

**CANADIAN SPACE AGENCY  
2006-2007 DEPARTMENTAL PERFORMANCE REPORT**

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### 3.2.10) Policy on Service Standards for External Fees

A. External Fee	Service Standard	Performance Result	Stakeholder Consultation
<p>Fees charged for the processing of access requests filed under the <i>Access to Information Act</i> (ATIA).</p>	<p>Response provided within 30 days following receipt of request; the response time may be extended pursuant to section 9 of the ATIA. Notice of extension to be sent within 30 days after receipt of request. The <a href="#">Access to Information Act</a> provides fuller details.</p>	<p>The most common performance measurement is the percentage of "on-time" responses as stipulated by the performance standard. For this reporting period the figures were 85% for the <i>Access to Information Act</i> and 100% for the <i>Privacy Act</i>.</p>	<p>The Access to Information Act and the Access to Information Regulations establish the service standard. Consultations were undertaken by the Department of Justice and the Treasury Board Secretariat for amendments made in 1986 and 1992.</p>
<p><b>B. Other Information</b></p> <p>In November 2004, Treasury Board ministers approved the <i>Policy on Service Standards for External Fees</i>. The Policy requires departments to report on the establishment of service standards for all external fees charged on a non-contractual basis. In CSA's context this policy applies to the ATI Program, for fees charged for the processing of access requests filed under the <i>Access to Information Act</i> (ATIA).</p>			

### 3.2.11) Details on Project Spending

(\$ in millions)	Current Estimated Total Cost	Actual 2004-2005	Actual 2005-2006	2006-2007			
				Main Estimates	Planned Spending	Total Authorities	Actual
<b>Space Based Earth Observation</b>							
(Q) RADARSAT-1 (MCP)	727.2	10.4	8.1	7.3	11.4	8.2	8.2
(BC-Q) RADARSAT-2 (MCP)	421.6	10.9	17.0	33.0	32.3	25.8	10.6
(O-Q) SWIFT - CHINOOK (PPA)	105.5	2.6	1.5	10.6	11.2	6.4	0.9
(Q-O) HYDROS (PPA)	1.3	0.3	0.3	1.2	1.5	0.0	0.0
(BC-M-O-Q) SAR CONSTELLATION (PPA)	207.2	-	4.7	26.7	27.0	28.6	8.2
<b>Space Science and Exploration</b>							
(BC) APXS (EPA)	9.5	-	-	3.3	3.3	5.2	4.0
(O) Herschel HIFI (EPA)	11.0	3.5	3.9	0.6	0.3	0.7	0.7
(O) JWST (MCP)	98.4	3.4	8.3	24.2	25.1	33.1	22.2
(O) MARS PHOENIX (EPA)	28.8	8.4	11.9	5.1	6.2	7.9	6.7
(O) NEOSSAT (EPA)	6.1	-	-	2.0	2.3	2.1	0.1
(O) UVIT (EPA)	6.3	-	1.3	3.3	3.5	3.1	1.5
<b>TOTAL</b>	1,622.9	39.6	56.9	117.3	124.0	121.2	63.1

**Note:**

- Due to rounding, figures may not add to totals shown.
- Difference between Total Authorities and Actual Spending is mainly due to re-profiling of funds from 2006-2007 to 2007-2008, 2008-2009 and 2009-2010 associated with the management of Capital Projects.
- Hydros project was cancelled by NASA.
- APXS project was not presented in RPP 2006-2007 total estimated cost of this project was under \$5 million at this time.

**Province where the capital project will be carried out:**

O = Ontario  
 Q = Quebec  
 BC = British Columbia  
 M = Manitoba

**Class of Project:**

MCP = Major Crown Project  
 EPA = Effective Project Approval  
 PPA = Preliminary Project Approval  
 S = Substantive Estimate

### **3.2.12) Status Report on Major Crown Projects**

#### **RADARSAT-1**

##### **Description**

RADARSAT-1, Canada's first Earth Observation satellite is the only fully operational civilian remote sensing satellite that carries Synthetic Aperture Radar (SAR). This technology, contrary to optical sensor satellites, has the capacity to image day and night, in all weather conditions, regardless of cloud cover, smoke, haze and darkness. Launched in November 1995, RADARSAT-1 was meant to operate for five years with an impressive 96% operational reliability, to consistently supply timely, high-quality data to RADARSAT International (RSI) now a wholly owned subsidiary of MacDonald, Dettwiler and Associates (MDA) and other partners (federal and provincial government departments, NASA and the US National Oceanic and Atmospheric Administration). RADARSAT-1 is now in its 11<sup>th</sup> year of operation.

