

**CANADIAN SPACE AGENCY  
2012-2013 REPORT ON PLANS AND PRIORITIES**

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## Annexe 1 – Details on Transfer Payment Programs (TPPs)

### Departmental Plan for Transfer Payment Programs (TPPs) for the Canadian Space Agency

#### Contribution under the Canada/ESA Cooperation Agreement

##### Strategic Outcome:

Canada's exploration of space, provision of space services and development of its space capacity meet the nation's needs for scientific knowledge, innovation and information.

##### Program Activity:

**Future Canadian Space Capacity:** This Program Activity secures the nation's strategic and on-going presence in space in the future and to preserve Canada's capability to deliver internationally renowned space assets for future generations. It is targeted at Canadian academia, industry and youth, as well as users of Canadian space solutions (Government of Canada (GoC) organizations) and international partners).

**Name of Transfer Payment Program:** Contributions under the Canada/European Space Agency (ESA) Cooperation Agreement.

**Start Date:** January 1<sup>st</sup>, 2000

**End Date:** March 31<sup>st</sup>, 2011\*

\* Further to the summative evaluation of the Canada/European Space Agency Cooperation Agreement, the contribution program under the said Agreement was recommended for continuation. Ratification of the new Agreement is not completed yet. The revised terms and conditions for the contributions under the 2010-2019 Cooperation Agreement will be submitted for Treasury Board's approval when the Cooperation Agreement is ratified. In the mean time, CSA can honor the commitments made during the Cooperation Agreement, but cannot make new contributions.

**Description:** Enhance Canadian industry's technological base and provide access to European markets for value added products and services in the fields of Earth Observation (EO), telecommunications and generic technological activities; foster the participation of Canadian academia and make possible the demonstration of Canadian space technologies in European science and exploration missions. This is achieved through a financial contribution by the CSA to ESA optional programs.

##### Expected Results (Program Activity Level):

**Future Canadian Space Capacity:** Canada has a space community (academia, industry and government) able to contribute to the sustained and strategic Canadian use of space.

**Expected Results Specific to the Transfer Payment Program:**

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: EOEP (Earth Observation Envelop Program), GMES (Global Monitoring for Environment and Security) Service Element and GMES Space Component.

Successful development and demonstration of advanced technologies, systems, components, or studies provided for in the contracts awarded by ESA to Canadian firms under the following ESA Telecommunications and Navigation programs: ARTES 1, 3-4, 5, 8 and GalileoSat.

Successful development and demonstration of advanced technologies, systems, components, or studies provided for in the contracts awarded by ESA to Canadian firms under Europe's space exploration program Aurora, under the European Transportation and Human Exploration Preparatory Activities program and under the European Physical and Life Science program (ELIPS).

Growing utilization of data obtained from ESA relating to European markets and Earth observation and telecommunications technologies as strategic information for government departments, agencies and industries in Canada.

Because of our participation in Europe's satellite communication, Earth observation and science and space exploration programs, increased demonstration opportunities for space-qualified technologies and products developed by Canadian firms for the space markets are available.

Development of new alliances and/or strengthening of established alliances between Canadian and European companies.

**Fiscal Year of Last Completed Evaluation: 2005-2006**

**Decision following the Results of Last Evaluation:**

The CSA intensified its efforts to secure cooperation agreements to ensure that Canada maintains a presence in European markets.

To meet program requirements, the CSA implemented a well-structured and transparent process for holding consultations with industry to support the selection of and promote optional programs.

The CSA implemented a mechanism for mitigating the risks of exchange rate fluctuations and inflation.

**Fiscal Year of Planned Completion of Next Evaluation: 2014-2015**

**General Targeted Recipient Group:**

Canadian space sector businesses, universities and not-for-profit research organizations

**Initiatives to Engage Applicants and Recipients:**

CSA will consult the Canadian space sector (industry and academia) and relevant GoC organizations as part of the Program selection process in preparation for the 2012 ESA Ministerial Council meeting during which ESA Member states and Canada will announce new contributions to the proposed ESA Programs.

