astronaut training, satellite and launch services. The transactions under this Barter Agreement may take place over the lifetime of the Space Station. During the fiscal years 2002 to 2006, the CSA received a part of astronaut training valued at \$11M CDN. As NASA did not exercise the option to access its proportion of Canada's utilization rights on the Space Station, a liability of \$11M CDN has been created by CSA. Relative to this barter agreement or other agreements of the same kind that the CSA may enter into with its International Partners under the Agreement on the Space Station, the Treasury Board grants to the Agency an exemption under the Policy on Accounting for Non-Monetary Transactions and does not have to charge the transaction(s) to its appropriation.

### b) Participation of Provinces – RADARSAT-I

This specified purpose account was established to record moneys received for both cost-sharing and advance payments for RADARSAT scenes. RADARSAT-1 is an Earth Observation satellite to monitor environmental change and planet's natural resources. It provides information to both commercial and scientific users in the fields of agriculture, cartography, hydrology, forestry, oceanography, ice studies and coastal monitoring.

## 11. Employee Benefits

### a) Pension Benefits:

The Agency's employees participate in the Public Service Pension Plan, which is sponsored and administered by the Government of Canada. Pension benefits accrue up to a maximum period of 35 years at a rate of 2 percent per year of pensionable service, times the average of the best five consecutive years of earnings. The benefits are integrated with Canada/Québec Pension Plans benefits and they are indexed to inflation.

Both the employees and the Agency contribute to the cost of the Plan. The 2005-2006 expense amounts to \$6.87M (\$6.04M in 2004-2005), which represents approximately 2.6 times the contributions by employees.

The Agency's responsibility with regard to the Plan is limited to its contributions. Actuarial surpluses or deficiencies are recognized in the financial statements of the Government of Canada, as the Plan's sponsor.

### b) Severance Benefits:

The Agency provides severance benefits to its employees based on eligibility, years of service and final salary. These severance benefits are not pre-funded. Benefits will be paid from future appropriations. Information about the severance benefits, measured as at March 31, is as follows:

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
Accrued benefit obligation, beginning of year	9,236	8,387
Plus:		
Expense for the year	1,137	1,219
Less:		
Benefits paid during the year	(444)	(370)
<b>Accrued benefit obligation, end of year</b>	<u><b>9,929</b></u>	<u><b>9,236</b></u>

## 12. Contingent Liabilities

In the normal course of its operations, the Agency becomes involved in various legal actions. Some of these potential liabilities may become actual liabilities when one or more future events occur or fail to occur. To the extent that the future event is likely to occur or fail to occur, and a reasonable estimate of the loss can be made, an estimated liability has been accrued and an expense recorded on the department's financial statements.

### 13. Contractual Obligations

The nature of the Agency's activities can result in some large multi-year contracts and obligations whereby the Agency will be obligated to make future payments when the services/goods are received. Significant contractual obligations that can be reasonably estimated are summarized as follows:

(\$ in thousands)

	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011 &amp; Thereafter</u>	<u>Total</u>
Acquisitions	39,000	4,000	-	-	-	43,000
Transfer payments	28,000	1,000	-	-	-	29,000
Capital Assets	54,000	47,000	36,000	25,000	24,000	186,000
<b>Total</b>	<b><u>121,000</u></b>	<b><u>52,000</u></b>	<b><u>36,000</u></b>	<b><u>25,000</u></b>	<b><u>24,000</u></b>	<b><u>258,000</u></b>

### 14. Related Party Transactions

The Agency is related as a result of common ownership to all Government of Canada departments, agencies, and Crown corporations. The Agency enters into transactions with these entities in the normal course of business and on normal trade terms. Also, during the year, the Agency received services, which were obtained without charge from other Government departments as presented in part (a).

#### (a) Services provided without charge

During the year the department received without charge from other departments, accommodation, legal fees and the employer's contribution to the health and dental insurance plans. These services without charge have been recognized in the department's Statement of Operations as follows:

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
Employer's contribution to the health and dental insurance plans	3,450	3,140
Legal services	206	331
Accommodation	169	130
<b>Total</b>	<b><u>3,825</u></b>	<b><u>3,601</u></b>

The Government has structured some of its administrative activities for efficiency and cost-effectiveness purposes so that one department performs these on behalf of all without charge. The costs of these services, which include payroll and cheque issuance services provided by Public Works are not included as an expense in the department's Statement of Operations.

**(b) Payables and receivables outstanding at year-end with related parties:**

	<u>2006</u>	<u>2005</u>
	(\$ in thousands)	
Accounts receivable with other government departments and agencies	1,270	3,179
Accounts payable to other government departments and agencies	306	379

**15. Comparative Information**

For the fiscal year 2005-2006, the department redefined its Business Lines; as a result, comparative information by Business Lines is not available.

#### **4.2.14 Details on Project Spending**

Information on Project Spending is reported on the CSA Web site at the following address: <http://www.space.gc.ca/asc/eng/resources/publications/default.asp#parliament>

#### **4.2.15 Status Report on Major Crown Projects**

Information on RADARSAT-1 and RADARSAT-2 Major Crown Projects is reported on the CSA Web site at the following address:

<http://www.space.gc.ca/asc/eng/resources/publications/default.asp - parliament>

#### **4.2.16 Details on Transfer Payment Programs (TPP)**

Information on Transfer Payment Programs is reported on the CSA Web site at the following address:

<http://www.space.gc.ca/asc/eng/resources/publications/default.asp - parliament>

### 4.3 STRATEGIC OUTCOMES CROSSWALK 2004-2005 TO 2005-2006

Further to the approval of the Canadian Space Strategy by the Government of Canada, the CSA has substantially revised its strategic outcomes in line with the Government of Canada's top priorities.

PREVIOUS STRATEGIC OUTCOMES 2004-2005	NEW STRATEGIC OUTCOMES 2005-2006	GOVERNMENT OF CANADA OUTCOMES
<ul style="list-style-type: none"> <li>- Economic Benefits</li> <li>- Technological Development and Diffusion</li> <li>- Understanding of the Environment</li> <li>- Contribution to the Quality of Life</li> <li>- World-Class Space Research</li> <li>- Social and Educational Benefits for Canadians</li> <li>- Promotion and Awareness of the CSP</li> </ul>	<p style="text-align: center;"><b>Knowledge, Innovation and Economy:</b></p> <p>A Space Program that generates knowledge and pushes innovation, while leading (where appropriate) to increased productivity and economic growth through commercialization.</p>	<p style="text-align: center;"><u><b>ECONOMIC OUTCOMES</b></u></p>
<ul style="list-style-type: none"> <li>- Economic Benefits</li> <li>- Understanding of the Environment</li> <li>- World-Class Space Research</li> </ul>	<p style="text-align: center;"><b>Sovereignty and Security:</b></p> <p>A Space Program that supports recognition of Canada's sovereignty and the security of its communities.</p>	
<ul style="list-style-type: none"> <li>- Economic Benefits</li> <li>- Understanding of the Environment</li> <li>- Technological Development and Diffusion</li> </ul>	<p style="text-align: center;"><b>Environment and Sustainable Development:</b></p> <p>A Space Program that helps Canada understand and protect the environment, and develop its resources in a sustainable manner.</p>	<p style="text-align: center;"><u><b>INTERNATIONAL OUTCOMES</b></u></p>