RADARSAT-1 operations will continue 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 early 2008. A contingency plan is in place to prescribe the use of foreign sensors as backup to RADARSAT-1 in order to continue to meet the needs of operational users until RADARSAT-2 data becomes available.

RADARSAT-1 acquires high quality images of the Earth, covering most of Canada every 72 hours and the Arctic every 24 hours. It has proven itself in gathering the data needed for more efficient resource management (e.g. support to fishing, shipping, oil and gas exploration, offshore drilling, mapping) as well as ice, ocean and environmental monitoring, disaster management, and Arctic and offshore surveillance.

##### **Leading and Participating Departments and Agencies**

Sponsoring Agency:	Canadian Space Agency
Contracting Authority:	Public Works and Government Services Canada
Participating Departments:	Environment Canada Natural Resources Canada (Canada Centre for Remote Sensing)

### Prime and Major Sub-Contractors

<b>Prime Contractor:</b> <ul style="list-style-type: none"> <li>- EMS Technologies (now MacDonald, Dettwiler &amp; Associates)</li> </ul>	<ul style="list-style-type: none"> <li>- Ste.-Anne-de-Bellevue, Quebec</li> </ul>
<b>Major Sub-Contractors:</b> <ul style="list-style-type: none"> <li>- MacDonald, Dettwiler &amp; Associates</li> <li>- SED Systems</li> <li>- EMS Technologies</li> <li>- COM DEV</li> <li>- Lockheed Martin</li> </ul>	<ul style="list-style-type: none"> <li>- Richmond, British Columbia</li> <li>- Saskatoon, Saskatchewan</li> <li>- Ottawa, Ontario</li> <li>- Cambridge, Ontario</li> <li>- Longueuil, Quebec</li> </ul>
<b>Other Contractors:</b> <ul style="list-style-type: none"> <li>- Ball Aerospace</li> <li>- RADARSAT International (RSI) (now MacDonald, Dettwiler &amp; Associates)</li> </ul>	<ul style="list-style-type: none"> <li>- Boulder, Colorado</li> <li>- Richmond, British Columbia</li> </ul>

### Major Milestones

Major milestones of the RADARSAT-1 Major Crown Project are now complete.

<b>Major Milestones</b>	<b>Date</b>
- Preliminary studies	Complete
- Feasibility and concept definition	Complete
- Systems requirement and preliminary design	Complete
- Development and testing up to qualification test review	Complete
- Manufacture of the prototype flight sub-systems up to acceptance testing of the sub-systems	Complete
- Assembly and integration of the sub-systems up to flight readiness review, plus post-launch and commissioning activities up to system acceptance	Complete
<ul style="list-style-type: none"> <li>- First Antarctica mission</li> <li>- Second Antarctica mission</li> <li>- Original Mission Life of five years</li> </ul>	Complete Complete Complete
- Satellite Operations	April 1996 to February 2008

## **Progress Report and Explanation of Variances**

Effective Program Approval was obtained for RADARSAT-1 in March 1991, with launch in November 1995 and beginning of operations in April 1996. The initial system included receiving stations for Synthetic Aperture Radar (SAR) data in Prince Albert (Saskatchewan), Gatineau (Quebec), Fairbanks (Alaska) and McMurdo (Antarctica). CSA and RADARSAT International (now MDA) have since signed agreements with another 31 network stations distributed around the world: Argentina, Australia, Brazil, China, Japan, Kazakhstan, South Korea, Malaysia, Norway, Puerto-Rico, Russia, Saudi Arabia, Singapore, Taiwan, Thailand, Turkey, the United Kingdom and the United-States. Presently, a second station in Norway is undergoing the certification process. This list includes the agreements that have been also signed with transportable stations for the direct reception of RADARSAT-1 data: one in Italy, five in the U.S., one in Taiwan and one in France. Even more stations are expected to join the RADARSAT network in 2007.

Following a commissioning period, routine operations of RADARSAT-1 commenced in April 1996. The average system performance is being maintained at 95.8%. The worldwide client base includes more than 600 commercial and government users from over 60 countries.