**Summary of CSA 3-Year Plan:** To learn more about it, please go to:

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

<b>Program Activity</b> (\$ in millions)	Forecast Spending 2011-2012	<b>Planned Spending 2012-2013</b>	Planned Spending 2013-2014	Planned Spending 2014-2015
Total Contributions	45.4	<b>29.0</b>	28.3	28.5
Total Transfer Payments	45.4	<b>29.0</b>	28.3	28.5

Notes: 1. This table details contribution programs with funding in excess of \$5 million per annum.

2. Due to rounding, decimals may not add up to totals shown.

## **Class Grant and Contribution Program to support Research, Awareness and Learning in Space Science and Technology**

**Strategic Outcome:** Canada's exploration of space, provision of space services and development of its space capacity meet the nation's needs for scientific knowledge, innovation and information.

### **Program Activities:**

**Space Data, Information and Services:** This Program Activity utilizes space-based solutions to assist Government of Canada (GoC) organizations in delivering growing, diversified or cost-effective programs and services within their mandate, which is related to key national priorities, such as sovereignty, defence, safety and security, resource management, environmental monitoring and the North. It also provides academia with data required to perform its own research.

**Space Exploration:** This Program Activity provides valuable Canadian science, signature technologies and qualified astronauts to international space exploration endeavours. This Program Activity contributes to the Government of Canada's Science and Technology Strategy. It fosters the generation of knowledge as well as technological spin-offs that contribute to a higher quality of life for Canadians. It generates excitement within the population in general and contributes to nation-building. This Program Activity appeals to the science and technology communities.

**Future Canadian Space Capacity:** This Program Activity secures the nation's strategic and on-going presence in space in the future and to preserve Canada's capability to deliver internationally renowned space assets for future generations. It is targeted at Canadian academia, industry and youth, as well as users of Canadian space solutions (Government of Canada (GoC) organizations) and international partners).

**Name of Transfer Payment Program:** Class Grant and Contribution Program to support Research, Awareness and Learning in Space Science and Technology.

**Start Date:** October 1<sup>st</sup>, 2009

**End Date:** N/A

**Description:** This program supports knowledge growth and innovation in the Canadian Space Agency's (CSA) priority areas while increasing the awareness and participation of Canadians in space-related disciplines and activities. The program has two components: a) Research and b) Awareness and Learning.

The research component aims to support the development of science and technology; foster the continual development of a critical mass of researchers and highly qualified people in Canada; and, support information-gathering and, space-related studies and research pertaining to Canadian Space Agency priorities.

The awareness and learning component aims to increase awareness of Canadian space science and technology among Canadian youth and educators and their participation in related activities; provide learning opportunities to Canadian students and physicians in various space-related disciplines; and support the operations of organizations dedicated to space research and education.

**Expected Results (Program Activity Level):**

**Space Data, Information and Services:** User GoC organizations offer more diversified or cost-effective programs and services due to their utilization of space-based solutions.

**Space Exploration:** Expansion of advanced scientific knowledge acquired through space exploration endeavours.

**Future Canadian Space Capacity:** Canada has a space community (academia, industry and government) able to contribute to the sustained and strategic Canadian use of space.

**Expected Results (Transfer Payment Program Level):**

**1. Research Component**

- Increased knowledge from research projects in priority space science and technology areas.
- Maintained and/or increased space focus in universities, post-secondary institutions, and not-for-profit organizations.
- Partnerships established and/or sustained.
- Leveraged partner contributions.
- Access to international collaboration for Canadian organizations.

**2. Awareness and Learning Component**

**Awareness:** Increased availability and use of the space theme in learning opportunities and materials related to science and technology.

**Learning:** Post-secondary level and physicians will have increased knowledge and skills in space-related disciplines.

**Fiscal Year of Last Completed Evaluation:** N/A

**Decision following the Results of Last Evaluation:** N/A

**Fiscal Year of Planned Completion of Next Evaluation:** 2014-2015

**General Targeted Recipient Group:**

Eligible recipients for Grants:

Research Component include Canadian universities and post-secondary institutions, not-for-profit organizations established and operating in Canada and not-for-profit international research organizations or a cluster formed by a combination of the above.