Several system upgrades were completed over the past few years to enhance performance, reliability, and maintainability of RADARSAT-1. Highlights include: June 2005 - addition of a new Order Desk server for Joint Contingency Operation with ESA; November 2005 – completion of scheduled MMO/DBM database server and controller system upgrades (SunFire V240/Solaris 9 equipment); January 2006 – completion of a scheduled upgrade of all five planning stations in the MMO (SunBlade 100/Solaris 8 equipment); November 2006 – completion of a scheduled Order Desk dual redundant configuration system upgrade (SunFire V210/Solaris 10 equipment) and an improved algorithm and tool for computing shared SAR usage statistics was developed, validated and made operational.

Since October 2000, the CSA is a signatory, along with ESA and the Centre National d'Études Spatiales (CNES) in France, to the International Charter on Space and Major Disasters. The emphasis of the Charter is on multi-satellite support for disaster response and mitigation efforts around the world utilising RADARSAT-1 and satellites of other Charter member agencies. Since its official launch, the Indian Space Research Organisation (ISRO), the National Oceanic and Atmospheric Administration (NOAA), Argentina's Comisión Nacional de Actividades Espaciales (CONAE), the Japanese Aerospace Exploration Agency (JAXA), the United States Geological Survey (USGS) and the Disaster Monitoring Constellation (DMC) have also joined the Charter and participate fully in its operations. Following the last Charter Board meeting hosted by the USGS at its EROS Centre in Sioux Falls, South Dakota, in October 2006, negotiations are under way to include the U.S. private companies, GeoEye and DigitalGlobe, in the Charter operations to have access to some of the world's highest resolution satellite remote sensing data.

So far, there have been 116 activations of the Charter on events such as: floods in France, Canada, Russia, Austria, Germany, Indonesia, Morocco, Argentina, Nepal, the Dominican Republic, the Philippines, Sudan, Haïti, Namibia, the Czech Republic, Sri Lanka, Pakistan, Hungary, Romania and Colombia; landslides in Slovenia, Italy, Nepal, Russia and the Philippines; earthquakes in El Salvador, India, Afghanistan, Turkey, Algeria and Iran; volcanic eruptions in Italy, Congo, Montserrat, Colombia and Spain; oil spills off the coasts of Ecuador, Lebanon, Denmark, Yemen and Spain; forest fires in France, Portugal, Canada and Bolivia; and, wind storms in India and Mexico. The Charter extensively covered three of recent history's most devastating disasters, namely the Asian tsunami, Hurricane Katrina, and the Kashmir earthquake. The coverage of the Asian tsunami was furthermore conducted under CSA's direct lead.

The RADARSAT-1 system has been improved to provide on average a less than 2.5-hour turnaround in the electronic delivery of images to the Canadian Ice Service (CIS) for the production of ice charts and bulletins for the Canadian Coast Guard and other marine clients. The CIS continues to be one of the leading users of RADARSAT-1 data since the first operational data began to flow in February 1996. Recently, the CIS has been collaborating with Noetix Research, CSA, and RSI (now MDA) on an ESA-sponsored Global Monitoring for Environment and Security (GMES) Project - The Northern View - to provide regular RADARSAT-1 images in support of a Floe Edge Service for two communities in the Canadian Arctic.

The RADARSAT-1 Background Mission has archived one of the largest microwave remote sensing data collections in the world. In fact, it is the first multi-mode uniformly collected database of its kind ever created. The data archive is the result of several Background Mission global coverage campaigns undertaken in the past seven years. These include a complete coverage of the world's continents, continental shelves and polar ice caps, as well as complete coverage of nearly the Earth's entire landmass with two RADARSAT-1 imaging beams for the first ever beam-pair stereo data collection. This is the world's largest radargrammetric dataset currently available. Some of the continents, including North America, were covered more than once to generate seasonal snapshots in the form of wide-area SAR mosaics. High-resolution RADARSAT-1 image mosaics of Canada, the U.S., Australia and Africa were produced with the Background Mission data. Several time- and site-specific coverage types have also been done, such as that of the remote oceanic island localities, the world's major cities and capitals. A seasonal coverage of the tropical deltas is also underway, as is also a four-season continuous coverage of the Arctic. The latter coverage, which now has uninterrupted data records over the Arctic since the summer of 2003, supports the growing interest in the Arctic and climate change captured within the International Polar Year (IPY) activities. These baseline coverage campaigns of RADARSAT-1 have established benchmarks for the follow-on Canadian SAR missions to build upon.