Awareness and Learning Component include Canadian citizens or permanent residents of Canada, Canadian elementary, secondary and post-secondary institutions, not-for-profit organizations established and operating in Canada, and international organizations dedicated to space relevant education.

Eligible recipients for Contributions:

Research Component include Canadian universities and post-secondary institutions, for-profit and not-for-profit organizations established and operating in Canada, and not-for-profit international research organizations or a cluster formed by a combination of the above.

Awareness and Learning Component include Canadian elementary, secondary and post-secondary institutions, not-for-profit organizations established and operating in Canada, and international organizations dedicated to space relevant education.

**Initiatives to Engage Applicants and Recipients:**

An initiative to engage recipients has been undertaken in January 2012 through a newly automated annual follow-up of projects. Based on this pilot, the Agency is planning to extend this experience to open a dialogue with potential applicants as well as recipients.

Consultations, presentations and discussions with the academic community and other potential recipient groups are ongoing and will continue.

**Summary of CSA 3-Year Plan:** To learn more about it, please go to:

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

<b>Program Activity</b> (\$ in millions)	Forecast Spending 2011-2012	<b>Planned Spending 2012-2013</b>	Planned Spending 2013-2014	Planned Spending 2014-2015
Total Grants	7.4	<b>6.0</b>	6.7	6.2
Total Contributions	4.6	<b>1.6</b>	2.1	2.5
Total Transfer Payments	12.0	<b>7.6</b>	8.8	8.7

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

## Annexe 2 – Sources of Respendable and Non-Respendable

### A. Respendable Revenue (\$ in millions)

Program Activity	Forecast Revenue 2011-2012	Planned Revenue 2012-2013	Planned Revenue 2013-2014	Planned Revenue 2014-2015
Respendable Revenue	0.0	0.0	0.0	0.0
<b>Total Respendable Revenue</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

### B. Non-Respendable Revenue (\$ in millions)

Program Activity	Forecast Revenue 2011-2012	Planned Revenue 2012-2013	Planned Revenue 2013-2014	Planned Revenue 2014-2015
<b>Space Data, Information and Services</b>				
Royalties from activities related to the RADARSAT Program	0.7	0.8	0.8	0.8
<b>Future Canadian Space Capacity</b>	7.0	4.0	4.0	2.0
Revenue of Royalties from intellectual property/Testing Facilities and Services of the David Florida Laboratory				
<b>Internal Services</b>	0.0	0.0	0.0	0.0
Miscellaneous Revenues - Sodexo				
<b>Total Non-Respendable Revenue</b>	<b>7.7</b>	<b>4.8</b>	<b>4.8</b>	<b>4.8</b>
<b>Total Respendable and Non-Respendable Revenue</b>	<b>7.7</b>	<b>4.8</b>	<b>4.8</b>	<b>4.8</b>

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



## **Annexe 3 – Status Report on Transformational and Major Crown Projects**

### **RADARSAT Constellation**

#### **1- Description**

The RADARSAT Constellation is the follow-on to RADARSAT-1 and 2. RADARSAT-1 was launched in 1995 and is still operating. RADARSAT-2, developed in partnership with the private sector, was launched in 2007 for a seven-year mission. Canada has established itself as a leading global supplier of C-band satellite radar data. The RADARSAT Constellation will enhance this leadership and position Canadian industry in technology and value-added product markets.

The RADARSAT Constellation is designed as a scalable constellation of three small satellites. The launch of the first satellite is planned to occur in fiscal year 2016-2017 followed by the other two satellites in fiscal year 2017-2018. With a constellation, the time between successive imaging of the same part of the Earth (revisit time) is significantly reduced. The creation of a three-satellite constellation will increase the frequency of available information, as well as the reliability of the system, making it better suited to operational requirements of Departments. In the event of a satellite failure, the other satellites can continue to provide a reduced level of service. The lower cost of satellites facilitates the replacement of individual satellites and makes the system scalable.