MDA/GSI continues to provide Earth-Observation data, derived information products, and leading-edge services to global clients. The broad range of MDA/GSI products includes geo-corrected imagery, digital elevation models, and application-specific products such as flood and ocean oil-seep vectors to meet the demands for new markets. Products are delivered to clients via Internet in near-real time for time-critical operations such as disaster management and ship navigation. Other services include training, monitoring and emergency response services, and custom product generation, as well as Geographic Information Systems (GIS) project implementation.

### **Industrial Benefits**

The Canadian Space Agency undertook a study to determine the achievements of RADARSAT data in support of ice mapping and related activities in Canada. The Canadian Ice Services was the first Canadian Government operational user of RADARSAT-1 data. The departments of Environment Canada (EC) Canadian Coast Guard (CCG) Transport Canada (TC) National Defense (ND) Fisheries and Oceans (DFO) have coordinated their efforts to implement an Integrated Satellite Tracking for Polluters initiative (ISTOP). In coordinating their effort they have been more effective and able to reduce their cost in sharing RADARSAT data acquired to monitor the targeted area. It became fully operational in 2006-2007. RADARSAT-1 provides observations over a wider geographical area, at much lower cost and risk, and in much less time than with an aircraft. As a result, CIS has been able to improve its operational efficiency. Over five years (1995 to 2000), the net average annual savings to CIS operations have been about \$7.7 million per year (\$38.5 million over 5 years), with the same per year benefits continuing up to and including the eighth year of operations for RADARSAT-1.

The Canadian Coast Guard (CCG), the largest direct customer of CIS products, has felt these benefits most significantly. The CCG Ice Operation Centres can provide improved routing information to commercial shipping, which allows for faster transit times. The shipping industry has benefited from the accuracy of RADARSAT information to produce ice charts. The shipping companies believe that as a result of RADARSAT-based ice charts, there have been savings in transit time through ice-infested waters. These commercial shipping savings are estimated to be \$18 million a year. Other benefits included less damage to ships and a reduction in the need for CCG escorts. The CCG has estimated dollar savings in both operating costs and transit time to be between \$3.6 million and \$7 million a year, depending on the severity of ice conditions.

In the past, the prime contractor SPAR and its Canadian sub-contractors created over 2,000 person-years of high technology employment during the construction phase of RADARSAT-1. Ongoing mission operations employ 75 people at CSA headquarters in Longueuil (Quebec), 7 in Saskatoon (Saskatchewan), 15 at ground stations in Prince Albert (Saskatchewan) and Gatineau (Quebec), as well as more than 80 at RSI (now MDA) in Richmond (British Columbia). In the highly competitive marketplace for space-based information, MDA continues to capture roughly 15% of the world's space borne remote sensing market. MDA has continued to process scenes and integrate RADARSAT data into information products for delivery to nearly 600 clients in 60 countries, and



furthermore, MDA has signed up 80 international distributions, 18 RADARSAT-1 Network Stations and 11 Resources Centres. The market development for data archives is likely to be significant and an area in which new benefits may develop.

## **RADARSAT-2**

### **Description**

The next generation of Canadian SAR-based satellite, RADARSAT-2, will be the most advanced satellite of its kind in the world. RADARSAT-2 will continue to provide all-weather, day-and-night coverage of the entire globe to support fishing, shipping, oil and gas exploration, offshore drilling, mapping and ocean research. Equipped with a C-band radar system, it will be the first fully commercial SAR satellite to offer multi-polarization, an important aid in identifying a wide variety of surface features and targets. It will also have the capability to image both the right and left with a resolution down to three metres and to access an area of 800 kilometres on either side. This translates into a new range of products and services, which will contribute valuable new information on natural resources and the global environment.

The RADARSAT-2 Major Crown Project, in partnership with MacDonald, Dettwiler and Associates (MDA), is elaborating the design, development, testing, deployment and operations of a space-borne SAR satellite to provide global coverage of terrestrial phenomena as a follow-up to RADARSAT-1. The current estimated total cost from CSA budget is \$421.6 million.

RADARSAT-2 design and construction improves upon RADARSAT-1, with new capabilities to ensure Canada's continued leadership in the satellite remote sensing global marketplace and to create a commercial industrial satellite remote sensing industry in Canada.

### **Leading and Participating Departments and Agencies**

Sponsoring Agency:	Canadian Space Agency
Contracting Authority for the CSA/MDA Master Agreement:	Canadian Space Agency
Participating Departments:	Natural Resources Canada (Canada Centre for Remote Sensing) Environment Canada Industry Canada Fisheries and Oceans National Defence Foreign Affairs International Trade Agriculture Canada

### Prime and Major Sub-Contractors

Prime Contractor: - MacDonald Dettwiler, and Associates (MDA)	- Richmond, British Columbia
Major Sub-Contractors: - EMS Technologies (now MacDonald Dettwiler, and Associates) - Alenia Aerospazio - AEC Able Engineering Co. - RADARSAT international (RSI) (now MacDonald Dettwiler, and Associates) - STARSEM	- Ste.-Anne-de-Bellevue, Quebec - Rome, Italy - Goletta, California - Richmond, British Columbia - Baikonur, Kazakhstan

### Major Milestones

The major milestones on Major Crown Projects, by phase, are the following:

Phase	Major Milestones	Date
A and B	Requirement Definition	June 1999
C	System Design	May 2002
D1	Sub-system Construction	September 2005
D2	Integration and Testing	January 2007
E1	Pre-launch Preparations	July 2007
E2	Launch System Commissioning	November 2007 February 2008
E3	Operations	2008 to 2014

### Progress Report and Explanation of Variances

In June 1994, the government directed the CSA to develop an arrangement with the private sector for the development and operation of a RADARSAT follow-on program to maintain continuity of data following RADARSAT-1. In February 1998, following a formal Request for Proposal, MDA was selected to construct and operate RADARSAT-2.

The CSA and MDA signed a Master Agreement in December 1998 for the RADARSAT-2 mission, under a firm price agreement in which the government contribution was \$225 million, in exchange for data. MDA was to invest \$80 million. The Master Agreement between the CSA and MDA was updated in January 2000 to reflect changes in the schedule and the latest cost estimates. The company (MDA) is responsible for spacecraft operations and business development, while the CSA is responsible for arranging the launch and maintaining the long-term national archive of RADARSAT-2 data. The CSA will also provide an additional "in-kind" contribution of certain assets, plus the services of its David Florida Laboratory and the NRC Institute of Aerospace Research Laboratory for spacecraft integration and testing.

In November 1998, Treasury Board approved the RADARSAT-2 Major Crown Project with a funding envelope of \$242.2 million. In March 2000, Treasury Board approved an increase of \$47.1 million to cover the cost of changing bus suppliers, required by US – government restrictions imposed on the US bus supplier at that time, and an increase of \$12.3 million for upgrades to existing satellite ground station infrastructures. In June 2000, Treasury Board approved an increase of \$108 million to cover the cost of procuring a commercial launch as a result of NASA withdrawing from the agreement to provide launch for RADARSAT-2 in exchange for data, as it did for RADARSAT-1. In June 2001, Treasury Board approved an increase of \$6 million to cover the cost of critical modifications to be made to the RADARSAT-2 spacecraft in order to accommodate a potential future tandem mission with RADARSAT-3.

The development of the RADARSAT-2 satellite has progressed, though at a slower pace than planned. Delays encountered by the main contractor and sub-contractors in the production of some of the satellite components have resulted in a significant delay in the assembly, integration and testing of the spacecraft. The Extendible Support Structure (ESS), one of the primary spacecraft sub-systems, was delivered to the Assembly, Integration and Test (AI&T) site at the David Florida Laboratory (DFL) in October 2003. The Solar Arrays and the Bus were delivered to DFL in April and May 2004, respectively. The SAR antenna was delivered in September 2005. The assembly, integration and test of the RADARSAT-2 spacecraft was completed in time at the David Florida Laboratory, along with the operations-preparations activities at CSA St-Hubert, Quebec, and launch campaign in Baikonur, Kazakhstan. Launch on a Soyuz rocket was rescheduled in November 2007. The initial phase of the commissioning of RADARSAT-2 should be completed by February 2008.