The scope of the RADARSAT Constellation Major Crown Project includes the requirement definition, design, development manufacture, integration, test and launch of the satellites plus the design, development, manufacture and installation of the associated ground segment. One year of operation of the 3-satellite constellation is also included as well as an applications development program.

The RADARSAT Constellation will provide all-weather day and night data in support of three main user areas: maritime surveillance, disaster management and ecosystem monitoring. The three satellite constellation provides average daily coverage of most of Canada and its surrounding waters. Coverage increases significantly in Canada's North. The constellation will provide coverage two to three times daily of the Northwest Passage.

In support of maritime surveillance requirements of Environment Canada, Department of National Defence, Department of Fisheries and Oceans, Canadian Coast Guard and Transport Canada, the RADARSAT Constellation is the principal data source envisaged for wide area surveillance of Canada's remote areas and marine approaches. Only satellite data can offer regular cost effective coverage to task ships and aircraft to intercept suspect vessels. The daily coverage of marine areas will also support fisheries monitoring, ice and iceberg monitoring, pollution monitoring and integrated ocean and coastal zone management.

In support of disaster management, both in Canada and globally, the RADARSAT Constellation can provide high resolution, all-weather (3 m) imagery of most places in the world on a daily basis. This data is critical to disaster mitigation, warning, response and recovery. Disaster types supported include flood monitoring and relief, oil spills, changes in the permafrost in northern Canada, volcano and earthquake warning and hurricane monitoring.

In support of ecosystem monitoring of Natural Resources Canada, Environment Canada, Parks Canada and Agriculture and Agri-foods Canada, the RADARSAT Constellation will be a critical source of information for agriculture, forestry and wildlife habitat. The Constellation will also provide medium resolution data for wide area change detection, supporting water quantity monitoring, wetlands mapping and coastal change monitoring.

In addition, the RADARSAT Constellation develops Canadian high technology design and manufacturing capabilities and the integration of satellite data into information products and services. Canada's space and geomatics industries will benefit from increased positioning on international markets and privileged access to data essential to many international users.

The RADARSAT Constellation will provide C-band SAR (Synthetic Aperture Radar) data continuity to existing RADARSAT users, including the Canadian Ice Service, which relies on SAR data to support safe shipping in Canada.

**Leading and participating Departments and Agencies**

- |                            |  |
|----------------------------|--|
| Sponsoring Agency:         | Canadian Space Agency  |
| Contracting Authority:     | Public Works and Government Services<br>Canada   |
| Participating Departments: | Natural Resources Canada<br>Environment Canada<br>National Defence<br>Foreign Affairs and International Trade<br>Industry Canada<br>Fisheries and Oceans<br>Agriculture and Agri-foods Canada<br>Transport Canada<br>Public Security<br>Indian and Northern Affairs Canada<br>Parks Canada |

### Prime and Major Sub-Contractors

<b>Prime Contractor:</b> - MacDonald, Dettwiler and Associates (MDA)	- Richmond, British Columbia
<b>Major Sub-Contractors:</b> - MacDonald, Dettwiler and Associates - Magellan Aerospace, Bristol Aerospace - COMDEV Limited - EADS, Astrium - MacDonald, Dettwiler and Associates - Space X  <b>Canadian Tier 2 and Tier 3 Subcontractors</b> - SED Systems - EADS, Composites Atlantic - IMP Group - DRS - Lemex - STMicroelectronics Canada - Maya	- Ste.-Anne-de-Bellevue, Québec - Winnipeg, Manitoba - Cambridge, Ontario - Stevenage, United Kingdom - Halifax, Nova Scotia - Hawthorne, California, USA  - Saskatoon, Saskatchewan - Lunenburg, Nova-Scotia - Halifax, Nova-Scotia - Ottawa, Ontario - Brossard, Quebec - Mississauga, Ontario - Montreal, Quebec

### Major Milestones

The major milestones on the RADARSAT Constellation Major Crown Project, by phase, are the following:

Phase	Major Milestones	Date (at completion)
A	Requirement Definition	March 2008
B	Preliminary Design	March 2010
C	Detailed Design	August 2012
D	Launch satellite #1 Launch satellite #2 and #3	August 2016 December 2017
E1	Operations (part of MCP)	April 2019
E2	Operations (not part of MCP)	2019 to 2025

### Progress Report and Explanation of Variances

On December 13, 2004, the Domestic Affairs Committee of Cabinet granted approval-in-principle to a ten-year program to implement a RADARSAT Constellation aimed at addressing user needs in relation to Canadian sovereignty and marine surveillance, environmental monitoring and change detection, and disaster management. The RADARSAT Constellation is to be government-owned and operated.

In Budget 2005, the CSA was provided with an additional \$111 million over five years (2005-2006 to 2009-2010) to work with the Canadian space industry on the development of the constellation of advanced radar remote sensing satellites. This funding covered

Phases A (Initial Planning and Identification Phase) through C (Detailed Definition Phase) of the RADARSAT Constellation Major Crown Project.

On June 6, 2005, Treasury Board granted Preliminary Project Approval (PPA) for the RADARSAT Constellation and expenditure authority for the Project Initial Planning and Identification Phase A. During Phase A, feasibility studies were finalized, user requirements were defined, and risk mitigation activities and options analysis for the BUS and payload were performed.

The Phase A work started in July 2005 and the initial scope of work was completed in December 2006. Phase A was then extended to allow additional technical risk reduction activities to continue during the period prior to the Phase B contract award. This was completed in March 2008.

A revised PPA (Preliminary Project Approval) Treasury Board Submission to proceed to Phases B and C was approved in March 2007. Following a competitive Request for Proposal (RFP) process, PWGSC obtained authority to enter into a contract with the Prime Contractor, MDA and the contract for Phase B was awarded to MDA in November 2008. The Preliminary Design (Phase B) was completed in March 2010. The contract for Phase B was subsequently amended to include the detailed design (Phase C). RADARSAT Constellation Mission (RCM) is now well advanced in its detailed design phase. Critical Design Reviews for the subsystems are planned for the summer 2012. The Phase C schedule has increased by six months, mainly due to technical risks realizations. The Phase C is planned to be completed in August 2012 with the achievement of the Mission Critical Design Review that is acceptable to the RADARSAT Constellation stakeholders.

Budget 2010 allocated additional funds to RCM. A Memorandum to Cabinet (MC) requesting authorization to pursue the further development of RCM was approved in June 2010 following the announcement of RCM funding in Budget 2010. The funding allocated in Budget 2010 is to support a portion of the manufacturing, integration and testing of RCM during the subsequent five year fiscal framework.

A second revised PPA was approved by Treasury Board in December 2010. The purpose of this revised PPA was also to provide additional expenditure authority to include the procurement of long-lead items during Phase C and also to include a technology demonstration program for the DND funded Automatic Identification System (AIS) payload.

The contract for Phase D (Manufacturing) will be awarded once CSA and PWGSC will have obtained the appropriated authorities required from Treasury Board.

## Industrial Benefits

Significant industrial benefits in the space and Earth observation sectors are expected from the RADARSAT Constellation program. It is expected to generate employment growth in the Canadian knowledge-based economy and spur the growth of small and medium-sized businesses as the Canadian infrastructure and services industry continues to grow. As of March 31, 2011, the CSA has funded over \$90 million worth of work to Canadian industry directly attributable to the design of RADARSAT Constellation Major Crown Project.

Regarding the Canadian content and the distribution of contracts within Canada, the prime contract includes a requirement for 70% Canadian content, excluding launch services, and the Prime contractor is required to apply CSA's overall regional distribution targets on a "best efforts" basis. In addition, considering the past difficulty in achieving the targets in Atlantic Canada, a minimum requirement of 3.5% of the 70% Canadian content has been set for that region. The prime contract includes reporting obligations and performance measures as well as financial penalties for not meeting the minimum Atlantic Canada content. CSA works closely with the Atlantic Canada Opportunities Agency (ACOA) to monitor regional distribution achievements and to support the prime contractor in the delivery of the given targets.

### Regional Distribution of RADARSAT Constellation Mission Contracts to Canadian Industry (\$ in millions) (as of March 31<sup>st</sup>, 2011)

	British Columbia	Prairies	Ontario	Quebec	Atlantic Provinces	Total Canada
Targets	10%	10%	35%	35%	10% (3.5 % min.)*	100%
Actuals %	29.5%	11.9%	20.0%	35.1%	2.5%*	100%
Actuals \$	\$26.56	\$10.70	\$18.97	\$31.65	\$2.27	\$90.16

\* The absolute Canadian Content requirement for the Atlantic Canada Region is of 2.45% of the total contract value (3.5% of the 70% Canadian Content Requirement. As of March 2011 this contractual requirement has been met since 2.5% of the total contract value has been achieved in the Atlantic Canada region. This 2.5% corresponds to 3.57% of the 70% Canadian Content Requirement.

### Summary of Non-Recurring Expenditures (\$ in millions) (Forecasts to March 31, 2012)

Program	Current Estimated Total Expenditure	Forecast to March 31, 2012	Planned Spending 2012-2013	Future Years
RADARSAT Constellation	286.9	210.1	73.3	3.5

## **James Webb Space Telescope**

### **1- Description**

The James Webb Space Telescope (JWST) is a joint mission of NASA, ESA, and the Canadian Space Agency. The mission concept is for a large filled-aperture telescope located 1.5 million km from Earth. Like Hubble, the JWST will be used by the astronomy community to observe targets that range from objects within our Solar System to the most remote galaxies, which are seen during their formation in the early universe. The science mission is centered on the quest to understand our origins, and specifically aimed at:

- Observing the very first generation of stars to illuminate the dark universe when it was less than a billion years old.
- Understanding the physical processes that have controlled the evolution of galaxies over cosmic time, and, in particular, identifying the processes that led to the assembly of galaxies within the first 4 billion years after the Big Bang.
- Understanding the physical processes that control the formation and early evolution of stars in our own and other nearby galaxies.
- Studying the formation and early evolution of proto-planetary disks, and characterizing the atmospheres of isolated planetary mass objects.

The JWST is now scheduled for launch in 2018 following NASA's replanning exercise. JWST instruments will be designed to work primarily in the infrared range of the electromagnetic spectrum, with some capability in the visible range. JWST will have a large mirror, 6.5 meters in diameter and a sunshield the size of a tennis court that will both fold up and open once in outer space.

Canada is providing the Fine Guidance Sensor (FGS) and Near Infra-Red Imager and Slitless Spectrometer (NIRISS). The NIRISS instrument replaces the Tuneable Filter Imager (TFI) originally planned. The FGS is integral to the attitude control system of JWST, and consists of two fully redundant cameras that will report precise pointing information of JWST. Canadian expertise in this area has been established with the successful fine error sensors for the FUSE mission. Packaged with the FGS but functionally independent, the Near Infra-Red Imager and Slitless Spectrometer covers the 0.7 to 5 micrometers spectral range. NIRISS provides capability specialized for surveys of objects such as primeval galaxies, for the study of transiting planetary systems and for high-contrast imaging applications such as the detection of extra-solar planets.

The JWST-FGS Major Crown Project, in partnership with COM DEV Canada, consists of the design, development, integration and testing and integration into the spacecraft, launch and commissioning of the Fine Guidance Sensor and Near Infra-Red Imager and Slitless Spectrometer. By participating in this leading-edge international space exploration mission, the Canadian Space Agency is actively promoting Canadian scientific expertise and innovative, advanced space technologies. The National Research Council's Herzberg Institute of Astrophysics is a key Government of Canada partner for activities related to the development of science instruments and distribution of telescope data. In return for its overall investment in the JWST, Canada will obtain a minimum of 5% of the time on this unique space telescope.