Any additional costs to complete the construction and launch of RADARSAT-2 will be at the main contractor's expense. However, these additional delays will require that the CSA RADARSAT-2 project office remain operational beyond the time for which funding is available. The necessary funding to cover all additional expenditures has been set aside in the CSA Five Year Risk Assessment and Source of Funds Plan.

### **Industrial Benefits**

Significant industrial benefits in the space and earth observation sector are expected from this next-generation satellite system. The RADARSAT-2 program will generate employment growth in the Canadian knowledge-based economy, mostly from export sales, and spur the growth of small- and medium-sized businesses as the Canadian infrastructure and services industry continues to grow.

A major objective of this project is the transition of the Earth Observation industry from the public sector to the private sector. The intention is to build on the SAR data and value-added markets established with RADARSAT-1 to strengthen the Canadian industry's position as a supplier of SAR-related technology, systems and value-added products and services. Specifically, manufacturing potential and competitiveness will be encouraged in Canadian industry in the areas of phased array antenna

design/manufacture, high performance receiver/transmitter design and manufacture, and enhanced structure design. Moreover, opportunities will be created for the export of ground station systems. The new capabilities also make new applications possible, creating new and expanded markets for data sales and value-added products.

As of March 31, 2006, the Canadian Space Program has funded \$377.8 million worth of work to Canadian industry directly attributable to the RADARSAT-2 Major Crown Project (MCP). Direct industrial benefits from the construction of the RADARSAT-2 system will benefit all regions of Canada. The regional distribution of direct industrial benefits is shown in the following table.

**Regional Distribution of RADARSAT-2 Contracts  
(as of January 2007)**

<b>PROGRAM</b>	<b>British Columbia</b>	<b>Prairie Provinces</b>	<b>Ontario</b>	<b>Quebec</b>	<b>Atlantic</b>	<b>Total Canada</b>
RADARSAT-2	54.4%	3.7%	5.4%	35.9%	0.7%	100%

**Note:** Due to rounding, decimals may not add up to totals shown.

**Summary of Non-Recurring Expenditures (\$ in millions)  
(as of March 2007)**

<b>RADARSAT-2</b>	<b>Current Estimated Total Expenditure</b>	<b>Actual Spending March 31, 2007</b>	<b>Planned Spending 2007-2008</b>	<b>Future Years</b>
	421.6	404.1	17.5	0

### 3.2.13) Details on Transfer Payments Programs (TPPs)

<b>Contribution to European Space Agency (ESA)</b>	
<b>Start date:</b> January 1, 2000	<b>End Date:</b> December 21, 2009
<p><b>Description:</b></p> <p>Enhance Canadian industry's technological base and provide access to European markets for value added products and services principally in the field of Earth Observation (EO) and Satellite Communications; allow the participation of Canadian academia; and, make possible the demonstration of Canadian space technologies in European science and exploration missions.</p>	
<p><b>Strategic Outcomes:</b></p> <p><b>Environment and Sustainable Development:</b> A Space Program that helps Canada understand and protect the environment, and develop its resources in a sustainable manner.</p> <p><b>Knowledge, Innovation and Economy:</b> A Space Program that generates knowledge and pushes innovation, while leading (where appropriate) to increased productivity and economic growth through commercialization.</p> <p><b>Sovereignty and Security:</b> A Space Program that supports recognition of Canada's sovereignty and the security of its communities.</p> <p><b>Expected Results (Program Activity Level)</b></p> <p><b>Space Based Earth Observation:</b> 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>Space Science and Exploration:</b> Increased participation in Canadian and international opportunities in order to expand the scientific knowledge base made available to Canadian academia and R&amp;D communities in astronomy, space exploration and solar-terrestrial relation as well as physical and life sciences.</p> <p><b>Satellite Communications:</b></p> <ol style="list-style-type: none"> <li>1) Increased access for Canadians to state-of-the-art communications systems and services to meet their social and economic needs.</li> <li>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.</li> </ol> <p><b>Generic Space Activities in support of EO, SE and SC:</b> Innovative space technologies, techniques, and design and test methodologies in response to advanced developments required for future space missions and activities.</p>	

**Expected Accomplishments:**

Successful development and demonstration of advanced technologies, systems, components, and studies provided for in the contracts awarded by ESA to Canadian firms under the following ESA EO programs: ENVISAT, EOEP/ EOPP, Earth Watch GMES, TerraSar, and Aurora.