Already, the news of Canada's involvement in this international space exploration mission is inspiring youth, educators and amateur astronomers, and rallying members of Canada's world-renowned astrophysics community.

**Leading and Participating Departments and Agencies**

Sponsoring Agency: Canadian Space Agency

Contracting Authority: Public Works and Government Services  
Canada for the Canadian Space Agency

Participating Departments: NRC's Herzberg Institute of Astrophysics  
Industry Canada

**Prime and Major Sub-Contractors**

Prime Contractor:  - COM DEV Canada	  - Ottawa, Ontario
Major Sub-Contractors: - Teledyne - Corning Netoptix - IMP Aerospace Avionics - ABB Bomem - MDA - INO - BMV - CDA - ESTL	- U.S. - U.S. - Canada - Canada - Canada - Canada - Canada - U.S. - Europe

**Major Milestones**

The major milestones, by phase, are the following:

Phase	Major Milestones	Date
A	Requirement Definition	2003-2004
B	Preliminary Design	August 2004 to May 2005
C	Detailed Design	July 2005 to September 2008
D	Manufacturing/Assembly; Integration/Testing; Pre-launch preparations, Launch/System Commissioning	May 2007 to 2019
E	Operations	2019 to 2024

Note: The Major Crown Project terminates with the completion of Phase D.

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

In March 2004, Treasury Board gave Preliminary Project Approval for Phases B, C and D at an indicative cost of \$67.2 million. In December 2006, before the completion of the detailed design of the FGS, the CSA requested increased expenditure authority to complete the project. Treasury Board granted Effective Project Approval for a substantive total cost estimate of \$98.4 million in February 2007 with the condition "that the Canadian Space Agency provide reports to Treasury Board at the completion of Phases C and D of the JWST project which include up-to-date information on the project scope, costs, schedule and risks". At the same time, the project became a Major Crown Project.

The first Critical Design Review (CDR), held in March 2007, for the guider function of the FGS, did reveal some technical issues, which required additional effort to resolve. This Review took place after the Effective Project Approval (EPA) received in February 2007. After this first CDR, with the focus now turning toward the preparation of the system level CDR, new issues became apparent requiring additional analysis. Testing of the Tunable Filter Imager prototype also revealed technical issues that needed to be addressed.

During this transition between the completion of the detailed design phase (Phase C) and the initiation of the manufacturing phase (Phase D) the project faced the prospect of a significant cost growth and therefore required the CSA to return to Treasury Board to amend its Effective Project Approval (EPA) for the JWST Major Crown Project. The current estimated total cost for the Definition and Implementation phases is now \$151.0 million (excluding contingency). On December 2007, Treasury Board granted a revised Effective Project Approval. Manufacturing, integration and test of the FGS will be completed during Fiscal Year 2012-2013.

COM DEV Canada, the prime contractor for the JWST Fine Guider Sensor (FGS) project, has been working on the FGS Engineering Test Unit (ETU) and Proto Flight Model (PFM).

After a successful environment test campaign replicating the conditions of the launch, transition to its operation site and operations the ETU was delivered to NASA Goddard Space Flight Center in September 2010.

Over the last period, the project has been very busy with the hardware and software development. On the PFM side, COM DEV Canada has successfully completed the final integration of all the components and the environmental test campaign. One key element of the TFI instrument encountered problems that could not be resolved in time for delivery. This prompted a change in our contribution to the Webb Space Telescope Mission: the TFI is being replaced by a Near Infra-Red Imager and Slitless Spectrometer (NIRISS). The NIRISS instrument has completed its critical design review and is progressing with components procurement and testing. The PFM is planned to be delivered to NASA Goddard Space Flight Center during the summer 2012.



## Industrial Benefits

As of March 31, 2011, the CSA has funded close to \$104 million worth of work to Canadian industry directly attributable to the JWST-FGS Major Crown Project. Direct industrial benefits from the construction of the JWST-FGS, TFI and NIRISS system will benefit central regions of Canada. Although there is no regional distribution requirement for this project, the following table provides an approximate distribution:

### Regional Distribution of JWST Contracts to Canadian Industry (\$ in millions) (As of March 31, 2011)

	Ontario	Quebec	Atlantic Provinces	Total Canada
Actuals (%)	89.7%	8.5%	1.7%	100%
Actuals (\$)	\$93.2	\$8.9	\$1.8	\$103.9

### Summary of Non-Recurring Expenditures (\$ in millions) (Forecasts to March 31, 2012)

Program	Current Estimated Total Expenditure	Forecast to March 31, 2012	Planned Spending 2012-2013	Future Years
JWST-FGS and TFI	151.0	145.4	1.7	3.8

#### Annexe 4 – Summary of Capital Spending by Program Activity

<b>Program Activity</b> (\$ in millions)	Forecast Spending 2011-2012	<b>Planned Spending 2012-2013</b>	Planned Spending 2013-2014	Planned Spending 2014-2015
Space Data, Information and Services	80.2	<b>137.6</b>	55.2	30.6
Space Exploration	9.1	<b>34.0</b>	24.8	26.8
Future Canadian Space Capacity	2.9	<b>2.4</b>	1.8	1.5
Internal Services	3.5	<b>2.2</b>	2.3	2.1
<b>Total Capital Spending</b>	95.7	<b>176.3</b>	84.1	60.9

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

## Annexe 5 – Upcoming Internal Audits and Evaluations over the next three fiscal years

### Audits

Name of Internal Audit	Type	Status	Completion Date	Electronic Link to Report
International Space Station Assembly and Maintenance Operations Program	Compliance / Management Framework	In Progress	June 2013	N/A
Intellectual Property and Technology Transfer	Compliance / Management Framework	Planned	March 2013	N/A
Elaboration Process of the Investment Plan	Compliance / Management Framework	Planned	March 2013	N/A
Grants and Contributions	Compliance	Planned	March 2013	N/A
Earth Observation Missions Program – RCM	Management Framework	Planned	March 2013	N/A
Corporate Office of Project management	Management Framework	Planned	March 2013	N/A
Risk Management Framework	Management Framework	Planned	March 2013	N/A
IT Security	Management Framework	Planned	March 2013	N/A
Advanced Exploration Technology Development Program – Economic Action Plan	Management Framework	Planned	March 2013	N/A
Governance Processes (monitoring and review of priorities)	Management Framework	Planned	March 2014	N/A
Work Relation	Management Framework	Planned	March 2014	N/A
Space Astronomy Missions and Planetary Missions Programs	Management Framework	Planned	March 2014	N/A
Satellite Operations Program	Compliance / Management Framework	Planned	March 2014	N/A
Contracting and Acquisition Management	Management Framework	Planned	March 2014	N/A

Management Framework of the Grants and Contributions Phase 2	Horizontal Internal Audit	Planned	March 2014	N/A
Budgeting, Oversight and Reallocation of Resources Processes	Management Framework	Planned	March 2014	N/A
Elaboration Process of the Performance Measurement Framework	Management Framework	Planned	March 2014	N/A

The Risk Based Audit Plan is presently under revision; therefore, the audits that will be undertaken in fiscal year 2014-2015 have not yet been identified.

### Evaluations

Name of Evaluation	Program Activity	Status	Completion Date	Electronic Link to Report
Evaluation Scientific Missions and Scientific Data utilization programs	1.1.1.3 / 1.1.3.3	In progress	March 2013	N/A
Evaluation of Communication Missions and Communication Services Utilization programs	1.1.1.2 / 1.1.3.2	Planned	March 2014	N/A
Evaluation of Earth Observation Missions Program	1.1.1.1	Planned	March 2014	N/A
Evaluation of Class Grant and Contribution Program to support Research, Awareness and Learning in Space Science and Technology	1.3.1.1	Planned	March 2015	N/A
Evaluation of International Market Access Program	1.3.2.1	Planned	March 2015	N/A
Evaluation of ISS Assembly and Maintenance Operations program	1.2.1.1	Planned	March 2015	N/A