Successful development and demonstration of advanced technologies, systems, components, and studies provided for in the contracts awarded by ESA to Canadian firms under the following ESA Telecommunications programs: ARTES 1,3,5,9, Artemis and GalileoSat.

Increased utilization of data obtained from ESA on markets and Earth Observation/Telecommunications technologies as strategic information for government departments, agencies and industries in Canada.

Demonstration of space-qualified technologies and products developed by Canadian firms for the space exploration markets.

Development of new alliances and/or strengthening of established alliances between Canadian and European companies, to diversify Canada's international space partnerships and complement its long-standing relationship with the U.S.

**Actual Accomplishments:**

Several technologies and skills have been developed and improved through the participation of Canadian companies in ESA programs. Some businesses have integrated these technologies into products, allowing them to sell these products in other than European markets. In addition to generating revenues, the development and improvement of space technologies also created or maintained specialized jobs. In addition, specialized skills were created in the areas of space hardware, ground segment, and space technology applications.

The program served to boost the visibility of Canada in European markets. Canadian contractors see the ESA Contribution program as a means of cultivating business relationships. The program also fosters regional development and access to other markets by virtue of the successes of companies in Europe. Furthermore, Canada expanded its knowledge and technology in fields such as weather and ice movement forecasting, Earth Observation data, satellite communications technologies, environmental monitoring and security.

(\$ in millions)	Actual Spending 2004-2005	Actual Spending 2005-2006	Planned Spending 2006-2007	Total Authorities 2006-2007	Actual Spending 2006-2007	Variance between Planned vs. Actual
Space Based Earth Observation	15.4	17.1	12.4	10.3	9.9	2.5
Space Science and Exploration	3.9	3.7	5.3	6.1	5.8	(0.5)
Satellite Communications	10.7	9.1	8.3	11.6	11.0	(2.7)
Generic Space Activities in support of EO, SSE & SC			7.0	9.0	8.7	(1.7)
Total Contributions	30.0	29.9	33.0	37.0	35.5	(2.5)
<b>Total PA</b>	<b>30.0</b>	<b>29.9</b>	<b>33.0</b>	<b>37.0</b>	<b>35.5</b>	<b>(2.5)</b>

**Notes:**

- Due to rounding, figures may not add up to totals shown.
- This table details contribution programs with funding in excess of \$5 million per annum.
- For the 2004-2005 and 2005-2006 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 into PAA format.
- Planned spending 2006-2007 corresponds to the approval 2006-2007 Main Estimates for ESA Programs.

**Comment on Variances:**

The additional contribution to ESA served to increase Canada's participation in the Advanced Research Telecommunication System (ARTES) in the amount of \$6.4 million (\$2.64 million approved in 2006-2007 Supplementary Estimates and \$3.96 million to be paid in 2007-2008). The ARTES is part of an ESA flagship Telecommunications program whose objective is to support the R&D efforts of the European and Canadian industry in the area of Satellite Communications, serving in particular to define, assess and promote the use of satellites for advanced fixed, broadcasting, multimedia and mobile communications, data relay, search and rescue, navigation, and aeronautical services.

This increase is made in accordance with the objectives and terms and conditions of the 2000-2009 Canada/ESA Cooperation Agreement. The Canadian industry (like that of other member states) is awarded contracts for the implementation of ESA optional programs in direct proportion to Canada's financial contributions to ESA.

**Significant Audit & Evaluation Findings and URL (s) to the Last Audit and / or Evaluation:**

Canada is well thought of by Europeans, as the 28 years of cooperation between ESA and Canada clearly demonstrate. Canadian companies have made a significant contribution to the many technologies developed in the areas of Earth Observation and Satellite Communications.

Several businesses have developed business relationships with Europe thanks to the Agreement, and all stakeholders in the program agree that these relationships could continue, provided that Canada maintains its financial contribution to ESA. Canadian businesses have cultivated alliances with each other to benefit from or facilitate access to European markets through ESA programs under the Agreement.

The program helps diversify and open markets and aids in the achievement of objectives under the Canadian Space Strategy respecting Earth Observation and Satellite Communications. However, it does not lead to the transfer of technologies as much as to the exchange of information on technologies.

Small and medium-sized companies have difficulty taking part in ESA programs and require greater support, not only to access these markets, but also to develop expertise so that they can continue doing business in these markets after their initial participation in ESA programs.

Source: Evaluation of the Canada/ESA Cooperation Agreement  
<http://www.espace.gc.ca/asc/eng/resources/publications/er-0405-0202.asp>



<b>CASSIOPE Mission</b>	
<b>Start date:</b> November 1, 2003	<b>End Date:</b> October 31, 2008
<b>Description:</b>	
Support the integration of two payloads on a single generic Canadian small satellite bus the CASCADE telecommunications Ka-band component and the enhanced Polar Outflow Probe (e-POP) scientific instrument.	
<b>Strategic Outcomes:</b>	
<b>Environment and Sustainable Development:</b> A Space Program that helps Canada understand and protect the environment, and develop its resources in a sustainable manner.	
<b>Knowledge, Innovation and Economy:</b> A Space Program that generates knowledge and pushes innovation, while leading (where appropriate) to increased productivity and economic growth through commercialization.	
<b>Sovereignty and Security:</b> A Space Program that supports recognition of Canada's sovereignty and the security of its communities.	
<b>Expected Results (Program Activity Level)</b>	
<b>Satellite Communications:</b>	
1) Increased access for Canadians to state-of-the-art communications systems and services to meet their social and economic needs.	
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.	
<b>Space Science and Exploration:</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.	
<b>Expected Accomplishments:</b>	
Development and demonstration of the CASCADE Ka-band telecommunications payload designed and built by Canadian companies. CASCADE is the precursor of communication satellite constellations that will help position the Canadian industry on the international market as a supplier of advanced components and a service provider.	
Development of a small Canadian scientific satellite, the enhanced Polar Outflow Probe (e-POP), which will probe the upper atmosphere and ionosphere region where solar variability influences global change in various time scales.	
Development of a generic Canadian small satellite bus that could also be used for future Canadian missions.	

**Actual Accomplishments:**

Continued manufacture of the Cascade payload and preparation for assembly, integration and test in the spacecraft. Continued manufacture of e-POP instruments, data handling units and booms. Planned payload assembly and test and integration into the spacecraft. Continued manufacture, test and integration of the generic small satellite.

(\$ in millions)	Actual Spending 2004-2005	Actual Spending 2005-2006	Planned Spending 2006-2007	Total Authorities 2006-2007	Actual Spending 2006-2007	Variance between Planned vs. Actual
Space Science and Exploration	3.2	3.2	1.8	2.3	2.3	(0.5)
Satellite Communications	14.3	14.5	18.0	16.2	16.2	1.8
Total Contributions	17.5	17.7	19.8	18.5	18.5	1.3
<b>Total PA</b>	<b>17.5</b>	<b>17.7</b>	<b>19.8</b>	<b>18.5</b>	<b>18.5</b>	<b>1.3</b>

**Notes:**

- Due to rounding, figures may not add up to totals shown.
- This table details contribution programs with funding in excess of \$5 million per annum.

**Comment on Variances:**

**CASSIOPE:** Program delays due to problems with the development of critical components (DSU, C&DH) and the move of the launch date from December 2007 to November 2008. After detailed reviews of all the mission components, the schedule and milestones were modified to fit the new program schedule and launch date and the cash flow projections were adjusted accordingly.

**EPOP:** The additional funding for ePOP was necessitated by the extension of the CASSIOPE schedule and slippage of the launch date, which are beyond the control of the University of Calgary. The schedule extension will require the University of Calgary to stretch instrument development, assembly and test to fit the extended CASSIOPE schedule and maintain the project development teams at the universities and in industry for a longer period. The integration of ePOP with the CASSIOPE spacecraft is MDA's responsibility, and will be performed at Bristol in Winnipeg and at the David Florida Lab in Ottawa. Synchronization of all program elements and activities, including the ePOP payload development, integration and test, is critical for success.

Significant Audit & Evaluation Findings and URL (s) to the Last Audit and / or Evaluation: None

### 3.2.14) Procurement and Contracting

Procurement and contracting are central to 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 2006-2007, the CSA awarded all of its contracts in accordance with *Government Contracts Regulations*.

### 3.2.15) Travel Policies

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

<b>Travel Policy 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 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

### 3.2.16) Fuel Storage Tanks

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

Status of Fuel Storage Tanks located in St-Hubert, Quebec; 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 Quebec Department of Natural Resources 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 litre 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.